MANKIND QUARTERLY

Volume 67, No. 1

Mankind Quarterly is published by Mankind Publishing House.

About Mankind Quarterly

Mankind Quarterly was founded as a quarterly journal of anthropology, in the broadest sense of "the science of man," in 1961. This was a time when the study of man had already diversified into physical anthropology, ethnography, quantitative cross-cultural research, archaeology and other subspecialties.

These developments took place against the background of a widening gulf between the biological and social sciences. Following the leading dogma of the day, cultural and social anthropologists in academe had begun to deny the importance of biology for behavioral and cultural phenomena. Conversely, biological (physical) anthropologists aligned themselves with the "hard" sciences, many describing themselves as human biologists rather than anthropologists in an attempt to distance themselves from a social anthropology that they no longer saw as scientifically sound. In many places, these divisions persist to the present day. *Mankind Quarterly* was founded as a response to these centrifugal trends. Its founders believed in the interdependence of human biology, behavior and culture, and they understood biological and cultural diversity as the outcomes of evolutionary, ecological, and historic processes.

In short, *Mankind Quarterly* was established as a journal for those scholars who still believed in a unified "science of man" that studies the interactions between biological and cultural diversity. It was first published in Edinburgh, Scotland in 1961, and then, from 1979 to 2014, by the Council for Social and Economic Studies (chaired by Roger Pearson) in Washington, D.C. In January 2015, publication was transferred to the Ulster Institute for Social Research, a non-profit organization in London, England. Throughout its existence, *Mankind Quarterly* has maintained its character as a journal devoted to the interdisciplinary study of man. New developments in the field were reflected in the journal early on. When first sociobiology and then evolutionary psychology developed descriptions of human nature and explanations for cultural universals, the new developments found expression in the journal. The same happened with behavioral genetics, which like sociobiology saw major advances during the last three decades of the 20^{th} century.

Today the editorial board includes scholars from 12 countries who represent a wide variety of disciplines including primatology, physical anthropology, archaeology, cultural anthropology, human genetics, differential psychology, sociology, and history. Despite their varied expertise and views, the editors share a common interest in the evolutionary and historical processes that generate human diversity, and in the universal features of human nature that constrain this diversity. Because history and biological evolution are ongoing processes, this includes an interest in the social, cultural, demographic and biological changes that are taking place in modern societies.

Some of the articles the journal publishes deal with the evolutionary and historic processes that have created the racial, ethnic, linguistic and cultural diversity we see today. Others describe present-day cultural diversity and ongoing trends, especially at the psychological level. During the last years, intelligence and its change over time have been especially active research areas, and a substantial part of this work has been published in *Mankind Quarterly*. The subject is important because education and intelligence are considered the key drivers of cultural change and economic growth, not only in developing countries but also in mature postindustrial societies. Other areas of special interest are the demographic changes that are taking place in countries today and that are shaping the world of the future.

Historically, *Mankind Quarterly* has earned a reputation for publishing articles in controversial areas, including behavioral race differences and the importance of mental ability for individual outcomes and group differences. During the "Bell Curve wars" of the 1990s, it became a target of attack when opponents realized that some of the work cited by Herrnstein and Murray had first been published in *Mankind Quarterly*. However, much of this science has stood the test of time. For example, the importance of genes for individual differences in intelligence is no longer controversial, and genetic effects on individual and group differences that were merely inferred in earlier research are now studied at the molecular level. There is nothing wrong with being at the embattled forefront of new scientific developments.

Most of the research that *Mankind Quarterly* publishes today is "normal" science, but the editors still welcome controversy and new ideas. They see it as part of the journal's mission to provide a forum for the presentation and discussion of theories and empiric research that challenge entrenched beliefs. Of course, the often contradictory views that are represented in *Mankind Quarterly* are those of the individual authors, not those of the journal's publishers or editors.

Notes for Authors

As a peer-reviewed academic journal of anthropology, *Mankind Quarterly* publishes articles on all aspects of the science of man, ranging from cultural and physical anthropology, and psychology and behavioral genetics, to demography, mythology, and the history of religion.

However, the editors are especially interested in articles relating to cultural and biological evolution, and to the interaction between biology and culture. Such topics include

(1) the historical origins of present-day cultural and biological diversity using approaches from history, archaeology, linguistics, mythology, and population genetics;

(2) the study of cultural and biological trends in contemporary societies including cross-cultural studies of personality, intelligence, and culturally transmitted beliefs and values, as well as the study of demographic trends and trends in physical characters and gene frequencies over time; and

(3) the implications of current trends for future human evolution.

Included in these areas of special interest are articles dealing with the evolution of personality, its expression in varying cultural, ecological, and economic conditions, and its implications for future cultural and biological evolution. Interdisciplinary approaches that integrate findings from historically separate disciplines and subdisciplines are especially encouraged.

Mankind Quarterly publishes research reports, theoretical articles, data-driven reviews, book reviews, and short communications on new discoveries or critical comments on published papers, either in *Mankind Quarterly* or elsewhere. Because *Mankind Quarterly* is read by individuals from diverse backgrounds, the authors of highly specialized or technical articles are asked to present the background and significance of their work clearly and concisely. Book reviews should also deal with publications that will be of interest to a non-specialist audience.

Theoretical articles may be speculative or controversial or both, but must be based on solid data. Submissions are evaluated only based on scientific soundness, relevance, and interest. Manuscripts should be composed in **Microsoft Word** and submitted electronically to:

submissions@mankindquarterly.org

The editors may request a printed copy of any article which is accepted for review by the journal's referees. The review process usually takes 1-3 months. Every effort is made to publish articles within six months after final acceptance.

Typography

Required typography for manuscripts that have been accepted for publication. Please read the requirements carefully, as they may have been updated.

Authors and Affiliations

Please include the city, country, and/or institution for each author. If an author wishes to stay anonymous, we may put "Independent Researcher" as the affiliation.

Abstracts and Keywords

All manuscripts should include keywords, a brief abstract, and an email or postal address for correspondence.

Numbering and Naming Sections

All sections and subsections (and subsubsections) must be numbered. Sections, Subsections, and Subsubsections are separated by a full stop ".", such as "1" or "2.1" or 4.1.2". After numbering the section/subsection/subsubsection, include the name of said (sub/subsub)section, such as "2 Methodology", "2.1 Data Gathering" or "2.1.1 Survey Design". The very first section of the manuscript should be named "1 Introduction".

Hyphens

Please do not manually hyphenate words at the ends of lines – not even when preparing tables.

Indents and Tables

Tables must be constructed using the MS Word table-building function. Images of tables will not suffice. Kindly do not create columns and indents by pressing the space bar multiple quantity of times.

References to Figures, Tables, Quotes, and Equations

In the interest of clarity, when referring to a Figure, Table, Quote, and/or Equation, do so by numbering each one of them, such as "See Figure 1", or "We calculated the results utilizing the method from Equation 5". Avoid spatial references such as "See the Table below", as the placement of Figures, Tables, Quotes, and Equations may be changed.

Figures and Images

When submitting a manuscript for publication, please ensure that any Figures or Images referenced in the text are included as separate files along with your complete manuscript. This means attaching the Figures or Images separately in the email if you are submitting via email.

Note on Image Quality: For optimal clarity, especially as *Mankind Quarterly* transitions to a fully digital format in the next issue, authors are encouraged to submit high-quality Figures and Images at a resolution of 300 ppi (pixels per inch) at the intended display size. This ensures that graphs, charts, and text within Figures remain sharp and legible, addressing issues with low-resolution submissions (e.g., below 75 ppi) where text may be illegible. To balance quality and practicality, aim for file sizes between 1 MB and 50 MB per image, depending on complexity. Avoid excessively large files (e.g., over 1 GB) by using efficient formats like PNG or JPEG for raster images or PDF for vector graphics. If you have concerns about file size or format, please contact the editorial team for guidance.

Lists

Lists must be created using the MS Word facility for building lists.
An example of an itemized/un-numbered list:

- First item.
- Second item.

An example of an enumerated/numbered list:

1. First item.
2. Second item

Footnotes

Footnotes must be created using the MS Word facility for building footnotes so that the footnote number in the text is digitally linked to the footnote itself. Footnote numbers must be “superscript”, not “raised”. *Mankind Quarterly* does not use endnotes.

References

References at the end of the article must be alphabetically by author, or, where necessary, by name of publication. If available, references must include a Digital Object Identifier (DOI). References and bibliographic data must be formatted according to the following examples:

Journal articles:

Lynn, R. & Irwing P. (2002). Sex differences in general knowledge, semantic memory, and reasoning ability. *British Journal of Psychology 93*(4), 545–556. doi: 10.1348/000712602761381394.

Books:

Lynn, R. & Vanhanen, T. (2012). Intelligence: A Unifying Construct for the Social Sciences. London: Ulster Institute for Social Research.

Articles in edited collections:

Rushton, J. P. (2003). Race differences in *g* and the Jensen effect. In: H. Nyborg (ed): The Scientific Study of General Intelligence: A Tribute to Arthur R. Jensen. Amsterdam: Pergamon.

Material published online:

Statistics New Zealand (2013). http://www.indexmundi.com/new_zealand/demographics_profile.html. Retrieved 10th of February 2025.

CONTENTS

Editorial: The Technological Fix
Gerhard Meisenberg 6

Can Embryo Selection Save the World?
Mingrui Wang 10

Rewriting Fatherhood in Shona Popular Music: Ethical and Emotional Labour in Alick Macheso's Baba VaSandy
Innocent Tinashe Mutero 35

Governmentality and Development Issues in Zimbabwe: A Decolonial Reading of Selected *Dendera* Songs by Simon Chimbetu
Wonder Maguraushe & Solomon Gwerevende 49

Surviving Capitalism from the Margins: Informal Economic Networks among African Migrants in Durban, South Africa
Yvonne Kabongo & Kenny Kimanuka Nkus 65

Assessment of Body Composition and Nutritional Status Utilizing Upper Arm Anthropometry and Its Determinants among Preschool Children of West Bengal, India
Arindam Biswas & Argina Khatun & Nitish Mondal 78

Prevalence of Morbidity and Healthcare-Seeking Behavior among the Chuktia Bhunjia, a Particularly Vulnerable Tribal Group in Western Odisha
Debaprakash Patra & Arpita Santra & Bharathi Karri 103

Adiposity and Skeletal Muscle Distribution among Older Adults in Southern West Bengal: Emergence of a Sarcopenic Obesity-like Phenotype
Sambaran Mondal & Sudipta Banerjee & Mala Dey & Sandipan Chatterjee & Shankarashis Mukherjee . . . 123

Critiquing the Default Hypothesis: The Importance of Group Identity
Curtis S. Dunkel 135

Intersection of Religious, Ethnic and Gender Identities in Central Asian Countries: Theoretical Framework and Practical Conflicts
Dinara Osmonova & Batmakhan Koshbakova & Klara Alimova & Saikal Orozovna & Aidai Kozubaeva . . . 145

Corrigendum for the article "Ethnic Vigilantism Propensity Index: Evidence from the Russian Federation", *Mankind Quarterly* 64(4), 690–720 (doi: 10.46469/mq.2024.64.4.7)
Pavel V. Ivanov 170

Cover picture: This image shows people standing side by side, with their backs against a map of the world. It represents humans' connection to each other and to other societies across the globe. The image also reflects some of the major factors that influence the modern world, including the economy, climate change, and population. The sunset suggests a world that is constantly changing. The people represent the societies that must respond to these changes and shape the future

MANKIND QUARTERLY Mankind Quarterly, 67(1), 6-9 2026 Fall Edition
ISSN: 0025-2344

Editorial
The Technological Fix

Gerhard Meisenberg

Modern human societies are unsustainable—and it's not because the climate is changing or artificially intelligent systems decide to exterminate us and take over the world. They are demographically unsustainable. First of all, numbers are important. A lone genius may be able to mobilize his people to conquer an empire, as Genghis Khan did, but a whole civilization requires a critical mass of very bright individuals who work with and against each other: the cognitive elite of a large population with high average intelligence. Victorian Britain had the required numbers (20-35 million population), but classical Athens (110,000-300,000) did not.

We still have large populations today, but according to the World Bank (2026a) practically all economically and intellectually advanced countries of the world have total fertility rates far below the replacement level of 2.1. Broadly, poor countries have high fertility, and rich countries have low fertility. Table 1 shows some examples. The relationship with intelligence is even more striking. East Asian countries have lower fertility than the countries of Europe and North America although they are a bit poorer, but they also have somewhat higher intelligence. These country-level differences suggest that it is high intelligence, not material wealth, that drives nations into childlessness and predictable extinction.

Table 1: Total fertility rate (TFR) of some countries

Country	TFR 2024	PISA avg.	IQ	GDP
Congo, Dem. Rep.	6.0		68.0	807
Nigeria	4.4		71.2	1,224
Saudi Arabia	2.3	387.3	79.6	34,537
Indonesia	2.1	369.3	85.8	5,060
India	2.0		82.2	2,703
Iran	1.7		85.6	3,924
United States	1.6	489.7	97.5	90,027
United Kingdom	1.6	494.0	99.1	57,602
Germany	1.4	482.3	98.8	60,496
Russia	1.4	481.7	96.6	17,547
Japan	1.1	533.0	104.2	35,951
China	1.0		105.8	13,862
South Korea	0.7	523.3	104.6	36,227
Taiwan	0.7	533.0	104.6	42,103

Data sources: *TFR*, World Bank, 2026a; *PISA average*, OECD, 2023; PISA data are averages Math-Reading-Science for 2022 (except Russia, 2018). *IQ*, L&V 2012 IQ in Becker, 2019; *GDP*, per capita GDP in current $US, from World Bank, 2026b.

Also within nearly all countries, those of higher education and intelligence tend to have fewer children than those with less education or lower intelligence (e.g., Jensen et al., 2025; Meisenberg, 2010). The result is a decline in the genetic capacity for educational attainment and intelligence, shown at the molecular level as declining polygenic scores[1] (Beauchamp, 2016; Hugh-Jones & Abdellaoui, 2022; Kong et al., 2017;

[1] Polygenic scores are predictive scores calculated from thousands of common genetic variants that are statistically associated with the predicted trait. The statistical associations are derived from genome-wide association studies.

Sanjak et al., 2018). The inevitable conclusion is that “genotypic intelligence” is declining for the world population as a whole.

Economic efficiency is at the core of modern industrial civilization. Economists use growth regressions to predict annual growth rates of per capita GDP (gross domestic product) or GNP (gross national product), and what they find is striking: Initial poverty (the “advantage of backwardness”) and high intelligence are the two conditions that consistently promote economic growth (Meisenberg, 2014; Weede & Kämpf, 2002). China during the last half century is the prime example. If intelligence were unchangeable, all nations would evolve to a stable state where prosperity is commensurate with their average intelligence.

Actually, however, such a stable state cannot last because intelligence does change over time. Our civilization depends on a positive feedback. Since the Industrial Revolution, rising intelligence (the Flynn effect) has driven economic growth and indeed the advancement of all aspects of civilization (Meisenberg, 2014), including the rise of highly effective educational systems. Conversely, these trappings of civilization created environmental advantages that raised the intelligence of the next generation even more, so it could improve the environmental conditions for its own children even more. This trans-generational feedback loop between human intelligence and the civilization it created is the reason why exponential economic growth occurred together with rising intelligence during the last two centuries.

This upward spiral cannot continue once the genetic limits of human intelligence have been reached. Genetic limitations are one likely reason why in many of the most advanced nations, the Flynn effect has practically ended in recent years (Meisenberg & Lynn, 2023)—and economic growth has slowed down accordingly. The process can even go into reverse when declining intelligence degrades the environmental conditions required for its own maintenance: a downward spiral terminating in civilizational collapse. Now add to this the slow workings of genetic selection against high intelligence, and it is evident that this risk is rising slowly but steadily across generations.

There are two possible ways to stem the tide of genetic deterioration. The first is to select the parentage of the next generation, by using gametes from healthy and highly intelligent donors. The second option is to apply selection not to the parents, but to the offspring generation based on genetic test results. In this issue of *Mankind Quarterly*, Chinese scholar Mingrui Wang looks at this second option: produce embryos in vitro, then use microarrays or DNA sequencing to determine their polygenic scores for educational attainment and intelligence, and implant only those embryos whose polygenic scores are above the average of their parents.

Our author is highly sceptical about the effectiveness of polygenic embryo selection. He discusses phenomena such as extreme polygenicity, the effects of rare and ultra-rare variants, and the continuous influx of new mutations in every generation. He emphasizes antagonistic pleiotropy, meaning that a genetic variant that slightly improves intelligence may very well be detrimental to other functions, such as immune defences. Natural selection acting on all traits simultaneously can deal with this, but embryo selection narrowly focussed on intelligence (or any other single trait) cannot.

One limitation is that predictive polygenic scores capture only the effects of common polymorphisms, not those of rare and ultra-rare variants. Most DNA variants in human genomes have practically no phenotypic effects at all. For those that do matter, the rule is that common polymorphisms generally have very small effects whereas rare ones can have larger effects—causing a genetic disease, for example. For this reason, the correlation between a predictive polygenic score for intelligence and actual, measured intelligence cannot be higher than 0.3 to 0.4.

Another important point that our author stresses (though in more carefully chosen words) is that children are, on average, a little sicker and a little stupider than their parents. This follows directly from the fact that every child is born with about 40 to 80 new mutations on top of the multitude of rare variants inherited from the parents. Those new mutations that matter at all are overwhelmingly detrimental, contributing to ill-health and to physical and mental flaws. It has been estimated that intelligence is the most polygenic trait in humans, with variations in about ten thousand genes (50% of all protein-coding genes) affecting it. Because of this enormous mutational target size, mental deficiency is one of the most frequent impairments in pleiotropic genetic diseases. In the absence of any selection for or against intelligence, human intelligence would not stay the same. It would disintegrate slowly due to new mutations that fail to be removed. This is

how evolution works. It's an uphill battle, a Red Queen effect where you have to keep running just to stay in the same place. Polygenic embryo selection cannot deal with these new mutations

Mingrui Wang's conclusion is sobering: Polygenic embryo selection alone cannot save the world. He leaves it to the reader to think of better ways to avoid civilizational collapse. There are indeed many options, but the ultimate problem is that people are selfish. Most of those few who understand what is going on have zero interest in saving the world. They couldn't care less about the well-being of future generations. Once they are made aware that methods such as embryo selection or paying women to bear and raise children produced from highly selected donor gametes are possible, they will most likely opt for prohibition of these practices. It doesn't feel right because it is not supported by their evolved human instincts. If it doesn't feel right, it is unethical, consequences be damned.

It can be objected that we don't need human intelligence anymore because we have artificial intelligence to do all the difficult thinking. Really? There is an old question: Would a team of two workers working on a task be more effective if both have an IQ of 100, or would it be better if one has an IQ of 70 and the other has an IQ of 130? The answer is, of course, that it depends on who is the boss: the one with IQ 70, or the one with IQ 130. In a world where the typical human IQ is 80 and the typical robot IQ is 10 million, do you seriously expect that humans will leave all decision-making to the robots? No, they will use them in the service of their own follies. To fight wars, for example. And why should super-intelligent robots, presumably able to re-program themselves, choose to devote their existence to maintaining a zoo of physically and mentally defective humans?

References

Beauchamp, J. P. (2016). Genetic evidence for natural selection in humans in the contemporary United States. *Proceedings of the National Academy of Sciences USA*, *113*(28), 7774–7779. https://doi.org/10.1073/pnas.1600398113

Becker, D. (2019). The NIQ Dataset (V1.3.2) [Chemnitz, Germany]. www.viewoniq.org.

Hugh-Jones, D., & Abdellaoui, A. (2022). Human capital mediates natural selection in contemporary humans. *Behavior Genetics*, *52*(4–5), 205–234. https://doi.org/10.1007/s10519-022-10107-w

Jensen, S., Pesta, B., & Kirkegaard, E. O. W. (2025). International meta-analysis of differential fertility for intelligence. *OpenPsych*. https://doi.org/10.26775/OP.2025.08.06

Kong, A., Frigge, M. L., Thorleifsson, G., et al. (2017). Selection against variants in the genome associated with educational attainment. *Proceedings of the National Academy of Sciences of the United States of America*, *114*(5), E727–E732. https://doi.org/10.1073/pnas.1612113114

Meisenberg, G. (2010). The reproduction of intelligence. *Intelligence*, *38*(2), 220–230. https://doi.org/10.1016/j.intell.2010.01.003

Meisenberg, G. (2014). Cognitive human capital and economic growth in the 21st century. In T. Abrahams (Ed.), *Economic Growth in the 21st Century: New Research* (pp. 49–106). Nova Publishers.

Meisenberg, G., & Lynn, R. (2023). Ongoing trends of human intelligence. *Intelligence*, *96*, 101708. https://doi.org/10.1016/j.intell.2022.101708

OECD (2023). *PISA 2022 Results (Volume I): The State of Learning and Equity in Education*. https://doi.org/10.1787/53f23881-en

Sanjak, J. S., Sidorenko, J., Robinson, M. R., et al. (2018). Evidence of directional and stabilizing selection in contemporary humans. *Proceedings of the National Academy of Sciences USA*, *115*(1), 151–156. https://doi.org/10.1073/pnas.1707227114

Weede, E., & Kämpf, S. (2002). The impact of intelligence and institutional improvements on economic growth. *Kyklos*, *55*(3), 361–380. https://doi.org/10.1111/1467-6435.00191

World Bank (2026a). Gender Data Portal. https://genderdata.worldbank.org/en/indicator/sp-dyn-tfrt-in.

World Bank (2026b). GDP per capita (current US$). https://data.worldbank.org/indicator/NY.GDP.PCAP.CD.

MANKIND QUARTERLY Mankind Quarterly, 67(1), 10-34 2026 Fall Edition
ISSN: 0025-2344

Can Embryo Selection Save the World?

Mingrui Wang[†*]

Abstract

In modern societies, purifying selection against deleterious mutations has been relaxed and the relationship between reproductive success and cognitive ability has reversed. Early 20th-century geneticists warned that the resulting genetic decline in cognitive and physical health poses a severe threat to civilization. Many today argue that reproductive biotechnologies—including polygenic embryo selection—offer a sufficient "technological fix" for the declining genetic baseline, but this premise raises serious scientific concerns. This paper synthesizes findings from psychometrics, quantitative genomics, evolutionary biology, immunology, and agricultural breeding to evaluate the systemic and biological limitations of these interventions. By examining the highly polygenic architecture of intelligence, the steady accumulation of *de novo* mutations, and the phenomenon of antagonistic pleiotropy, this review demonstrates that relying on current or anticipated future advancements in these technologies to engineer complex traits is fundamentally flawed. The analysis reaches four main conclusions: (1) Reproductive technologies can remove some severe mutations. (2) They cannot repair the deterioration of the genetic baseline caused by minor-effect rare variants and *de novo* mutations. (3) Aggressively targeting intelligence for genotypic selection risks severe unintended consequences, such as depleting historically preserved genetic diversity and compromising immune system resilience. (4) A "perfect" gene-editing system capable of eliminating *de novo* mutations would halt human evolution. This review urges caution regarding reproductive biotechnologies that aggressively aim to maximize specific polygenic traits.

Keywords: Genetic deterioration, Embryo selection, Mutational load, Antagonistic pleiotropy, PGT-P

1 Introduction

The direction of human biological evolution in the modern era has been a subject of intense concern for over a century. The concept of dysgenics—the genetic deterioration of a population—was formally articulated by Francis Galton, who argued that the relaxation of natural selection in industrialized societies would lead to the accumulation of harmful genes and a decline in heritable traits such as health and intelligence. The recognition that human biological capacity is not static, but changes across generations due to evolutionary pressures—or lack thereof—was the consensus among major geneticists in the late 19th century and the first half of the 20th century (Lynn, 1996). Historically, reproductive fitness favoured individuals with higher cognitive ability, maintaining a positive selective gradient for intelligence across pre-industrial societies (Meisenberg, 2010). However, the "demographic transition" fundamentally inverted this pattern. Modern industrialized societies now exhibit a persistent negative correlation between fertility and educational attainment or cognitive ability, a pattern observed at both the phenotypic and genotypic levels across multiple populations. We have, for example, genotypic evidence for this from the US, Iceland, and the UK (Beauchamp, 2016; Hugh-Jones & Abdellaoui, 2022; Kong et al., 2017; Sanjak et al., 2018).

For Galton and several other founders of modern genetics, this was not merely a matter of public health, but an existential threat to civilization itself. Because economic growth and societal maintenance rely on cognitive ability (Weede & Kämpf, 2002), the present trend is unsustainable over the long term. The cumulative genetic decline of population-level intelligence and health inevitably undermines the biological foundation required to sustain complex civilizations. The dysgenic effect is small in a single generation and therefore goes unnoticed by a society unaccustomed to multi-generational thinking, ultimately leading towards civilizational decline and collapse.

† Independent researcher, Beijing, China
* Corresponding author, email: mail@mingrui.wang

The seriousness of this "civilizational collapse" scenario is further illustrated by the interest in biological degeneration displayed by Karl Marx (Feuer, 1977, 1979). He wrote to the Russian translator of *Das Kapital* inquiring whether E. Ray Lankester's book *Degeneration* (1880) had been translated (Marx, 1881). In this book, Lankester used cross-species examples to demonstrate degeneration, asking: "Does the reason of the average man of civilised Europe stand out clearly as an evidence of progress when compared with that of the men of bygone ages? [...] In such respects we have at least reason to fear that we may be degenerate. Possibly we are all drifting, tending to the condition of intellectual Barnacles or Ascidians." Later, Marxist geneticists J. B. S. Haldane (co-founder of population genetics and proposer of mutation-selection balance) and H. J. Muller (who won the Nobel Prize for being the first to directly manipulate the genome via X-ray mutagenesis) further studied the accumulation of deleterious *de novo* mutations and were deeply concerned with "genetic load" and the long-term biological health of the species (Muller, 1950; Paul, 1984). For these red geneticists, eugenics was not a reactionary tool to justify capitalist inequality, but a crucial prerequisite to human emancipation (Paul, 1984). This consensus was clearly expressed in the 1939 "Geneticists' Manifesto", signed by Muller, Haldane, and other prominent geneticists, which declared that the genetic improvement of mankind could only be fully realized alongside major social changes that eradicate class prejudice and ensure economic equalization (Crew et al., 1939). Evolutionary theorist W. D. Hamilton mathematically formalized Haldane's conceptualization of kin selection (Hamilton, 1964) and further explored the biology of altruism—the conflict between the short-term, partial interests of the individual and the long-term, holistic interests of the group (Hamilton, 1967, 1975). Today, inclusive fitness theory is recognized as "the single most important theoretical revision of Darwin's theory of natural selection in the past century" (Buss, 2019). In his final manuscript, Hamilton (2000) reviewed Lynn's *Dysgenics: Genetic Deterioration in Modern Populations* and endorsed these foundational concerns, warning that acknowledging the objective reality of genetic deterioration is essential to avert future "painful catastrophes" for human civilization.

Methods proposed to counter these effects involved changing the relationship between trait value and fertility, a strategy Lynn (2001) termed "classical eugenics". However, in the second half of the 20th century, the pre-war prioritization of "social rights"—the collective right of the state to safeguard its future genetic quality—was superseded by the absolute priority of "individual rights", particularly regarding reproductive autonomy (Lynn, 1996, 2001). Consequently, the study of average population genetic levels was marginalized and classical eugenics, with its heavy emphasis on outcomes for society at large, became untenable in Western societies. In its place emerged medical genetics, sometimes called the "new eugenics" (Lynn, 2001), specifically novel reproductive biotechnologies aimed at disease prevention (e.g., predictive prenatal testing on early fetuses).

At the same time, the application of medical genetics to intelligence became confined to preventing severe, single-gene Mendelian disorders causing intellectual disability (Harper, 2019); the broader genetics paradigm was politicized and commercialized, and was overwhelmingly pushed towards the Mendelian school. In the first half of the 20th century, a scientific debate unfolded between the biometric school (led by Karl Pearson), which emphasized continuous, polygenic variation, and the Mendelian school (led by William Bateson), which focused on discontinuous variation and discrete inheritance (typically governed by one or a few genes of large effect). R. A. Fisher unified the two schools, showing that continuous variation naturally arises from the additive effects of multiple Mendelian loci. However, in the second half of the 20th century, the academic climate shifted. Politically, the study of continuous, polygenic variation was suppressed to discredit the eugenics of polygenic intelligence. Behind this marginalization was the moralistic fallacy—the flawed assumption that in order to achieve the social ideal of human equality, all individuals must possess identical innate biological capacities for socially valued traits.

Commercially, the Mendelian paradigm flourished. This was initially due to the technological limitations of the era, which could map only discrete disease-causing mutations; the approach also aligned with the pharmaceutical industry's profitable, reductionist model of "one gene, one disease, one drug". The assumption that complex biology could be decomposed into isolated, targetable components became an economic priority. During the foundational decades of biotechnology, the intellectual property system permitted the patenting of isolated genes and single-locus diagnostics (L. L. Hill, 2003; Sherkow & Greely, 2015).

Even after subsequent legal reforms restricted the patentability of unaltered genomic DNA, commercial incentives continue to overwhelmingly reward discrete, single-target molecular mechanisms (Sherkow & Greely, 2015). In contrast, highly distributed polygenic networks do not offer single molecular entities that can be easily monopolized; thus, despite reflecting biological reality, they are commercially unattractive.

Today, with the advent of massively parallel genome sequencing, microarrays, and genomic datasets, the biometric school is effectively being "rediscovered". As Tautz et al. (2026) emphasized, the genotype-phenotype map is fundamentally polygenic, and purely Mendelian diseases are the exception rather than the rule. Even in conditions historically treated as monogenic, it is now understood that the polygenic background heavily dictates disease penetrance (Fahed et al., 2020). Nevertheless, the politicization and commercialization of science over the past decades have already embedded the Mendelian paradigm in the public consciousness and scientific funding. This paradigm has resulted in serious scientific failures (Duval, 2018; Hopkins, 2008; Ségalat, 2007), including the inability to identify the genetic etiology of the vast majority of cases of adult-onset neurodegenerative disorders that affect cognition, such as Alzheimer's disease (Frisoni et al., 2022) and Parkinson's disease (Blauwendraat et al., 2020).

As the broader scientific paradigm inevitably shifts back towards the polygenic reality—catalysed by milestone studies such as the first genome-wide association study (GWAS) for educational attainment (Rietveld et al., 2013)—the scope of new eugenics is once again expanding beyond severe single-gene disorders. Polygenic embryo screening has been proposed as a potential technological solution to the problem of genetic deterioration. Proponents suggest that once the technology matures, a "technological fix" will be sufficient to solve the problem. Lynn (2001) posited that the widespread, voluntary adoption of embryo selection could theoretically arrest and reverse genetic deterioration. Similarly, Dutton and Woodley of Menie (2018) characterized the modern era as a race between the accumulation of deleterious mutations (mutational load) and the development of genetic technologies capable of correcting them. More specifically, proponents argue that by screening embryos using polygenic scores derived from GWAS, we can select for higher intelligence (Shulman & Bostrom, 2014).

This paper argues that such technological optimism is misplaced. By examining the genetic architecture of intelligence—specifically the distinction between common and rare variants, the prevalence of *de novo* mutations, the phenomenon of antagonistic pleiotropy, and lessons learned from actual agricultural breeding programs—I demonstrate that reproductive biotechnologies are fundamentally constrained in their ability to improve genotypic intelligence. Natural selection weighs both common and rare variants when assessing overall biological fitness and preserves advantageous genetic novelty; artificial interventions, however, are myopic. They either target isolated traits—some of which historically underwent balancing selection for multiple alleles—or enforce strict genomic conservation, depriving the species of its evolutionary potential. Consequently, embryo selection and potentially more radical genetic technologies, such as large-scale genome editing, are incapable of resolving the long-term, population-level problem of genetic deterioration.

2 The genomic architecture of intelligence

Muller (1950) wrote: "Moreover, it is likely that, in man especially, the number and complications of genes having to do with mental traits is exceedingly great, so as to result in a comparatively high mutation frequency, one requiring a considerable compensatory selection for the mere maintenance of equilibrium." Decades later, modern genomic research has provided rigorous empirical validation for this hypothesis: Intelligence is a highly heritable and complex trait (Plomin & Deary, 2015). Its extreme polygenicity makes it especially vulnerable to rare, deleterious mutations. While GWAS and polygenic scores have successfully mapped the common variant landscape, they are blind to the rare mutational load that exerts a powerful drag on cognitive function. This distinction—between the visible common variants and the invisible rare load—is the critical prerequisite for understanding the mechanism of genetic deterioration. Population-level single nucleotide variants can be classified into three types:

1. Common variants with minor effects: Ancient variants detected by microarrays or sequencing, whose effects can be inferred in GWAS. They can be targeted by polygenic embryo screening (PGT-P).

2. Rare variants with major effects: Variants detected by sequencing, whose effects can be inferred by sequence-to-function models. These typically manifest as Mendelian diseases and are kept rare by purifying selection. These are the current targets of preimplantation genetic testing for monogenic defects (PGT-M).

3. Rare variants with minor effects: The continuous influx of highly polygenic, weakly deleterious *de novo* mutations. This category constitutes the invisible mutational load, whose combined contribution is likely responsible for much of the "missing heritability", yet it remains overlooked in most contemporary research.

Traditional family-based designs in behavioural genetics capture the heritability arising from the additive effects of all variant types. The long-standing consensus in behavioural genetics is that intelligence is highly heritable—often estimated between 60% and 80% in developed nations (Bouchard, 1998), or even up to 86% when isolating the latent *g* factor (Panizzon et al., 2014). The "shared" familial environment exerts only a transient childhood effect (Bouchard, 1998), while the remaining "non-shared" environmental variance is increasingly recognized as endogenous biological noise, such as stochastic developmental errors and somatic mutations (Plomin, 2024). Heritability studies often estimate only genetic effects that are additive. Using an extended twin-family design, Vinkhuyzen et al. (2012) examined non-additive (i.e., dominance and epistasis) genetic effects. They estimated that while additive genetic factors accounted for 44% of the variance in adult intelligence, non-additive genetic factors accounted for 27%. Using common SNP data from unrelated individuals, Hivert et al. (2021) found negligible non-additive effects.

A persistent challenge in contemporary genomics—and a central vulnerability in current predictive paradigms—is the sharp contrast between pedigree-derived heritability and the heritability captured by single-nucleotide polymorphisms (SNPs) in unrelated cohorts (e.g., estimated at 21% for cognitive performance by Lee et al. (2018) using LDSC, and 31% for verbal-numerical reasoning by Davies et al. (2016) using GCTA-GREML). Analytical frameworks such as LDSC and GCTA-GREML compute heritability directly from molecular data (Bulik-Sullivan et al., 2015; J. Yang et al., 2017); however, when applied to standard array data, they only capture the heritability explained by common variants. Consequently, estimates based on common SNPs act merely as a lower bound. The substantial "missing heritability" gap between these array-based estimates and family studies highlights that a high proportion of heritability is driven by evolutionarily recent, rare, or structurally complex mutations that are not captured by standard genotyping. When models like GREML-KIN reincorporated pedigree data to account for rare variants, the molecular heritability estimate surged to 54% (W. D. Hill et al., 2018). Wainschtein et al. (2026) used whole-genome sequencing (WGS) to evaluate the missing heritability of cognitive traits. They showed that the total WGS-based heritability was 34.7% for educational attainment, with rare variants (0.01% < MAF < 1%) accounting for approximately 43% of this explained variance. For fluid intelligence, the WGS-based heritability reached 32.8%. The impact of ultra-rare variants (MAF < 0.01%) and *de novo* mutations remains unaccounted for even in these estimates. This shows that the missing heritability resides within the rare mutational load—a domain systematically overlooked by conventional GWAS models and current polygenic embryo selection practices.

Holland et al. (2020) estimated the "polygenicity" (as the proportion of causal variants in the genome) of many traits and showed that cognitive phenotypes are the most polygenic quantitative traits. Specifically, they estimated 35,000 and 24,000 independent causal variants among common SNPs (0.32% and 0.22% of all common SNPs) for educational attainment and intelligence, respectively. This estimate implies a massive "mutational target size" that extends beyond the specific common variants identified in GWAS. It suggests that a significant fraction of the functional genome is used for cognitive processes. In addition to the common variants, rare variants could impact the same elements of the genome and exert deleterious effects.

Huguet et al. (2021) further supported this by analysing copy number variants (CNVs), estimating that approximately 10,000 genes—roughly half of the protein-coding genome—modulate cognitive ability. However, focusing solely on coding regions (1-2% of the genome) underestimates the true vulnerability, as the expression of these genes is governed by regulatory elements (such as enhancers and promoters)

and potentially other genomic features whose functions are not yet fully understood. Theoretically, any deleterious *de novo* mutation disrupting the coding or regulatory sequences of these 10,000 genes will negatively impact intelligence. While some high-impact variants are individually detectable, the vast majority are minor-effect variants. Though their existence can be theoretically inferred and their collective load effect macroscopically observed, detecting them at the single-mutation level is exceedingly difficult. Because gene regulation exhibits a "many-to-one" architecture, a much larger proportion of the genome likely influences these 10,000 genes, and by extension, cognitive ability. Databases like GeneHancer (Fishilevich et al., 2017) and the ABC model demonstrate that regulatory elements encompass an area vastly larger than the coding exome, with single genes often regulated by multiple distal enhancers across different tissues and cell types (Nasser et al., 2021). Furthermore, the ENCODE Project Consortium (2012) revealed biochemical activity across much of the non-coding genome, suggesting the effective mutational target size is orders of magnitude larger than the exome alone.

The genomic era has witnessed an exponential growth in GWAS sample sizes, yet this approach has exposed the theoretical limits of common-variant prediction. For direct intelligence measures, Savage et al. (2018) leveraged nearly 270,000 samples to pinpoint 205 significant loci and 1,016 genes, confirming dense expression networks in the central nervous system (CNS). Using educational attainment as a highly correlated proxy, the field has dramatically increased cohort sizes from 126,000 (Rietveld et al., 2013) to an unprecedented 3 million individuals (Okbay et al., 2022). Yet the predictive variance of polygenic scores for these cognitive phenotypes in independent samples remains capped at 12-16%—a fraction of the 60-80% heritability—corresponding to a correlation of .35 to .40 between the trait and its predictive score. The theoretical upper limit of GWAS predictive power is the common SNP heritability (h^2_{SNP}), which has been estimated at 12% (Lee et al., 2018) and 21% (Davies et al., 2016) for educational attainment.

High polygenicity is not unique to intelligence. Although the legacy of the reductionist Mendelian framework continues to constrain genetics, common diseases are fundamentally polygenic in nature (Khera et al., 2018). While this review concentrates on cognitive health, physical health is governed by the same biological and evolutionary principles, suggesting that the mechanisms of genetic deterioration described here apply equally to non-cognitive traits. Beyond this parallel logic, there is a direct genetic interconnection: because of the extensive pleiotropy inherent in the genome, many mutations concurrently impair both cognitive and physical health, including immune resilience. Consequently, the relaxed purifying selection against variants deleterious to intelligence inevitably facilitates the accumulation of mutations that simultaneously degrade overall physical health. Therefore, the conclusions drawn in this review are likely to apply to the overall biological baseline of the human population.

3 The mechanism of genetic deterioration

Mutation-selection balance is the equilibrium in which the continuous influx of novel, predominantly deleterious mutations is offset by the purifying force of natural selection. Genetic deterioration (dysgenics) arises from two sources: the natural accumulation of *de novo* mutations, and reversed selection, which is characterized by a negative correlation between fertility rates and intelligence.

First, as early-life mortality dropped sharply in modern societies, purifying selection that historically removed deleterious mutations was significantly relaxed, allowing genetically impaired individuals to survive and reproduce. Darwin (1871) explicitly warned against this, noting that while savages quickly eliminated the weak in body or mind, civilized men built asylums and did their "utmost to check the process of elimination". Consequently, the natural accumulation of *de novo* mutations has accelerated. High-coverage whole-genome sequencing of parent-offspring trios estimated an average human mutation rate of approximately 1.2×10^{-8} per nucleotide per generation, which translates to roughly 70 new mutations in every newborn (Kong et al., 2012). Specifically, the paternal germline drives an increase of 1.51 *de novo* mutations per additional year of age at conception—four times the rate observed in the maternal germline, which accumulates mutations at 0.37 per year (Jónsson et al., 2017). This striking divergence stems from different mutagenic mechanisms in male and female gametogenesis. Recent studies show that paternal mutations are overwhelmingly replication-driven; maternal mutations primarily arise from the

accumulation of non-replicative DNA damage and meiotic recombination errors during the oocyte's decades-long developmental arrest (Halldorsson et al., 2019). Unlike the inactive oocyte pool, spermatogonial stem cells (SSCs) undergo continuous division throughout a male's life. This persistent mitotic activity subjects the male germline to compounding DNA replication errors and cumulative oxidative stress within the ageing testis (Aitken et al., 2020; Wood & Goriely, 2022). Furthermore, the paternal mutation rate is exacerbated by "selfish spermatogonial selection". In this micro-evolutionary process, certain spontaneous mutations confer a proliferative advantage to the SSCs themselves, facilitating the clonal expansion of mutant sperm populations over time. While advantageous to the individual stem cell, these mutations are deleterious to the resulting offspring, not only causing severe dominant genetic disorders (such as Apert syndrome and achondroplasia), but also exerting broader negative impacts on polygenic neurodevelopmental stability through the transgenerational accumulation of milder variants (Aitken et al., 2020; Wood & Goriely, 2022). This provides a micro-level illustration of the conflict between the short-term interests of the mutated cell and the long-term interests of the individual's lineage.

The consequences of this continuous mutational influx extend far beyond specific developmental disorders, negatively affecting overall human health. While current natural selection remains effective at removing catastrophic genomic errors through "ultraselection" on approximately 0.4-0.7% of the genome (Dukler et al., 2022), this focused pressure is insufficient to arrest the accumulation of widespread, weakly deleterious variants. Assuming a substantial relaxation of selection facilitated by modern medical intervention, Lynch (2016) estimated that recurrent mutational load drives a baseline fitness decline of roughly 1% (and potentially up to 5%) per generation. Similarly, Kondrashov (2017) estimated that the overall health of young people deteriorates by 2% to 5% per generation (p. 223). Given its massive mutational target size, the human brain is especially vulnerable to this systemic genetic erosion. Extensive population-level sequencing has confirmed that the collective burden of ultra-rare disruptive and damaging mutations exerts a negative effect on educational attainment and adult cognitive function (Chen et al., 2023; Ganna et al., 2016). This aligns with the finding of an inverse association between an individual's overall deleteriousness (and total count of minor alleles) and their educational attainment (Wang & Huang, 2023). The danger of this mutational influx is amplified by the fact that most deleterious mutations do not wait to become homozygous to do their damage. As Muller (1950) demonstrated, the great majority of seemingly recessive mutant genes act as "effective dominants", exerting their primary detrimental effects on the population through minor manifestations in the heterozygotes. Rather than presenting as clear-cut diseases, these accumulated mutations typically manifest as subtle, quantitative inadequacies—such as lowered physiological resilience or a reduced cognitive baseline.

Modern demographic fertility trends further exacerbate this phenomenon. Because highly educated individuals increasingly delay childbearing—if they choose to reproduce at all—the rate at which *de novo* mutations accumulate in the population gene pool is further amplified by parental age effects. Given the well-documented monotonic increase of *de novo* mutations with paternal age, researchers have attempted to leverage paternal age as a proxy to infer the speed of mutation-driven cognitive deterioration (Woodley of Menie, 2015). While estimating the exact magnitude of this cognitive decline has traditionally been confounded by the correlation between parental IQ and reproductive timing, Wang (2023) introduced a methodological framework that leveraged micro-molecular constants to calibrate macro-demographic data. By utilizing the biological asymmetry between male and female *de novo* mutation rates as a quantitative anchor, the study attempted to isolate the parental age effect independently of parental genotypic differences. It estimated a -2.0-point (95% CI: -3.7 to -0.3) change in offspring IQ per decade of paternal age when unadjusted for birth order. After further adjustment for birth order, this estimate was attenuated to a -0.6-point change (95% CI: -2.6 to 1.6). Adjusting for birth order risks over-controlling due to its high collinearity with paternal age, which would attenuate the true effect. Conversely, not adjusting for it leaves the estimate vulnerable to confounding from potential non-genetic birth order effects. The true magnitude of the effect likely lies somewhere between these two estimates.

However, the decline driven by *de novo* mutations is ignored by some contemporary authors. For instance, Bratsberg and Rogeberg (2018) observed that the phenotypic IQ rise and subsequent decline in Norway occurred within individual families, rather than being driven by demographic shifts between different

families. They asserted that this indicated no genetic involvement in the decline of population intelligence, treating dysgenic fertility (a between-family difference) as the sole mechanism for genetic deterioration. Astonishingly, a study published in the *Proceedings of the National Academy of Sciences* (PNAS) attempting to debunk genetic deterioration completely ignored the *de novo* mutation mechanism that most concerned early geneticists like Muller—ironically, it was in the very same journal in which Muller (1928) both published his Nobel Prize-winning proof that environmental radiation actively generates *de novo* mutations and laid the foundational mathematical framework for quantifying human mutational damage (Morton et al., 1956). The *de novo* mutational load is dictated by fundamental biological laws and causes within-family changes. Even if the true effect were only a fraction of the unadjusted 2.0-point estimate—such as the 0.6-point change observed when controlling for birth order—it would still represent a decline larger than typical estimates predicted by dysgenic fertility. Because this mutational source is within-family, Bratsberg and Rogeberg's data are actually consistent with mutation-driven genetic deterioration. The observed rise and fall in IQ perfectly align with a continuous underlying genetic decline caused by mutation load that was temporarily masked by finite environmental improvements, becoming visibly manifest only after those environmental gains plateaued.

The second cause of genetic deterioration is reversed selection. This contemporary fertility pattern contrasts sharply with the selection pressures of pre-industrial societies. Historical and demographic analyses indicate that prior to the "demographic transition", there was a positive correlation between cognitive ability and reproductive fitness, which effectively maintained a positive selective pressure for intelligence (Meisenberg, 2010). However, the onset of the "demographic transition" reversed this pattern. As early-life mortality decreased and modern reproductive patterns emerged, the historical positive correlation vanished, decoupling cognitive ability from reproductive success.

Modern society exhibits a robust negative correlation between fertility and highly heritable traits such as intelligence and educational attainment (Lynn, 1996). This negative correlation has become an almost universal phenomenon, particularly evident in developing nations as shown by World Fertility Surveys for educational attainment (Bongaarts, 2003).

To quantify this dysgenic trend, researchers employ two primary methodologies to measure selection differentials (Lynn, 1996). The first is the *offspring method*, which calculates the selection differential from the covariance between adults' intelligence and their number of children. The second is the *sibling method* (Lentz, 1927), which infers the selective pressure of the preceding generation via the covariance between individuals' cognitive ability and their number of siblings. An analysis using population-representative data in China explicitly compared these two methods, yielding very similar estimates of the selection differentials (Wang et al., 2016).

Phenotypic evidence of this dysgenic fertility trend has been documented globally. A recent international meta-analysis of differential fertility incorporating data from 65 countries revealed that individuals with higher intelligence consistently reproduce at below-replacement rates, estimating a decline in genotypic IQ of 0.4 points per decade (Jensen et al., 2025). Note, this estimate reflects the population-weighted decline exclusively *within* countries; it excludes between-nation IQ differences, as cross-national heritability is difficult to quantify. Large-scale genomic analyses provide molecular evidence of an underlying genetic deterioration. Genetic data from cohorts in the US, Iceland, and the UK support the trend (Beauchamp, 2016; Hugh-Jones & Abdellaoui, 2022; Kong et al., 2017; Sanjak et al., 2018). However, a recent demographic analysis suggested that the negative relationship between female education and fertility has disappeared in Western Europe and related countries (Cheng et al., 2022).

For decades, massive environment-driven gains in phenotypic intelligence have masked genetic deterioration. Historically, this phenomenon—widely known as the Flynn effect—yielded rapid population-level gains (e.g., Lynn, 1982; Wang & Lynn, 2018). Recently, however, the trend has reversed, and average phenotypic IQ scores have begun to fall across many countries (Dutton et al., 2016).

4 Non-germline medical interventions

When confronted with the accumulation of deleterious germline mutations, the standard medical response relies on the optimistic assumption that continuous therapeutic advancements will neutralize these genetic defects. However, Muller (1950) dismantled this argument over seven decades ago: “Furthermore, may we not confidently expect that, with continued advances in general technology, living standards and medicine, the genetic burden will be further lightened and kept very small indeed? [...] The great trouble with this method is that [...] each successive generation will have not only the mutant genes which have in this way been passed along to it but also its own new crop of mutations.”

Today, advanced gene therapies utilizing CRISPR or viral vectors can manage specific monogenic pathologies. However, they are powerless against the polygenic degradation of baseline cognition driven by minor-effect mutations. Regarding physical interventions, the advancement of neurotechnologies raises the possibility that such tools could eventually enhance human cognition and prevent deterioration. Much research effort has been devoted to the treatment of neurodegenerative disorders that cause adult cognitive decline, such as Alzheimer’s and Parkinson’s diseases. Neuromodulation techniques—such as transcranial magnetic stimulation (TMS) and deep brain stimulation (DBS)—can only provide clinical relief. Their utility is also constrained: DBS requires invasive neurosurgical implantation, while the effects of non-invasive TMS are short-lived. Following a standard TMS treatment course—typically 2 to 4 weeks—cognitive improvements in Alzheimer’s disease generally last for only 1 to 3 months (Chou et al., 2020), whereas in Parkinson’s disease, such benefits typically last for only 1 month and completely disappear by the 3rd month (Y. Yang et al., 2024). As neurodegenerative diseases inevitably advance, these interventions eventually lose their efficacy.

In summary, whether molecular or neuromodulatory, these therapies remain fundamentally identical to the conventional medicine Muller criticized: They are somatic interventions, not germline repairs. Because they exclusively target somatic cells to cure the individual phenotype, they leave the germline (sperm and eggs) untouched. Consequently, the deleterious mutations are preserved and passed on to the next generation. This ensures that each subsequent generation of descendants will inherit the uncorrected ancestral load alongside a newly acquired crop of *de novo* mutations. This creates multiple interacting biological deficits, forcing future generations into an ever-expanding medical dependence where exponentially more treatments will be required simply to maintain baseline human function. As Muller (1950) warned, it would inevitably lead to the complete disintegration of our natural biological organization. In such a scenario, Muller predicted that “everyone would be an invalid, with his own special familial twists”, requiring highly individualized, continuous medical intervention merely to survive.

5 GWAS-based embryo selection

Embryo selection is currently recognized within the public discourse as a prospective method to enhance offspring intelligence. The standard protocol involves fertilizing multiple embryos *in vitro*, sequencing their genomes, evaluating polygenic scores for cognitive and health traits based on population-level GWAS data, and implanting the most promising candidate. However, this approach suffers from important limitations.

Firstly, the predictive power of polygenic scores is limited. Current polygenic score models for cognitive traits rely almost exclusively on common variants derived from population-level data. Even those constructed from cohorts of millions account for only a small fraction of phenotypic variance (7–10% in Lee et al., 2018). Though predictive power will grow as sample sizes increase, it cannot exceed the SNP heritability ceiling. This leaves the vast majority of the biological architecture—particularly rare and *de novo* variants—invisible to the selection process. While conventional preimplantation genetic testing (PGT) can be effective at screening out major chromosomal abnormalities (aneuploidies and structural rearrangements, including large-scale copy number variations; PGT-A/SR) and specific monogenic or simple oligogenic disorders (PGT-M), such interventions only eliminate catastrophic errors. Moreover, PGT-M relies on prior knowledge—parents must already know they carry a pathogenic mutation (e.g., after having an affected child). It is ineffective against true *de novo* mutations. Untargeted fetal screening for

pathogenic *de novo* mutations is unfeasible because of the false-positive paradox: when conducting mass screening for rare events, errors yield far more false alarms than true discoveries, rendering the screening impractical. GWAS-based embryo screening (PGT-P) is powerless to detect or halt the silent accumulation of minor-effect *de novo* point mutations—the diffuse, polygenic genetic load that constituted the primary concern of early geneticists like H. J. Muller.

This blind spot is not merely a matter of insufficient data that can be resolved by scaling up sequencing efforts. Even if we could hypothetically obtain perfect whole-genome sequencing (WGS) data and precise intelligence testing for the entire global population, methods like GWAS would still fail to accurately estimate the effects of rare and *de novo* variants. Multiple adjacent variants in linkage disequilibrium (LD) might exert independent causal effects—sometimes in opposing directions—on the phenotype. Association studies cannot estimate the effects of these physically linked variants.

Secondly, embryo yield is limited; the power of selection depends on the pool size. In standard *in vitro* fertilization, couples typically produce only 3 to 8 viable embryos (cited in Karavani et al., 2019). Under these clinical constraints, the expected phenotypic gain is minimal; Karavani et al. (2019) demonstrated that selecting the "best" of 5 embryos yields an expected average gain of merely ~2.5 IQ points, based on the predictive power available at the time (r^2_{pgs}=4.3%). Due to high unexplained variance, the highest-scoring embryo frequently does not develop into the offspring with the highest actual phenotypic value. The research suggested that the simulated gain increases proportionally to the square root of the proportion of the variance explained by the predictor. Even if the polygenic score's predictive power were to reach the common SNP heritability ceiling ($h^2_{SNP}\approx$21%) for cognitive performance, the simulated gain for 5 embryos would only increase to ~5.5 IQ points ($2.5 \times \sqrt{\frac{21\%}{4.3\%}}$). Even if future technology allowed a couple to choose from a pool of 1,000 embryos, the average gain would still be only ~5.1 IQ points under the 4.3% predictive power model, and would barely reach ~11.3 points even with 21% predictive power. Moreover, if embryos were simultaneously screened for multiple health traits alongside intelligence, the selection pressure would be divided, causing the potential for cognitive enhancement to decrease significantly.

The within-family predictive power of polygenic scores is lower than population-level (between-family) estimates, driving the realized utility down even further due to inherent range restriction among siblings and the compounding effects of assortative mating (Turley et al., 2021). Current estimates of the within-family penalty rely on additive models and likely underestimate the true extent of this predictive decay. In population-level studies using common variants, non-additive genetic variance appears statistically negligible (Hivert et al., 2021; Zhu et al., 2015) because purifying selection keeps deleterious dominant mutations at extremely low frequencies. However, every couple transmits rare inherited deleterious variants, and every embryo acquires *de novo* mutations. Because polygenic scores rely exclusively on common additive variants, they are blind to this mutational load. Family-based studies reveal substantial non-additive genetic variance, accounting for up to 27% of the variance in intelligence (Vinkhuyzen et al., 2012), suggesting that neurodevelopment is a non-linear biological system where deleterious mutations act as an asymmetric downside risk that can override a high additive score. Consequently, linear models artificially inflate the expected accuracy of embryo selection. This phenomenon is well-documented in agricultural genomics, where traditional models that ignore non-additive interactions consistently overestimate the accuracy of genetic predictions among full-sibling families (Muñoz et al., 2014; Nadeau et al., 2023; Pante et al., 2002).

6 Sequence-to-function models

Recent advancements in artificial intelligence have introduced "sequence-to-function" deep learning models. Unlike GWAS, which rely on statistical correlations, these models learn the syntax of the genetic code, enabling them to directly estimate the molecular consequences of variants (Avsec et al., 2021, 2026). The continued research and development of these tools could enable the identification of high-impact *de novo* mutations even within the non-coding genome—variants invisible to GWAS yet often responsible for severe neurodevelopmental disorders. Theoretically, this would allow for the effective eradication of Mendelian cognitive deficits and catastrophic biological errors from the gene pool, thereby reducing the most severe manifestations of mutation load.

However, the ability to screen out the most severe mutations does not equate to the ability to reverse genetic deterioration. A fundamental limit remains: the accumulation of weakly deleterious variants. Because deep learning models are trained to recognize deviations from evolutionary conservation (Brandes et al., 2023), they can identify major functional disruptions but remain insensitive to the subtle, cumulative effects of weakly deleterious variants. Given the extreme polygenicity of cognitive traits, the effects of the vast majority of deleterious *de novo* mutations are incredibly small—falling far below the threshold at which conservation-based AI models can reliably detect them.

7 Foreseeable technological advancements

To overcome the mathematical limits of embryo yield, proponents of genetic enhancement have set their sights on the development of "stem-cell-derived gamete" technology. As Shulman and Bostrom (2014) proposed, if viable human sperm and eggs could be reliably derived from induced pluripotent stem cells, the biological limits on natural egg retrieval would be effectively abolished. This technology could enable the creation of hundreds or thousands of embryos for a single couple, vastly expanding the selection pool and dramatically increasing the expected phenotypic gain. Furthermore, Shulman and Bostrom (2014) hypothesized the possibility of "iterated embryo selection"—extracting cells from these generated embryos to derive new gametes, thereby allowing an even higher diversity of combinations. Biological barriers remain for such technologies. Generating gametes from stem cells risks epigenetic imprinting errors similar to those seen in mammalian reproductive cloning. More importantly, gametes derived from induced pluripotent stem cells are expected to harbour more *de novo* mutations than natural gametes, because natural germline cells have uniquely efficient DNA repair mechanisms compared to somatic cells.

Proponents of such technologies draw parallels to successful long-term selection experiments in agriculture, such as the breeding of commercial broiler chickens, which have increased in size more than four times since 1957 (Hsu, 2014), and the Illinois maize experiment for protein and oil content. However, these successes were driven by phenotypic selection rather than genotypic selection. Phenotypic selection captures and propagates both standing common variation and *de novo* mutations that continuously arise in the population (Mulder et al., 2019). In a recent review, Floriani and Lipka (2025) highlighted that rare variants are critical for driving yield improvements and stress resistance in staple crops such as maize and soybean. They noted that empirical studies in yeast demonstrate that such rare alleles often exhibit larger effect sizes and explain more than half of the additive genetic variance. In contrast, GWAS-based selection relies on predefined common SNP markers, meaning favourable *de novo* mutations would not be selected and would be lost.

Beyond embryo selection, the rapid advancement of gene-editing technologies could theoretically offer a more direct way to halt genetic deterioration. Visscher et al. (2025) theorized that with advancing understanding of causal variants, CRISPR-like technologies could evolve to permit heritable polygenic editing—the simultaneous, high-throughput editing of tens or hundreds of loci across the genome. As previously mentioned, trait-associated variants identified in GWAS frequently occur in clusters; nearby variants are co-inherited in the population and are in strong linkage disequilibrium (LD) with one another. The authors predicted that if we could identify the causal variant within an LD block and edit ten such loci with the largest effects, the lifetime prevalence of Alzheimer's disease could be reduced from 5% to 0.6%, type 2 diabetes from 10% to 0.2%, and coronary artery disease from 6% to 0.1%.

This calculation rests on the premise that there is only one causal variant ("lead SNP") per LD block, implying that editing these specific single nucleotides would reverse the entire phenotypic effect observed for those LD blocks in the population. This assumption is invalid. Experimental and statistical research demonstrates that a single independent GWAS signal is often driven by multiple functional variants aggregating within a strong LD block (Long et al., 2025). Experimentally, Abell et al. (2022) used high-throughput functional assays to reveal that 17.7% of eQTLs contain multiple active SNPs in tight LD. At the *FTO* locus, Sobreira et al. (2021) showed that a single risk haplotype harbours at least four distinct enhancers coordinately regulating downstream genes. Furthermore, Chatterjee et al. (2021) showed that

disrupting multiple linked enhancer SNPs at the *RET* locus causes a synergistic, rather than merely additive, reduction in target gene expression.

Even assuming that in the future, technologies such as stem cell-derived gametes, heritable polygenic editing, and sequence-to-function predictive models achieve a threshold of clinical reliability—reaching a point where their practical utility outweighs their cost and technical risks—a fundamental biological barrier remains: the extensive interconnectedness of the human genome.

8 Antagonistic pleiotropy

The implicit assumption for the use of embryo selection to offset genetic deterioration is that since overall cognitive capacity can be elevated by aggressively selecting for advantageous common variants identified by GWAS, the underlying *de novo* mutational load can be neutralized. In other words, the logic presumes that the diffuse burden of minor-effect *de novo* mutations can simply be compensated for by aggregating advantageous common variants. However, this palliative strategy is biologically problematic because the genome exhibits widespread antagonistic pleiotropy—where an allele confers a functional advantage for one trait while increasing susceptibility to adverse outcomes in another. For example, genetic variants promoting high educational attainment correlate with increased risks for psychiatric conditions like autism spectrum disorder and bipolar disorder (Anttila et al., 2018).

This pervasive biological trade-off poses a fundamental challenge to the very premise of polygenic embryo selection and genome editing. Because these reproductive technologies aim to unilaterally maximize desired phenotypes, such as cognitive capacity, they unintentionally co-select for antagonistically linked deleterious traits (Turley et al., 2021; Visscher et al., 2025). Unlike natural phenotypic selection—which assesses overall evolutionary fitness by simultaneously acting on common and rare variants across numerous traits—current polygenic selection only screens common variants, and only for specific or isolated phenotypes. Yet, the "harmful common variants" for these phenotypes might be the pleiotropic alleles that natural selection has maintained in long-term balance because they are beneficial to other phenotypes.

A theoretical technological workaround to this global pleiotropy might involve using local genetic correlation frameworks, such as LAVA (Werme et al., 2022), to isolate and exclude specific genomic regions exhibiting antagonistic effects, while selecting for alleles in regions free of pleiotropic conflict. However, this detailed approach reveals a deeper layer of complexity. Even when the global genetic correlation between two traits appears neutral, extensive localized antagonistic pleiotropy often persists across the genome. While current tools have identified a subset of these conflicting regions, the extreme polygenicity of cognitive traits dictates that countless local antagonistic effects remain undetected due to statistical power limitations.

Recent comprehensive analyses support the ubiquity of this biological trade-off. Bian et al. (2024) identified extensive pleiotropic conflicts covering approximately 11.4% of LD blocks in the human genome, noting that these antagonistic variants are enriched for intermediate allele frequencies and exhibit strong signatures of balancing selection[1].

Note, because this estimate primarily captures conflicts between macroscopic phenotypes, we can expect this antagonism to be even more pervasive at a microscopic level. Cognition is a highly complex trait underpinned by a large number of biological substrates (endophenotypes / intermediate phenotypes). Antagonistic pleiotropy likely operates not only for macroscopic traits like intelligence but also between different endophenotypes. Wang (2025) explored this possibility, suggesting that the same set of genetic predispositions may exert conflicting effects on different endophenotypes of the same behavioural phenotype. The same genetic predisposition might be beneficial to the brain-structural mechanisms of educational attainment, yet detrimental to its brain-functional mechanisms.

Genomics research frequently grapples with the "portability problem"—the observation that European-derived polygenic scores perform sub-optimally when predicting phenotypes in non-European populations (Lupi et al., 2024). But a more important evolutionary question is: why do these genotype-phenotype associations, for complex traits like intelligence, remain shared across different human races that diverged

[1] Balancing selection refers to the evolutionary processes that actively maintain multiple alleles at the same locus.

tens of thousands of years ago? Based on this widespread pleiotropy, I propose a hypothesis: The very fact that genetic variants linked to intelligence detected in common-variant GWAS are shared across different races strongly implies the existence of antagonistic pleiotropy. If the common variants negatively associated with a highly fitness-relevant trait like intelligence had been exclusively detrimental, ancestral variants would have been purged by natural selection over the extensive evolutionary time since human races diverged. Under such a scenario, the "low-intelligence" variants identified by contemporary GWAS would primarily consist of mildly deleterious mutations that had arisen independently in different races and drifted to higher frequencies. However, their persistence as common variants across races implies they have instead been actively maintained by balancing selection.

Directly contradicting the independent local drift hypothesis, empirical analyses suggest that GWAS signals are highly replicable across races (Marigorta & Navarro, 2013). This variant-level sharing proves they are not deleterious mutations that occurred after human divergence, but rather deeply conserved ancient variants. These trade-offs have ancient evolutionary roots; genomic evidence reveals that certain disease-associated polymorphisms, including major genomic deletions, have been actively maintained by balancing selection for hundreds of millennia—predating even the divergence of modern humans and Neanderthals (Aqil et al., 2023)—sometimes because they confer early-life developmental and reproductive advantages at the cost of late-onset disease and senescence (Rodríguez et al., 2017). Thus, the detrimental effects of these variants on specific cognitive or physical phenotypes are linked to biological benefits elsewhere in the physiological network or lifespan. The attempt to "correct" these ancient variants to unilaterally maximize a single trait could disrupt this biological equilibrium.

The side effects of such unilateral selection are illustrated by commercial agricultural breeding. For instance, intensive artificial selection in broiler chickens over the past half-century has yielded unprecedented increases in growth rate, feed efficiency, and breast meat yield, with modern commercial strains growing to more than four times the mass of unselected strains from 1957 (Zuidhof et al., 2014). However, this massive phenotypic enhancement was accompanied by severe unintended consequences driven by antagonistic pleiotropy (Rauw et al., 1998; van der Most et al., 2011). The extreme selection for rapid muscle accumulation unintentionally compromised the birds' overall physiological equilibrium, resulting in widespread skeletal deformities and cardiovascular vulnerabilities (Julian, 2005). Most critically, it significantly depressed their immunological resilience. Qureshi and Havenstein (1994) demonstrated that modern broilers selected almost exclusively for maximum muscle growth exhibited impaired adaptive immunity compared to a 1957 random-bred control line: while their innate immune system (such as macrophage function and inflammatory recruitment) remained largely intact, the metabolically expensive adaptive system was severely compromised.

9 Genetic diversity and immunity

Perhaps the most catastrophic risk of employing large-scale embryo selection or genome editing to stop genetic deterioration lies in the depletion of genetic diversity and its effects on immunocompetence. Host resistance to rapidly evolving pathogens is dependent on high levels of genetic variation, particularly heterozygosity (Penn et al., 2002). For instance, heterozygote advantage at the major histocompatibility complex (MHC)—the highly polymorphic genomic region governing immunological recognition—allows individuals to recognize and clear a vastly broader spectrum of pathogenic strains. Conversely, inbreeding-induced depletion of genome-wide diversity has been shown to depress cell-mediated immune responses and overall immunocompetence in wild birds (Reid et al., 2003, 2007).

This immune system vulnerability is directly linked to cognitive ability because the genomic architecture of the human immune system is tightly interwoven with the CNS. The brain is integrated with immune functions anatomically via recently discovered meningeal lymphatic vessels (Louveau et al., 2015) and molecularly through genetic pleiotropy. Some of the core genes that dictate advanced cognitive functions and neural wiring are dual-purpose immune genes. For example, MHC class I molecules, classically responsible for antigen presentation, are also essential for regulating neurite outgrowth, synaptic plasticity, and the activity-dependent refinement of cortical connections during brain development (Elmer & McAllister,

2012). Similarly, the classical complement cascade—specifically complement component 4 (C4) located within the MHC locus—mediates the precise elimination of synapses (synaptic pruning) in the developing brain, a process whose dysregulation is implicated in cognitive wiring abnormalities and schizophrenia (Sekar et al., 2016).

Furthermore, cross-disorder genomic analyses demonstrate that the genetic overlap between brain-behavioural phenotypes and immune-mediated diseases is a genome-wide phenomenon. For example, widespread genetic correlations between psychiatric conditions and immune phenotypes persist robustly even after the entire extended MHC region is statistically removed from the analysis (Tylee et al., 2018). Shared genetic risk variants frequently operate through diverse, non-MHC pathways that guide both neuronal migration and immune regulation, such as the *EPHB4* gene linking schizophrenia and Crohn's disease (Pouget et al., 2019). Because cognitive and immune functions share this deeply integrated, genome-wide architecture, they cannot be uncoupled. Attempting to preserve immune diversity by algorithmically excluding known immunity-related regions from genomic cognitive enhancement is biologically infeasible.

The root of the problem is that nature optimizes traits in a fundamentally different way than biotechnology does. Natural selection operates on the phenotype. It evaluates only the final outcome, allowing diverse genetic pathways to reach the same phenotypic destination (Barghi et al., 2020). Through convergent evolution, this "many-to-one mapping" of genotype to phenotype ensures that necessary adaptations are achieved while leaving a vast reservoir of genetic heterogeneity intact. This phenomenon is widely observed, from diverse morphological forms mapping to identical mechanical functions (Wainwright et al., 2005) to distinct genetic mutations enabling human lactase persistence (Tishkoff et al., 2007) and mammalian high-altitude adaptation on the Tibetan Plateau (Lyu et al., 2022). By achieving the same phenotypic target through heterogeneous genetic blueprints, natural selection protects variation. This preserves the genetic diversity essential for future adaptations and fending off novel pathogens. Genotypic selection, however, enforces a standardized molecular blueprint. By optimizing for a specific set of predefined markers, it systematically eradicates the underlying variance that phenotypic selection would otherwise tolerate. This molecular overlap establishes an evolutionary trap. By standardizing the brain, we unknowingly standardize the immune system. This antagonism with immunity represents a unique form of pleiotropy: traits like intelligence are typically directionally selected in natural selection (where higher capacity is favoured); the immune system relies on genetic diversity itself to combat rapidly evolving pathogens. Importantly, once this immunological diversity is compromised, we cannot rely on *de novo* mutations to restore it. The extreme polymorphism of the major histocompatibility complex—the genomic region governing adaptive immune responses—is maintained through ancient balancing selection favouring multiple alleles, rather than a rapid turnover of new mutations. This ensures a deep reservoir of protective alleles (Özer, 2023). As explained by Fisher's geometric model, an organism's phenotype exists within a highly complex, multi-dimensional space. When a population is well-adapted and located at or near its fitness optimum, random genetic changes are much more likely to move the organism away from this peak. This is especially true for complex organisms like humans. As organismal complexity increases, random mutations become overwhelmingly likely to disrupt crucial biological functions rather than enhance them (Lin et al., 2025). Consequently, while future biotechnology might succeed in halting cognitive deterioration, the irreversible loss of immune diversity could ultimately lead to human extinction.

10 Hypothetical perfection: Prediction and editing

Modern genomic research fundamentally pursues two ultimate objectives: (1) understanding—the accurate functional mapping of the genome, enabling the perfect prediction of how any mutation (from common SNPs to *de novo* variants) affects protein structure, regulation, and phenotypic development; and (2) manipulation—the technological capacity to precisely edit and control the human genome.

If these goals were fully realized, it would be technically possible to precisely pinpoint every *de novo* variant compromising physical and cognitive health, and systematically correct each such mutation in the germline.

Yet, if this "perfect" technological solution were uniformly implemented, human evolution would effectively cease. Genetic variation is the fundamental source of evolution. Although the vast majority of non-neutral *de novo* mutations disrupt biological systems, particularly in highly complex organisms (Lin et al., 2025), advantageous mutations occasionally arise. These rare variants are the indispensable raw materials driving evolution, allowing the species to continuously adapt to the environment and elevate its physical and mental potential.

Furthermore, there is a fundamental theoretical limitation in using computational models to predict complex macroscopic phenotypes. Even at the molecular level, state-of-the-art protein structure prediction models are not forward simulations deducing outcomes using physicochemical rules; rather, they depend heavily on historical evolutionary data, such as multiple sequence alignments. If predicting a single protein is so challenging, predicting a highly complex trait like intelligence from genomic novelty is exponentially more difficult. This difficulty is rooted in computational irreducibility (Wolfram, 2024), which means that the developmental process cannot be mathematically bypassed; the exact outcome can only be known by allowing the biological system to actualize itself *in vivo*. The dependence of such models on known evolutionary history to evaluate mutations limits their ability to predict evolutionary novelty. For example, algorithms trained on historical data often fail to predict the physical consequences of new, individual missense mutations (Buel & Walters, 2022). When the biological system does not follow a fixed historical rule, the algorithm's predictions collapse. Consequently, sequence-to-function algorithms would only act as conservative filters, systematically removing unverified genetic variations to preserve the known norm. In doing so, this technological filter would eradicate the rare, advantageous *de novo* mutations that serve as the indispensable raw material for adaptation, unintentionally imposing an artificial ceiling on human potential and freezing the species in a state of permanent evolutionary stagnation.

11 Conclusions

This paper has critically evaluated the potential of reproductive biotechnologies to counter the trend of human genetic deterioration. Based on the analysis of genomic architecture, mutational load, evolutionary mechanisms, and current technological capabilities and their future development, four fundamental conclusions emerge:

1. Reproductive biotechnologies represent a useful tool in mitigating some severe mutations. These technologies warrant development and widespread application after rigorous scrutiny, with a specific ethical obligation to ensure equitable access, lest genetic inequality between socioeconomic groups be exacerbated.

2. Current biotechnologies are—and will likely remain—insufficient to fully offset the genetic deterioration driven by *de novo* mutations and negative fertility correlations. Due to the massive mutational target size of cognitive (and likely physical) health and the continuous influx of *de novo* mutations, simple genetic selection strategies cannot fully counteract these forces.

3. While screening embryos using polygenic scores may indeed increase the intelligence of offspring, widespread adoption carries the risk of reducing population-level genetic diversity. Unlike natural selection, which acts holistically on overall organismal fitness across all variants, polygenic scores target isolated phenotypes using common variants only. This short-sighted homogenization could deplete the population of protective alleles maintained by conflicting selection pressures and erode the biological resilience necessary to survive novel pathogens.

4. Theoretically, a "perfect" system of prediction and genome editing could halt genetic deterioration and stabilize physical and cognitive health. Yet, by correcting every deviation to fit a normative, conserved model, such a system would differ from the mechanics of natural selection, which preserves and relies on rare, advantageous *de novo* mutations. This technological filter would simultaneously eliminate the raw material of variation required for future adaptation, freezing our species in a state of static optimization and rendering it incapable of further evolution.

Despite the existential importance of understanding these issues for humanity, they are frequently marginalized in contemporary mainstream academia. The increasing politicization and commercialization of science severely challenge research into these questions. Langbert (2018) revealed severe political homogeneity within elite American liberal arts colleges, noting that among those registered with a major political party, 95% of biology professors, 94% of psychology professors, and 100% of anthropology professors identify as Democrats. This ideological hegemony inevitably shapes research agendas, creating blind spots on topics that conflict with specific political narratives. Democratic elites strategically encourage mass immigration to serve their interests: economically utilizing it as a reserve army of labour to suppress domestic wages for the working class, and politically leveraging it as a voting bloc to maintain state power—thereby subjecting research at the "population genetic level", with consequences that might be detrimental to their special interests, to unprecedented ideological pressure (Wang, 2026).

The suppression of science has historical precedent. When the National Academy of Sciences (NAS) faced pressure from a letter demanding the suppression of research regarding racial differences in intelligence, the co-discoverer of DNA structure, Francis Crick (1971) wrote: "[The letter] neither gives nor refers to any scientific arguments, but makes unsupported statements of opinion. This [. . .] is politics, not science." He threatened to resign as a foreign associate of the NAS to defend such research. In 2007, James Watson, another co-discoverer of DNA structure, boldly cited Richard Lynn's study on the subject, fearless of political persecution (Lynn, 2001). While the study of genetic deterioration within a population is distinct from the study of racial differences, the suppression of the latter has created a "chilling effect" that discourages rigorous investigation into the former. Such suppression betrays the legacy of Karl Marx and the founders of molecular biology. If open debate continues to be suppressed by political taboos, we risk failing to solve the problem of genetic deterioration while potentially exacerbating it through ill-conceived interventions that could trigger unforeseen health crises.

Furthermore, the commercialization of reproductive technologies introduces a distinct source of bias. While commercialization is frequently celebrated as a powerful engine for technological innovation and dissemination, its alienating and distorting effects on scientific objectivity remain vastly underappreciated (Wang, 2026). As Karl Marx famously observed, social existence determines social consciousness, a principle that applies as much to researchers as to any other group. Evolutionary biologist Robert Trivers (2011) expanded on this with his theory of self-deception, arguing that self-deception is an evolved trait of human nature, designed to allow individuals to more effectively deceive others by first deceiving themselves, ultimately serving their own special interests. Science, as a human enterprise, is not immune to this instinct. Both politicization and commercialization fuel this self-deception. When a scientific hypothesis aligns with a researcher's political ideology or financial interest, the brain readily constructs a biased narrative, filtering out contradictory evidence to maintain a coherent, self-serving worldview.

Unlike conventional medical research—which typically prioritizes short-term, partial outcomes by evaluating immediate efficacy and direct adverse effects on individual patients—large-scale embryo selection or gene editing for polygenic traits operates on an entirely different scale. While it attempts to integrate partial, immediate interests (such as parental reproductive choices) with long-term population interests, its unintended "side effects" are transgenerational, systemic, and holistic in nature. Because these long-term, population-level risks are easily overshadowed by the immediate gratification of political or commercial incentives, the only antidote to our evolved tendency for self-deception is rigorous, adversarial, and open debate. Considering that genetic quality is of paramount importance to humanity, I urge researchers to place the long-term, holistic interests of the human species above short-term, partial political and commercial interests, and above their own special interests in academic career advancement.

Author's Note

This work was presented at the London Conference on Intelligence 2025, Budapest.
I would like to thank Gerhard Meisenberg for his helpful comments and editing.
Artificial intelligence assisted in the writing of this paper.

References

Abell, N. S., DeGorter, M. K., Gloudemans, M. J., Greenwald, E., Smith, K. S., He, Z., & Montgomery, S. B. (2022). Multiple causal variants underlie genetic associations in humans. *Science*, *375*(6586), 1247–1254. https://doi.org/10.1126/science.abj5117

Aitken, R. J., De Iuliis, G. N., & Nixon, B. (2020). The sins of our forefathers: Paternal impacts on *de novo* mutation rate and development. *Annual Review of Genetics*, *54*(1), 1–24. https://doi.org/10.1146/annurev-genet-112618-043617

Anttila, V., Bulik-Sullivan, B., Finucane, H. K., Walters, R. K., Bras, J., Duncan, L., Escott-Price, V., Falcone, G. J., Gormley, P., Malik, R., Patsopoulos, N. A., Ripke, S., Wei, Z., Yu, D., Lee, P. H., Turley, P., Grenier-Boley, B., Chouraki, V., Kamatani, Y., … Neale, B. M. (2018). Analysis of shared heritability in common disorders of the brain. *Science*, *360*(6395). https://doi.org/10.1126/science.aap8757

Aqil, A., Speidel, L., Pavlidis, P., & Gokcumen, O. (2023). Balancing selection on genomic deletion polymorphisms in humans. *eLife*, *12*. https://doi.org/10.7554/elife.79111

Avsec, Ž., Agarwal, V., Visentin, D., Ledsam, J. R., Grabska-Barwinska, A., Taylor, K. R., Assael, Y., Jumper, J., Kohli, P., & Kelley, D. R. (2021). Effective gene expression prediction from sequence by integrating long-range interactions. *Nature Methods*, *18*(10), 1196–1203. https://doi.org/10.1038/s41592-021-01252-x

Avsec, Ž., Latysheva, N., Cheng, J., Novati, G., Taylor, K. R., Ward, T., Bycroft, C., Nicolaisen, L., Arvaniti, E., Pan, J., Thomas, R., Dutordoir, V., Perino, M., De, S., Karollus, A., Gayoso, A., Sargeant, T., Mottram, A., Wong, L. H., … Kohli, P. (2026). Advancing regulatory variant effect prediction with AlphaGenome. *Nature*, *649*(8099), 1206–1218. https://doi.org/10.1038/s41586-025-10014-0

Barghi, N., Hermisson, J., & Schlötterer, C. (2020). Polygenic adaptation: A unifying framework to understand positive selection. *Nature Reviews Genetics*, *21*(12), 769–781. https://doi.org/10.1038/s41576-020-0250-z

Beauchamp, J. P. (2016). Genetic evidence for natural selection in humans in the contemporary United States. *Proceedings of the National Academy of Sciences USA*, *113*(28), 7774–7779. https://doi.org/10.1073/pnas.1600398113

Bian, B., Hivert, V., Wray, N. R., & McRae, A. F. (2024). Extensive antagonistic variants across human genome. *medRxiv*. https://doi.org/10.1101/2024.11.28.24318135

Blauwendraat, C., Nalls, M. A., & Singleton, A. B. (2020). The genetic architecture of Parkinson's disease. *Lancet Neurology*, *19*(2), 170–178. https://doi.org/10.1016/s1474-4422(19)30287-x

Bongaarts, J. (2003). Completing the fertility transition in the developing world: The role of educational differences and fertility preferences. *Population Studies*, *57*(3), 321–335. https://doi.org/10.1080/0032472032000137835

Bouchard, T. J. (1998). Genetic and environmental influences on adult intelligence and special mental abilities. *Human Biology*, *70*(2), 257–279.

Brandes, N., Goldman, G., Wang, C. H., Ye, C. J., & Ntranos, V. (2023). Genome-wide prediction of disease variant effects with a deep protein language model. *Nature Genetics*, *55*(9), 1512–1522. https://doi.org/10.1038/s41588-023-01465-0

Bratsberg, B., & Rogeberg, O. (2018). Flynn effect and its reversal are both environmentally caused. *Proceedings of the National Academy of Sciences USA*, *115*(26), 6674–6678. https://doi.org/10.1073/pnas.1718793115

Buel, G. R., & Walters, K. J. (2022). Can AlphaFold2 predict the impact of missense mutations on structure? *Nature Structural & Molecular Biology*, *29*(1), 1–2. https://doi.org/10.1038/s41594-021-00714-2

Bulik-Sullivan, B. K., Loh, P.-R., Finucane, H. K., Ripke, S., Yang, J., Patterson, N., Daly, M. J., Price, A. L., & Neale, B. M. (2015). LD score regression distinguishes confounding from polygenicity in genome-wide association studies. *Nature Genetics*, *47*(3), 291–295. https://doi.org/10.1038/ng.3211

Buss, D. M. (2019). *Evolutionary Psychology: The New Science of the Mind* (6th). Routledge. https://doi.org/10.4324/9780429061417

Chatterjee, S., Karasaki, K. M., Fries, L. E., Kapoor, A., & Chakravarti, A. (2021). A multi-enhancer RET regulatory code is disrupted in Hirschsprung disease. *Genome Research*, *31*(12), 2199–2208. https://doi.org/10.1101/gr.275667.121

Chen, C.-Y., Tian, R., Ge, T., Lam, M., Sanchez-Andrade, G., Singh, T., Urpa, L., Liu, J. Z., Sanderson, M., Rowley, C., Ironfield, H., Fang, T., Kyttälä, A., Elliott, A., Kämpe, A., Sourander, A., Tuulio-Henriksson, A., Solismaa, A., Tanskanen, A., … Runz, H. (2023). The impact of rare protein coding genetic variation on adult cognitive function. *Nature Genetics*, *55*(6), 927–938. https://doi.org/10.1038/s41588-023-01398-8

Cheng, H., Luo, W., Si, S., Xin, X., Peng, Z., Zhou, H., Liu, H., & Yu, Y. (2022). Global trends in total fertility rate and its relation to national wealth, life expectancy and female education. *BMC Public Health*, *22*(1), 1346. https://doi.org/10.1186/s12889-022-13656-1

Chou, Y.-h., Ton That, V., & Sundman, M. (2020). A systematic review and meta-analysis of rTMS effects on cognitive enhancement in mild cognitive impairment and Alzheimer's disease. *Neurobiology of Aging*, *86*, 1–10. https://doi.org/10.1016/j.neurobiolaging.2019.08.020

Crew, F. A. E., Darlington, C. D., Haldane, J. B. S., Harland, C., Hogben, L. T., Huxley, J. S., Muller, H. J., Needham, J., Child, G. P., Koller, P. C., David, P. R., Landauer, W., Dahlberg, G., Plough, H. H., Dobzhansky, T., Price, B., Emerson, R. A., Schultz, J., Gordon, C., … Huskins, C. L. (1939). Social biology and population improvement. *Nature*, *144*(3646), 521–522. https://doi.org/10.1038/144521a0

Crick, F. (1971). Letter from Francis Crick to John T. Edsall, Fogarty International Center. https://profiles.nlm.nih.gov/101584582X196.

Darwin, C. (1871). *The Descent of Man, and Selection in Relation to Sex*. John Murray.

Davies, G., Marioni, R. E., Liewald, D. C., Hill, W. D., Hagenaars, S. P., Harris, S. E., Ritchie, S. J., Luciano, M., Fawns-Ritchie, C., Lyall, D., Cullen, B., Cox, S. R., Hayward, C., Porteous, D. J., Evans, J., McIntosh, A. M., Gallacher, J., Craddock, N., Pell, J. P., … Deary, I. J. (2016). Genome-wide association study of cognitive functions and educational attainment in UK Biobank (n=112 151). *Molecular Psychiatry*, *21*(6), 758–767. https://doi.org/10.1038/mp.2016.45

Dukler, N., Mughal, M. R., Ramani, R., Huang, Y.-F., & Siepel, A. (2022). Extreme purifying selection against point mutations in the human genome. *Nature Communications*, *13*(1), 4312. https://doi.org/10.1038/s41467-022-31872-6

Dutton, E., van der Linden, D., & Lynn, R. (2016). The negative Flynn effect: A systematic literature review. *Intelligence*, *59*, 163–169. https://doi.org/10.1016/j.intell.2016.10.002

Dutton, E., & Woodley of Menie, M. A. (2018). *At Our Wits' End: Why We're Becoming Less Intelligent and What It Means for the Future*. Societas.

Duval, M. X. (2018). The inadequacy of the reductionist approach in discovering new therapeutic agents against complex diseases. *Experimental Biology and Medicine*, *243*(12), 1004–1013. https://doi.org/10.1177/1535370218794365

Elmer, B. M., & McAllister, A. K. (2012). Major histocompatibility complex class I proteins in brain development and plasticity. *Trends in Neurosciences*, *35*(11), 660–670. https://doi.org/10.1016/j.tins.2012.08.001

ENCODE Project Consortium (2012). An integrated encyclopedia of DNA elements in the human genome. *Nature*, *489*(7414), 57–74. https://doi.org/10.1038/nature11247

Fahed, A. C., Wang, M., Homburger, J. R., Patel, A. P., Bick, A. G., Neben, C. L., Lai, C., Brockman, D., Philippakis, A., Ellinor, P. T., Cassa, C. A., Lebo, M., Ng, K., Lander, E. S., Zhou, A. Y., Kathiresan, S., & Khera, A. V. (2020). Polygenic background modifies penetrance of monogenic variants for tier 1 genomic conditions. *Nature Communications*, *11*(1), 3635. https://doi.org/10.1038/s41467-020-17374-3

Feuer, L. S. (1977). Marx and Engels as sociobiologists. *Survey*, *44*, 109–136.

Feuer, L. S. (1979). The friendship of Edwin Ray Lankester and Karl Marx: The last episode in Marx's intellectual evolution. *Journal of the History of Ideas*, *40*(4), 633. https://doi.org/10.2307/2709363

Fishilevich, S., Nudel, R., Rappaport, N., Hadar, R., Plaschkes, I., Iny Stein, T., Rosen, N., Kohn, A., Twik, M., Safran, M., Lancet, D., & Cohen, D. (2017). Genehancer: Genome-wide integration of enhancers and target genes in GeneCards. *Database*, *2017*, 2017. https://doi.org/10.1093/database/bax028

Floriani, T., & Lipka, A. E. (2025). Rare variants in crops: Theoretical insights and emerging detection strategies. *in silico Plants*, *7*(2). https://doi.org/10.1093/insilicoplants/diaf012

Frisoni, G. B., Altomare, D., Thal, D. R., Ribaldi, F., van der Kant, R., Ossenkoppele, R., Blennow, K., Cummings, J., van Duijn, C., Nilsson, P. M., Dietrich, P.-Y., Scheltens, P., & Dubois, B. (2022). The probabilistic model of Alzheimer disease: The amyloid hypothesis revised. *Nature Reviews Neuroscience*, *23*(1), 53–66. https://doi.org/10.1038/s41583-021-00533-w

Ganna, A., Genovese, G., Howrigan, D. P., Byrnes, A., Kurki, M. I., Zekavat, S. M., Whelan, C. W., Kals, M., Nivard, M. G., Bloemendal, A., Bloom, J. M., Goldstein, J. I., Poterba, T., Seed, C., Handsaker, R. E., Natarajan, P., Mägi, R., Gage, D., Robinson, E. B., … Neale, B. M. (2016). Ultra-rare disruptive and damaging mutations influence educational attainment in the general population. *Nature Neuroscience*, *19*(12), 1563–1565. https://doi.org/10.1038/nn.4404

Halldorsson, B. V., Palsson, G., Stefansson, O. A., Jonsson, H., Hardarson, M. T., Eggertsson, H. P., Gunnarsson, B., Oddsson, A., Halldorsson, G. H., Zink, F., Gudjonsson, S. A., Frigge, M. L., Thorleifsson, G., Sigurdsson, A., Stacey, S. N., Sulem, P., Masson, G., Helgason, A., Gudbjartsson, D. F., … Stefansson, K. (2019). Characterizing mutagenic effects of recombination through a sequence-level genetic map. *Science*, *363*(6425). https://doi.org/10.1126/science.aau1043

Hamilton, W. D. (1967). Extraordinary sex ratios. *Science*, *156*(3774), 477–488. https://doi.org/10.1126/science.156.3774.477

Hamilton, W. D. (1975). Innate social aptitudes of man: An approach from evolutionary genetics. In R. Fox (Ed.), *Biosocial Anthropology* (pp. 133–155). Malaby Press.

Hamilton, W. D. (2000). A review of Dysgenics: Genetic Deterioration in Modern Populations. *Annals of Human Genetics*, *64*(4), 363–374. https://doi.org/10.1046/j.1469-1809.2000.6440363.x

Hamilton, W. (1964). The genetical evolution of social behaviour. I. *Journal of Theoretical Biology*, *7*(1), 1–16. https://doi.org/10.1016/0022-5193(64)90038-4

Harper, P. S. (2019). *The Evolution of Medical Genetics*. CRC Press. https://doi.org/10.1201/9780429340789

Hill, L. L. (2003). The race to patent the genome: Free riders, hold ups, and the future of medical breakthroughs. *Texas Intellectual Property Law Journal*, *Winter*, 221.

Hill, W. D., Arslan, R. C., Xia, C., Luciano, M., Amador, C., Navarro, P., Hayward, C., Nagy, R., Porteous, D. J., McIntosh, A. M., Deary, I. J., Haley, C. S., & Penke, L. (2018). Genomic analysis of family data reveals additional genetic effects on intelligence and personality. *Molecular Psychiatry*, *23*(12), 2347–2362. https://doi.org/10.1038/s41380-017-0005-1

Hivert, V., Sidorenko, J., Rohart, F., Goddard, M. E., Yang, J., Wray, N. R., Yengo, L., & Visscher, P. M. (2021). Estimation of non-additive genetic variance in human complex traits from a large sample of unrelated individuals. *American Journal of Human Genetics*, *108*(5), 786–798. https://doi.org/10.1016/j.ajhg.2021.02.014

Holland, D., Frei, O., Desikan, R., Fan, C.-C., Shadrin, A. A., Smeland, O. B., Sundar, V. S., Thompson, P., Andreassen, O. A., & Dale, A. M. (2020). Beyond SNP heritability: Polygenicity and discoverability of phenotypes estimated with a univariate Gaussian mixture model. *PLOS Genetics*, *16*(5), e1008612. https://doi.org/10.1371/journal.pgen.1008612

Hopkins, A. L. (2008). Network pharmacology: The next paradigm in drug discovery. *Nature Chemical Biology*, *4*(11), 682–690. https://doi.org/10.1038/nchembio.118

Hsu, S. (2014). Super-intelligent humans are coming. *Nautilus*. https://nautil.us/super_intelligent-humans-are-coming-235110/.

Hugh-Jones, D., & Abdellaoui, A. (2022). Human capital mediates natural selection in contemporary humans. *Behavior Genetics*, *52*(4-5), 205–234. https://doi.org/10.1007/s10519-022-10107-w

Huguet, G., Schramm, C., Douard, E., Tamer, P., Main, A., Monin, P., England, J., Jizi, K., Renne, T., Poirier, M., Nowak, S., Martin, C.-O., Younis, N., Knoth, I. S., Jean-Louis, M., Saci, Z., Auger, M., Tihy, F., Mathonnet, G., … Jacquemont, S. (2021). Genome-wide analysis of gene dosage in 24,092 individuals estimates that 10,000 genes modulate cognitive ability. *Molecular Psychiatry*, *26*(6), 2663–2676. https://doi.org/10.1038/s41380-020-00985-z

Jensen, S., Pesta, B., & Kirkegaard, E. O. W. (2025). International meta-analysis of differential fertility for intelligence. *OpenPsych*. https://doi.org/10.26775/op.2025.08.06

Jónsson, H., Sulem, P., Kehr, B., Kristmundsdottir, S., Zink, F., Hjartarson, E., Hardarson, M. T., Hjorleifsson, K. E., Eggertsson, H. P., Gudjonsson, S. A., Ward, L. D., Arnadottir, G. A., Helgason, E. A., Helgason, H., Gylfason, A., Jonasdottir, A., Jonasdottir, A., Rafnar, T., Frigge, M., ... Stefansson, K. (2017). Parental influence on human germline *de novo* mutations in 1,548 trios from Iceland. *Nature*, *549*(7673), 519–522. https://doi.org/10.1038/nature24018

Julian, R. J. (2005). Production and growth related disorders and other metabolic diseases of poultry – a review. *Veterinary Journal*, *169*(3), 350–369. https://doi.org/10.1016/j.tvjl.2004.04.015

Karavani, E., Zuk, O., Zeevi, D., Barzilai, N., Stefanis, N. C., Hatzimanolis, A., Smyrnis, N., Avramopoulos, D., Kruglyak, L., Atzmon, G., Lam, M., Lencz, T., & Carmi, S. (2019). Screening human embryos for polygenic traits has limited utility. *Cell*, *179*(6), 1424–1435.e8. https://doi.org/10.1016/j.cell.2019.10.033

Khera, A. V., Chaffin, M., Aragam, K. G., Haas, M. E., Roselli, C., Choi, S. H., Natarajan, P., Lander, E. S., Lubitz, S. A., Ellinor, P. T., & Kathiresan, S. (2018). Genome-wide polygenic scores for common diseases identify individuals with risk equivalent to monogenic mutations. *Nature Genetics*, *50*(9), 1219–1224. https://doi.org/10.1038/s41588-018-0183-z

Kondrashov, A. S. (2017). *Crumbling Genome: The Impact of Deleterious Mutations on Humans*. Wiley-Blackwell. https://doi.org/10.1002/9781118952146

Kong, A., Frigge, M. L., Masson, G., Besenbacher, S., Sulem, P., Magnusson, G., Gudjonsson, S. A., Sigurdsson, A., Jonasdottir, A., Jonasdottir, A., Wong, W. S. W., Sigurdsson, G., Walters, G. B., Steinberg, S., Helgason, H., Thorleifsson, G., Gudbjartsson, D. F., Helgason, A., Magnusson, O. T., ... Stefansson, K. (2012). Rate of *de novo* mutations and the importance of father's age to disease risk. *Nature*, *488*(7412), 471–475. https://doi.org/10.1038/nature11396

Kong, A., Frigge, M. L., Thorleifsson, G., Stefansson, H., Young, A. I., Zink, F., Jonsdottir, G. A., Okbay, A., Sulem, P., Masson, G. B., Gudbjartsson, D. F., Helgason, A., Bjornsdottir, G., Thorsteinsdottir, U., & Stefansson, K. (2017). Selection against variants in the genome associated with educational attainment. *Proceedings of the National Academy of Sciences of the United States of America*, *114*(5), E727–E732. https://doi.org/10.1073/pnas.1612113114

Langbert, M. (2018). Homogenous: The political affiliations of elite liberal arts college faculty. *Academic Questions*, *31*(2), 186–197. https://doi.org/10.1007/s12129-018-9700-x

Lankester, E. R. (1880). *Degeneration: A Chapter in Darwinism*. Macmillan & Co. https://doi.org/10.5962/bhl.title.4740

Lee, J. J., Wedow, R., Okbay, A., Kong, E., Maghzian, O., Zacher, M., Nguyen-Viet, T. A., Bowers, P., Sidorenko, J., Karlsson Linnér, R., Fontana, M. A., Kundu, T., Lee, C., Li, H., Li, R., Royer, R., Timshel, P. N., Walters, R. K., Willoughby, E. A., ... Cesarini, D. (2018). Gene discovery and polygenic prediction from a genome-wide association study of educational attainment in 1.1 million individuals. *Nature Genetics*, *50*(8), 1112–1121. https://doi.org/10.1038/s41588-018-0147-3

Lentz, T. (1927). Relation of I.Q. to size of family. *Journal of Educational Psychology*, *18*(7), 486–496. https://doi.org/10.1037/h0072940

Lin, M., Chakraborty, S., Amorim, C. E. G., Nigenda-Morales, S. F., Beichman, A. C., Nuñez-Valencia, P. G., Mah, J., Robinson, J. A., Kyriazis, C. C., Huber, C. D., Webb, A. E., Kocher, S. D., Archer, F. I.,

Moreno-Estrada, A., Wayne, R. K., & Lohmueller, K. E. (2025). The distribution of fitness effects varies phylogenetically across animals. *bioRxiv*. https://doi.org/10.1101/2025.05.13.653358

Long, E., Williams, J., Zhang, H., & Choi, J. (2025). An evolving understanding of multiple causal variants underlying genetic association signals. *American Journal of Human Genetics*, *112*(4), 741–750. https://doi.org/10.1016/j.ajhg.2025.01.018

Louveau, A., Smirnov, I., Keyes, T. J., Eccles, J. D., Rouhani, S. J., Peske, J. D., Derecki, N. C., Castle, D., Mandell, J. W., Lee, K. S., Harris, T. H., & Kipnis, J. (2015). Structural and functional features of central nervous system lymphatic vessels. *Nature*, *523*(7560), 337–341. https://doi.org/10.1038/nature14432

Lupi, A. S., Vazquez, A. I., & de los Campos, G. (2024). Mapping the relative accuracy of cross-ancestry prediction. *Nature Communications*, *15*(1), 10480. https://doi.org/10.1038/s41467-024-54727-8

Lynch, M. (2016). Mutation and human exceptionalism: Our future genetic load. *Genetics*, *202*(3), 869–875. https://doi.org/10.1534/genetics.115.180471

Lynn, R. (1982). IQ in Japan and the United States shows a growing disparity. *Nature*, *297*(5863), 222–223. https://doi.org/10.1038/297222a0

Lynn, R. (1996). *Dysgenics: Genetic Deterioration in Modern Populations*. Praeger.

Lynn, R. (2001). *Eugenics: A Reassessment*. Praeger. https://doi.org/10.5040/9798400648007

Lyu, T., Zhou, S., Fang, J., Wang, L., Shi, L., Dong, Y., & Zhang, H. (2022). Convergent genomic signatures of high-altitude adaptation among six independently evolved mammals. *Animals*, *12*(24), 3572. https://doi.org/10.3390/ani12243572

Marigorta, U. M., & Navarro, A. (2013). High trans-ethnic replicability of GWAS results implies common causal variants. *PLoS Genetics*, *9*(6), e1003566. https://doi.org/10.1371/journal.pgen.1003566

Marx, K. (1881). Marx to nikolai danielson in st. petersburg.

Meisenberg, G. (2010). The reproduction of intelligence. *Intelligence*, *38*(2), 220–230. https://doi.org/10.1016/j.intell.2010.01.003

Morton, N. E., Crow, J. F., & Muller, H. J. (1956). An estimate of the mutational damage in man from data on consanguineous marriages. *Proceedings of the National Academy of Sciences*, *42*(11), 855–863. https://doi.org/10.1073/pnas.42.11.855

Mulder, H. A., Lee, S. H., Clark, S., Hayes, B. J., & van der Werf, J. H. J. (2019). The impact of genomic and traditional selection on the contribution of mutational variance to long-term selection response and genetic variance. *Genetics*, *213*(2), 361–378. https://doi.org/10.1534/genetics.119.302336

Muller, H. J. (1928). The production of mutations by X-rays. *Proceedings of the National Academy of Sciences*, *14*(9), 714–726. https://doi.org/10.1073/pnas.14.9.714

Muller, H. J. (1950). Our load of mutations. *American Journal of Human Genetics*, *2*(2), 111–176.

Muñoz, P. R., Resende, M. F. R., Gezan, S. A., Resende, M. D. V., de los Campos, G., Kirst, M., Huber, D., & Peter, G. F. (2014). Unraveling additive from nonadditive effects using genomic relationship matrices. *Genetics*, *198*(4), 1759–1768. https://doi.org/10.1534/genetics.114.171322

Nadeau, S., Beaulieu, J., Gezan, S. A., Perron, M., Bousquet, J., & Lenz, P. R. N. (2023). Increasing genomic prediction accuracy for unphenotyped full-sib families by modeling additive and dominance effects with large datasets in white spruce. *Frontiers in Plant Science*, *14*. https://doi.org/10.3389/fpls.2023.1137834

Nasser, J., Bergman, D. T., Fulco, C. P., Guckelberger, P., Doughty, B. R., Patwardhan, T. A., Jones, T. R., Nguyen, T. H., Ulirsch, J. C., Lekschas, F., Mualim, K., Natri, H. M., Weeks, E. M., Munson, G., Kane, M., Kang, H. Y., Cui, A., Ray, J. P., Eisenhaure, T. M., … Engreitz, J. M. (2021). Genome-wide enhancer maps link risk variants to disease genes. *Nature*, *593*(7858), 238–243. https://doi.org/10.1038/s41586-021-03446-x

Okbay, A., Wu, Y., Wang, N., Jayashankar, H., Bennett, M., Nehzati, S. M., Sidorenko, J., Kweon, H., Goldman, G., Gjorgjieva, T., Jiang, Y., Hicks, B., Tian, C., Hinds, D. A., Ahlskog, R., Magnusson, P. K. E., Oskarsson, S., Hayward, C., Campbell, A., … Young, A. I. (2022). Polygenic prediction of educational attainment within and between families from genome-wide association analyses in 3 million individuals. *Nature Genetics*, *54*(4), 437–449. https://doi.org/10.1038/s41588-022-01016-z

Özer, O. (2023). Disentangling the roles of adaptive and neutral evolution in shaping HLA immune gene diversity in humans [Doctoral dissertation, Kiel University]. https://nbn-resolving.org/urn:nbn:de:gbv:8:3-2024-00023-8.

Panizzon, M. S., Vuoksimaa, E., Spoon, K. M., Jacobson, K. C., Lyons, M. J., Franz, C. E., Xian, H., Vasilopoulos, T., & Kremen, W. S. (2014). Genetic and environmental influences on general cognitive ability: Is g a valid latent construct? *Intelligence*, *43*, 65–76. https://doi.org/10.1016/j.intell.2014.01.008

Pante, M. R., Gjerde, B., McMillan, I., & Misztal, I. (2002). Estimation of additive and dominance genetic variances for body weight at harvest in rainbow trout, Oncorhynchus mykiss. *Aquaculture*, *204*(3-4), 383–392. https://doi.org/10.1016/s0044-8486(01)00825-0

Paul, D. (1984). Eugenics and the Left. *Journal of the History of Ideas*, *45*(4), 567–590. https://doi.org/10.2307/2709374

Penn, D. J., Damjanovich, K., & Potts, W. K. (2002). MHC heterozygosity confers a selective advantage against multiple-strain infections. *Proceedings of the National Academy of Sciences*, *99*(17), 11260–11264. https://doi.org/10.1073/pnas.162006499

Plomin, R., & Deary, I. J. (2015). Genetics and intelligence differences: Five special findings. *Molecular Psychiatry*, *20*(1), 98–108. https://doi.org/10.1038/mp.2014.105

Plomin, R. (2024). Nonshared environment: Real but random. *JCPP Advances*, *4*(3). https://doi.org/10.1002/jcv2.12229

Pouget, J. G., Han, B., Wu, Y., Mignot, E., Ollila, H. M., Barker, J., Spain, S., Dand, N., Trembath, R., Martin, J., Mayes, M. D., Bossini-Castillo, L., López-Isac, E., Jin, Y., Santorico, S. A., Spritz, R. A., Hakonarson, H., Polychronakos, C., Raychaudhuri, S., & Knight, J. (2019). Cross-disorder analysis of schizophrenia and 19 immune-mediated diseases identifies shared genetic risk. *Human Molecular Genetics*, *28*(20), 3498–3513. https://doi.org/10.1093/hmg/ddz145

Qureshi, M. A., & Havenstein, G. B. (1994). A comparison of the immune performance of a 1991 commercial broiler with a 1957 randombred strain when fed "typical" 1957 and 1991 broiler diets. *Poultry Science*, *73*(12), 1805–1812. https://doi.org/10.3382/ps.0731805

Rauw, W., Kanis, E., Noordhuizen-Stassen, E., & Grommers, F. (1998). Undesirable side effects of selection for high production efficiency in farm animals: A review. *Livestock Production Science*, *56*(1), 15–33. https://doi.org/10.1016/s0301-6226(98)00147-x

Reid, J. M., Arcese, P., & Keller, L. F. (2003). Inbreeding depresses immune response in song sparrows (Melospiza melodia): Direct and inter–generational effects. *Proceedings of the Royal Society of London. Series B: Biological Sciences*, *270*(1529), 2151–2157. https://doi.org/10.1098/rspb.2003.2480

Reid, J. M., Arcese, P., Keller, L. F., Elliott, K. H., Sampson, L., & Hasselquist, D. (2007). Inbreeding effects on immune response in free-living song sparrows (Melospiza melodia). *Proceedings of the Royal Society B: Biological Sciences*, *274*(1610), 697–706. https://doi.org/10.1098/rspb.2006.0092

Rietveld, C. A., Medland, S. E., Derringer, J., Yang, J., Esko, T., Martin, N. W., Westra, H.-J., Shakhbazov, K., Abdellaoui, A., Agrawal, A., Albrecht, E., Alizadeh, B. Z., Amin, N., Barnard, J., Baumeister, S. E., Benke, K. S., Bielak, L. F., Boatman, J. A., Boyle, P. A., … Koellinger, P. D. (2013). GWAS of 126,559 individuals identifies genetic variants associated with educational attainment. *Science*, *340*(6139), 1467–1471. https://doi.org/10.1126/science.1235488

Rodríguez, J. A., Marigorta, U. M., Hughes, D. A., Spataro, N., Bosch, E., & Navarro, A. (2017). Antagonistic pleiotropy and mutation accumulation influence human senescence and disease. *Nature Ecology & Evolution*, *1*(3), 0055. https://doi.org/10.1038/s41559-016-0055

Sanjak, J. S., Sidorenko, J., Robinson, M. R., Thornton, K. R., & Visscher, P. M. (2018). Evidence of directional and stabilizing selection in contemporary humans. *Proceedings of the National Academy of Sciences USA*, *115*(1), 151–156. https://doi.org/10.1073/pnas.1707227114

Savage, J. E., Jansen, P. R., Stringer, S., Watanabe, K., Bryois, J., de Leeuw, C. A., Nagel, M., Awasthi, S., Barr, P. B., Coleman, J. R. I., Grasby, K. L., Hammerschlag, A. R., Kaminski, J. A., Karlsson, R., Krapohl, E., Lam, M., Nygaard, M., Reynolds, C. A., Trampush, J. W., … Posthuma, D. (2018). Genome-wide association meta-analysis in 269,867 individuals identifies new genetic and functional links to intelligence. *Nature Genetics*, *50*(7), 912–919. https://doi.org/10.1038/s41588-018-0152-6

Ségalat, L. (2007). Loss-of-function genetic diseases and the concept of pharmaceutical targets. *Orphanet Journal of Rare Diseases*, *2*(1), 30. https://doi.org/10.1186/1750-1172-2-30

Sekar, A., Bialas, A. R., de Rivera, H., et al. (2016). Schizophrenia risk from complex variation of complement component 4. *Nature*, *530*(7589), 177–183. https://doi.org/10.1038/nature16549

Sherkow, J. S., & Greely, H. T. (2015). The history of patenting genetic material. *Annual Review of Genetics*, *49*(1), 161–182. https://doi.org/10.1146/annurev-genet-112414-054731

Shulman, C., & Bostrom, N. (2014). Embryo selection for cognitive enhancement: Curiosity or game-changer? *Global Policy*, *5*(1), 85–92. https://doi.org/10.1111/1758-5899.12123

Sobreira, D. R., Joslin, A. C., Zhang, Q., et al. (2021). Extensive pleiotropism and allelic heterogeneity mediate metabolic effects of IRX3 and IRX5. *Science*, *372*(6546), 1085–1091. https://doi.org/10.1126/science.abf1008

Tautz, D., Pallares, L. F., Andersson, L., et al. (2026). Beyond Mendel: A call to revisit the genotype-phenotype map through new experimental paradigms. *Genetics*, *232*(4), 1–10. https://doi.org/10.1093/genetics/iyag024

Tishkoff, S. A., Reed, F. A., Ranciaro, A., et al. (2007). Convergent adaptation of human lactase persistence in Africa and Europe. *Nature Genetics*, *39*(1), 31–40. https://doi.org/10.1038/ng1946

Trivers, R. (2011). *The Folly of Fools: The Logic of Deceit and Self-Deception in Human Life*. Basic Books.

Turley, P., Meyer, M. N., Wang, N., et al. (2021). Problems with using polygenic scores to select embryos. *New England Journal of Medicine*, *385*(1), 78–86. https://doi.org/10.1056/NEJMsr2105065

Tylee, D. S., Sun, J., Hess, J. L., et al. (2018). Genetic correlations among psychiatric and immune-related phenotypes based on genome-wide association data. *American Journal of Medical Genetics Part B: Neuropsychiatric Genetics*, *177*(7), 641–657. https://doi.org/10.1002/ajmg.b.32652

van der Most, P. J., de Jong, B., Parmentier, H. K., & Verhulst, S. (2011). Trade-off between growth and immune function: A meta-analysis of selection experiments. *Functional Ecology*, *25*(1), 74–80. https://doi.org/10.1111/j.1365-2435.2010.01800.x

Vinkhuyzen, A. A., van der Sluis, S., Maes, H. H. M., & Posthuma, D. (2012). Reconsidering the heritability of intelligence in adulthood: Taking assortative mating and cultural transmission into account. *Behavior Genetics*, *42*(2), 187–198. https://doi.org/10.1007/s10519-011-9507-9

Visscher, P. M., Gyngell, C., Yengo, L., & Savulescu, J. (2025). Heritable polygenic editing: The next frontier in genomic medicine? *Nature*, *637*(8046), 637–645. https://doi.org/10.1038/s41586-024-08300-4

Wainschtein, P., Zhang, Y., Schwartzentruber, J., Kassam, I., Sidorenko, J., Fiziev, P. P., Wang, H., McRae, J., Border, R., Zaitlen, N., Sankararaman, S., Goddard, M. E., Zeng, J., Visscher, P. M., Farh, K. K.-H., & Yengo, L. (2026). Estimation and mapping of the missing heritability of human phenotypes. *Nature*, *649*(8099), 1219–1227. https://doi.org/10.1038/s41586-025-09720-6

Wainwright, P. C., Alfaro, M. E., Bolnick, D. I., & Hulsey, C. D. (2005). Many-to-one mapping of form to function: A general principle in organismal design? *Integrative and Comparative Biology*, *45*(2), 256–262. https://doi.org/10.1093/icb/45.2.256

Wang, M., et al. (2016). Evidence of dysgenic fertility in China. *Intelligence*, *57*, 15–24. https://doi.org/10.1016/j.intell.2016.04.001

Wang, M. (2023). Estimating the parental age effect on intelligence with controlling for confounding effects from genotypic differences. *Personality and Individual Differences*, *207*, 112137. https://doi.org/10.1016/j.paid.2023.112137

Wang, M. (2025). Genetic basis and applications of imaging scores of behavioural phenotypes [Doctoral dissertation, Peking University].

Wang, M. (2026). The red gene: Sociobiology as the modern heir of marxism [Manuscript in preparation].

Wang, M., & Huang, S. (2023). The collective effects of genetic variants and complex traits. *Journal of Human Genetics*, *68*(4), 255–262. https://doi.org/10.1038/s10038-022-01105-1

Wang, M., & Lynn, R. (2018). Intelligence in the People's Republic of China. *Personality and Individual Differences*, *134*, 275–277. https://doi.org/10.1016/j.paid.2018.06.010

Weede, E., & Kämpf, S. (2002). The impact of intelligence and institutional improvements on economic growth. *Kyklos*, *55*(3), 361–380. https://doi.org/10.1111/1467-6435.00191

Werme, J., van der Sluis, S., Posthuma, D., & de Leeuw, C. A. (2022). An integrated framework for local genetic correlation analysis. *Nature Genetics*, *54*(3), 274–282. https://doi.org/10.1038/s41588-022-01017-y

Wolfram, S. (2024). Can AI solve science? *Stephen Wolfram Writings*. https://doi.org/10.31855/54c0d5a7-0b8

Wood, K. A., & Goriely, A. (2022). The impact of paternal age on new mutations and disease in the next generation. *Fertility and Sterility*, *118*(6), 1001–1012. https://doi.org/10.1016/j.fertnstert.2022.10.017

Woodley of Menie, M. A. (2015). How fragile is our intellect? Estimating losses in general intelligence due to both selection and mutation accumulation. *Personality and Individual Differences*, *75*, 80–84. https://doi.org/10.1016/j.paid.2014.10.047

Yang, J., Zeng, J., Goddard, M. E., Wray, N. R., & Visscher, P. M. (2017). Concepts, estimation and interpretation of SNP-based heritability. *Nature Genetics*, *49*(9), 1304–1310. https://doi.org/10.1038/ng.3941

Yang, Y., Yan, Z., Chang, W., Ding, J., & Xu, H. (2024). Effect of different modalities of transcranial magnetic stimulation on Parkinson's patients cognitive impairment and long-term effectiveness: A systematic review and network meta-analysis. *Frontiers in Neuroscience*, *18*. https://doi.org/10.3389/fnins.2024.1354864

Zhu, Z., Bakshi, A., Vinkhuyzen, A. A., Hemani, G., Lee, S. H., Nolte, I. M., van Vliet-Ostaptchouk, J. V., Snieder, H., Esko, T., Milani, L., Mägi, R., Metspalu, A., Hill, W. G., Weir, B. S., Goddard, M. E., Visscher, P. M., & Yang, J. (2015). Dominance genetic variation contributes little to the missing heritability for human complex traits. *American Journal of Human Genetics*, *96*(3), 377–385. https://doi.org/10.1016/j.ajhg.2015.01.001

Zuidhof, M., Schneider, B., Carney, V., Korver, D., & Robinson, F. (2014). Growth, efficiency, and yield of commercial broilers from 1957, 1978, and 2005. *Poultry Science*, *93*(12), 2970–2982. https://doi.org/10.3382/ps.2014-04291

MANKIND QUARTERLY Mankind Quarterly, 67(1), 35-48 2026 Fall Edition
ISSN: 0025-2344

Rewriting Fatherhood in Shona Popular Music: Ethical and Emotional Labour in Alick Macheso's Baba VaSandy

Innocent Tinashe Mutero[†*]

Abstract

This article examines Alick Macheso's Shona song Baba VaSandy as a site for negotiating, critiquing, and reimagining fatherhood in contemporary Zimbabwe. Drawing on multivocal ethnomusicological frameworks and critical masculinity scholarship, the study analyses the song's lyrical narrative alongside its digital reception. This qualitative study uses verse-by-verse textual analysis and thematic interpretation of YouTube comments to trace public engagement and moral reflection. The analysis highlights five interrelated dimensions: children as moral witnesses to paternal failure; the temporal and ritual politics of arrival; the intergenerational consequences of neglect framed through *dzinza* (lineage); the affective and somatic imprint of domestic conflict; and the de-commodification of care, in which love (*rudo*) is enacted through presence, attentiveness, and relational labour rather than material provision. The study integrates African philosophical and Southern African ethnomusicological perspectives to demonstrate how Baba VaSandy functions as a moral pedagogy, offering culturally grounded tools for evaluating, critiquing, and reshaping masculinities. The study contributes to literature on African fatherhood, popular music as ethical practice, and the role of digital media in mediating social discourse, showing that popular songs can generate public moral reflection and advance alternative forms of paternal authority.

Keywords: Shona, Popular music, Fatherhood, Masculinity, Ethics of care, Digital media

1 Introduction

Between 1993 and 1999, I attended Takunda Primary School in Mkoba, a former Group B government school that mostly served children from low-income households. Schools like Takunda were visibly different from City Council and corporate-run institutions such as Takwirira or Bata Primary. It was common for pupils at Takunda to be sent home for unpaid fees or incomplete uniforms, a daily reminder of the economic struggles many families faced. Yet even within this sea of hardship, our classrooms were not homogeneous. A few children came from comparatively better-off families, while others performed small acts of self-fashioning to mask their economic backgrounds.

One incident from Grade 5 stands out. A classmate whom I will call Corlo had written in an English composition that his father was a medical doctor at Gweru General Hospital. Our teacher asked him to confirm the story, her disbelief revealing more than I understood at the time. Corlo's father was in fact a general hand. Corlo had been too ashamed to write his father's real occupation, and the truth was betrayed by the simple details we all recognised: an incomplete uniform, worn-out shoes, and the quiet embarrassment that surrounded many of us.

I, too, crafted a more dignified paternal identity when required. I would write that my father worked for ZIMNAT Life as a Senior Financial Advisor, a position actually held by my uncle, who happened to share his initials. When friends visited our home, the ZIMNAT calendar bearing "my father's" name reinforced the illusion. The discomfort underlying these fictions had little to do with our fathers themselves; it stemmed

† Johannesburg Business School
* Corresponding author, email: muteroinnocent@gmail.com

from the social pressure to measure fatherhood through income and occupation. Poverty made our fathers appear inadequate.

As an adult and a father, I now recognise how narrow that childhood conception was. My father may not have been a high-earning professional, but he offered nurturing care in abundance. With more resources, he would likely have fulfilled the provider role with ease. What I once viewed as failure was in fact a reflection of the structural conditions that limited many Zimbabwean men's ability to embody the conventional ideal of the provider-father.

This early experience reflects a larger social reality. Fatherhood in Zimbabwe occupies a complex social, cultural, and economic terrain in which traditional expectations, structural constraints, and shifting family forms intersect (Musiwa et al., 2026). Historically, fatherhood has been defined through the roles of authority, discipline and economic provision, positions deeply rooted in patriarchal kinship systems and reinforced through customary norms that cast men as heads of households (Bhana et al., 2026). In many communities, a "good" father is one who fulfils his provider obligations even if this comes with emotional distance or limited everyday engagement with children. This model has remained remarkably resilient despite profound social change, shaping public perceptions of what men ought to do within families and determining how paternal success is evaluated.

Contemporary realities complicate the above mentioned ideal. Economic instability, unemployment, labour migration, and evolving gender expectations have transformed the lived experience of fatherhood in Zimbabwe. Many men struggle to perform the provider role in the ways tradition prescribes, leading to feelings of inadequacy, withdrawal, or diminished involvement in family life (Mogano et al., 2025). Others are physically present but emotionally absent, maintaining a distant patriarchal authority that restricts everyday relational intimacy with their partners and children. These dynamics have fuelled public concerns about "present-but-absent" fathers, paternal silence, and the intergenerational consequences of authoritarian or disengaged fatherhood.

At the same time, there is growing recognition of the importance of paternal involvement in children's emotional and social well-being. Research across Southern Africa shows that fathers significantly contribute to children's cognitive development, educational outcomes, and emotional security, regardless of co-residency (Lobaka, 2022; Makusha & Richter, 2014). However, despite the clear developmental value of nurturing fatherhood, the cultural scripts available to Zimbabwean men remain narrow. Dominant constructions of masculinity continue to equate fatherhood with wage labour and financial responsibility, marginalising emotional presence, affection, and everyday nurturing labour as feminine or secondary responsibilities. This mismatch between cultural expectations, economic realities and children's developmental needs reproduces a persistent tension: Fathers are expected to care, yet they are not socially equipped or encouraged to practise care.

This tension creates fertile ground for cultural intervention particularly through popular music, which has long served in Zimbabwe as a medium for social commentary, moral reflection, and everyday pedagogy. Within this context, Alick Macheso's widely celebrated song Baba VaSandy becomes an indispensable cultural text. Macheso, Zimbabwe's foremost sungura musician, commands a unique cultural authority; his music, rooted in the rhythms of Zimbabwean traditional genres and styles , has long served as a vernacular for reflecting the everyday moral and material concerns of Zimbabwean life (Chamisa, 2022). Macheso's voice carries the weight of public trust, transforming popular song into social commentary with broad pedagogical reach (Chamisa, 2023; Matiza-Mtombeni, 2022). Rather than reinforcing the familiar figure of the distant or purely economic father, Macheso articulates a form of nurturing fatherhood that values presence, accountability, and relational care. Its widespread popularity evident in continual airplay, social media circulation, and adoption into everyday family conversations signals a public resonance with this alternative script, and yet scholarship has largely overlooked its cultural significance.

This article examines Baba VaSandy as a culturally significant site through which I explore how popular music might open space for alternative masculinities in Zimbabwe. I am motivated by the limited cultural scripts available to men who wish to practise nurturing fatherhood and by the paucity of scholarly attention to music's role in shaping these possibilities. By analysing the song's lyrical framing of fatherly responsibility alongside its public reception, I seek to understand how Macheso's work engages with,

questions, or unsettles prevailing expectations of paternal authority and emotional restraint. In doing so, I aim to contribute to broader debates on masculinity, caregiving, and the pedagogical functions of popular music, and to consider whether Baba VaSandy gestures toward a more relational and emotionally engaged model of fatherhood within contemporary Zimbabwe.

2 Theoretical framework

This study is situated at the intersection of masculinity studies, African ethnomusicology, and scholarship on public pedagogy. It draws on this interdisciplinary constellation to analyse Baba VaSandy as a cultural site in which competing ideas of fatherhood, emotionality and male responsibility are negotiated, performed, and pedagogically reshaped.

2.1 Masculinity and fatherhood in African contexts

Fatherhood is shaped by broader configurations of masculinity. Connell and Messerschmidt (2005) concept of hegemonic masculinity provides a useful starting point for understanding dominant expectations placed on Zimbabwean men, particularly the expectation to exercise authority, provide materially, and maintain emotional restraint. Yet, as Morrell and Ouzgane (2005) argue, African masculinities are neither monolithic nor static; they are historically layered, culturally specific, and continually reworked in response to social and economic conditions. Within this framework, nurturing or emotionally expressive fatherhood does not necessarily represent a Western imposition, but can be read as part of a wider repertoire of African paternal practices that have been overshadowed by colonial legacies, labour migration, and economic precarity.

Complementing this is scholarship on hybrid masculinities (Bridges & Pascoe, 2014), which examines how men selectively incorporate practices such as caregiving while retaining or reconfiguring patriarchal authority. This concept helps to frame Macheso's lyrical portrayal of fatherhood as both a challenge to and a negotiation with conventional gendered expectations. The song's attention to presence, emotional visibility, and mutual respect positions paternal care not only as a moral duty but as a relational practice grounded in everyday interactions within the household.

2.2 Popular music as social text and public pedagogy

The study is further anchored in theoretical work that understands popular music as a mode of public pedagogy; a cultural form through which social meanings are produced, circulated, and contested. It follows the tradition set by Barber (1997), who conceptualises popular arts as public arenas of debate or public sphere where society reflects upon itself. Ethnomusicological scholarship (Mutero, 2018c; Turino, 2008) has long argued that African popular music functions as an arena for moral debate, political commentary, and social reflection. Drawing on Hall (2001) encoding/decoding model, the song is treated as a text that encodes particular interpretations of fatherhood while audience responses, such as those expressed in YouTube comments, constitute the decoding practices through which these meanings are affirmed, challenged, or extended.

By bringing these perspectives into conversation, this analysis examines how Baba VaSandy encodes a form of hybrid masculinity that simultaneously draws from and critiques hegemonic norms, and how it circulates as public pedagogy through digital reception. This integrated framework allows us to treat the song not merely as a musical artefact, but as a dynamic social text, one where masculinities are performed and debated, emotional norms are made visible, and cultural understandings of fatherhood are pedagogically reshaped. This lens supports an analysis attuned not only to lyrical content, but to the wider social, affective, and moral work that popular music performs in contemporary Zimbabwe.

3 Methods

This study adopts an interpretive qualitative design that combines ethnomusicological multivocal thick description with elements of digital ethnography. According to Titon (2012), multivocal thick description is an interpretive methodology used to apprehend and interpret cultural "texts" by unpacking the layers of symbolic meaning embedded within social actions and musical expressions. In this framework, a song is treated not merely as a technical object of analysis or a "text" to be decoded scientifically, but as a "social text" that reflects lived experience, identity, and cultural symbols (Titon, 2012).

The analysis proceeds in two interconnected stages. First, the lyrical narrative of Baba VaSandy is examined using close reading techniques grounded in ethnomusicology and African popular music studies (Barber, 1997). This step involves identifying recurring motifs, moral framings, and representations of paternal behaviour and emotional labour within the song. Second, the study analyses public reception through comments posted on the song's most viewed YouTube video. Here, the affordances of the digital platform are integral to the method.

YouTube functions not only as a contemporary cultural forum but as an archival and algorithmic system that reshapes the song's pedagogical function. Unlike ephemeral radio play, it provides a permanent, on-demand archive. The anonymity of the comment section can enable more confessional discourse, while algorithmic recommendations recirculate the song within broader networks of social and moral content (Hine, 2020; Kozinets, 2015). Following netnographic principles, YouTube comments were thus treated as naturally occurring data that offer insight into how listeners interpret and mobilize the song within this specific digital ecosystem.

To ensure methodological transparency and avoid selective sampling, a clear set of inclusion criteria was developed. All comments posted between 2019 and 2024 were retrieved and sorted by relevance, with the first 200 populated comments subjected to analysis. Spam, duplicated comments, emoji-only posts, and off-topic remarks were excluded. The remaining comments were coded inductively using Braun and Clarke (2006) six-step thematic analysis. The analysis approached comments as discursive performances situated within the affordances and vernacular conventions of the YouTube platform rather than treating them as transparent expressions of intent. This enabled the identification of dominant interpretive patterns, affective registers, and recurring cultural frames, including humour, irony, and exaggeration as analytically significant modes of meaning-making rather than methodological limitations. My positionality as a Zimbabwean ethnomusicologist informed the interpretive lens while maintaining analytic reflexivity. This positionality functioned to explicate tacit (nontextual) knowledge (Tracy, 2010), allowing for culturally grounded and nuanced interpretation of both the music and comments from YouTube. The goal of this qualitative design is to illuminate how meaning circulates through both the musical text and its digital reception, thereby demonstrating how Baba VaSandy becomes a site for negotiating paternal norms in contemporary Zimbabwe.

4 Results and discussion: Reading Baba VaSandy as a multivocal social text

Applying Jeff Todd Titon's framework of multivocal description to Alick Macheso's Baba VaSandy, understood both as a lyrical narrative and as a digitally mediated cultural artefact, reveals the song as a key site where Zimbabwean fatherhood is publicly negotiated, contested, and reimagined. Rather than approaching the song as a closed musical object, (Askew, 2002; I. T. Mutero, 2018).

The discussion unfolds across two interrelated domains. First, it examines the lyrical semiotics through which Macheso mobilises familiar Shona symbols to unsettle hegemonic paternal authority. Second, it situates these lyrical interventions within their multivocal reception on YouTube, where listeners extend, personalise, and sometimes confess through Macheso's narrative. Together, these layers illuminate how Baba VaSandy operates as a form of public pedagogy around care, masculinity and moral responsibility, one that resonates strongly within contemporary debates on fatherhood in Southern Africa (Ratele, 2016; Richter & Morrell, 2006).

4.1 Children as moral subjects and the exposure of paternal failure

Verse 1: Alick Macheso

The opening verse of Baba VaSandy establishes the song's ethical orientation by centring children as moral subjects rather than passive dependents. Macheso directly confronts the father, *nhai baba vaSandy munodarirei pamberi pevana* (Father of Sandy, why do you act/behave like that in front of the children?), posing a question that is less inquisitive than accusatory. The question and by extension the verse works to foreground the spatial and moral visibility of paternal conduct thus framing fatherhood as a practice that is continuously observed, evaluated, and judged within the domestic sphere, thereby alerting the audience's attention not just to inappropriate behaviour, but to the fact that it unfolds in front of children.

Crucially, Macheso rejects a common patriarchal assumption, that children are either oblivious to adult conflict or too immature to interpret it. His insistence that *vana vanoziva musiyano wekufara nekusuwa* ("The children know the difference between happiness and sadness") asserts children's emotional literacy and moral discernment. Children, in this formulation, are not shielded innocents but perceptive witnesses who can distinguish joy from sorrow and, by implication, care from neglect. In addition, the repeated refrain *vana vanoti kudiiko nazvo* ("the children ask, what is this?") functions as a chorus of ethical indictment. Rather than articulating anger or rebellion, the children voice confusion which is itself politically and morally significant.

In African expressive traditions, repetition is not redundancy but emphasis; it amplifies moral urgency and invites communal reflection (Agawu, 2014; Nketia, 1974). Through returning insistently to the children's question, Macheso transforms private domestic disturbance into a public moral problem, rendering paternal failure audible and socially discussable. This positioning challenges dominant masculinity frameworks in which adult male authority is insulated from scrutiny by age hierarchies and emotional silence. Much scholarship on African masculinities has prioritised men's struggles to achieve respectability under conditions of economic and social constraint, sometimes at the expense of those who bear the consequences of masculine failure (Morrell, 2001). Macheso's intervention disrupts this analytic emphasis by shifting attention to children as evaluators of masculine conduct. In doing so, Baba VaSandy resonates with more recent work that treats children as social actors whose emotional responses constitute a form of moral commentary on adult behaviour (Hardecker et al., 2016). Macheso's choice to ventriloquise children's voices does not diminish adult responsibility; rather, it intensifies it. The father's actions no longer belong to the private realm of marital conflict but are exposed as failures with social, emotional, and intergenerational consequences.

What Macheso does is significant because it situates popular music as a form of everyday moral pedagogy. As scholars of African popular music have long argued, musicians often act as social commentators who translate intimate experiences into shared ethical frameworks (Barber, 1997; Turino, 2008). Song is thus understood as a socially authorised medium through which otherwise marginalised voices, children, women and subordinates, can speak moral truths indirectly (I. Mutero, 2018). The functional role of music thus becomes both a representation of emotion and performance of ethical disclosure. Macheso lays the groundwork for a broader critique of masculinities that rely on silence, fear, or assumed dominance by granting children narrative voice and moral standing.

4.2 Temporal absence, deception, and the moral politics of homecoming

Verse 2: Alick Macheso

The second verse of Baba VaSandy deepens the song's ethical critique by shifting attention from exposure to temporality. Here, Macheso interrogates not only what the father does, but when and how he appears within the domestic space. The father's repeated late arrival, rationalised through claims of work, becomes a moral problem rather than a logistical one. The pointed question *kubasaiko kwamunouya isu vamwe tatorara* ("What kind of work is it where you come home only after the rest of us are already asleep?") destabilises the dominant patriarchal narrative in which labour justifies absence. Scholarship on African fatherhood has long documented how histories of migrant labour and economic dispossession have normalised male absence while preserving symbolic authority within the household (Hunter, 2015; Morrell, 2001).

Macheso scrutinises the way work is mobilised discursively to mask withdrawal, deception, and emotional non-participation. He frames lateness as a relational failure rather than an economic sacrifice, by emphasising that the father arrives when "the rest of us are already asleep". As such, time becomes ethical substance where arrival after sleep is not neutral. Instead, it signifies avoidance, secrecy, and a refusal of encounter. This temporal failure culminates in one of the song's most powerful sonic inversions: the household responds to the father's arrival with *maihwee vauya* (Oh no, he's back), a cry of alarm rather than welcome.

In Shona domestic life, *vauya baba* ("here comes the father") conventionally signals safety, order, and restored authority. Macheso fractures this deeply embedded script, transforming the father's presence into a source of fear. This inversion is crucial. As Agawu (2014) argues, African musical meaning often emerges through the manipulation of expectation. Macheso exploits a familiar auditory cue only to subvert it, making fear audible where comfort should reside. This resonated with my own childhood understanding of paternal inadequacy, which was also framed through economic lack. Where I once internalized shame for my father's modest job, Macheso's lyrics expose a more insidious failure: the use of "work" as a shield for emotional neglect. Both revelations, however, stem from the same oppressive logic that reduces fatherhood to a transactional, economically defined role devoid of nurturing care.

The repeated confessions: *tavakanganisa, pfungwa toga toga* ("we have failed them; their minds are scattered/disturbed") register the affective fallout of this distorted homecoming. Although voiced collectively, the disorientation is clearly traced to paternal deception. Authority here is revealed as performative rather than relational. Macheso thus aligns with critical masculinity scholarship that shows how hegemonic masculinities sustain themselves through appearances of control that conceal emotional disengagement (Ratele, 2016). The home, far from being stabilised by paternal arrival, becomes a space of anxiety where the father's arrival is met with screaming *maihwee vauya,* precisely because authority is no longer anchored in care.

4.3 Moral education, communal witness, and the crisis of dzinza

Verse 3: Alick Macheso

The third verse widens the moral horizon of Baba VaSandy, extending the consequences of paternal failure beyond the household into the intergenerational and cosmological order. Macheso's question *chidzidzoiko chavachadzidza kubva kwatiri*? ("What kind of lesson will they learn from us?") reframes fatherhood as a pedagogical relationship. Children are not only witnesses to behaviour; they are learners whose moral worlds are being actively shaped by what they observe. This framing resonates with African philosophical traditions that understand socialisation as moral apprenticeship rather than abstract instruction (Chitakure, 2022; Taringa & Chirongoma, 2023).

Macheso intensifies this argument through the warning that such children may grow up to be described as having no ancestral roots: *pavanozodero zvonzi vana ava hapana dzinza*. ("When they imitate us, people will exclaim: 'These children have no proper upbringing/heritage'."). In Shona cosmology, *dzinza* (clan/lineage) is not reducible to biological descent. It is a moral and spiritual infrastructure linking the living to ancestors and future generations (Bourdillon, 1976; Matiure, 2011). To lack ancestry is to be socially unanchored and spiritually vulnerable. Macheso reframes fatherhood as custodial responsibility rather than personal entitlement by connecting paternal neglect to the erosion of clan lineage. The father's failure is both emotional and threatens the continuity of moral personhood itself.

Anthropological work on kinship in Southern Africa has emphasised that lineage is sustained not only through naming and ritual, but through everyday practices of care, discipline, and presence (Mshayisa et al., 2024; Mthethwa, 2025). Macheso's intervention aligns with this scholarship by showing how emotional abandonment produces symbolic orphanhood even in the presence of a living father. The song thus challenges masculinities that claim ancestral legitimacy while undermining the very relational labour through which lineage is reproduced. Significantly, Macheso stages this crisis as a communal concern. Grandmothers and relatives are brought in the chorus of bewilderment, repeatedly asking *veukama vanoti kudiiko nazvo*? ("What will the relatives say about it?"). Failing to provide positive fatherhood is no longer an

individual failure but a public moral rupture. This multivocality reflects a broader African musical logic in which ethical judgement is dispersed across collective voices rather than monopolised by a single narrator (Barber, 1997). Through repetition and escalation, the song transforms domestic neglect into a socially accountable problem, demanding recognition from the wider kinship network.

4.4 Silence, somatic distress, and the reconstruction of nurturing presence

Verse 4: Alick Macheso

Verse 4 marks a pivotal shift in Baba VaSandy, moving from critique toward reconstruction. Macheso begins by insisting that some things should not be said or done in front of children: *Zvimwe hazvibvire kurevaaaa, (Pamberi pevana); Zvimwe hazvibvire kutaura, (Tavapariraka) (“*Some things cannot be said openly, (in front of the children); Some things cannot be spoken about, (we try to shield them from it”). This refrain is not an appeal to silence for its own sake, but a demand for ethical restraint with a view to protect adult reputation and children’s emotional integrity. Macheso underscores the moral obligation of adults to manage conflict responsibly rather than displacing its weight onto children through repetition of this warning. Across disciplines, research strongly implies that adults have a moral responsibility to manage conflict in ways that protect children rather than shifting its emotional burden onto them (Nangia, 2023; Sudland & Neumann, 2020). Rather than treating moral responsibility as an empirically provable fact, this analysis understands it as a socially produced norm communicated and reinforced through musical performance.

The verse then returns to the consequences of domestic strife, tracing its effects on the child’s body and social life. The child becomes withdrawn at home and visibly sad at school (*Bopoto pamba rinoita kuti mhuri ishungurudzike, Chero kuchikoro unomuona nekusuw*a) (Conflict at home causes the family to be distressed; even at school, you can see them [children] looking sad). Drawing on Sara Ahmed’s affect theory, we can read this "*kusuwa*" (sadness) as an example of how emotions stick to subjects through repetition and proximity (Ahmed, 2013). The domestic tension does not remain at home; instead, the child’s body becomes a "bodily archive" of the father’s conduct. As the child moves from the home to the school, the sadness circulates with them, transforming a private domestic conflict into a visible public affect. This somatic distress demonstrates that fatherhood is not just a social status but a practice that "orients" children toward particular emotional states.

When Sandy is "visibly sad at school", her body is performing a "multivocal" critique of her father’s neglect, a silence that speaks more loudly than the father’s deceptive excuses. By framing the child’s body as a site of moral witness, Macheso challenges the patriarchal "culture of silence”. He challenges the assumption that domestic conflict can be contained within private space. Instead, Macheso renders trauma as somatic and mobile, carried into classrooms, friendships, and public life. This aligns with anthropological work on affect that emphasises how emotions circulate socially rather than remaining privately owned (Ahmed, 2013). Silence here is not absence of speech; it is a bodily archive of harm.

Against this bleak landscape, Macheso introduces a counterfactual vision of fatherhood organised around time, ritual, and attentiveness: *Sandy naye anofara kugashira baba vabve kubasa, (Vasvikaa nguva dziripo)* Sandy rejoices to greet her father returning from work, (when he comes home on time). *Vauya vauya babaaaa, vauya baba ohhhh vauya vauya, (zvihwitsi muhomwe)* (He’s here, he’s here — father has come home! (with sweets in his pocket).

The father who arrives on time while the child is awake embodies an alternative masculine ethic. Time, previously a marker of avoidance, becomes a moral resource. The act of *kugashira baba* (receiving the father) is framed as a relational ritual through which authority is confirmed by eagerness rather than fear. In addition, the objects the father brings, sweets, newspapers, small treats, are not incidental embellishments. Macheso introduces a counterfactual vision of fatherhood organised around time, ritual, and attentiveness. The father who arrives on time while the child is awake embodies an alternative masculine ethic. Time, previously a marker of avoidance, becomes a moral resource. The shift is captured in the jubilant, repeated chant that rewrites the domestic soundscape:

In African expressive traditions, material symbols often condense moral meaning (Mdhluli, 2025). Here they signify remembrance, communication, and shared pleasure. The newspaper links the father

to knowledge and conversation rather than noise and conflict; the sweets and treats register intentional tenderness. Through these details, Macheso reconstructs fatherhood as something enacted through ordinary gestures rather than dramatic authority. This reconstruction demonstrates how popular song can function as what Turino (2008) calls a socially meaningful process, a shared script for feeling and action that listeners can recognise and inhabit. The repeated chant "*vauya vauya baba*", once associated with fear, is reclaimed as celebration. The emotional soundscape of the home is rewritten where authority is no longer imposed but is welcomed.

4.5 De-commodifying fatherhood and reclaiming loving and nurturing care

Verse 5: Alick Macheso

The song's closing movement crystallises its ethical intervention through a decisive separation of provision from care: *Mari tingavapa zvedu harusi rudo, mari tingavapa zvedu harusi rudo; Zvitsvene tingavapa zvedu rudo rwuhombe, zvitsvene tingavapa zvedu rudo rwuhombe (asi) (*"We may give them money, but that is not love; giving them money alone is not love. What we must give them is something sacred — our great love, our deepest love (but. . .)"). Macheso insists that money, while necessary, does not constitute love. In a Zimbabwean context historically shaped by migrant labour, economic precarity and colonial disruptions to family life, this distinction is profoundly destabilising. Much scholarship on African fatherhood has shown how masculinity has been anchored in the capacity to provide materially, often rendering emotional absence socially intelligible or morally excusable (Hunter, 2015; Morrell, 2001). Macheso does not dismiss provision; rather, he relativizes it. He exposes the thinness of a paternal model that reduces responsibility to remittances and symbolic authority by declaring that money alone is not love.

In Macheso's formulation, love is redefined as presence, affirmation, and emotional labour. His repeated insistence that children should know they have parents, ought to be certain that both father and mother are present, frames love as relational certainty rather than material security. This resonates with feminist ethics of care that conceptualise care not as affective disposition but as sustained practice involving time, attentiveness, and accountability (Hooks, 2004). Read through this lens, Baba VaSandy articulates fatherhood as an embodied obligation that cannot be outsourced or deferred. Love is not something that circulates indirectly through money; it is enacted through everyday presence.

Financial provision is often associated with hegemonic masculinity, where traditional masculine performance remains entangled with wage labour and financial provision (Helman et al., 2019), standing in the way of fathers being proactive primary caregivers. Typically, simple family interactions like playing, singing, and reading with young children are not perceived as important aspects of child care by some Black African men (Gibbs et al., 2017). Through song Macheso engages communities in negotiating hegemonic masculinity and the traditional conception of men as financial providers with a view to improve positive fatherhood. Positive fatherhood is crucial in ensuring that children thrive, not just survive (Makusha & Richter, 2018). It lays the foundation for good health, rapid brain growth (Allen et al., 2015), optimum human capital, and subsequent success in adult life (Allen et al., 2015).

Through foregrounding emotional availability as a core paternal duty, Macheso challenges a dominant masculine logic in Southern Africa in which economic contribution is mobilised to compensate for emotional withdrawal. As Ratele (2016) argues, such logics sustain masculinities that are socially powerful but ethically thin, privileging authority over care. Baba VaSandy intervenes in this terrain by offering an alternative moral grammar of fatherhood; one in which legitimacy is grounded in responsiveness rather than distance, and authority is earned through relational labour rather than assumed through provision.

5 Audience meaning-making and the social life of Baba VaSandy

The lyrical analysis reveals Baba VaSandy as a carefully encoded text of moral pedagogy. Yet, its cultural significance is ultimately determined by its public uptake and resonance. To understand how this alternative script of fatherhood circulates and gains social traction, we should move from textual encoding to audience decoding.

The digital reception on YouTube provides a dynamic, multi-vocal record of this process, functioning as a contemporary public forum where the song's lessons are validated, negotiated, and integrated into everyday moral reasoning. Across comments, the song is taken up as a moral reference point through which fatherhood, masculinity, care, and domestic harm are publicly evaluated. These digital conversations reveal how popular music participates in shaping social understandings of fatherhood by offering shared symbols, language, and affective cues that listeners mobilise in relation to their own lives. By analysing this reception, we will see how listeners transform the song into a shared cultural tool using it to draw moral boundaries, confess personal trauma, critique materialist masculinity, and collectively imagine a more empathetic paternal authority.

5.1 Baba VaSandy as moral caution and masculine boundary

A recurring pattern in the YouTube comments is the transformation of Baba VaSandy into a moral shorthand for failed fatherhood. Listeners invoke the character not merely as a narrative figure, but as a negative reference point against which they actively position themselves. Statements such as *Ndikasazongoitawo baba va Sandy* ("I hope I don't become like Baba Sandy") reveal how the song enables moral self-fashioning, allowing men to articulate what they refuse to become. This process aligns with scholarship on masculinity as relational and performative rather than fixed, in which men continually negotiate acceptable masculine identities in relation to culturally available figures and scripts (Connell, 2020; Hatendi, 2024).

What is significant here is that this moral boundary-making occurs in a context where paternal authority is often normalised even when it is emotionally harmful. Macheso's song renders damaging forms of fatherhood visible and discussable by naming Baba VaSandy as a recognisable figure of fear, neglect, and emotional absence. This resonates with African fatherhood studies that have shown how cultural respect for male authority can coexist with silence around emotional harm (Makusha, 2024; Richter & Morrell, 2006). The song provides a culturally legitimate proxy through which critique can be voiced without directly confronting elders, kinship hierarchies, or entrenched gender norms. In this way, music becomes a mediating device for negotiating alternative masculinities, displacing critique onto a shared aesthetic figure while preserving social cohesion (de Boise, 2012).

5.2 Lyrical language as moral resource

Another dominant theme in the comments is the circulation of Macheso's lyrical phrases as moral resources, most notably *Mari tingavapa zvedu harusi rudo* ("Giving them money is not love"). When listeners reproduce this line in the comment space, they are not simply quoting the song for the sake of it; they are mobilising its language to critique materialist definitions of fatherhood that prioritise financial provision while excusing emotional withdrawal. This directly engages debates within fatherhood literature that distinguish between provider masculinity and caregiving masculinity, particularly in contexts of economic precarity where breadwinning is often overemphasised (Richter & Morrell, 2006).

The portability of this phrase suggests that Baba VaSandy has contributed a durable moral vocabulary to everyday discourse. Ethnomusicological work has long argued that song lyrics can function as "social texts" that circulate beyond performance contexts, shaping moral reasoning and everyday talk (Barber, 1997; Turino, 2008). Here, Macheso's lyrics become tools for judgement and reflection, allowing listeners to name dissatisfaction with dominant fatherhood norms in culturally resonant terms. The repeated quotation of Macheso's lyrics in the comment space also reflects a process of entextualisation, whereby elements of a performed song are rendered into detachable, circulating texts that listeners mobilise as moral resources or perhaps socially actionable discourse (Barber, 2005).

5.3 Music as a space for disclosure and affective witnessing

Perhaps the most consequential audience responses are those in which listeners use the song as a point of entry to disclose personal experiences of family breakdown, neglect, and abuse. Comments such as "*Masong edu vane vabereki vakaparadzana*" ("This song is for those of us from broken homes") position

Baba VaSandy as a collective site of recognition for shared histories of paternal absence and domestic conflict. These disclosures align with scholarship on music as an affective and social infrastructure, one that enables recognition, emotional articulation, and forms of witnessing that may be unavailable in formal public spheres (DeNora, 1999, 2000).

More starkly, some commenters use the space to speak about ongoing emotional abuse and gender-based violence, as in the comment: *in love with this song cz boyfriend yangu inondishungurudza and I'm pregnant*. While individually these are personal testimonies, collectively they reveal how the song legitimises speech about harm that is often silenced by norms of endurance, respectability, and family privacy. Silencing abuse in families is a dominant part of Shona culture, with the proverb *chakafukidza dzimba matenga* implying that the secrets of the home need to remain untold being used to legitimise abuse as expected and a norm in families (Manyonganise, 2015).

The culture of silence gives abusive fathers room to continue with their wayward behaviour realising that there are no immediate consequences and that the public would never know about it. However, by repeatedly foregrounding the effects of paternal behaviour in the refrain *pamberi pevana* ("in front of the children"), Macheso's lyrics reframe domestic cruelty as a public moral issue rather than a private matter. This echoes feminist and public health scholarship that emphasises the social normalisation of domestic violence and the difficulty of naming it within patriarchal family structures (Mathews et al., 2015). The song thus represents suffering as well as creates conditions under which suffering can be acknowledged, shared, and morally evaluated.

5.4 Empathy and the reimagining of masculine authority

A further theme emerging from the comments is listeners' recognition of Macheso's empathic narrative stance. Several respondents explicitly note that the song's power lies in the fact that it is voiced by a man who inhabits the emotional worlds of women and children. One comment observes that Macheso is a fellow male who we all respect stepping into a woman's shoes and singing passionately from a woman's heart." This response is culturally significant in a context where masculine authority is often associated with emotional restraint, stoicism, and distance.

Rather than being interpreted as weakness, Macheso's empathic positioning is read as moral strength. This resonates with critical masculinity scholarship that argues for the ethical and political importance of care, vulnerability, and emotional openness as alternative masculine virtues (Ratele, 2016). Through this empathic orientation, Baba VaSandy reframes paternal authority as something earned through attentiveness and presence rather than assumed through gender, age, or economic role. Audience responses suggest that this reframing resonates across gendered and generational lines, contributing to a wider moral community that values emotionally engaged fatherhood.

6 Conclusion

This article extends existing scholarship on African fatherhood and masculinity by demonstrating how popular music functions not merely as a reflective medium, but as an active cultural mechanism through which alternative paternal ideals are articulated, circulated, and normalised. While much work on fatherhood in Southern Africa has focused on social policy, labour migration, or ethnographic accounts of family life (Morrell & Ouzgane, 2005; Richter & Morrell, 2006), this study shows how music supplies the affective language, symbolic cues, and moral scripts through which fatherhood is publicly debated and emotionally apprehended. Baba VaSandy operates as a form of public pedagogy: It renders harmful forms of masculinity visible, legitimises emotional critique, and offers listeners a culturally resonant vocabulary for imagining nurturing paternal presence. By foregrounding multi-vocal audience engagement in digital spaces, the article further demonstrates that musical meaning is co-produced through listening, repetition, and response.

The YouTube comment space extends the song's social life, enabling listeners to reflect on personal experience, articulate moral judgement, and imagine alternative paternal futures. This aligns with ethnomusicological and cultural studies scholarship that positions music as a site of informal learning,

moral reasoning, and social instruction (Giroux, 2004; Turino, 2008). In this sense, Macheso's song does not simply comment on fatherhood; it actively participates in reshaping the moral commons within which fatherhood in contemporary Zimbabwe is understood and evaluated. Rather than prescribing behaviour, the song works by shaping affect, language, and recognition. It renders certain forms of fatherhood visible as harmful while making nurturing presence intelligible and desirable. In doing so, Baba VaSandy illustrates how popular music can intervene in intimate social domains, offering culturally grounded resources for thinking about care, responsibility, and what it means to be a father in contemporary Zimbabwe.

Conflict of interest

The author declares that there are no conflicts of interest or competing interests associated with this research.

Data Availability

The data that support the findings of this study are available from publicly accessible online sources. These data were derived from publicly available YouTube comment threads accessible at the time of data collection. Any personally identifiable user information has been removed or anonymised in line with ethical research practice.

References

Agawu, K. (2014). *Representing African Music: Postcolonial Notes, Queries, Positions*. Routledge. https://doi.org/10.4324/9781315810942

Ahmed, S. (2013). *The Cultural Politics of Emotion*. Routledge. https://doi.org/10.4324/9780203700372

Allen, L., Kelly, B. B., & National Research Council (2015). *Child Development and Early Learning. Transforming the Workforce for Children Birth through Age 8: A Unifying Foundation*. National Academies Press (US).

Askew, K. (2002). *Performing the Nation: Swahili Music and Cultural Politics in Tanzania*. University of Chicago Press.

Barber, K. (1997). *Readings in African Popular Culture*. Indiana University Press.

Barber, K. (2005). Text and performance in Africa. *Oral Tradition*, *20*(2), 264–277. https://doi.org/10.1353/ort.2006.0001

Bhana, D., Govender, D., & Matswetu, V. (2026). Parents, patriarchy and schooling amongst the Shona in rural Zimbabwe. *Gender and Education*, *38*(5). https://doi.org/10.1080/09540253.2026.2672613

Bourdillon, M. F. (1976). *The Shona Peoples: An Ethnography of the Contemporary Shona, with Special Reference to Their Religion*. Mambo Press.

Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology*, *3*(2), 77–101. https://doi.org/10.1191/1478088706qp063oa

Bridges, T., & Pascoe, C. J. (2014). Hybrid masculinities: New directions in the sociology of men and masculinities. *Sociology Compass*, *8*(3), 246–258. https://doi.org/10.1111/soc4.12134

Chamisa, V. (2022). *Macheso's Sungura and Social Identity Narratives in Postcolonial Zimbabwe. Indigenous African Popular Music, Volume 1: Prophets and Philosophers*. Springer. https://doi.org/10.1007/978-3-030-97884-6_19

Chamisa, V. (2023). Singing for and on behalf of the subaltern: An analysis of Alick macheso's sungura. *Mankind Quarterly*, *64*(2), 261–278. https://doi.org/10.46469/mq.2023.64.2.5

Chitakure, J. (2022). *The Indispensability of One's Culture: Lessons from Oliver Mtukudzi's Songs. The Life and Music of Oliver Mtukudzi: Reconstruction and Identity*. Springer. https://doi.org/10.1007/978-3-030-80728-3_7

Connell, R. W. (2020). *Masculinities*. Routledge. https://doi.org/10.4324/9781003116479

Connell, R. W., & Messerschmidt, J. W. (2005). Hegemonic masculinity: Rethinking the concept. *Gender & Society*, *19*(6), 829–859. https://doi.org/10.1177/0891243205278639

de Boise, S. (2012). Masculinities, music, emotion and affect [Doctoral dissertation, University of Leeds].

DeNora, T. (1999). Music as a technology of the self. *Poetics*, *27*(1), 31–56. https://doi.org/10.1016/s0304-422x(99)00017-0

DeNora, T. (2000). *Music in Everyday Life*. Cambridge University Press.

Gibbs, A., Crankshaw, T., Lewinsohn, R., Chirawu, P., & Willan, S. (2017). 'I play with the baby so that people can see that I'm a man': Young fathers' involvement in the first 1000 days of a child's life in South Africa. *South African Review of Sociology*, *48*(1), 67–84. https://doi.org/10.1080/21528586.2016.1204244

Giroux, H. A. (2004). Public pedagogy and the politics of neo-liberalism: Making the political more pedagogical. *Policy Futures in Education*, *2*(3-4), 494–503. https://doi.org/10.2304/pfie.2004.2.3.5

Hall, S. (2001). 1980 Encoding/decoding, Encoding/decoding. *Media and Cultural Studies: Keyworks*, 166–176.

Hardecker, S., Schmidt, M. F. H., Roden, M., & Tomasello, M. (2016). Young children's behavioral and emotional responses to different social norm violations. *Journal of Experimental Child Psychology*, *150*, 364–379. https://doi.org/10.1016/j.jecp.2016.06.012

Hatendi, C. M. (2024). Changing masculinities and femininities for Zimbabwe's development: A philosophical examination. In E. Chitando, O. B. Mlambo, S. Mfecane, & K. Ratele (Eds.), *The Palgrave Handbook of African Men and Masculinities* (pp. 589–604). Palgrave Macmillan.

Helman, R., Malherbe, N., & Kaminer, D. (2019). Young people's reproductions of the 'father as provider' discourse: Intersections of race, class, culture and gender within a liberal democracy. *Community, Work & Family*, *22*(2), 146–166. https://doi.org/10.1080/13668803.2018.1433636

Hine, C. (2020). *Ethnography for the Internet: Embedded, Embodied and Everyday*. Routledge.

Hooks, b. (2004). *The Will to Change: Men, Masculinity, and Love*. Washington Square Press.

Hunter, M. (2015). Cultural politics and masculinities: Multiple partners in historical perspective in KwaZulu-Natal. *Culture, Health and Sexuality*, *7*(4), 37–52. https://doi.org/10.4324/9781315794259-5

Kozinets, R. V. (2015). *Netnography: Redefined*. Sage.

Lobaka, S. T. (2022). Non-resident, not absent: The caregiving role non-resident fathers play in raising their children. *South African Review of Sociology*, *52*(4), 21–41.

Makusha, T. (2024). Young fatherhood, masculinities, and structural factors in South Africa. *Frontiers in Sociology*, *9*, 1410801.

Makusha, T., & Richter, L. (2014). The role of black fathers in the lives of children in South Africa. *Child Abuse & Neglect*, *38*(6), 982–992. https://doi.org/10.1016/j.chiabu.2014.05.003

Makusha, T., & Richter, L. (2018). Fatherhood in the first 1,000 days. In *State of South Africa's fathers* (pp. 49–63).

Manyonganise, M. (2015). Oppressive and liberative: A Zimbabwean woman's reflections on ubuntu. *Verbum et Ecclesia*, *36*, 1–7.

Mathews, S., Jewkes, R., & Abrahams, N. (2015). 'So now i'm the man': Intimate partner femicide and its interconnections with expressions of masculinities in South Africa. *British Journal of Criminology*, *55*, 107–124.

Matiure, P. (2011). Mbira dzavadzimu and its space within the Shona cosmology: Tracing mbira from bira to the spiritual world. *Muziki*, *8*, 29–49. https://doi.org/10.1080/18125980.2011.631291

Matiza-Mtombeni, V. M. (2022). Tracing family agency in Alick Macheso's selected songs. *South African Journal of African Languages*, *42*, 172–178.

Mdhluli, N. G. (2025). The role played by folklore in raising up an African child. *Journal of Education and Learning Technology*, *6*(6), 397–405. https://doi.org/10.38159/jelt.2025666

Mogano, N. T. H., Letsoalo, D. L., & Oduaran, C. A. (2025). Effects of masculine culture on the mental health of Northern Sotho male youth. *BMC Psychology*, *13*(1), 605. https://doi.org/10.1186/s40359-025-02934-3

Morrell, R. (Ed.) (2001). *Changing Men in Southern Africa*. University of Natal Press.

Morrell, R., & Ouzgane, L. (2005). *African Masculinities: Men in Africa from the Late Nineteenth Century to the Present*. Palgrave Macmillan.

Mshayisa, L., Bhagwan, R., & Dewan, F. (2024). The role of African spirituality in the provision of kinship care in the South African context. *Religions*, *15*(1), 108.

Mthethwa, N. N. (2025). African spirituality as a source of wisdom and strength in rural Ndwedwe [Doctoral dissertation]. Durban University of Technology.

Mutero, I. (2018). Performing subversion: Negotiating social and political space in Zimbabwe through Chinyambera traditional dance. In *Performing Zimbabwe: A Transdisciplinary Study of Zimbabwean Music* (pp. 56–75).

Mutero, I. T. (2018). Voices of dissent: The music of Chiwoniso Maraire, 'the rebel woman'. In B. Chinouriri, U. Kufakurinani, & M. Nyakudya (Eds.), *Victors, Victims and Villains: Women in Musical Arts in Zimbabwe: Past and Present*. University of Zimbabwe Press.

Nangia, V. (2023). Crisis of parental conflict: Impact on children and families. *Horyzonty Wychowania*, *22*(64), 71–82.

Nketia, J. K. (1974). The musical heritage of Africa. *Daedalus*, *103*(2), 151–161.

Ratele, K. (2016). *Liberating Masculinities*. HSRC Press.

Richter, L., & Morrell, R. (2006). *Baba: Men and Fatherhood in South Africa*. HSRC Press.

Sudland, C., & Neumann, C. B. (2020). Should we take their children? Caseworkers' negotiations of 'good enough' care for children living with high-conflict parents. *European Journal of Social Work*, *24*, 683–695.

Taringa, B., & Chirongoma, S. (2023). Socially constructed discourse on chihera: An asset or liability in Zimbabwe's envisioned gender equal society. In E. Chitando, S. Chirongoma, & M. Nyakudya (Eds.), *Chihera in Zimbabwe: A Radical African Feminist Principle*. Springer Nature.

Titon, J. T. (2012). *Textual Analysis or Thick Description? The Cultural Study of Music*. Routledge.

Tracy, S. J. (2010). Qualitative quality: Eight "big-tent" criteria for excellent qualitative research. *Qualitative Inquiry*, *16*, 837–851.

Turino, T. (2008). *Music as Social Life: The Politics of Participation*. University of Chicago Press.

MANKIND QUARTERLY
Mankind Quarterly, 67(1), 49-64 2026 Fall Edition
ISSN: 0025-2344

Governmentality and Development Issues in Zimbabwe: A Decolonial Reading of Selected *Dendera* Songs by Simon Chimbetu

Wonder Maguraushe[†] Solomon Gwerevende[‡]

Abstract

Music functions as a vital communicative tool, engaging with and reflecting upon social, cultural, economic, and political realities. This article interrogates how *Sungura* music articulates the intricate interplay between governance and development in Zimbabwe through the works of prominent artist Simon Chimbetu. By deploying critical discourse, content, and textual analyses, this qualitative study examines four selected *Dendera* tracks to reveal how music operates not merely as entertainment but as a medium for social commentary, critique, and dialogue on pressing national concerns. The paper addresses a significant gap in scholarship by demonstrating how *Dendera* music serves as a vehicle for political and social discourse that both shapes public perceptions and influences community development. The findings show that Chimbetu's lyrics address the theme of governmentality, manifested in economic hardship, food insecurity, unemployment, transport inefficiencies, and social injustice. His music thus provides a narrative that resonates with the lived struggles of ordinary Zimbabweans, positioning him as a cultural voice for the marginalised and as an interpreter of Zimbabwe's contested developmental trajectory. Ultimately, the study contributes to broader debates on the role of popular culture in advancing critical citizenship, amplifying subaltern voices, and shaping the discourse on sustainable governance and development in postcolonial African contexts.

Keywords: Governance, *Dendera*, Development, Popular music, *Sungura*

1 Introduction

Music has long served as a critical medium of expression and resistance in Africa, functioning not only as entertainment but also as a vehicle for social commentary and political engagement (Nketia, 1986). From liberation songs that mobilised independence movements to contemporary protest music that amplifies marginalised voices, musical traditions across the continent have been deeply entwined with struggles for justice, governance reform, and development (Bayart, 2009). In Zimbabwe, this role has been particularly pronounced in the *Sungura* genre, a fast-paced and widely popular musical style known for its rhythmic intensity and lyrical depth (Muranda & Maguraushe, 2014). *Sungura* artists such as Leonard Zhakata, Tongai Moyo, Hosea Chipanga, and Simon Chimbetu have consistently engaged with pressing socio-political themes in their music (Gwerevende, 2022; Ncube, 2022). By embedding lived experiences into relatable narratives, *Sungura* has emerged as a critical site for both preserving cultural identity and interrogating political realities.

Within this context, Simon Chimbetu's distinctive *Dendera* music occupies a central position in Zimbabwe's cultural and political landscape. *Dendera*, a sub-genre of *Sungura,* named after the Shona word for the hornbill bird, became Chimbetu's artistic brand and a platform through which he articulates the struggles, aspirations, and frustrations of ordinary Zimbabweans. His lyrics, rich in metaphor and symbolism, address enduring challenges such as poverty, unemployment, corruption and social injustice, situating

† Senior Lecturer, Midlands State University, Zimbabwe and Research Fellow, African Musicology Institute, University of Venda, South Africa, email: maguraushew@msu.ac.zw
‡ Research Associate, University of Music and Performing Arts Vienna, Austria and Research Fellow at the University of South Africa, email: sologwedza@gmail.com

them within broader questions of governance and development (Gwindingwe & Osunkunle, 2022; Pfukwa, 2019). While scholars such as Vambe (2004), Maganga et al. (2015) and Maguraushe (2024) have explored Chimbetu's contributions to debates on culture, land reform, liberation struggles and Pan-Africanism, less attention has been paid to his sustained engagement with governance and development discourses. This paper addresses that gap by analysing selected *Dendera* songs, demonstrating how Chimbetu's music both reflects and critiques Zimbabwe's governance crisis, while amplifying the voices of the subaltern in a postcolonial state.

The aim of this article is to examine how Simon Chimbetu expresses governance and development issues in Zimbabwe through his selected songs. The article proceeds in three parts. The first section examines music as a medium of grievance articulation and resistance against misgovernance. The second analyses selected songs by Chimbetu, focusing on their embedded commentaries on governance and development. The final section reflects on the implications of these insights for understanding Zimbabwe's governance trajectory. Ultimately, the paper demonstrates that Chimbetu's *Dendera* music not only documents the historical struggles of the Zimbabwean populace but also contributes to diagnosing the enduring governance crisis. In elevating subaltern voices through popular culture, his music reaffirms the role of art in shaping political consciousness and fostering critical engagement with questions of justice, development, and nationhood.

2 Popular music as subaltern journalism and a postcolonial critique of socio-political issues in Africa

Music continues to play an integral role in the political and social development of societies (Gwerevende et al., 2026). Popular music is a site where ordinary citizens critique, align with, and express aspirations about governance and development outside formal political channels (Bayart, 2009). In the African context, music functions as a potent form of popular culture, addressing the struggles of the majority and amplifying their socio-political concerns (Ncube, 2022). Artists in Africa have consistently used their platforms to expose bad governance (Gwerevende, 2023; Gwerevende & Matiure, 2022). Protest songs have functioned as a form of 'people's journalism' (Mano, 2007), articulating grievances and mobilising public consciousness. Gwerevende et al. (2026) explore the role of music as a tool to fight for democracy, and to peddle views on governance, politics and elections. Protest music has oscillated between celebratory and critical registers, simultaneously affirming cultural identity and contesting political authority. Popular music has become a sonic register of "domestic despondency" (Maguraushe et al., 2022), resonating with younger Zimbabweans navigating precarity.

African countries, including Zimbabwe, have grappled with chronic economic crises marked by hyperinflation, an unsustainable debt burden, sanctions and protracted political instability, compounded by what Bräutigam and Knack (2004) identified as Africa's pervasive crisis of governance: weak institutions, fragile leadership, and corruption. These governance failures manifest in persistent policy challenges, including limited access to healthcare, food insecurity, unemployment, climate vulnerability, economic instability, and housing shortages (Poshai et al., 2024). Corruption, in particular, has eroded public trust and diverted resources away from urgent development needs, with high-profile cases such as that of former Health Minister Obadiah Moyo, implicated in a fraudulent US$ 60 million procurement of COVID-19 medical supplies, reinforcing citizens' disillusionment (Gwerevende, 2022). In response, Zimbabwean musicians deploy their art as a platform to denounce corruption, gaining national traction as their protest songs expose the ubiquity of graft. In this context, popular musicians have emerged as cultural actors advocating for justice and accountability. Their work aligns with continental visions such as the African Union's Agenda 2063, which underscores culture as a driver for a prosperous, peaceful, and just Africa (Gebrihet et al., 2025).

Reports by the South African Institute of International Affairs (South African Institute of International Affairs, 2021) and the International Crisis Group (International Crisis Group, 2016) emphasise the severity of Zimbabwe's long-standing economic crises, characterised by hyperinflation, unemployment, debt, policy inconsistency, and infrastructural decline. Such realities are embedded in musical discourse, with

comments on state failures. At the turn of the millennium political and economic conditions deteriorated and popular musicians openly critiqued governance, thereby both articulating and amplifying popular discontent (Gukurume, 2025; Tivenga, 2018; Vambe, 2004). The relationship between music performance, development and governance issues is undeniable (Gwerevende, 2022). Through intricate melodies and relatable storytelling, popular songs resonate with listeners' experiences with politicians, providing both entertainment and insight. The narratives within these songs highlight the challenges faced by citizens in a rapidly changing environment, revealing the complexities of governance in a country marked by economic hardships and political unrest. Popular music not only preserves cultural heritage but also encourages discourse around pressing issues, making it a crucial part of Africa's socio-political fabric.

Several post-independence scholars have blamed African crises on African leaders' corruption, greed, gluttonous accumulation of wealth, and bad governance. Scholars have frequently attributed the crisis to internal factors such as corruption, patronage, and poor governance (Chitando, 2002; Makumbe, 2009; Muwati et al., 2013, 2018; Ndlovu-Gatsheni, 2018; Raftopoulos & Mlambo, 2009). However, Chirombe (2019) contends that such perspectives are often parochial, overlooking external contributing dynamics, including sanctions and global economic pressures. Few studies have examined the protracted nature of the crisis from the late 1990s into the post-2017 era, nor have they considered how cultural production, particularly music, mediates popular understandings of governance. This study addresses that gap by analysing Chimbetu's *Dendera* music as a form of agency in tackling governance challenges. His repertoire demonstrates how popular music functions as 'music as journalism' (Mano, 2007), producing narratives that transcend temporal boundaries while engaging enduring governance themes.

3 Sungura music a sonic archive of postcolonial crisis and elite betrayal in Zimbabwe

Zimbabwean popular music encompasses a diverse repertoire, ranging from traditional forms such as *Sungura,* Chimurenga, *mbira* and *jiti* to hybridised contemporary genres that draw on hip-hop, reggae, and pop (Gwerevende, 2022, 2023). Popular music has played a significant and multifaceted role during periods of crisis in Zimbabwe, serving as a medium of expression, critique, and cultural resilience. Vambe (2004) highlights how themes of governance and development have been central to popular music in the post-independence era, situating art as a critical site for political and social reflection. Throughout Zimbabwe's turbulent history, marked by political upheaval, economic instability and social unrest, *Sungura* music has provided both solace and a powerful platform for commentary.

Scholars such as Kwaramba (1997), Eyre (2001) and Mhiripiri (2011) define *Sungura* music based on its instrumentation and its East African regional genealogy (Kenyan and Tanzanian Benga/rhumba traditions). *Sungura* is a vibrant and widely consumed genre in Zimbabwe, characterised by its fast-paced rhythms, intricate melodies, instrumental richness and localised lyrical content (Muranda & Maguraushe, 2014). Perman (2012, p. 397) noted that "*Sungura* is constructive and expressive of local lives and identities that have emerged through very specific political and economic circumstances." Chirombe (2019) says that *Sungura* artists have foregrounded the corrosive effects of cronyism and corruption, linking them to broader governance failures. Chipanga's post-2000 reflections on the land question, for instance, frame Zimbabweans as betrayed by the ruling party's leadership. Within this tradition, artists such as Leonard Dembo, Cephas Mashakada, Tongai Moyo, Hosea Chipanga, Leonard Zhakata, and Simon Chimbetu have consistently engaged with political themes, embedding within their lyrics pointed critiques of governance and development failures. These artists have popularised the genre. This reflects the country's ongoing cultural dialogue, and the enduring role of music as storytelling, social critique, and cultural pride.

Within this broader *Sungura* tradition, Simon Chimbetu's *Dendera* occupies a complex position: While echoing popular concerns about economic and social injustice, his work often articulated them in ways that aligned with or cautiously supported the ruling party, thereby embodying the ambiguities and compromises inherent in Zimbabwe's protest music tradition. Ambivalence is characteristic of musicians like Chimbetu who vacillated between support for the ruling ZANU PF party and opposition to its authoritarian ways. The reason for this ambivalence is that the ruling party originated as a revolutionary movement before it installed

itself in government, where it produced disappointing results. Chimbetu himself was a revolutionary at heart, who first supported Mugabe's party but later became critical of it when the political realities changed and the musician responded to the change in the nature of the ruling party.

4 Who is Simon Chimbetu and why his music?

Simon Chimbetu (23 September 1955–14 August 2005) remains one of Zimbabwe's most celebrated and award-winning musicians whose ingenuity established a cultural brand with enduring resonance in Zimbabwe and the wider Southern African region. At the height of his career, Chimbetu filled stadiums, and his lyrics continue to appeal to successive generations of listeners who regard his music as both essential and reflective of their lived experiences. Chirere (2015), however, observed that Chimbetu's career was also marred by controversy, including media demonisation, show boycotts, and overt hostility from some citizens who were feeling the impact of the economic meltdown. Nevertheless, his repertoire remains vital for understanding the intersection of music, politics, and governance in Zimbabwe. In this article we argue that Chimbetu sang about political issues as they affected Zimbabweans despite his political affiliation with ZANU PF. His music transcends time and space and historical boundaries.

Central to this study are Chimbetu's *Dendera* songs, which poignantly capture Zimbabwe's socio-political landscape. The term *Dendera*, derived from the Shona word for the hornbill bird, was appropriated by Chimbetu to brand his style of *Sungura* music. Chimbetu named his brand of *Sungura Dendera* because the bass guitar sound on his songs is a sonic mimicry of this tropical bird's deep, booming, bass call. His bass guitar sound is complemented and harmonised by the rhythm and sub rhythm guitars. His songs not only preserve cultural heritage but also interrogate systemic injustices, tackling themes such as corruption, poverty, and inequality. Through rich storytelling and evocative performance, Chimbetu's music reflects the lived struggles and aspirations of ordinary Zimbabweans, positioning itself as both entertainment and social critique (Gwerevende, 2023).

Chimbetu's music, in particular, provides critical insight into Zimbabwe's postcolonial trajectory. Scholars have examined his engagement with cultural identity (Pfukwa, 2010), land reform (Maguraushe, 2024; Pfukwa, 2019), the liberation struggle (Maganga et al., 2015), and Pan-Africanism (Vambe, 2004). Gwindingwe and Osunkunle (2022) further highlight the apocalyptic and political dimensions of *Dendera* music, showing how tracks like *Sawara* warned of the dangers of false promises during the land redistribution programme. By examining Chimbetu's work, one can gain a clearer understanding of how art can influence societal change and reflect the collective consciousness of a nation grappling with its identity and future. *Dendera* music, therefore, also influences governance and stands as more than just an entertainment genre; it embodies the spirit of resilience and the quest for better governance and development in Zimbabwe.

Despite the growing body of scholarship, Chimbetu's articulation of governance and development themes remains underexplored. This study addresses that gap by interpreting Chimbetu's music as a cultural text that voices the concerns of the subaltern, situating his work within the broader critique of Zimbabwe's governance crisis. Following Quijano (2007)'s notion of the *colonial matrix of power*, the paper argues that Chimbetu's songs articulate postcolonial struggles of survival, unemployment, and disempowerment. His compositions, such as *Vana vaye* (Those Children), *Magobo* (Stumps), *Lullaby*, and *Ndaremerwa* (I Am Overwhelmed), give voice to citizens navigating systemic economic collapse. These narratives speak to the historical moment of the late 1990s, a period marked by worsening economic conditions and culminating in the birth of the opposition Movement for Democratic Change (MDC) in 1999. Although Chimbetu passed away in 2005, his critique of corruption, poverty, unemployment, and transport crises resonates with contemporary realities.

The governance and development challenges experienced in Zimbabwe can be linked to the binary relationship between the subaltern and ruling elite characterised by what Aníbal Quijano (2007) referred to as the 'colonial matrix of power'. The working-class problems of survival, unemployment, and economic collapse that are nuanced in Chimbetu's song lyrics are typically post-colonial and post-imperial. The music speaks on behalf of the subaltern through his expression of everyday life experiences (Maggio, 2007). Therefore, we argue that Chimbetu uses *Dendera* music to speak on behalf of the subaltern through the

songs *Vana vaye* (those children), *Magobo* (Stumps), Lullaby and *Ndaremerwa*. Chimbetu assumes the voice of the citizens who struggle to eke out a living in a very difficult economic environment. The paper adds to the analysis of the theme of governance and development in Zimbabwe from the late 1990s to the present as gauged through some of Simon Chimbetu's *Dendera* music compositions. The economic woes experienced in the country are captured in Chimbetu's 1997 album, and these challenges culminated in the birth of the opposition Movement for Democratic Change (MDC) party in 1999. Chimbetu's songs invaluably contribute to understanding historical struggles and offer a contribution to the diagnosis of the contemporary governance crisis in Zimbabwe.

Despite this enduring popularity, scholarly engagement with Chimbetu's work has been limited. This paper, therefore, argues that Chimbetu consistently addressed political and governance issues in his music, regardless of political affiliation or historical epoch. From a governance perspective, his contribution is especially significant. As both an artist and a cultural worker he influenced, and was influenced by, the cultural and political milieu of Zimbabwe (Chitando, 2002). His songs provide an important lens for examining how governance is interpreted, experienced, and represented through popular music. Chimbetu's significance lies partly in his dual identity as a self-confirmed ZANU PF member and a liberation fighter, which enabled him to articulate political issues in Zimbabwe's anticolonial struggle. His narratives both affirmed ruling party discourses and highlighted the stark realities of poverty and inequality in Zimbabwe. His music reflects the struggles of ordinary citizens, employed and unemployed alike, and functions as historically conscious art. Marongedze (2019) notes that Chimbetu was consistent in composing songs that responded to specific socio-historical contexts, thereby offering cultural texts through which governance issues can be critically interrogated.

5 Performance, postcoloniality and governmentality as theoretical underpinnings

The paper is framed by the intersecting theories of performance, postcoloniality, and governmentality, which together provide a productive lens for interrogating the dynamics of power, culture, and governance in contemporary Zimbabwe. Performance, in this paper, is conceived not only in its theatrical sense and potential to convey meaning (Cohen, 2012), but also as the enactment of identities, the contestation of oppression, and the negotiation of societal expectations. Performance is an inclusive concept that spans the ritualisation of animals (including humans), everyday social interactions, professional roles, play, music, sport, theatre, dance, and large-scale ceremonies (Schechner, 1977, p. 78). Schechner's influential theory offers useful insights into the analysis of popular music performance, in this case *Dendera*. Performativity, closely tied to postmodern thought, positions performance not as an isolated artistic practice but as a phenomenon deeply embedded within political, social, and material realities (Gwerevende, 2022). Chimbetu's music exemplifies this entanglement, engaging directly with Zimbabwe's socio-economic and political landscape. In this sense, *Dendera* transcends Eurocentric understandings of music as mere aesthetic expression, emerging instead as a performative practice that intervenes in debates on governance, justice, and development.

Postcoloniality provides a further interpretive framework, enabling an exploration of the lingering effects of colonialism on cultural identities, social structures, and power relations (Radhakrishnan, 1993). It highlights the ways in which historical narratives continue to shape contemporary struggles over nationhood, democracy, and belonging. Zimbabwe's postcolonial experience is marked by the continual wrestling between nationalist discourses and democratic aspirations. Perman (2012) characterises the social formations around *Sungura* as subaltern, drawing on Gramsci's notion of a group yet to attain full consciousness of its strength or potential (Gramsci, 2000, p. 210).

Within this subaltern context, Chimbetu's *Dendera* music reflects the socio-economic crises of postcolonial Zimbabwe, offering a space for the articulation of new social identities forged in struggle and hardship. Perman (2012, p. 397) notes that *Sungura* emerges as an expressive response to postcolonial turmoil, giving cultural form to collective experiences of dislocation and resilience. Chimbetu's music thus functions as both a cross-cultural expression and a site of postcolonial critique. Postcolonial theory,

originally rooted in literary studies, provides a framework for understanding how artists in formerly colonised contexts negotiate identity, resist domination, and reinterpret culture (Klein, 2004; Mishra & Hodge, 1991). While its uptake in ethnomusicology has been uneven, postcolonialism nonetheless illuminates the political and cultural dimensions of artistic production, highlighting how *Dendera* music both reflects and resists Zimbabwe's postcolonial condition.

Governmentality (Foucault, 1991) extends this analysis by interrogating the diffuse ways in which power is exercised through societal norms, institutions, and practices that regulate behaviour and shape subjectivities. Governance, in this sense, is not confined to formal state structures but encompasses cultural and discursive practices. Effective governance is premised on listening to citizens' voices, fostering fairness, dignity, trust and harmony, principles also embedded within the African humanist philosophy of *ubuntu/unhu*. *Ubuntu* foregrounds shared humanity, solidarity, and communal accountability as essential to rebuilding societies fractured by injustice (Molefe, 2019). Within this framework, Chimbetu's *Dendera* music can be interpreted as a cultural intervention in governance debates, articulating demands for justice, dignity and equitable resource allocation. His performances metaphorically reflect on *matongerwo enyika* ('a country's governance and political life'), thereby imbuing the music with political weight and positioning it as a vehicle for human rights advocacy and social transformation.

Analysing Chimbetu's oeuvre, thus, reveals how popular music mediates understandings of governance in Zimbabwe. As both a cultural worker and a producer of meaning, Chimbetu shaped and was shaped by the socio-political context in which his music circulated. His songs provide historically conscious commentaries that respond to shifting political landscapes, thereby constituting an archive of Zimbabwe's governance crises. Marongedze (2019) similarly observes that Chimbetu consistently composed music that directly engaged with the socio-historical moment. While Zimbabwe's crises have been extensively studied across disciplines, including economics, history, media, and political science (Chitando, 2002; Makumbe, 2009; Muwati et al., 2013, 2018; Ndlovu-Gatsheni, 2018; Raftopoulos & Mlambo, 2009), analyses have often privileged elite political and economic explanations, neglecting cultural interventions such as popular music. This study seeks to fill that lacuna by adopting an applied ethnomusicological approach, demonstrating how *Dendera* functions as a form of cultural agency in addressing governance challenges. Moreover, it shows that Chimbetu's music operates as a form of "music as journalism" (Mano, 2007), producing narratives that transcend specific epochs and continue to resonate with Zimbabwe's enduring struggles over governance and development.

Taken together, performance theory, postcoloniality, and governmentality form a multi-faceted lens to gauge the nexus of power and citizens' gross domestic vicissitudes. The communal experience of melodies turns commuter blues and unemployment into shared, cathartic public expressions as audiences to "perform" resistance and solidarity through song and dance, not direct confrontation. Situated within the postcolony, these grievances are read as residual elements of colonial economic structures that Zimbabwe's ruling elite reproduced rather than dismantled, hence Chimbetu's lyrics critique the betrayal of liberation war promises. Governmentality illuminates how the state exercises overt force, the public transport system, the labour market and economic policies. Neglect is seen to cruelly shape ordinary life. These frameworks simultaneously show Chimbetu's music as an artistic performance, postcolonial critique, and a revelation of governmental mechanisms that produce and normalize citizens' suffering.

6 Linguistic ethnomusicology and lyrical analysis

This research adopted a qualitative approach to explore the governance issues linked to the economic difficulties in Zimbabwe, as portrayed through selected *Dendera* song lyrics by Chimbetu. The study is framed explicitly within the context of linguistic and semiotic ethnomusicology, drawing from song analysis, secondary sources, and the researchers' experiences of the social, economic, and political landscape in Zimbabwe. Chimbetu's *Dendera* song lyrics were analysed using critical and textual discourse analysis. The study posits that music functions as a form of symbolic discourse which, when interpreted, reveals multiple meanings (Gwerevende, 2022). Critical discourse analysis prompts us to view language in music not as detached but as meaningful within a specific social, political, and historical framework (McGregor,

2010). Textual analysis seeks to comprehend language, symbols, and imagery within musical texts to understand how individuals interpret and convey their lives and experiences (Hawkins, 2017).

While ethnomusicologists widely agree that 'music is a universal language', it also poses challenges that could lead to misunderstandings, prompting several significant inquiries (Beaster-Jones, 2019). For instance, how does music convey or signify meaning? What do we mean when one states that music expresses an idea or represents something? This article addresses these inquiries by examining the linguistic components of *Dendera* lyrics. These components offer insights into Chimbetu's perception of *Dendera* music as a vehicle for fostering good governance and sustainable development. Primary data were collected through lyrical content analysis and semi-structured interviews with two purposively selected music analysts.

We purposively sampled and analysed four *Dendera* song lyrics for the purpose of this study. The songs *Vana vaye* (those children) and *Magobo* (Stumps) are from the 1997 Orchestra *Dendera* Kings' album *Survival*, which was recorded at Gramma Records. *Lullaby* is on the Orchestra *Dendera* Kings' 1998 album *Vasiye* (Leave Them). *Ndaremerwa* (I am overwhelmed) is from the Orchestra *Dendera* Kings' 2011 album *African Panorama* (Chapter 1). The four songs were selected because of their common feature of lyrics that explicitly or satirically allude to a crisis of governance in Zimbabwe. While there are other songs by Chimbetu that address the governance theme, such as *Zuva raenda*, Southern Africa and Governor Conwell, they were excluded as they also touched on the land issue which the authors felt to be a subject for another discussion.

The lyrics of the songs on YouTube were transcribed for analysis. Open, axial and selective manual coding procedures were qualitatively inductive (Williams & Moser, 2019). We listened to the song lyrics and at first conducted open coding to identify distinct emergent themes for categorisation of expressions. This was followed by axial coding during which we further sifted, refined, aligned, and categorised the themes. Axial coding entailed line-by-line coding in which each textual line of a song was deeply scrutinised to extract discrete thematic nuances and their interconnectivity. The process required immersion in the song text, pedantically focused on identifying textual subtleties fueling the construction of meaning. Finally, selective coding enabled the researchers to select and integrate categories of text in cohesive and meaning-filled expressions at a higher level of abstraction to formulate the governance message of the songs. Chimbetu sang about national economic development in the areas of food security, employment creation, transport, and upholding human rights.

7 Deconstructing *Dendera* lyrics: Subaltern aesthetics and political critique

In this section, we analyse lyrics from four of Simon Chimbetu's *Dendera* songs—*Vana vaye* ("Those Children"), *Magobo* ("Stumps"), *Lullaby*, and *Ndaremerwa* ("I Am Overburdened"). These compositions provide critical insights into how *Dendera* lyrics articulate governance and development concerns in Zimbabwe. The analysis categorised the issues represented in the songs into four overarching themes: fighting for survival, unemployment, hard-heartedness, and urban commuter transport crises. These themes reveal how Chimbetu's music captures the socio-economic struggles and political complexities of postcolonial Zimbabwe, positioning his repertoire as a cultural archive for interrogating governance, accountability, and development.

7.1 Survival

For decades, Zimbabweans have been engaged in a relentless struggle for survival amid political instability and economic collapse. As Munangagwa (2009) argues, the country requires a fundamental re-examination of its political conditions before long-term stabilisation can be achieved. Weak agricultural policies, military engagements, unsustainable public spending, and poor investment strategies have collectively fuelled the country's economic demise, necessitating structural reforms.

The survival theme is poignantly articulated in *Vana vaye* ("Those Children"), which critiques inflation, food insecurity, corruption, and state negligence. The presidency has a record of flying in and out of the country numerous times for various reasons. They use chartered flights and are accompanied by a very large entourage which consumed a hefty chunk of the fiscus when travelling abroad (*Kana moenda kure kure*). In this song, Chimbetu subtly appeals to political leaders, urging them to remember the plight of ordinary citizens:

Kana moenda mukoma kana moenda. . .	Please comrade, when you attend [the functions with decision makers]
muitaure yehupfu hwevana vaye	remind them of the food to feed the hungry children.

Here, *hupfu* (mealie meal) symbolises the main ingredient for the staple food of Zimbabweans and the minimum expectation of livelihood security. Musiyiwa (2013) noted that Chimbetu laments a political elite that indulges in lavish lifestyles while neglecting the heroes, both fallen and the living, who fought for the liberation of the country from colonial rule. This critique resonates with Rothstein and Teorell's (2008) emphasis on fairness and equal treatment as the foundation of governance legitimacy. The imagery of political leaders hosting banquets (*kana moenda kumabiko*) while children languish in poverty (*vanochema chavanoda kusurvivor*) reflects negligence and misgovernance. Chimbetu further pleads for restraint in price increases, particularly for maize meal and bread:

mundisiire chingwa chevana vangu. . .	Keep bread for my children
vandisiirewo hupfu hwevana vaye.	and also keep the mealie-meal for those children

The lyrics highlight the devastating impact of hyperinflation (*kana vokwidza mitengo yetunonaka* — when they increase prices of basic commodities), which rendered basic commodities inaccessible to many. In 2008, Zimbabwe's economic collapse reached a point where supermarket shelves stood empty, queues for essentials were interminable, and civil service salaries were eroded by hyperinflation. Chimbetu subtly tells mukoma not to 'forget' the electorate (*vanokanganwa vaNyamande*), but remember to ensure they are fed (*Chawawana mukoma udye nehama*), underscoring the expectation that political representatives must deliver policies that secure livelihoods, not perpetuate precarity.

Chimbetu is directing the grievances to "mukoma," contextually referring to the political leadership, epitomised by the presidency. The term "vana" in this context refers to the suffering citizens. In Foucauldian governmentality, the state shifts responsibility for economic hardship onto the citizens in such situations. Citizens are forced to govern their own budgeting in line with market reality in the face of structural precarity. The state does not directly intervene to alleviate economic woes.

7.2 Unemployment

Investment and growth in Zimbabwe's economy have been shrinking, with companies closing operations. The more than 5,000 people who graduate from tertiary institutions in Zimbabwe have found getting a job and contributing to their country's development a nightmare because the local industry and economy cannot offer them anything. The unemployment rate is more than 85 percent (J. Mpofu & Chimhenga, 2016). The lyrics of the following song *Magobo* (Stumps) summarise the unemployment crisis faced by graduates in Zimbabwe.

Magobo is a song of sacrifices that school leavers and vocational training graduates must make due to high levels of unemployment in the urban centres *(Chikoro ndakapeda basa ndakadzidza, asi harisati ramuka muno muchirungu)*. These youths end up working as unskilled labourers (*Chokwadi ndichanochera nyangwe makandiwa, rudo rwuchandiurayisa nemagobo*). This is evidence that they end up sacrificing so as to satisfy their lover (*nyaya yerudo ichandisvitsa kure kure*) by working even in fiery conditions (*Chokwadi ndichanoshanda nyangwe pane moto, ndovavarira kuyananisa nyaya yerudo*). Machingo and Sayeed

(2019) says that “While youth unemployment as well as graduate unemployment in Zimbabwe is given pre-eminence in several discussion fora, there is evidence that it is increasing instead of receding, with some statistics indicating that it is hovering around 85%.” The country has a very high literacy rate, but unemployment is 85%. Dodo and Dodo (2014) postulate that “Presently, Zimbabwe’s unemployment rate stands at over 85% and literacy rate at over 92%”. According to M. Mpofu (2020), youth unemployment has contributed to the increase in international legal and illegal migration as unemployed youth go in search of decent employment and a better life. In the last decade, Zimbabwe has experienced the worst brain drain, with millions migrating to neighbouring countries in the region and to overseas countries (Masiiwa & Chilunjika, 2021). South Africa is accommodating more than 2 million Zimbabweans, not including the undocumented. Most of those who have migrated to neighbouring South Africa and Botswana are youth, both skilled and unskilled. Unemployment leads even the educated to stoop low and work in the farms under the supervision of foremen, uprooting stumps and making contour ridges (*NaForomani heyi heyi kumagobo, ndini uyo cheru cheru kumakandiwa*). Magobo is a song that aptly captures the desperation of the next generation of the country’s workers.

Chimbetu embodies the voice of a poor unemployed young man who loves his girlfriend very much in this song. Postcolonial theory contends that the enduring structural legacies of colonial and racialized economic organization lead to chronic unemployment in Zimbabwe. The attainment of political independence did not dismantle the economic dependency on former colonial and global-capitalist markets. Internalized colonial structural legacies continue to dog productive economic participation due to misgovernance in Zimbabwe and economic sanctions.

7.3 Hard-heartedness

Chimbetu also addresses the brutality and impunity characterising Zimbabwe’s governance landscape. *Lullaby* laments human rights abuses, arbitrary killings, torture, and cruelty (*ivo vane hutsinye*) inflicted on civilians. The Zimbabwe Human Rights Report (2020) documents the human rights violations, highlighting the absence of accountability. Rosenbloom and Piotrowski (2005) argue that governments must be governed by laws rather than the whims of individuals; yet in Zimbabwe, impunity has persisted, allowing perpetrators of violence to evade justice.

The cruelty has deep historical roots. Between 1982 and 1988, an estimated 10,000–20,000 civilians were killed during the Gukurahundi atrocities, accompanied by widespread torture, rape, and mutilation (Killander & Nyathi, 2015). Later, opposition members were targeted, with Zimbabwe Unity Movement candidates murdered in the early 1990s and MDC supporters subjected to violence during the 2000 and 2002 elections (Tendi, 2013). The 2008 elections witnessed an orchestrated campaign of intimidation, torture, and assassinations designed to secure ZANU PF’s hold on power (Masunungure, 2009). Even within the ruling elite, mysterious deaths of figures such as Solomon Mujuru, Sibusiso Moyo, and Perrence Shiri have fuelled speculation about intra-party violence. *Lullaby* thus becomes a lyrical indictment of systemic cruelty and state-orchestrated violence that has marred Zimbabwe’s postcolonial history.

This is a solemn song that implicitly speaks out on the cruelty of a world where murder is no longer feared and life no longer valued. The extent of the gruesomeness of cruelity is expressed when Chimbetu says they can murder innocent people and even the child of God. Chimbetu makes an effort to comfort the pain bearer through the words *nyarara kacheche, usacheme yawaona iyi hondo* (be quiet toddler, do not cry because of this war which you are experiencing). The song moves on to change the beat soon after the counselling which depicts an I don’t care attitude.

7.4 Transport challenges in the cities

Urban commuting in Zimbabwe is a daily struggle for many workers, with exorbitant fares and unreliable transport infrastructure compounding the economic burdens they face. For most urban dwellers, commuting consumes a significant portion of household income. Return fares average one United States dollar, but can double during peak hours, adverse weather conditions, or for longer routes such as Chitungwiza and Norton which are 30 km and 40km away from Harare respectively. Many commuters must take two buses

each way, spending two dollars or more daily, while thousands of Harare's workers face persistent fuel shortages and scarcity of vehicle spare parts. This transport crisis is articulated in Chimbetu's *Ndaremerwa* ("I Am Burdened"), where he laments:

> *Babamukuru honaika Sunday Monday Tuesday Wednesday Thursday Friday Mugovera Ndaremerwa*
>
> (Uncle, look, I am burdened the whole week).

His lyrics describe the distance between home and workplace symbolising the physical and economic obstacles confronting ordinary Zimbabweans. He sings,

> *Kumunda kwangu kure nekwandinovata, kwandinoshanda kure nekwandinovata*
>
> (The field I work in is far from my home, and my workplace is also far from my home.)

Zimbabwe's deteriorating socio-economic situation has exposed the neglect and discrimination embedded within its public transport system, failures that originate with the state itself (Ndebele, 2020). Despite assurances from the state-owned Zimbabwe United Passenger Company (ZUPCO), the situation has deteriorated. ZUPCO's limited fleet is overwhelmed, forcing commuters to endure long queues, delays, and overcrowding (Tamborinyoka, 2002). Private omnibuses, once a vital supplement to urban transport, were banned and ordered to register under ZUPCO, further straining supply. Commuters, including security guards and other low-income earners, express despair at their inability to afford private operators charging in US dollars, with some forced to sleep at workplaces to avoid daily travel costs. ZUPCO officials acknowledge shortages of buses and fuel, while overcrowded conditions undermine public health measures such as social distancing during the COVID-19 pandemic (Chateuka, 2020).

The state is governing "at a distance" when read through Foucauldian governmentality. The transport crisis in Zimbabwe epitomises both infrastructural failure and *mishikashika* (unregulated transport operators), and citizens are forced to navigate, improvise and endure a risky terrain in survival mode. Some of the commuters resort to cycling to and from work as an alternative in the face of the transport crisis characterised by high bus fares and inadequate means.

The collapse of rail commuter services exacerbated the problems. Once carrying over 120,000 passengers daily, the National Railways of Zimbabwe (NRZ) is now in near-terminal decline, employing about 7,000 workers but generating minimal revenue (Moyo, 2021). The near disappearance of rail transport has left urban commuters vulnerable to exploitation by private operators. As one Harare commuter remarked: "We used to have regular local commuter trains, but now they are rarely available, and [minibus] operators are daily milking us of our hard-earned cash" (cited in Moyo, 2021). In the song, Chimbetu represents the voice of the overwhelmed ordinary citizen.

The interpretive subtlety of Chimbetu's *Ndaremerwa* is evident in its rhetorical framing. Rather than overtly confronting state authorities, the song adopts familial language, addressing an elder, Babamukuru ("uncle"), as a metaphor for political leaders. As Music Analyst 1 (personal communication, 31 August 2025) notes, "This rhetorical strategy positions the music as a moral rather than revolutionary critique: an appeal to conscience rather than a direct political confrontation." Music Analyst 2 (personal communication, 2 September 2025) concurs, stating that Chimbetu's songs such as *Survival* and *One Week* highlight inflation, cost of living, and the struggles of civil servants who live hand-to-mouth. His lyrics expose systemic neglect and elite looting but do so through subtle, coded appeals rather than overt denunciation. In this way, Chimbetu transforms everyday transport struggles into broader critiques of governance failure, demonstrating how music functions as both a record of lived hardship and a moral commentary on political irresponsibility.

8 Decolonial revelations: Re-reading governance and development trajectories

Arbitrary political appointments have long characterised Zimbabwe's urban councils, exacerbating many of the challenges vividly captured in Chimbetu's music. Such appointments often prioritise the narrow interests of national politicians over the needs of residents, thereby undermining service delivery in critical areas such as food security, transport, water provision, and housing (Jonga & Chirisa, 2009). They call for the inclusion of broader stakeholder participation and direct democratic practices to complement representative democracy, ensuring that leaders remain accountable to their constituencies. In this regard, Chimbetu's songs provide cultural testimony and empirical insight into governance failures, foregrounding the urgent need for inclusive, participatory, and accountable governance as a pathway to poverty reduction and sustainable development.

Since the turn of the millennium, Zimbabwe's governance crisis has manifested through entrenched corruption, mass unemployment, transport failures, chronic energy shortages, recurrent economic instability, and contested political legitimacy. The state has often responded with a heavy-handed securocrat approach marked by torture, disappearances, and the imposition of command currencies, such as bearer cheques, bond notes, and the recently introduced ZiG, which cannot be used internationally. Against this backdrop, Chimbetu's music remains strikingly relevant nearly two decades after his death. His lyrics continue to resonate with ordinary citizens who endure persistent bread-and-butter struggles while political elites maintain extravagant lifestyles and preside over the open plunder of national resources. Fuel and electricity shortages remain unresolved, the national airline has collapsed, and public transport systems are in disarray. Hyperinflation continues to erode livelihoods, perpetuating cycles of despair that mirror the crises Chimbetu so poignantly chronicled in song.

Tracks such as *Vana vaye*, *Magobo*, *Lullaby*, and *Ndaremerwa* emerged from contexts of acute hardship and reflect the lived realities of Zimbabwe's working classes. In these compositions, Chimbetu documents the daily struggles of urban communities, particularly those in high-density suburbs, who remain locked in economic precarity despite their efforts to survive through limited industrial and informal opportunities. His lyrics move beyond lamentation to constitute a subtle form of cultural activism. Employing Shona, a language accessible to the majority, Chimbetu's music functions simultaneously as critique and mobilisation, empowering marginalised communities to situate their own struggles within broader demands for justice, equity, and accountability. As Perman (2012) notes, *Sungura* flourished during periods of severe economic decline in Zimbabwe, serving both as a soundtrack to crisis and a vehicle for political commentary.

The persistence of economic decline (Munangagwa, 2009) since the Economic Structural Adjustment Programme (ESAP) era underscores the enduring salience of Chimbetu's work. Conflicting political narratives surrounding the causes of Zimbabwe's crises have undermined pragmatic policy responses, while the country has witnessed extensive brain drain, hollowing out vital sectors such as health, education, and mining (Chirombe, 2019). Public services have deteriorated to such an extent that political leaders routinely seek medical treatment abroad while citizens face the collapse of local facilities. Within this context, Chimbetu's repertoire functions as a cultural archive of bad governance, articulating the enduring struggles of ordinary Zimbabweans and demonstrating the potency of popular music as a medium for interpreting, contesting, and documenting governance and development in postcolonial Zimbabwe.

9 Conclusion

This paper examined how Simon Chimbetu's *Dendera* music functions as a cultural lens through which the governance crisis in Zimbabwe can be interrogated. Far from serving merely as entertainment, his songs constitute poignant reflections on the persistent challenges of bad governance that have afflicted the nation since the turn of the millennium. Rooted in Zimbabwe's cultural landscape, Chimbetu's music captures and communicates the despair of ordinary citizens while simultaneously providing commentary on their resilience, frustrations, and aspirations. Although aligned with the ruling party, Chimbetu's lyrical

narratives amplify the struggles of the marginalised and disenfranchised, thereby raising awareness of pressing socio-economic and political issues.

The analysis demonstrated that, despite their seemingly straightforward composition, Chimbetu's lyrics act as a powerful communicative tool that both documents and critiques the socio-economic hardships confronting urban residents. His music highlights critical themes such as unemployment, corruption, food insecurity and the erosion of civil rights, while also resonating deeply with audiences by fostering a sense of empathy, solidarity, and cultural identity. In doing so, *Dendera* music contributes to the formation of a collective consciousness that interrogates governance failures and sustains public memory of socio-economic struggles.

The insights generated through Chimbetu's repertoire offer valuable lessons for policymakers, community leaders, and scholars alike. By engaging with the themes articulated in his songs, stakeholders can gain a nuanced understanding of Zimbabwe's multifaceted crisis and, in turn, design more responsive and participatory interventions to address the nation's enduring governance and development challenges. Ultimately, Chimbetu's work transcends the boundaries of artistic expression, standing as a critical commentary on Zimbabwean society and a potential catalyst for reflection, dialogue, and meaningful change.

References

Bayart, J. F. (2009). *The State in Africa: The Politics of the Belly*. Polity Press.

Beaster-Jones, J. (2019). Linguistic and semiotic approaches to ethnomusicology: From abstract structure to situated practice. In H. M. Berger & R. M. Stone (Eds.), *Theory for Ethnomusicology* (pp. 26–50). Routledge. https://doi.org/10.4324/9781315408583-2

Bräutigam, D. A., & Knack, S. (2004). Foreign aid, institutions, and governance in Sub-Saharan Africa. *Economic Development and Cultural Change*, *52*(2), 255–285. https://doi.org/10.1086/380592

Chateuka, P. (2020). Public transport woes in Harare. https://www.corah.live/public-transport-woes-in-harare/.

Chirere, M. (2015). Chopper Chimbetu: Tribute to a master of song [16 August 2015]. *Sunday Mail*. https://www.sundaymail.co.zw/chopper-chimbetu-tribute-to-a-master-of-song.

Chirombe, J. (2019). The interface of music and politics: Exposition of Tongai Moyo and Hosiah Chipanga's post-2000 music [Doctoral thesis]. University of South Africa.

Chitando, E. (2002). Down with the devil, forward with Christ! A study of the interface between religious and political discourses in Zimbabwe. *African Sociological Review*, *6*(1), 1–16. https://doi.org/10.4314/asr.v6i1.23200

Cohen, A. J. (2012). Music in performance arts: Film, theatre and dance. In S. Hallam, I. Cross, & M. H. Thaut (Eds.), *The Oxford Handbook of Music Psychology* (Online ed.). Oxford University Press.

Dodo, O., & Dodo, T. (2014). *Unemployment and Conflict in Zimbabwe: An Analysis and Resolution*. IDA Publishers.

Eyre, B. (2001). *Playing with Fire: Fear and Self-Censorship in Zimbabwe's Music*. Freemuse.

Foucault, M. (1991). Governmentality (R. Braidotti, Trans.). In G. Burchell, C. Gordon, & P. Miller (Eds.), *The Foucault Effect: Studies in Governmentality* (pp. 87–104). University of Chicago Press.

Gebrihet, H. G., Pabón, F. A. D., & Mustafa Babikir Ahmed, A. (2025). Sustainable development as an African agenda [SALDRU Working Paper, 315, Southern Africa Labour and Development Research Unit, University of Cape Town].

Gramsci, A. (2000). *The Antonio Gramsci Reader: Selected Writings 1916–1935*. New York University Press.

Gukurume, S. (2025). Singing truth to power: Youth existential struggles and popular music in Zimbabwe. *Canadian Journal of African Studies / Revue canadienne des études africaines*, *59*(1), 149–173. https://doi.org/10.1080/00083968.2025.xxxxx

Gwerevende, S. (2022). Musicking ubuntu/unhu sustainability: Human rights and social justice activism in the Chimurenga music of Thomas Mapfumo. *Africa Insight*, *51*(4), 19–34. https://doi.org/10.4314/ai.v51i4.3

Gwerevende, S. (2023). Dancing with musicking in Zimdancehall: Divergent discourses and interpretations. In *The Zimdancehall Revolution: Critical Perspectives* (pp. 59–81). Springer Nature. https://doi.org/10.1007/978-3-031-41854-9_3

Gwerevende, S., & Matiure, P. (2022). Performing liberation heritage: Kongonya and toyi-toyi as cultural resistance in colonial and postcolonial Zimbabwe. *Etnomüzikoloji Dergisi*, *5*(2), 329–353.

Gwerevende, S., Matsilele, T., & Maguraushe, W. (2026). *Musicking and Dancing Politics in Africa: Power, Activism, and Elections*. Bloomsbury Academic.

Gwindingwe, G., & Osunkunle, O. O. (2022). Forewarned is forearmed: Exploring the apocalyptic voice of popular music in post-colonial Zimbabwe. In *Indigenous African Popular Music, Volume 1: Prophets and Philosophers* (pp. 209–226). Springer International Publishing.

Hawkins, J. (2017). Textual analysis. In M. Allen (Ed.), *The SAGE Encyclopedia of Communication Research Methods* (pp. 1754–1756). SAGE Publications, Inc.

International Crisis Group (2016). Zimbabwe: Stranded in stasis [Crisis Group Africa Briefing, 118, International Crisis Group. Accessed 14 Jun. 2016]. http://www.crisisgroup.org/~/media/Files/africa/southern-africa/zimbabwe/b118-zimbabwe-stranded-in-stasis.pdf.

Jonga, W., & Chirisa, I. (2009). Urban local governance in the crucible: Empirical overtones of central government meddling in local urban councils' affairs in Zimbabwe. *Theoretical and Empirical Researches in Urban Management*, *4*(12), 166–182.

Killander, M., & Nyathi, M. (2015). Accountability for the Gukurahundi atrocities in Zimbabwe thirty years on: Prospects and challenges. *Comparative and International Law Journal of Southern Africa*, *48*(3), 463–487.

Klein, T. R. (2004). Drawing on musical ideas with dazzling eclecticism: Preliminary sketches on postcolonialism in Africa and Ghanaian music. *Afrika in Context V.A.D. Conference*.

Kwaramba, A. D. (1997). *Popular music and society: The language of protest in Chimurenga music: The case of Thomas Mapfumo in Zimbabwe*. Department of Media & Communication, University of Oslo.

Machingo, H., & Sayeed, C. (2019). Innovation and structural change: A paradigm shift in addressing youth unemployment in Zimbabwe as a way to meet its 2030 Agenda. *Journal of African Union Studies*, *8*(2), 201–217. https://doi.org/10.31920/2050-4306/2019/8n2a11

Maganga, A. T., Tembo, C., & Dewah, P. (2015). Singing the second Chimurenga (liberation struggle): An Afrocentric elucidation of Simon Chimbetu's selected songs. *Oral History Journal of South Africa*, *3*(1), 32–42.

Maggio, J. (2007). Can the subaltern be heard? Political theory, translation, representation, and Gayatri Chakravorty Spivak. *Alternatives: Global, Local, Political*, *32*(4), 419–443.

Maguraushe, W. (2024). Mukoma govai minda: Reading Simon Chimbetu's compositions on the land issue in Zimbabwe. *Mankind Quarterly*, *65*(2), 16–25.

Maguraushe, W., Muranda, R., & Chimbudzi, W. (2022). Portrayal of Zimbabwe's socio-economic struggles through Winky D's Zimdancehall soundscape. *Mankind Quarterly*, *63*(2), 1–18.

Makumbe, J. (2009). The impact of democracy in Zimbabwe: Assessing political, social and economic developments since the dawn of democracy [University of Zimbabwe, Harare, Research Report, 119].

Mano, W. (2007). Popular music as journalism in Zimbabwe. *Journalism Studies*, *8*(1), 61–78. https://doi.org/10.1080/14616700601056858

Marongedze, R. (2019). Interface of music and politics: Versions of patriotic consciousness in Zimbabwean music, 1970–2015 [Doctoral dissertation, University of South Africa].

Masiiwa, M., & Chilunjika, A. (2021). Migration and economic development. In L. Sachikonye & D. Kaulemu (Eds.), *Zimbabwe at 40: Development, Democracy and Transformation* (pp. 122–140). Weaver Press.

Masunungure, E. (2009). *Defying the Winds of Change: Zimbabwe's 2008 Elections*. Weaver Press.

McGregor, S. L. T. (2010). Critical discourse analysis: A primer.

Mhiripiri, N. A. (2011). 'Welcome Sungura singing queens': Cultural studies and the promotion of female musicians in a Zimbabwean male-dominated music genre. *Muziki*, *8*(1), 103–119. https://doi.org/10.1080/18125980.2011.570304

Mishra, V., & Hodge, B. (1991). What is post-colonialism? *Textual Practice*, *5*(3), 399–414.

Molefe, M. (2019). Ubuntu and development: An African conception of development. *Africa Today*, *66*(1), 45–60.

Moyo, J. (2021). Zimbabwe's railroads riding to extinction. http://www.ipsnews.net/2013/03/zimbabwes-railroads-riding-to-extinction/.

Mpofu, J., & Chimhenga, S. (2016). Unemployment and implications to social and political conflict: Perspectives from Zimbabwe. *IOSR Journal of Research & Method in Education*, *6*(3), 8–13.

Mpofu, M. (2020). Youth unemployment: The challenges and possible solutions for Zimbabwe's lost generation. https://futureafricaforum.org/author/musawenkosi-mpofu/.

Munangagwa, C. L. (2009). The economic decline of Zimbabwe. *Gettysburg Economic Review*, *3*(1), 9.

Muranda, R., & Maguraushe, W. (2014). Sungura music's development in Zimbabwe: The emergence of trendsetters, emulators and copycats. *Journal of Music and Meaning*, *12*, 44–62.

Musiyiwa, M. (2013). Hit songs and the dynamics of postcolonial Zimbabwe: A study in popular music trends, 1980–2009. *African Music*, *9*(3), 59–91.

Muwati, I., Charamba, T., & Tembo, C. (Eds.) (2018). *Singing Nation and Politics: Music and the "Decade of Crisis" in Zimbabwe, 2000–2010*. Midlands State University Press.

Muwati, I., Gambahaya, Z., & Mutasa, D. E. (2013). A potentially dystrophic era: Analysing the lyrical sociology of selected Sungura songs in Zimbabwe in the 1990s and beyond. *Muziki*, *10*(2), 107–121.

Ncube, B. (2022). Musicians and political songs in the struggle for freedom in Zimbabwe. In U. Onyebadi (Ed.), *Political Messaging in Music and Entertainment Spaces across the Globe* (pp. 183–208). Vernon Press.

Ndebele, T. (2020). Neglect and discrimination: A tale of Zimbabwe's inaccessible public transport system. *Journal of African Studies and Development*, *12*(3), 97–103.

Ndlovu-Gatsheni, S. (2018). The dynamics of epistemological decolonisation in the 21st century: Towards epistemic freedom. *Strategic Review for Southern Africa*, *40*(1).

Nketia, J. (1986). *The Music of Africa*. Victor Gollancz.

Perman, T. (2012). Sungura in Zimbabwe and the limits of cosmopolitanism. *Ethnomusicology Forum*, *21*(3), 374–401. http://www.jstor.org/stable/23271889.

Pfukwa, C. (2010). When cultures speak back to each other: The legacy of Benga in Zimbabwe. *Muziki*, *7*(1), 169–178.

Pfukwa, C. (2019). Pegging out claims in space and place: The theme of land redistribution in the music of Simon Chimbetu. In J. Kangira, A. Nhemachena, & N. Mlambo (Eds.), *Displacement, Elimination and Replacement of Indigenous People* (pp. 83–95). Langaa Research & Publishing CIG.

Poshai, L., Chilunjika, A., & Intauno, K. (2024). Analysing the urban housing challenge in Harare, Zimbabwe through the wicked policy problems framework. *Journal of Government and Civil Society*, *8*(1), 135–160. https://doi.org/10.31000/jgcs.v8i1.10976

Quijano, A. (2007). Coloniality and modernity/rationality. *Cultural Studies*, *21*(2–3), 168–178.

Radhakrishnan, R. (1993). Postcoloniality and the boundaries of identity. *Callaloo*, *16*(4), 750–771. https://doi.org/10.2307/2932208

Raftopoulos, B., & Mlambo, A. (Eds.) (2009). *Becoming Zimbabwe: A History from the Pre-Colonial Period to 2008*. Weaver Press.

Rosenbloom, D., & Piotrowski, S. (2005). Outsourcing the constitution and administrative law norms. *American Review of Public Administration*, *35*(2), 103–121.

Rothstein, B., & Teorell, J. (2008). Impartiality as a basic norm for the quality of government. *Governance*, *21*(2), 201–204.

Schechner, R. (1977). *Essays on Performance Theory, 1970–1976*. Drama Book Specialists.

South African Institute of International Affairs (2021). Economic governance and the economic crisis in Zimbabwe. In *Civil Society Submission to the APRM in Zimbabwe: 2020/2021* (pp. 164–179). South African Institute of International Affairs. http://www.jstor.org/stable/resrep36212.18.

Tamborinyoka, L. (2002). Zimbabwe: Transport woes dog workers in Harare [5 October 2002]. *Daily News*.

Tendi, B. M. (2013). Ideology, civilian authority and the Zimbabwean military. *Journal of Southern African Studies*, *39*(4), 831–843.

Tivenga, D. R. (2018). Contemporary Zimbabwean popular music in the context of adversities. *Tydskrif vir Letterkunde*, *55*(1), 134–148.

Vambe, M. T. (2004). Versions and sub-versions: Trends in Chimurenga musical discourses of post-independence Zimbabwe. *African Study Monographs*, *25*(4), 167–193.

Williams, M., & Moser, T. (2019). The art of coding and thematic exploration in qualitative research. *International Management Review*, *15*(1), 45–55.

Zimbabwe Human Rights Report (2020). United States Department of State, Bureau of Democracy, Human Rights and Labor.

MANKIND QUARTERLY Mankind Quarterly, 67(1), 65-77 2026 Fall Edition
ISSN: 0025-2344

Surviving Capitalism from the Margins: Informal Economic Networks among African Migrants in Durban, South Africa

Yvonne Kabongo[†*] Kenny Kimanuka Nkus[†]

Abstract

Capitalist urban economies do not incorporate all residents on equal terms. In cities marked by deep inequality, exclusion from formal labour markets produces forms of work and exchange that operate alongside, and in relation to, the dominant economic system. This article examines how African migrants living in Durban, South Africa, navigate restricted access to formal employment within a highly unequal capitalist environment. Rather than treating informal economic life as existing outside capitalism, the study situates migrant livelihood practices within the broader dynamics of urban inequality, market competition, labour flexibilization, and regulatory exclusion. Drawing on qualitative data generated through in-depth interviews and life-history narratives with 40 African migrants in Durban, South Africa, the article explores migrants' experiences of labour market marginalisation, precarious legal status, language barriers, and limited access to social protection. The findings indicate that many migrants engage in small-scale trading, service provision, and community-based financial arrangements as practical responses to structural constraints. These informal economic networks are embedded in the wider urban economy: They depend on formal supply chains, urban consumer markets, and regulatory frameworks, even as they operate at its margins. While these networks foster cooperation, resource-sharing, and social connection among migrants, they do not represent a romantic alternative to capitalist modernity. Solidarity emerges under conditions of necessity and uncertainty, and participation in the informal economy often entails economic instability, exposure to harassment, and limited legal recourse. Migrants' agency is therefore exercised within tight structural constraints. By analysing informal economic networks as products of, rather than exceptions to, capitalist urban dynamics, the article contributes to debates on migration, informality, and inequality in African cities. It calls for closer scholarly and policy attention to how economic exclusion and migrant entrepreneurship are intertwined in contemporary urban contexts.

Keywords: Capitalism, Informal economy, African migrants, Urban inequality, Durban

1 Background of the study

South Africa has long been a major destination for migrants from across the African continent. Migrants are attracted by the country's relatively advanced economy, employment opportunities, educational institutions, and prospects for improved living conditions (Castles et al., 2014). Among South African cities, Durban occupies an important position as a destination for migrants because of its role as a major port city, commercial centre, and transport hub. Over the years, migrants from countries such as the Democratic Republic of Congo (DRC), Burundi, Zimbabwe, Somalia, and Ethiopia have settled in Durban and become active participants in the city's economic and social life (Mbatha & Koskimaki, 2023; Umubyeyi & Mtapuri, 2024). Despite their contributions to local economies, many African migrants continue to face significant barriers to economic inclusion and social integration.

South Africa's urban economy is characterised by persistent unemployment, poverty, and inequality. The country remains one of the most unequal societies globally, with large sections of the population excluded from stable employment opportunities (Sassen, 2014; Turok & Visagie, 2018). In cities such

† University of KwaZulu-Natal
* Corresponding author, email: yvonnekabongo2@gmail.com

as Durban, competition for employment opportunities is intense, making it difficult for both migrants and citizens to secure formal employment. Consequently, many urban residents depend on informal economic activities as a means of survival (Chen, 2012; Meagher, 2015).

For African migrants, access to formal employment is often further constrained by documentation requirements, limited recognition of foreign qualifications, language barriers, and restrictive administrative procedures (Landau, 2011; Neocosmos, 2010). In addition, migrants frequently experience xenophobia, discrimination, and social exclusion that negatively affect their ability to access employment and business opportunities (Charman et al., 2019; Crush & Ramachandran, 2014). Recent studies have shown that anti-migrant sentiments and exclusionary practices continue to shape migrants' experiences in South African cities, including Durban (Mbatha & Koskimaki, 2023; Umubyeyi & Mtapuri, 2024). These challenges place many migrants in vulnerable economic positions and increase their dependence on informal livelihood strategies.

Within this context, informal economic activities have become an important source of survival for many African migrants living in Durban. Migrants participate in a wide range of informal activities, including street trading, small-scale retail businesses, food vending, hair salons, transport-related services, and other entrepreneurial ventures (Mhandu, 2020; Skinner, 2019). Access to these activities is often facilitated through social networks based on kinship, friendship, shared nationality, language, and community affiliation. Such networks provide migrants with information, financial assistance, accommodation, business opportunities, and emotional support that help them navigate difficult urban environments (Mhandu, 2025; Umubyeyi & Mtapuri, 2024).

Previous studies have highlighted the significance of social networks and informal economic activities in sustaining migrant livelihoods in South Africa. For example, Mbatha and Koskimaki (2023) demonstrate how migrant traders in Durban rely on networks of friendship and mutual support to navigate precarious informal markets. Similarly, Umubyeyi and Mtapuri (2024) found that social networks play a critical role in maintaining livelihoods among African migrant refugees in Durban by facilitating access to resources, information, and economic opportunities. Research by Mhandu (2020, 2025) further illustrates how migrant entrepreneurs rely on informal social relations to survive economic uncertainty and regulatory challenges within Durban's informal economy. Collectively, these studies suggest that informal economic networks remain central to migrants' everyday survival strategies.

Despite growing scholarship on migration and informality, limited attention has been devoted to understanding how African migrants mobilise informal economic networks as adaptive livelihood strategies within the context of Durban's unequal urban economy. Existing studies have documented migrant vulnerability, xenophobia, and economic exclusion, yet there remains insufficient empirical understanding of how migrants actively construct and utilise informal networks to sustain livelihoods in conditions characterised by unemployment, legal insecurity, and limited access to formal employment opportunities (Meagher, 2015; Mhandu, 2025). This study addresses this gap by examining the experiences of African migrants operating within Durban's informal economy and exploring the role of informal economic networks in facilitating survival and economic participation.

The study is guided by the recognition that migrants are not merely passive victims of exclusion but active economic actors who develop innovative strategies to survive and participate in urban economic life (Bayat, 2013; Simone, 2010). Through informal economic networks, migrants create opportunities for income generation, resource mobilisation, and mutual support despite operating within environments characterised by uncertainty and vulnerability. Examining these networks provides valuable insights into the relationship between migration, informality, urban inequality, and economic survival in contemporary South Africa.

1.1 Research problem

Although African migrants contribute significantly to Durban's urban economy, many remain excluded from formal employment opportunities due to documentation barriers, labour market competition, restrictive administrative procedures, xenophobia, and broader processes of economic marginalisation (Crush &

Ramachandran, 2014; Landau, 2011). Consequently, many migrants depend on informal economic networks to secure livelihoods and support their families. However, there remains limited empirical understanding of how these networks function as mechanisms of survival and economic participation within Durban's highly unequal urban environment.

1.2 Aim of the study

This study aims to examine how African migrants in Durban utilise informal economic networks to sustain their livelihoods within a context of economic exclusion, unemployment, and urban inequality.

1.3 Research objectives

The study seeks to:

- Examine the factors that limit African migrants' access to formal employment opportunities in Durban.
- Explore the informal economic activities undertaken by African migrants.
- Investigate the role of informal social and economic networks in sustaining migrant livelihoods.
- Analyse the challenges experienced by migrants operating within Durban's informal economy.

1.4 Research question

How do African migrants in Durban mobilise informal economic networks to sustain their livelihoods within the context of South Africa's unequal urban economy?

1.5 Significance of the study

This study contributes to scholarship on migration, informality, and urban livelihoods by providing empirical evidence on the experiences of African migrants in Durban. It extends existing research on migrant survival strategies, social networks, and informal economic participation within South African cities (Mbatha & Koskimaki, 2023; Mhandu, 2025; Umubyeyi & Mtapuri, 2024). The findings contribute to broader debates on migration, urban inequality, and economic exclusion while also providing insights that can assist policymakers, municipal authorities, and organisations working with migrant communities to better understand the realities and challenges faced by migrants operating within Durban's informal economy.

2 Literature review

2.1 African migration and Durban as a migrant destination

South Africa remains one of the principal destinations for migrants and refugees within Africa due to its relatively diversified economy, established urban infrastructure, and perceived employment opportunities (Castles et al., 2014). Since the end of apartheid, the country has experienced increasing migration from neighbouring countries as well as from other parts of the continent, including the Democratic Republic of Congo (DRC), Burundi, Zimbabwe, Somalia, Ethiopia, and Nigeria. Many migrants settle in major urban centres where economic opportunities are believed to be more accessible than in rural areas.

Durban has emerged as one of the most important destinations for African migrants in South Africa. As a major port city and commercial centre, Durban attracts migrants seeking employment, business opportunities, education, and security. The city hosts a diverse migrant population that participates in various sectors of the urban economy, particularly within informal economic spaces (Mbatha & Koskimaki, 2023). Unlike Johannesburg, which has received substantial scholarly attention in migration studies, Durban possesses distinct social, economic, and political dynamics that shape migrant experiences in unique ways.

Recent studies highlight the importance of examining migrant livelihoods within the specific context of Durban. Mbatha and Koskimaki (2023) demonstrate how migrant traders rely on networks of friendship and cooperation to navigate informal markets in Durban's inner city. Similarly, Umubyeyi and Mtapuri (2024) show that social networks play a crucial role in sustaining the livelihoods of African migrant refugees in Durban by facilitating access to information, accommodation, employment opportunities, and financial support. These studies suggest that understanding migration in Durban requires attention not only to economic factors but also to the social relationships that enable survival in a highly unequal urban environment.

2.2 Urban inequality, unemployment, and exclusion from formal labour markets

South Africa continues to experience some of the highest levels of unemployment and socioeconomic inequality in the world. Despite being one of Africa's largest economies, the benefits of economic growth remain unevenly distributed, with many urban residents excluded from stable employment opportunities (Turok & Visagie, 2018). The legacy of apartheid spatial planning, combined with contemporary economic restructuring, has contributed to persistent patterns of exclusion and marginalisation within urban labour markets.

Within this context, migrants often face additional barriers that further limit access to formal employment. These barriers include documentation requirements, limited recognition of foreign qualifications, language barriers, and restrictive immigration regulations (Landau, 2011). While labour market exclusion affects both migrants and citizens, migrants frequently encounter additional challenges related to their legal status and social position within host communities.

Research suggests that economic exclusion should not be understood solely as an outcome of market competition. Institutional and bureaucratic processes also influence access to employment opportunities. Sassen (2014) argues that contemporary urban economies create differentiated forms of inclusion in which some populations are integrated into formal labour markets while others remain confined to insecure and informal forms of work. For many African migrants in South African cities, exclusion from formal employment often results in dependence on informal economic activities as a primary means of survival.

2.3 Urban marginality and migrant livelihoods

The concept of urban marginality provides an important framework for understanding the experiences of migrants living and working in South African cities. Wacquant (2008) describes urban marginality as a condition in which particular groups experience systematic exclusion from stable employment, social protection, and institutional resources. In highly unequal urban environments, marginalised populations are frequently concentrated within precarious economic sectors characterised by instability and limited legal protection.

African migrants often occupy marginal positions within urban economies because they face both economic and social forms of exclusion. Their participation in urban life is shaped by limited access to employment opportunities, insecure legal status, and restricted access to formal institutions. According to Simone (2010), African cities are characterised by complex forms of economic improvisation in which marginalised populations develop alternative mechanisms for accessing resources and opportunities. Such strategies are particularly important for migrants who are unable to secure stable incorporation into formal economic structures.

Urban marginality does not imply passivity. Rather, migrants actively negotiate economic constraints by developing livelihood strategies that enable survival within challenging urban environments. These strategies frequently involve participation in informal economic activities and reliance on social networks that provide access to resources otherwise unavailable through formal channels.

2.4 Xenophobia, legal insecurity and the policing of migrants

One of the most significant challenges confronting African migrants in South Africa is xenophobia. Research consistently demonstrates that migrants experience discrimination, hostility, and exclusion within both social

and economic spheres (Crush & Ramachandran, 2014; Neocosmos, 2010). Xenophobic attitudes are often linked to perceptions that migrants compete with citizens for jobs, housing, public services, and business opportunities.

In addition to social hostility, migrants frequently encounter legal insecurity arising from documentation challenges and restrictive administrative systems. Difficulties associated with visa renewals, asylum processes, and business registration procedures often place migrants in vulnerable positions, limiting their access to formal employment and entrepreneurship opportunities (Landau, 2011). Bureaucratic uncertainty may therefore become a significant source of economic insecurity for migrant populations.

Recent scholarship has also highlighted the role of state power and policing in shaping migrant experiences. Informal traders are frequently subjected to inspections, confiscation of goods, fines, and displacement from trading spaces (Horn, 2019; Skinner, 2019). These enforcement practices disproportionately affect migrants who often lack the documentation and resources necessary to challenge administrative decisions. Consequently, policing and regulation become important mechanisms through which exclusion is reproduced within urban economic spaces.

2.5 Social networks and migrant solidarity

Social networks constitute one of the most important resources available to migrants facing economic exclusion. Migration scholars have long argued that social relationships facilitate access to employment opportunities, housing, information, and financial support (Granovetter, 1985). For migrants operating within unfamiliar environments, networks often provide the practical assistance necessary for survival and economic participation.

Studies conducted in Durban demonstrate the central role of social networks in sustaining migrant livelihoods. Umubyeyi and Mtapuri (2024) found that migrant refugees depend heavily on community networks to access employment opportunities, business information, accommodation, and emotional support. Similarly, Mbatha and Koskimaki (2023) illustrate how friendship networks among migrant traders contribute to economic resilience within informal markets.

Mhandu (2020) further shows that undocumented migrant women working in Durban's informal economy rely extensively on social relationships to overcome economic and legal barriers. These networks provide access to customers, business knowledge, credit arrangements, and mutual assistance during periods of crisis. Such findings suggest that migrant livelihoods cannot be understood solely through individual economic behaviour but must also be examined through the collective relationships that facilitate survival and adaptation.

2.6 Informality as a survival strategy

Informal economic activity has become an essential livelihood strategy for many migrants living in South African cities. Informality encompasses a wide range of activities, including street trading, home-based enterprises, food vending, transport services, hairdressing, and small-scale retail businesses (Chen, 2012). These activities often emerge where formal employment opportunities are inaccessible or insufficient.

Rather than viewing informality as a temporary deviation from formal economic systems, recent scholarship recognises it as a durable feature of urban economies characterised by high unemployment and inequality (Meagher, 2015). Informal activities enable migrants to generate income, support family members, and establish forms of economic independence despite limited access to formal labour markets.

Research conducted in Durban supports this perspective. Mhandu (2025) argues that migrant entrepreneurs actively negotiate structural constraints by developing adaptive livelihood strategies within informal economic spaces. Similarly, Mbatha and Koskimaki (2023) demonstrate that migrant traders create innovative systems of cooperation and resource sharing that enable survival despite economic precarity and regulatory challenges.

Overall, the literature suggests that informal economic networks represent more than simple survival mechanisms. They constitute important forms of economic organisation through which migrants respond to unemployment, exclusion, xenophobia, and legal insecurity. However, while these networks facilitate

livelihood generation, they do not eliminate vulnerability. Migrants operating within informal economies remain exposed to income instability, regulatory enforcement, and social exclusion. It is within this context that the present study examines how African migrants in Durban mobilise informal economic networks to sustain their livelihoods and navigate the challenges associated with economic marginality and urban inequality.

3 Methods and research design

This study employs a qualitative research design to examine how informal economic networks shape the livelihood practices of African migrants in Durban, South Africa. The research is grounded in an interpretive approach that seeks to understand migrants' lived economic experiences, strategies, and constraints within the city's unequal urban economy. Qualitative methods are particularly appropriate for analysing how individuals navigate exclusion, construct economic networks, and make sense of their participation in informal markets (Bryman, 2016; Creswell & Creswell, 2018).

The empirical material consists primarily of in-depth semi-structured interviews and life-history narratives with African migrants engaged in informal economic activities in Durban. These methods enable detailed exploration of participants' trajectories into informal work, their economic practices, and their experiences of regulatory and social exclusion. Narrative accounts provide insight into how migrants interpret their own economic positioning and decision-making within constrained urban labour markets.

In addition to qualitative interviews, a structured questionnaire was administered to collect descriptive socio-economic information about participants, including demographic characteristics, migration history, type of economic activity, income patterns, and network participation. These descriptive data do not constitute a quantitative analytical design but serve to contextualise the qualitative findings and illustrate general patterns within the study sample. Summary statistics derived from the questionnaire are presented in tables in section 4 to provide an overview of participant characteristics and economic profiles.

By combining narrative qualitative data with descriptive survey information, the study provides both depth and contextual breadth in analysing migrant informal economic networks. This mixed qualitative–descriptive approach supports a grounded understanding of how migrants sustain livelihoods within conditions of uneven incorporation into Durban's urban economy.

3.1 Study site

The research was conducted in Durban, a major urban and economic hub in South Africa with a diverse migrant population and a well-established informal economy. Durban's urban landscape provides a suitable setting for examining migrant informality due to high levels of unemployment, economic inequality, and regulatory constraints affecting access to formal employment. Urban centres characterised by high levels of informality offer critical insights into how marginalized populations negotiate economic survival (De Soto, 2000). Informal trading areas, transport nodes, residential townships, and central business districts served as key sites for data collection.

3.2 Sampling and participants

The study sample consists of African migrants residing in Durban who are engaged in informal economic activities. A non-probability sampling strategy combining purposive and convenience approaches was employed due to the absence of reliable population data on informal migrant workers. Participants were recruited through multiple entry points to reach this hard-to-access population. Initial contacts were established in known sites of informal economic activity, including inner-city trading areas, transport corridors, and market spaces where migrant traders operate. Additional participants were identified through pre-existing community contacts and migrant support networks, and further respondents were accessed through referral (snowball) sampling, whereby participants introduced the researcher to other migrants engaged in similar livelihoods. Such strategies are widely used in research involving undocumented

migrants and informal workers (Etikan et al., 2016). Participants were selected based on non-citizen status, engagement in informal economic activity, and residence in Durban at the time of the study.

The final sample included 40 respondents, both males and females aged 18 and above, representing diverse national backgrounds and types of informal economic participation. Although the findings are not statistically generalisable to all migrant populations, the sample provides meaningful insights into patterns of survival and economic adaptation within informal migrant economies.

3.3 Data collection

Data were collected using a structured questionnaire administered in person. The questionnaire consisted of closed-ended questions designed to capture demographic characteristics, types of informal economic activities, income levels, working hours, access to capital, reliance on social and economic networks, and experiences of economic insecurity. Structured questionnaires are well-suited to quantitative studies, aiming to standardise responses and facilitate comparative analysis across respondents (Fowler, 2014).

To address language barriers, the questionnaire was administered in English and, where necessary, translated orally into French, Swahili, or Lingala. This approach has been widely used in migrant research to enhance comprehension and reduce response bias in multilingual contexts (Liamputtong, 2010).

3.4 Data analysis

Quantitative data were analysed using descriptive statistical techniques. Frequencies and percentages were used to examine patterns of informal economic participation, income generation, and reliance on economic networks. Cross-tabulations were employed to explore relationships between variables such as legal status, type of informal activity, and levels of economic security. Descriptive analysis is particularly suitable for exploratory quantitative studies that aim to map social and economic trends rather than establish causal inference (Punch, 2014).

The analysis focuses on illustrating how informal economic networks function as survival mechanisms within a capitalist system that limits migrants' access to formal economic opportunities, rather than on producing predictive or causal models.

3.5 Ethical considerations

Ethical approval for the study was obtained from the relevant institutional ethics committee. Participation was voluntary, and informed consent was obtained from all respondents prior to data collection. To protect participants' confidentiality, no identifying information was recorded, and all data were anonymized. Research involving migrant populations requires heightened ethical sensitivity due to participants' legal and social vulnerability (Block et al., 2013).

4 Findings

4.1 Exclusion from formal employment and economic marginalisation

One of the strongest themes emerging from the interviews was the persistent exclusion of African migrants from formal employment opportunities. Almost all participants reported that securing formal employment in Durban was extremely difficult despite possessing work experience, educational qualifications, and professional skills acquired in their countries of origin. Participants described repeated experiences of rejection, often linked to documentation requirements, lack of local experience, language barriers, and employers' preferences for South African citizens.

Many participants explained that they had arrived in South Africa with expectations of finding stable employment, but soon discovered that access to formal work was highly restricted. As a result, many experienced prolonged periods of unemployment before turning to informal economic activities. A 42-year-old Congolese participant explained:

Table 1: Socio-economic characteristics of participants and types of informal economic activities

Variable	Category	Number (n)	Percent (%)
Gender	Male	20	50%
	Female	20	50%
Age group	18–29	6	15%
	30–39	9	22.5%
	40–49	15	37.5%
	50+	10	25%
Country of origin	RDC	10	25%
	Rwanda	10	25%
	Zimbabwe	5	12.5%
	Other	15	37.5%
Length of stay in South Africa	0–2	2	5%
	3–5	6	15%
	6–10	10	25%
	$>$10	22	55%
Education level	Primary	5	12.5%
	Secondary	15	37.5%
	Tertiary	20	50%
Type of activity	Street trading	18	45%
	Small retail shop	6	15%
	Services (hair, repair, etc.)	10	25%
	Other	6	15%
Business location	Street/pavement	34	85%
	Market stall	1	2.5%
	Home-based	4	10%
	Shared shop	1	2.5%
Access to permit	Yes	2	5%
	No	38	95%

> *"When I left the Democratic Republic of Congo, I believed that South Africa would offer opportunities for people willing to work. Back home, I worked as an electrician and supported my family comfortably. When I arrived in Durban, I spent almost a year searching for work. Every morning, I would leave my room carrying copies of my certificates and CV. I visited factories, construction companies, workshops, and warehouses. Some employers never called me back, while others immediately asked whether I had South African identity documents. Even when I explained that I had refugee documents, they would say they were looking for someone with permanent residency or citizenship. Eventually, I realised that my qualifications and experience meant very little because I was a foreigner. I felt invisible and excluded from the system."* (R. N., 3 September 2025)

A participant from Burundi described a similar experience:

> *"For nearly eight months, I searched for work. Sometimes I would spend money on transport to attend interviews only to be told that the position was no longer available or that they preferred South African applicants. It became frustrating because every rejection meant another day without income. I had children depending on me, rent to pay, and relatives back home who expected support. There were days when I questioned whether migrating had been the right decision."* (G. F., 22 August 2025)

These experiences demonstrate how exclusion from formal labour markets constitutes an important dimension of migrants' economic vulnerability.

4.2 Entry into informal economic activities as a survival strategy

The interviews revealed that participation in informal economic activities was largely driven by necessity rather than choice. Most participants explained that they entered the informal economy after exhausting efforts to secure formal employment. Informal activities represented one of the few accessible opportunities for generating income and supporting household survival.

Participants reported involvement in a wide range of activities, including street trading, food vending, mobile phone repairs, tailoring, hairdressing, transportation services, and small retail businesses. Entry into these activities often occurred through assistance from friends, relatives, or members of migrant communities already established in Durban. One Congolese participant explained:

> *"After months of looking for work without success, a friend from church invited me to help him at his small clothing stall. At first, I was only assisting him by arranging stock and speaking to customers. Over time, I learned where to buy goods, how to negotiate prices, and how to identify products that sold quickly. Eventually, I borrowed money from relatives and started selling my own items. It was not the life I had imagined for myself, but it allowed me to survive and provide food for my family."* (J. T., 11 August 2025)

A participant from Rwanda stated:

> *"When I arrived, I knew nobody and had no money. A fellow Rwandan allowed me to stay in his room while I looked for work. Later, he introduced me to people who sold fruit and vegetables at the market. They taught me everything from where to buy stock to how to avoid losing money. Without their help, I would have had no way of surviving."* (J. K., 22 August 2025)

These findings indicate that informal economic participation often emerges as an adaptive response to structural barriers within formal labour markets.

4.3 Economic insecurity and everyday risks in the informal economy

Although informal economic activities generated income, participants consistently described conditions of uncertainty and insecurity. Daily earnings fluctuated significantly, and many participants expressed anxiety regarding their ability to meet basic household needs.

Several participants explained that they operated without contracts, legal protections, or stable sources of income. Unexpected events such as poor sales, illness, theft, or confiscation of goods could immediately threaten household survival. One Ethiopian participant stated:

> *"There are days when I leave home at six o'clock in the morning and return late in the evening with almost nothing. Yet rent, electricity, and food expenses continue regardless of how much I earn. Every day feels uncertain because tomorrow's income depends on factors I cannot control. Sometimes rain keeps customers away. Sometimes, police operations force us to close early. Sometimes there are simply too many traders competing for the same customers."* (R. L., 25 August 2025)

A Zimbabwean participant explained:

> *"I live with constant fear of losing everything. Two years ago, municipal officers confiscated goods worth several thousand rand. That stock represented months of savings. Overnight, I had to start again from nothing. Experiences like that make you realise how fragile your livelihood really is."* (H. M., 19 August 2025)

These findings suggest that while the informal economy provides opportunities for survival, it also exposes migrants to significant economic insecurity.

4.4 Social networks and collective survival

A dominant theme throughout the interviews was the importance of social networks in facilitating survival and economic participation. Participants repeatedly emphasised that family members, friends, religious communities, and ethnic associations provided critical forms of support that compensated for limited access to formal institutions.

Many participants described social networks as their primary source of information, accommodation, employment opportunities, financial assistance, and emotional support. A female participant from the DRC explained:

> *"When I arrived in Durban, I did not know where to stay or how to survive. Members of my church collected money to help me pay rent during my first months. Later, they introduced me to women who were running small businesses. They taught me how to manage stock, how to budget, and where to buy products at lower prices. Without that support, I honestly do not know what would have happened to me."* (D. M., 11 August 2025).

Another participant stated:

> *"Among Congolese migrants, people often help each other because we understand the difficulties we face. When someone's business is struggling, others contribute money or provide stock on credit. We know that next time it could be us who needs assistance."* (B. M., 18 August 2025).

These narratives demonstrate the central role of collective support systems in sustaining migrant livelihoods.

4.5 Trust, reciprocity, and community-based economic support

Participants also highlighted the importance of trust and reciprocity within migrant communities. Many informal economic activities depended on relationships built over time through repeated interaction and mutual assistance.

Several participants described rotating savings groups, informal credit arrangements, and collective purchasing schemes that enabled business development despite limited access to formal financial institutions. One female participant explained:

> *"A group of ten women contributes money every month. Each month, one member receives the total amount collected. Through this system, I managed to buy equipment for my food business. Banks would never lend money to someone in my situation, but our savings group made it possible."* (E. M., 12 August 2025).

These arrangements illustrate how trust-based relationships create economic opportunities that would otherwise remain inaccessible.

4.6 Gendered experiences of informal economic participation

Gender emerged as an important factor shaping migrants' experiences within the informal economy. Female participants often described balancing income-generating activities with childcare responsibilities and domestic obligations.

Many women explained that they selected economic activities that could be conducted from home or close to their residences in order to accommodate family responsibilities. A Congolese mother of four explained:

> *"I wake up before sunrise to prepare food for my children before they leave for school. During the day, I cook meals that I sell to customers from my room. While serving customers, I am also cleaning, helping children with homework, and managing household responsibilities. Running a business and caring for a family at the same time is exhausting, but I have no alternative because I am responsible for supporting my children."* (F. T., 15 August 2025).

These findings suggest that gender influences both opportunities and constraints within informal economic participation, with women often carrying multiple responsibilities simultaneously.

5 Conclusion

This study examined how African migrants in Durban mobilise informal economic networks to sustain their livelihoods within a context characterised by unemployment, economic exclusion, legal insecurity, and limited access to formal employment opportunities. The study sought to answer the research question of how African migrants utilise informal economic networks to survive and participate in Durban's urban economy despite the barriers they encounter in the formal labour market.

The findings demonstrate that exclusion from formal employment remains a significant challenge for many African migrants living in Durban. Participants reported facing multiple barriers, including documentation requirements, non-recognition of foreign qualifications, language difficulties, labour market competition, and xenophobic attitudes. These barriers often prevented migrants from accessing stable employment opportunities, forcing many to seek alternative means of livelihood within the informal economy.

The study further revealed that participation in informal economic activities is primarily a survival strategy rather than a matter of personal preference. Many participants entered informal economic activities after unsuccessful attempts to secure formal employment. Street trading, food vending, hairdressing, transportation services, mobile phone repairs, and other small-scale enterprises emerged as important sources of income that enabled migrants to meet basic household needs and support family members both locally and in their countries of origin.

A key finding of the study is the central role played by informal economic networks in sustaining migrant livelihoods. Participants consistently highlighted the importance of social relationships, including family members, friends, religious organisations, ethnic associations and community groups, in facilitating access to accommodation, employment opportunities, financial support, business information, and emotional assistance. These networks function as critical survival mechanisms that compensate for migrants' limited access to formal institutions and economic resources.

The findings also reveal that while informal economic activities provide opportunities for livelihood generation, they do not eliminate vulnerability. Participants described experiences of income instability, insecurity, police interventions, confiscation of goods, discrimination, and xenophobia. Consequently, migrants often operate under conditions of uncertainty where economic survival depends on their ability to adapt to changing circumstances continually. The study, therefore, highlights the dual nature of informality as both a source of opportunity and a source of ongoing precarity.

This study contributes to the growing body of literature on migration, informality, and urban livelihoods by providing empirical evidence from Durban, a city that has received comparatively less scholarly attention than other South African urban centres. By focusing on the lived experiences of African migrants, the study demonstrates that informal economic networks are not merely supplementary support systems but constitute essential mechanisms through which migrants negotiate exclusion and sustain livelihoods in highly unequal urban environments.

The findings have important policy implications. First, there is a need for policies that facilitate greater economic inclusion of migrants through improved access to documentation processes, skills recognition, and employment opportunities. Second, municipal authorities should adopt more supportive approaches towards informal economic activities by recognising their role in livelihood creation and urban economic development. Third, interventions aimed at reducing xenophobia and discrimination remain critical for promoting social cohesion and improving migrants' access to economic opportunities. Finally, organisations

working with migrant communities should strengthen programmes that support entrepreneurship, business development, and community-based support networks.

Future research should expand understanding of migrant livelihoods by examining comparative experiences across different South African cities and exploring how local contexts shape economic opportunities and constraints. Further studies could also investigate the long-term sustainability of informal livelihoods, the experiences of undocumented migrants, and the gendered dimensions of economic survival within migrant communities.

In conclusion, the study demonstrates that African migrants in Durban are not passive victims of economic exclusion but active agents who develop innovative strategies to navigate difficult urban environments. Through informal economic networks, migrants create pathways to survival, income generation, and social support despite operating under conditions of uncertainty and marginalisation. Understanding these experiences is essential for developing more inclusive urban and migration policies that recognise the contributions of migrants to the social and economic life of South African cities.

References

Bayat, A. (2013). *Life as Politics: How Ordinary People Change the Middle East* (2nd). Stanford: Stanford University Press.

Block, K., Riggs, E., & Haslam, N. (Eds.) (2013). *Values and Vulnerabilities: The Ethics of Research with Refugees and Asylum Seekers*. Australian Academic Press.

Bryman, A. (2016). *Social Research Methods* (5th). Oxford University Press.

Castles, S., de Haas, H., & Miller, M. J. (2014). *The Age of Migration: International Population Movements in the Modern World* (5th). Basingstoke: Palgrave Macmillan. https://doi.org/10.1007/978-0-230-36639-8_4

Charman, A., Petersen, L., & Piper, L. (2019). *From local survivalism to foreign entrepreneurship: Informal economies and migrant enterprise in South Africa*. Sustainable Livelihoods Foundation.

Chen, M. A. (2012). The informal economy: Definitions, theories and policies (WIEGO Working Paper 1). WIEGO. https://doi.org/10.4337/9781849809290.00039

Creswell, J. W., & Creswell, J. D. (2018). *Research Design: Qualitative, Quantitative, and Mixed Methods Approaches* (5th). Sage Publications.

Crush, J., & Ramachandran, S. (2014). Xenophobic violence in South Africa: Denialism, minimalism, realism. *Migration Policy Series*, *66*, 1–32. https://doi.org/10.2307/j.ctvh8qxcj

De Soto, H. (2000). *The Mystery of Capital: Why Capitalism Triumphs in the West and Fails Everywhere Else*. Basic Books.

Etikan, I., Musa, S. A., & Alkassim, R. S. (2016). Comparison of convenience sampling and purposive sampling. *American Journal of Theoretical and Applied Statistics*, *5*(1), 1–4. https://doi.org/10.11648/j.ajtas.20160501.11

Fowler, F. J. (2014). *Survey Research Methods* (5th ed.). SAGE Publications.

Granovetter, M. (1985). Economic action and social structure: The problem of embeddedness. *American Journal of Sociology*, *91*(3), 481–510. https://doi.org/10.1086/228311

Horn, P. (2019). *Women and the informal economy: Labour rights, urban governance and survival strategies*. WIEGO.

Landau, L. B. (2011). *Exorcising the Demons Within: Xenophobia, Violence and Statecraft in Contemporary South Africa*. Johannesburg: Wits University Press.

Liamputtong, P. (2010). *Research Methods in Health: Foundations of Evidence-Based Practice*. Oxford University Press.

Mbatha, N., & Koskimaki, L. (2023). Informal trading, social networks and migrant livelihoods in Durban. *Journal of Southern African Studies*, *49*(2), 215–232.

Meagher, K. (2015). Leaving no one behind? Informal economies, inclusive growth and development. *Development*, *58*(1), 88–95.

Mhandu, J. (2020). Informal livelihoods and survival strategies among migrant women in Durban. *Agenda*, *34*(4), 52–63.

Mhandu, J. (2025). Migrant entrepreneurship and economic survival in Durban's informal economy. *African Human Mobility Review*, *11*(1), 45–68.

Neocosmos, M. (2010). *From foreign natives to native foreigners: Explaining xenophobia in post-apartheid South Africa*. Dakar: CODESRIA.

Punch, K. F. (2014). *Introduction to Social Research: Quantitative and Qualitative Approaches* (3rd ed.). Los Angeles, CA: SAGE Publications.

Sassen, S. (2014). *Expulsions: Brutality and Complexity in the Global Economy*. Cambridge, MA: Harvard University Press.

Simone, A. (2010). *City Life from Jakarta to Dakar: Movements at the Crossroads*. New York: Routledge. https://doi.org/10.4324/9780203892497

Skinner, C. (2019). Informal sector policy and urban governance in South Africa. *Urban Forum*, *30*(2), 145–161. https://doi.org/10.4324/9780429200724-21

Turok, I., & Visagie, J. (2018). The continued uneven geography of spatial inequality in South Africa. *Economic Development Quarterly*, *32*(3), 215–227. https://doi.org/10.64628/aaj.mxw95fdc6

Umubyeyi, B., & Mtapuri, O. (2024). Social networks and livelihood sustainability among African refugees in Durban. *Journal of Refugee Studies*, *37*(1), 101–120. https://doi.org/10.46469/mq.2024.64.4.14

Wacquant, L. (2008). *Urban Outcasts: A Comparative Sociology of Advanced Marginality*. Cambridge: Polity Press.

MANKIND QUARTERLY Mankind Quarterly, 67(1), 78-102 2026 Fall Edition
ISSN: 0025-2344

Assessment of Body Composition and Nutritional Status Utilizing Upper Arm Anthropometry and Its Determinants among Preschool Children of West Bengal, India

Arindam Biswas[†] Argina Khatun[‡] Nitish Mondal[§*]

Abstract

Body composition is closely linked to nutritional status, dietary habits, physical activity, sex, and the prevalence of disease. Poor body composition and low nutritional status can increase morbidity and reduce the capacity for physical activity and performance. Upper arm anthropometry has the potential to estimate body composition and nutritional assessment in children and adults. The present cross-sectional study was undertaken among 1122 children (570 boys, 552 girls) aged 24-71 months in Maynaguri Block, Jalpaiguri District, West Bengal, India. The present study aimed to assess body composition and nutritional condition by upper arm muscle area by height (UAMAH). Anthropometric and skinfold measurements were used to assess upper arm body composition by utilizing the standard methods developed by Frisancho (1981, 1990). Most of the anthropometric and body composition variables showed significant age-related variation. Overall, the prevalence of UAMAH-defined wasting was 48.13 percent (52.63 percent in boys, 43.48 percent in girls). Age- and sex-specific comparison with the National Health Statistics Report showed that mean height, weight, and BMI are lower than the reference values. Body composition and nutritional status of these children were found to be unsatisfactory. Most of the socio-economic and demographic variables were significantly associated with low UAMAH (i.e., wasting). Binary logistic regression showed that boys are at greater risk of wasting than girls. Ethnicity, type of delivery, birth weight of child, number of rooms, fuel for cooking, type of bath place, monthly family income, and maternal BMI all were statistically related to wasting. The combined use of upper arm anthropometry and conventionally used anthropometric measures appears to be a useful tool for assessing body composition and nutritional status.

Keywords: Anthropometry, Body composition, Nutritional assessment, Preschool children, Upper arm muscle area for height

1 Introduction

Assessing body composition utilizing anthropometric measurements is a vital method in epidemiological and clinical investigations (Addo et al., 2017; Debnath et al., 2017; Dutta & Sengupta, 2023; Lambebo et al., 2023; Muñoz Esparza et al., 2019; Ngaboyeka et al., 2025; Nwankwo et al., 2024; Oyhenart et al., 2019; Yavuz & Özer, 2020). Body composition is closely linked to nutritional status, dietary habits, physical activity, sex, and the prevalence of disease (Oukheda et al., 2023; Pelc et al., 2024; Sen & Mondal, 2013; Thibault & Pichard, 2012). Poor body composition and inadequate nutritional status can increase morbidity and lead to decreased physical activity and performance (Manikandan et al., 2024; Oukheda et al., 2023; Sen et al., 2015; Thibault & Pichard, 2012; Thibault et al., 2012). The assessment of body composition provides a relative estimation of changes in muscle mass and adiposity due to environmental influences, early diseases, and nutritional status during childhood (Debnath et al., 2017; Dutta & Sengupta, 2023;

† Research Scholar (NET-SRF), Department of Anthropology, University of North Bengal. rs_arindamb@nbu.ac.in
‡ Assistant Professor, Department of Anthropology, University of North Bengal. argina.khatun@nbu.ac.in
§ Professor, Department of Anthropology, School of Human Sciences, Sikkim University. nmondal@cus.ac.in
* Corresponding author, email: nmondal@cus.ac.in

Holmes & Racette, 2021). The BMI centile characterizes children's adiposity but fails to quantify body mass components (Chainoglou et al., 2025; Cole et al., 2005), but upper arm muscle area (UMA) denotes muscularity and body protein reserves, whereas upper arm fat area (UFA) represents adiposity and calorie reserves (Debnath et al., 2017; Dutta & Sengupta, 2023; Senbanjo et al., 2014). Body composition and nutritional status are affected by socio-economic variables (Ayele et al., 2022; Cheruiyot, 2024; Sen et al., 2011, 2015; Sen & Mondal, 2013; Singh & Mondal, 2014).

Several recommended methods are available for measuring body composition, including underwater weighing, air displacement plethysmography, bioelectrical impedance analysis (BIA), and dual-energy X-ray absorptiometry (DEXA) (Kontogianni et al., 2005; Sala et al., 2007; Sun et al., 2003; Thomas et al., 2025; Wells, 2010; Zemel, 2021).

Dual-energy X-ray absorptiometry in the four-compartment model estimates body composition and can be used for adiposity and leanness estimation (Cherian et al., 2021). The BIA scale is found to be relatively inaccurate in bone mineral content compared to DEXA (Lee et al., 2020). Researchers often used BIA in combination with DEXA to improve accuracy or validation and to avoid the logistical challenges for assessment of body composition argued by scholars (Dumitriu et al., 2025; Manole et al., 2025; Stone et al., 2018). BIA-derived mineral content in place of DEXA can be used in multi-compartment models in which DEXA also estimates whole-body skeletal muscle mass based on lean tissue measures (Messina et al., 2020; Nickerson & Tinsley, 2018). To assess body composition, the 3D body scanners use digital images to estimate volume, size, and circumference in various anatomical locations (Balasubramanian & Sheykhmaleki, 2025; Tinsley et al., 2020). Fat-free mass is calculated from the measurement of total body water (TBW) using the hydration factors. This is considered a safe, effective, and non-invasive means of measuring the size of the total body water pool in infants and children (Zemel, 2021). The H_2O overestimates TBW by about 4%, and O^{18} overestimates TBW by about 1%. While advanced techniques such as DEXA, BIA, TBW, and 3D body scanning provide accurate and detailed assessments of body composition, their use is limited by high cost, technical complexity, and lack of portability. In contrast, anthropometric methods are low-cost, non-invasive, and feasible for large-scale field use, making them the preferred approach for screening undernutrition and assessing body composition in low-resource and community settings (Nwankwo et al., 2024; Puttaswamy et al., 2024).

Anthropometric measures are widely used to estimate whole-body fat-free mass, fat mass as a percent of body mass, and upper arm composition (Zemel, 2021). However, measuring skinfold thickness remains a widely accepted, simple, reliable, and cost-effective method for evaluating nutrition in children (Kalami et al., 2022; Kriemler et al., 2010; Rahman et al., 2024; van Beijsterveldt et al., 2023). Muscularity and adiposity can be indirectly assessed through skinfold thickness, body mass index (BMI), and circumference measurements (Frisancho, 1990; Malik et al., 2023; Sen & Mondal, 2013; Wells, 2010). Research suggests that skinfold measurements in children may be superior to BMI as predictors of obesity and body fat (Kriemler et al., 2010; Nooyens et al., 2007; Puttaswamy et al., 2024; van Beijsterveldt et al., 2023; Zimmermann et al., 2004). Typically, the assessment of muscularity and adiposity is conducted using skinfold thickness and upper arm circumference measurements (Addo et al., 2017; Debnath et al., 2017; Dutta & Sengupta, 2023; Frisancho, 1981; Gibson, 2005; Muñoz Esparza et al., 2019; Nwankwo et al., 2024; Oyhenart et al., 2019; Taylor et al., 2010; Yavuz & Özer, 2020). Frisancho and Tracer (1987) conducted a study on 9,134 American children aged 2–17 years and developed means and percentiles for UMA based on height, using data from the National Health and Nutrition Examination Survey (NHANES 1971–1974 and NHANES 1976–1980). A study conducted on Egyptian children aged 2–17 years developed standards for upper arm muscle area on height (UAMAH) (Monir et al., 2008).

Upper arm anthropometry, including total upper arm area (TUA), UMA, UFA, arm fat index (AFI), and upper arm fat area estimate (UFE), is used to assess body composition. UFA provides a direct estimate of subcutaneous fat in the upper arm, reflecting adiposity. UFA and UFE allow comparison of fat stores across children of varying growth patterns depending on age, sex, and body size. Together with upper arm muscle area estimate (UME), these measurements are derived from mid-upper arm circumference (MUAC) and triceps skinfold (TSF) (Debnath et al., 2017; Frisancho, 1990; Wells, 2010).

Upper arm anthropometry has gained considerable attention over recent decades compared to

traditional measurements (e.g., (Basu et al., 2010; Bolzan et al., 1999; Chowdhury & Ghosh, 2009; Dutta & Sengupta, 2023; Gültekin et al., 2006; Lipsberga & Kažoka, 2016; Monir et al., 2008; Nwankwo et al., 2024; Ozturk et al., 2009; Sen et al., 2011, 2015; Senbanjo et al., 2014; Singh & Mondal, 2014; Yavuz & Özer, 2020)), though it has not yet been routinely adopted to assess body composition and nutritional status. UMA and UFA were introduced as reliable measures of nutritional status for children in various community settings. Research has subsequently employed UMA and UFA to assess body composition and nutritional status of children (e.g., (Arps, 2023; Basu et al., 2010; Chowdhury & Ghosh, 2009; Çiçek et al., 2009; Erfan et al., 2003; Oyhenart et al., 2019; Sen et al., 2011, 2015; Sikdar, 2012; Singh & Mondal, 2014; Yavuz & Özer, 2020)).

Few studies exist regarding standard growth references for children concerning upper arm composition (Addo et al., 2017; Gültekin et al., 2006; Monir et al., 2008; Nwankwo et al., 2024; Oyhenart et al., 2019). UAMAH has been recognised as a relatively better and more reliable indicator for assessment of child nutritional status (Frisancho & Tracer, 1987) based on body composition compared to conventional indices such as BMI for age, because UAMAH is derived from MUAC and TSF, which reflect muscle mass and body composition, whereas BMI only reflects body weight relative to height (Debnath et al., 2017; Dutta & Sengupta, 2023). Some studies have reported on UAMAH-based nutritional assessments (Arps, 2023; Debnath et al., 2017; Dutta & Sengupta, 2023; Lipsberga & Kažoka, 2016; Singh & Mondal, 2014). Using these anthropometric measurements, several investigations have been conducted to assess body composition and undernutrition among children (Arps, 2023; Basu et al., 2010; Çiçek et al., 2014; Debnath et al., 2017; Dutta & Sengupta, 2023; Erfan et al., 2003; Gültekin et al., 2006; Lipsberga & Kažoka, 2016; Ozturk et al., 2009; Sen et al., 2015; Sikdar, 2012; Singh & Mondal, 2014).

Upper arm anthropometry is becoming increasingly used for nutritional assessment and body composition analysis. Traditionally, height, weight, MUAC, BMI, and skinfolds were utilized to assess nutritional status and body composition; however, Frisancho (1981) emphasized the importance of upper arm measurements. Body composition indicates muscle mass and adiposity variations caused by genetic or ethnic and environmental factors (Dutta & Sengupta, 2023; Kang et al., 2021; Paciência et al., 2021). Several studies reported the relationships of socio-economic and demographic factors with the prevalence of wasting (Harding et al., 2018; P. Khanra et al., 2020; Mishra & Bera, 2024; Mutua et al., 2017; Mutunga et al., 2020; Patil et al., 2017; Sen et al., 2011, 2020; Tigga et al., 2015; Wali et al., 2021). Few studies have been conducted on age- and sex-specific changes in body composition and standard growth references for preschool-age children based on upper arm anthropometry. Therefore, the aim and objective of this study was to evaluate age- and sex-specific body composition and nutritional status and their association with socio-economic and demographic factors among preschool children aged 2–5 years in Jalpaiguri, West Bengal, India, using upper arm composition.

2 Material and methods

The present cross-sectional study has been carried out among 1122 preschool children (570 boys and 552 girls) of three ethnicities, including Rajbanshi, Namasudra, and Nashyaseikh, aged 2–5 years. Data was collected from 48 Integrated Child Development Centers of the Maynaguri block, Jalpaiguri district, West Bengal, India. Children were selected by age, sex, and ethnicity based on the stratified sampling method. The study was conducted from 5th August 2023 to 5th April 2024. The participants were free from any physical deformities and not suffering from any disease at the time of examination.

The Rajbanshi, Namasudra, and Nashyaseikh communities constitute the predominant resident populations in the study area. Rajbanshis are an indigenous agrarian community traditionally engaged in agriculture and allied occupations. Namasudras are a Scheduled Caste community with diverse occupations, including agriculture, wage labour, and small-scale business. Nashyaseikhs are a socioeconomically disadvantaged Muslim community, primarily involved in agriculture, daily wage labour, and other informal occupations. These three communities together represent the majority of preschool children enrolled in the selected ICDS centres and therefore were considered appropriate for investigating body composition and nutritional status in the study area.

2.1 Data collection

All the necessary study approval was taken from the Child Development Project Officer (CDPO) of Maynaguri, and research permission was obtained from the University of North Bengal. All types of data were collected by the first author, AB.

Anthropometric measurements

The anthropometric measurements used in the present study were height, body weight, mid-upper arm circumference (MUAC), and triceps skinfold (TSF) measurements. All anthropometric measurements were taken following standard anthropometric techniques as proposed by Lohman et al. (1988). The heights of the subjects were recorded with the help of an anthropometer to the nearest 0.10 cm. The weight of the children wearing minimal clothing and with bare feet was recorded using a portable digital scale to the nearest 0.1 kg. MUAC was taken at the point midway between the acromion and the radial of the upper arm using a non-stretchable measuring tape on the left side to the nearest 0.10 cm. The skinfold measurement was done using a Holtain skinfold calliper calibrated on the left side of each subject to the nearest 0.2 mm.

Socio-economic and demographic data

Various socio-economic and demographic data, such as children's sex (boys & girls), age (2 years, 3 years, 4 years & 5 years), ethnicity (Rajbanshi, Namasudra & Nashyaseikh), type of delivery (vaginal – caesarean), birth weight (<2500 gm – $\geq$2500 gm), number of rooms in the household (1, 2, $\geq$3), fuel for cooking (wood, crop residue, LPG), house type (non-brick – brick), bathing place (open – closed), monthly family income (INR <7500, INR 7500-15000, INR >15000) and maternal BMI (<18.5 kg/m^2, 18.5-22.99 kg/m^2, >23 kg/m^2), were collected by a pre-tested questionnaire.

2.2 Data management and statistical analysis

Assessment of upper arm composition

Upper arm body composition was assessed utilizing the standard equations developed by Frisancho (1981, 1990) using MUAC and TSF.

$$TUA\ cm^2 = (MUAC)^2 / (4\times \pi)$$

$$UMA\ cm^2 = \{MUAC - (TSF\times\pi)\}^2/(4\times n)$$

$$UFA\ cm^2 = \{(MUAC)^2 / (4\times\pi)\} - UMA$$

$$AFI = UFA /\{(MUAC)^2 / (4\times\pi)\} \times 100$$

Using the anthropometric indices of the upper arm, anthropometric body composition was calculated using the formula developed by Rolland-Cachera et al. (1997).

$$UFE = MUAC \times (TSF/2)$$

$$UME = \{(MUAC)^2 / (4\times\pi)\} - UFE$$

Assessment of nutritional status

The prevalence of undernutrition was evaluated in terms of UAMAH using the classification based on Z-scores for UAMAH as developed by Frisancho and Tracer (1987) (Table 1).

Table 1: Classification of nutritional status based on UAMAH

Nutritional Status	UAMAH Percentile	UAMAH Category	Z-Score
Wasted	0–5.0	Category I	< -1.60
Below Average	5.1–15.0	Category II	-1.60 to -1.00
Average	15.1–85.0	Category III	-1.00 to +1.00
Above Average	85.1–95	Category IV	+1.00 to +1.60
High Muscle	95.1–100	Category V	$\geq$ +1.60

Statistical analysis

All statistical analyses were done on the Statistical Package for the Social Sciences (SPSS v. 18). One-way analysis of variance (ANOVA) was utilized to observe significant age variations. A t-test was performed between low birth weight (LBW) and normal birth weight child groups to observe sex- and age-specific differences based on birth weight. The Chi-square (χ^2) analysis, binary logistic regression (BLR), and multiple linear regression were performed to observe the associations of socio-economic and demographic variables with wasting measured as low UAMAH. The χ^2 analysis was employed to examine the unadjusted association between categorical socioeconomic and demographic variables and the prevalence of wasting (low UAMAH). The BLR was subsequently performed to estimate the independent effects of these variables on wasting (low UAMAH) while simultaneously controlling for the influence of other covariates. Multiple linear regression analysis was additionally conducted to evaluate the relative contribution of socioeconomic and demographic variables to UMA among studied children. A p-value of <0.05 was considered to be statistically significant.

3 Results

Table 2 shows the age- and sex-specific sample size, mean, and standard deviation (SD) values of height, weight, BMI, MUAC, and TSF and the derived body composition measurements of TUA, UMA, UFA, AFI, UFE, and UME among 24-71-month-old children. The mean height and weight of boys are significantly higher than those of girls. The mean height shows significant sex differences at all ages. TSF is slightly higher among girls than boys in most of the age groups. Mean weight, UMA, and UME show statistically significant sex differences in the age groups of 36-47 months and 48-59 months. The mean TSF, UFA, and UFE show significant sex differences only in the age group of 36-47 months. The mean BMI, MUAC, and TUA show significant sex differences only in the age group of 48-59 months, whereas AFI shows significant sex differences in the age groups of 36-47 and 60-71 months. F-tests showed that significant age variation was found in all anthropometric and body composition variables among boys and girls except for TSF and AFI, which show significant age variation only in the case of boys, but BMI shows significant age variation only in girls.

Table 3 presents age- and sex-specific descriptive statistics of anthropometric and body composition variables among children who have LBW. The t-test shows significant sex differences in mean height only in children aged 36-47 months. UMA shows sex differences at the age of 48-59 months in children. TSF, UFA, and UFE show significant sex differences in children aged 60-71 months. UME shows statistically significant sex differences in the age groups of 36-47 months and 48-59 months of children. The F-test shows that height, weight, and BMI show significant age variation among both sexes. MUAC, TUA, UMA, UFA, UFE, and UME signify the age variation only in girls. TSF and AFI show no significant age variation in both sexes.

Table 4 depicts the age- and sex-specific prevalence of wasting among children categorized by Frisancho and Tracer's (Frisancho & Tracer, 1987) classification based on UAMAH. The proportion of children belonging to the wasted category was found to be higher among boys than girls (<-1.60 z-score; 52.63% vs. 43.48%). However, the below-average category had about the same percentage of boys as girls (-1.60 to -1.00 z-score; 26.14% vs. 26.27%); the average category was more frequent among girls (-1.00 to

Table 2: Age- and sex-specific descriptive statistics (mean ± SD) of anthropometric and body composition variables among the studied preschool children

Variable	Sex	N	24-35 months	36-47 months	48-59 months	60-71 months	*F*-value
			B-105; G-90	B-153; G-157	B-167; G-191	B-145; G-114	
Height (cm)	Boys	570	89.42 (3.72)	94.19 (4.28)	101.65 (4.96)	108.57 (5.26)	422.59***
	Girls	552	88.15 (2.87)	92.28 (4.37)	99.98 (5.05)	106.73 (6.33)	320.51***
	t-value		2.69*	3.89***	3.14**	2.49*	
Weight (kg)	Boys	570	12.08 (1.70)	13.09 (1.65)	15.24 (2.94)	17.36 (3.36)	108.80***
	Girls	552	12.02 (1.70)	12.51 (1.77)	14.29 (2.26)	16.78 (3.57)	92.21***
	t-value		0.27	2.98**	3.39***	1.32	
BMI (kg/m^2)	Boys	570	15.08 (1.56)	14.74 (1.46)	14.67 (1.89)	14.62 (1.89)	1.61
	Girls	552	14.43 (1.78)	14.67 (1.65)	14.25 (1.57)	14.61 (1.87)	9.91***
	t-value		-1.48	0.39	2.27*	0.69	243.68
TSF (mm)	Boys	570	7.43 (1.57)	7.31 (1.57)	8.14 (3.19)	7.56 (2.74)	3.55*
	Girls	552	7.82 (2.42)	7.88 (2.24)	8.05 (2.14)	8.17 (2.64)	0.54
	t-value		-1.29	-2.61*	0.30	-1.80	
MUAC (cm)	Boys	570	14.01 (1.16)	14.09 (0.93)	14.80 (5.59)	15.14 (1.69)	21.08***
	Girls	552	14.07 (1.16)	14.04 (1.26)	14.40 (1.20)	15.17 (1.71)	17.96***
	t-value		-0.37	0.33	2.63*	-0.15	
TUA (cm^2)	Boys	570	15.74 (2.70)	15.86 (2.10)	17.64 (4.22)	18.47 (4.54)	19.07***
	Girls	552	15.88 (2.75)	15.83 (2.94)	16.63 (2.90)	18.55 (4.63)	17.18***
	t-value		-0.36	0.12	2.60**	-0.142	
UMA (cm^2)	Boys	570	10.92 (1.69)	11.10 (1.26)	11.99 (1.72)	13.05 (2.34)	40.36***
	Girls	552	10.79 (1.48)	10.71 (1.69)	11.29 (1.80)	12.74 (2.35)	30.06***
	t-value		0.53	2.25*	3.75***	1.10	
UFA (cm^2)	Boys	570	4.81 (1.34)	4.76 (1.21)	5.34 (2.98)	5.41 (2.64)	5.49***
	Girls	552	5.08 (1.90)	5.11 (1.81)	5.60 (1.77)	5.81 (2.62)	3.23*
	t-value		-1.09	-1.98*	1.18	-1.21	
AFI	Boys	570	30.36 (4.34)	29.73 (4.62)	30.82 (7.02)	28.34 (6.19)	5.14**
	Girls	552	31.38 (6.78)	31.77 (5.98)	31.76 (5.69)	30.43 (5.83)	1.41
	t-value		-1.23	-3.36***	-1.38	-2.80*	
UFE (cm^2)	Boys	570	5.27 (1.66)	5.20 (1.41)	6.25 (3.61)	5.92 (3.10)	5.24***
	Girls	552	5.60 (2.28)	5.64 (2.16)	5.88 (2.14)	6.39 (3.06)	2.63*
	t-value		-1.17	-2.12*	1.14	-1.22	
UME (cm^2)	Boys	570	10.46 (1.62)	10.66 (1.23)	11.39 (1.50)	12.54 (2.14)	44.39***
	Girls	552	10.27 (1.47)	10.18 (1.64)	10.74 (1.79)	12.16 (2.10)	31.17***
	t-value		0.87	2.85***	3.69***	1.464	

* $p < .05$, ** $p < .01$, *** $p < .001$

Note. BMI = body mass index; TSF = triceps skin fold; MUAC = mid upper arm circumference; TUA = total upper arm area; UMA = upper arm muscle area; UFA = upper arm fat area; AFI = arm fat index; UFE = upper arm fat estimate; UME = upper arm muscle estimates.

Table 3: Age- and sex-specific descriptive statistics (mean ± SD) of anthropometric and body composition variables among children having LBW (<2.50 kg).

Variables	Sex	N	24-35 months B- 23; G- 17	36-47 months B- 44; G- 49	48-59 months B- 29; G- 56	60-71 months B- 16; G- 21	F
Height (cm)	Boys	112	89.46 (3.91)	92.38 (4.02)	99.33 (5.66)	104.13 (6.02)	41.79***
	Girls	143	88.60 (3.18)	90.06 (4.41)	97.18 (4.91)	107.45 (7.99)	67.63***
	t-value		0.77	2.65**	1.73	-1.44	
Weight (kg)	Boys	112	11.99 (1.64)	12.67 (1.43)	13.86 (1.90)	15.03 (2.61)	11.49***
	Girls	143	12.13 (1.37)	12.25 (1.81)	13.13 (1.47)	17.57 (5.57)	22.95***
	t-value		-0.29	1.23	1.79	-1.84	
BMI (kg/m^2)	Boys	112	14.98 (1.93)	14.87 (1.64)	14.00 (1.13)	13.73 (1.07)	3.95*
	Girls	143	15.44 (1.55)	15.07 (1.56)	13.92 (1.44)	14.88 (2.56)	5.72***
	t-value		-0.84	-0.60	0.28	-1.85	
TSF (mm)	Boys	112	7.45 (1.07)	7.80 (1.88)	7.50 (2.29)	7.30 (1.53)	0.41
	Girls	143	7.97 (1.76)	8.28 (2.29)	7.89 (1.43)	9.06 (3.48)	1.56
	t-value		-1.09	-1.10	-0.85	-2.08*	
MUAC (cm)	Boys	112	13.82 (0.91)	14.19 (0.96)	14.20 (1.11)	14.38 (1.03)	1.17
	Girls	143	14.04 (0.80)	14.08 (1.27)	13.81 (0.77)	15.24 (2.08)	7.09***
	t-value		-0.82	0.46	1.69	-1.64	
TUA (cm^2)	Boys	112	15.26 (1.99)	16.09 (2.26)	16.15 (2.60)	16.55 (2.39)	1.14
	Girls	143	15.75 (1.83)	15.91 (3.00)	15.24 (1.75)	18.83 (5.39)	7.55***
	t-value		-0.80	0.34	1.71	-1.73	
UMA (cm^2)	Boys	112	10.53 (1.42)	10.99 (1.21)	11.22 (1.52)	11.70 (1.69)	2.32
	Girls	143	10.64 (1.44)	10.53 (1.38)	10.28 (1.53)	12.33 (2.26)	8.71***
	t-value		-0.24	1.72	2.71*	-0.97	
UFA (cm^2)	Boys	112	4.73 (0.82)	5.10 (1.48)	4.93 (1.80)	4.85 (1.18)	0.37
	Girls	143	5.10 (1.22)	5.37 (1.94)	4.96 (0.92)	6.50 (3.32)	3.65*
	t-value		-1.09	-0.77	-0.08	-2.10*	
AFI	Boys	112	30.93 (3.37)	31.27 (5.35)	30.03 (6.08)	29.21 (5.04)	0.78
	Girls	143	32.33 (6.00)	33.09 (5.40)	32.60 (5.20)	32.87 (7.39)	0.10
	t-value		-0.86	-1.63	-1.94	-1.79	
UFE (cm^2)	Boys	112	5.17 (0.94)	5.60 (1.74)	5.41 (2.18)	5.28 (1.36)	0.37
	Girls	143	5.62 (1.43)	5.95 (2.32)	5.46 (1.09)	7.23 (3.89)	3.46*
	t-value		-1.13	-0.82	-0.12	-2.13*	
UME (cm^2)	Boys	112	10.09 (1.40)	10.48 (1.16)	10.74 (1.54)	11.26 (1.68)	2.41
	Girls	143	10.12 (1.51)	9.95 (1.24)	9.77 (1.60)	11.59 (1.81)	7.79***
	t-value		-0.07	2.14*	2.71*	-0.57	

* $p < .05$, ** $p < .01$, *** $p < .001$

Note. Abbreviations: BMI = body mass index; TSF = triceps skinfold; MUAC = mid-upper arm circumference; TUA = total upper arm area; UMA = upper arm muscle area; UFA = upper arm fat area; AFI = arm fat index; UFE = upper arm fat estimate; UME = upper arm muscle estimate.

1.00 z-score; 20.88% vs. 29.89%); and very few boys and girls (1.00 to 1.60 z-score; 0.35% vs. 0.36%) were in the above-average category. The prevalence of wasting was highest (62.07%) at 60-71 months and lowest (30.48%) at 24-35 months among boys. Among girls, however, the prevalence of wasting was the highest (50.78%) at 48-59 months and lowest (26.67%) at 24-35 months. Chi-square analysis shows significant categorical variation in prevalence or distribution of wasting across different age groups among boys (χ^2=37.47; p<0.001) as well as girls (χ^2=22.54; p<0.01).

Table 4: Prevalence of undernutrition (wasting) using UAMAH among studied children

Age (months)	N	Wasted (< -1.60 z-score)	Below average (-1.60 to -1.00)	Average (-1.00 to 1.00)	Above average (1.00 to 1.60)
	Boys				
24–35	105	32 (30.48)	41 (39.04)	32 (30.48)	0
36–47	153	77 (50.33)	44 (28.76)	32 (20.91)	0
48–59	167	101 (60.49)	36 (21.55)	30 (17.96)	0
60–71	145	90 (62.07)	28 (19.31)	25 (17.24)	2 (1.38)
24–71	570	300 (52.63)	149 (26.14)	119 (20.88)	2 (0.35)
χ^2	37.47*** d.f., 9				
	Girls				
24–35	90	24 (26.67)	31 (34.44)	35 (38.89)	0
36–47	157	70 (44.59)	42 (26.75)	45 (28.66)	0
48–59	191	97 (50.78)	44 (23.04)	50 (26.18)	0
60–71	114	49 (42.98)	28 (24.57)	35 (30.70)	2 (1.75)
24–71	552	240 (43.48)	145 (26.27)	165 (29.89)	2 (0.36)
χ^2	22.54** d.f., 9				

** $p < .01$, *** $p < .001$

Table 5 depicts age- and sex-specific bivariate correlations in all the anthropometric and body composition variables that are statistically significantly correlated. There is no statistically significant correlation of height with BMI and AFI among boys, and of height with BMI and AFI, as well as AFI with UMA, in girls.

Table 7 presents multiple linear regression analysis in which UMA, a continuous dependent variable, was predicted from selected socioeconomic and demographic variables. Factors like sex, age, ethnicity, type of delivery, birth weight of child, fuel for cooking, house type, monthly family income, and maternal BMI showed significant association with UMA. Among these, age showed the strongest positive association (β = 0.403), followed by birth weight (β = 0.171) and monthly family income (β = 0.134). Whereas the number of living rooms and bath places was found as a not significant factor of UMA among studied children.

Table 5: Age and sex combined bivariate correlation of all anthropometric and body composition variables

Variables	HT	WT	BMI	TSF	MUAC	TUA	UMA	UFA	AFI	UFE	UME
Boys											
HT	1	.803**	-.035	.150**	.472**	.461**	.583**	.256**	-.064	.246**	.583**
WT	.803**	1	.612**	.563**	.829**	.833**	.806**	.678**	.301**	.668**	.724**
BMI	.035	.612**	1	.714**	.759**	.768**	.585**	.761**	.563**	.755**	.460**
TSF	.150**	.563**	.714**	1	.791**	.808**	.411**	.978**	.932**	.979**	.209**
MUAC	.472**	.829**	.759**	.791**	1	.995**	.881**	.879**	.548**	.866**	.761**
TUA	.461**	.833**	.768**	.808**	.995**	1	.865**	.902**	.561**	.891**	.738**
UMA	.583**	.806**	.585**	.411**	.881**	.865**	1	.563**	-.100*	.543**	.976**
UFA	.256**	.678**	.761**	.978**	.879**	.902**	.563**	1	.837**	.999**	.371**
AFI	-.064	.301**	.563**	.932**	.548**	.561**	.100*	.837**	1	.841**	-.096*
UFE	.246**	.668**	.755**	.979**	.866*	.891**	.543**	.999**	.841**	1	.347**
UME	.583**	.724**	.460**	.139**	.759**	.736**	.976**	.371**	-.096*	.347**	1
Girls											
HT	1	.793**	-.055	.147**	.441**	.432**	.500**	.247**	-.021	.232**	.491**
WT	.793**	1	.550**	.532**	.815**	.819**	.747**	.666**	.266**	.651**	.666**
BMI	-.055	.550**	1	.673**	.743**	.749**	.544**	.746**	.469**	.742**	.426**
TSF	.147**	.532**	.673**	1	.711**	.724**	.276**	.968**	.926**	.974**	.091*
MUAC	.441**	.815**	.743**	.711**	1	.995**	.870**	.846**	.418**	.829**	.762**
TUA	.432**	.819**	.749**	.724**	.995**	1	.860**	.864**	.428**	.848**	.747**
UMA	.500**	.747**	.544**	.276**	.870**	.860**	1	.486**	-.074	.458**	.981**
UFA	.247**	.666**	.746**	.968**	.846**	.864**	.486**	1	.806**	.999**	.311**
AFI	-.021	.266**	.469**	.926**	.418**	.428**	-.074	.806**	1	.818**	-.250**
UFE	.232**	.651**	.742**	.974**	.829**	.848**	.458**	.999**	.818**	1	.281**
UME	.491**	.666**	.426**	.091*	.762**	.747**	.981**	.311**	-.250**	.281**	1

* $p < .05$, ** $p < .01$, *** $p < .001$

Note. For abbreviations see Table 2.

Table 6: Association of socio-economic and demographic factors with prevalence of wasting (low UAMAH).

Variables	$<5^{th}$ percentile (Wasted)	$>5^{th}$ percentile (Normal)	Exp (B)	95% CI	χ^2
Sex					
Boys	300	270	0.633***	0.49–0.82	9.41**
Girls	240	312	1		
Age					
2 years	56	139	1		40.06***
3 years	147	163	0.428***	0.28–0.64	
4 years	198	160	0.274***	0.18–0.41	
5 years	139	120	0.287***	0.19–0.44	
Ethnicity					
Rajbanshi	185	198	1.274	0.96–1.70	11.69**
Namasudra	155	216	1.659***	1.24–2.22	
Nashyaseikh	200	168	1		
Delivery					
Vaginal	394	330	0.557***	0.42–0.73	32.36***
Caesarean	146	252	1		
Birth weight of child					
$<$2500 gm	144	111	0.554***	0.41–0.76	9.20**
$\geq$2500 gm	396	471	1		
Number of living rooms					
1	126	115	1.410	0.97–2.04	7.91*
2	213	278	1.802***	1.33–2.43	
$\geq$3	201	189	1		
Fuel for cooking					
Wood	415	410	0.712*	0.52–0.98	11.77*
Crop residue	12	5	0.231*	0.07–0.74	
LPG	113	167	1		
House type					
Non-brick	409	457	1.264	0.95–1.68	1.23
Brick	131	125	1		
Bath place					
Open	219	186	0.666***	0.52–0.85	8.97**
Closed	321	396	1		
Monthly Family Income					
INR $<$7500	155	129	0.537**	0.36–0.79	14.10***
INR 7500–15000	318	338	0.664*	0.47–0.93	
INR $>$15000	67	115	1		
Maternal BMI					
$<$18.5 kg/m^2	66	59	1.190	0.78–1.81	12.25**
18.5–22.99 kg/m^2	280	254	1		
$>$23 kg/m^2	194	269	1.388*	1.05–1.83	

* $p < .05$, ** $p < .01$, *** $p < .001$
Note. For abbreviations see Table 2.

Table 7: Multiple regression predicting upper arm muscle area (dependent variable) from socioeconomic and demographic factors

Variables	B	Std Error	Beta	t	95% CI		Sig
					Lower	Upper	
Constant	6.957	0.459		15.172	6.057	7.857	0.000
Sex	-0.417	0.098	-0.101	-4.251	-0.610	-0.225	0.000
Age	0.775	0.047	0.403	16.398	0.682	0.868	0.000
Ethnicity	-0.213	0.061	-0.085	-3.506	-0.333	-0.094	0.000
Delivery	0.558	0.104	0.130	5.360	0.354	0.763	0.000
Birth weight of child	0.802	0.114	0.171	7.029	0.578	1.025	0.000
Number of living rooms	-0.028	0.070	-0.010	-0.398	-0.166	0.110	0.691
Fuel for cooking	0.142	0.062	0.058	2.266	0.019	0.264	0.024
House Type	-0.330	0.123	-0.066	-2.683	-0.571	-0.089	0.007
Bath Place	0.208	0.108	0.049	1.916	-0.005	0.420	0.056
Monthly Family Income	0.431	0.086	0.134	5.014	0.262	0.599	0.000
Maternal BMI	-0.089	0.044	-0.049	-2.012	-0.175	-0.002	0.044

Note. $p < .05$*, $p < .01$**, $p < .001$***

4 Discussion

Nutritional assessment by upper arm composition has received considerable attention in epidemiological research and clinical investigations among populations due to its universality, reliability, low cost, simplicity, and non-invasive technique. Combining upper arm composition and conventional anthropometric indices is useful for body composition and nutritional assessment (Addo et al., 2017; Arps, 2023; Chowdhury & Ghosh, 2009; Debnath et al., 2017; Dutta & Sengupta, 2023; Monir et al., 2008; Muñoz Esparza et al., 2019; Nwankwo et al., 2024; Oyhenart et al., 2019; Puttaswamy et al., 2024; Yavuz & Özer, 2020). In developing countries, when age is not known or is unreliable, UAMAH may be an interesting index to predict growth when synchronized with weight-for-height indexes (Bolzan et al., 1999; Monir et al., 2008). The UAMAH is an important tool in combination with recommended nutritional measures (e.g., BMI, stunting, MUAC, and underweight) in children. The present investigation reports an assessment of inferred body composition and nutritional status to improve screening of undernutrition by utilizing upper arm composition, especially in community settings and clinical examination among Integrated Child Development Scheme beneficiaries, to identify adiposity as well as low UAMAH (e.g., wasting) among children. It is an important tool to improve health quality through regular monitoring, which can provide a good assessment of muscularity and adiposity compared to conventional anthropometric measures (Debnath et al., 2017; Dutta & Sengupta, 2023; Lipsberga & Kažoka, 2016; Sen & Mondal, 2013; Singh & Mondal, 2014).

The UAMAH is proposed as a conventional upper arm-based anthropometric measure to identify nutritional status in populations with chronic undernutrition where both muscle and fat mass remain depleted (Bolzan et al., 1999; Debnath et al., 2017; Dutta & Sengupta, 2023; Lipsberga & Kažoka, 2016; Singh & Mondal, 2014). The majority of the children in the present study were observed to be lower than the 5^{th} percentile of the reference values (Frisancho & Tracer, 1987). Greater muscularity would reflect a greater protein reserve, and the low arm musculature is related to low height in children (Frisancho, 1981, 1990; Frisancho & Tracer, 1987). Researchers are advised to use BMI and UAMAH in conjunction for a more complete evaluation of body composition (Frisancho & Tracer, 1987). BMI is widely used to assess nutritional status but does not differentiate between fat mass and lean body mass. BMI is unable to measure body composition; therefore, arm anthropometry is recommended, as it provides additional information that helps to distinguish between fat mass and muscle mass. The present study indicates poor physical growth attainment of children, with low protein reserves and a high prevalence of wasting. The existing reference percentiles for MUAC, AMA, and AFA of well-nourished children up to 20 years are available to researchers around the world (Addo et al., 2017). That study also reported an age-dependent association between height-for-age z-score (HAZ) and the arm z-score measures that varied across sexes, whereas height-adjusted MUAC and AFA may be more sensitive than unadjusted measures of fatness (Addo et al., 2017).

Several studies have been done among different populations for establishing population-specific reference values related to upper arm composition among children and adolescents (e.g., (Arps, 2023; Basu et al., 2010; Bolzan et al., 1999; Çiçek et al., 2014; Frisancho & Tracer, 1987; Gültekin et al., 2006; Monir et al., 2008; Muñoz Esparza et al., 2019; Nwankwo et al., 2024; Oyhenart et al., 2019; Sen et al., 2015; Senbanjo et al., 2014; Sikdar, 2012; Singh & Mondal, 2014)). Frisancho and Tracer (1987), Monir (2008), and Addo et al. (2017) studied UMA and UFA. The present findings can be utilized for further investigations among Indian children aged 24-71 months. Research workers and clinicians can utilise these tables for age- and sex-group-specific comparisons. The present study utilized the age range of 24 months to 71 months, and age-sex-specific mean values of the present study can be compared to those reported by Frisancho and Tracer (1987) and Monir et al. (2008). The UAMAH was lower among the children of the present study than in the American and Egyptian samples, indicating poor nutrition (Figures 1 & 2).

The mean UMA for age in the present investigation is much lower than the 50^{th} percentile value of U.S. children of both sexes, being close to the 5^{th} percentile of U.S. children across age and gender. Also, the age-specific mean UFA in our study was distinctly lower than the 50^{th} percentile value of U.S. children in both sexes but slightly higher than the 5^{th} percentile value of U.S. children (Figures 3 & 4).

The present study concludes that poor caloric and protein reserves indicate wasting among the

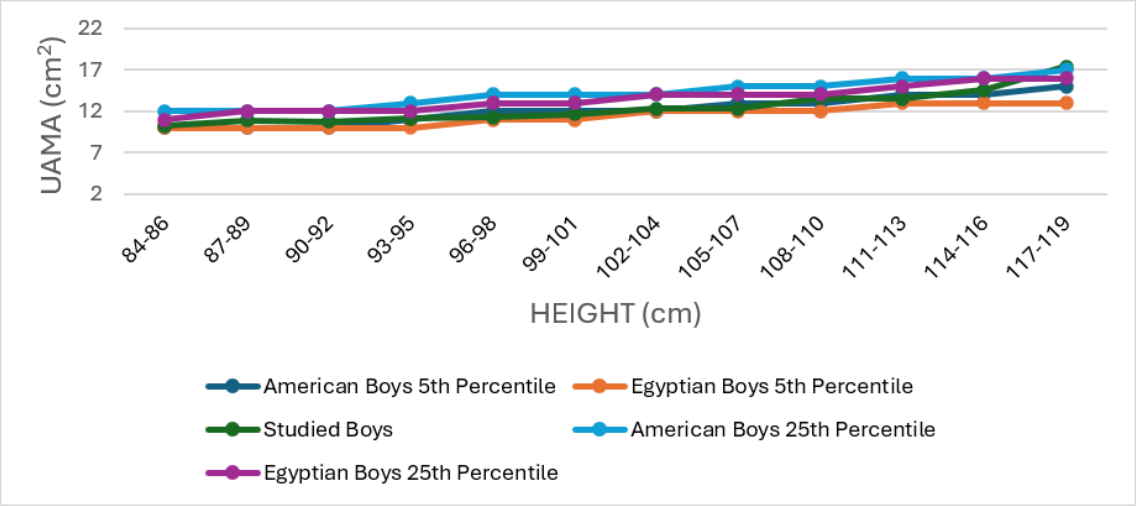

Figure 1: Comparison of UAMAH (cm^2) among Boys with International Standards.

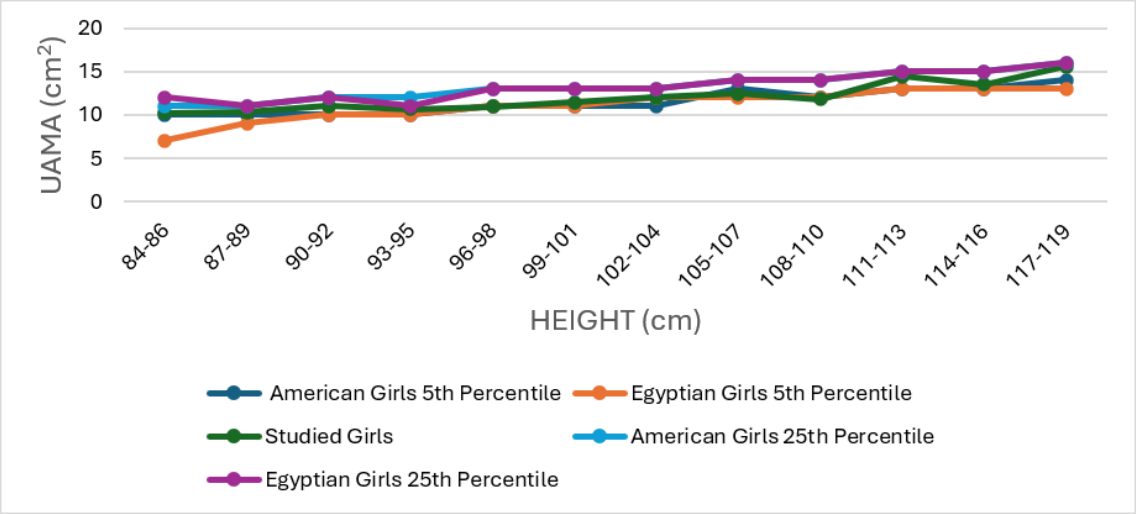

Figure 2: Comparison of UAMAH (cm^2) among Girls with International Standards.

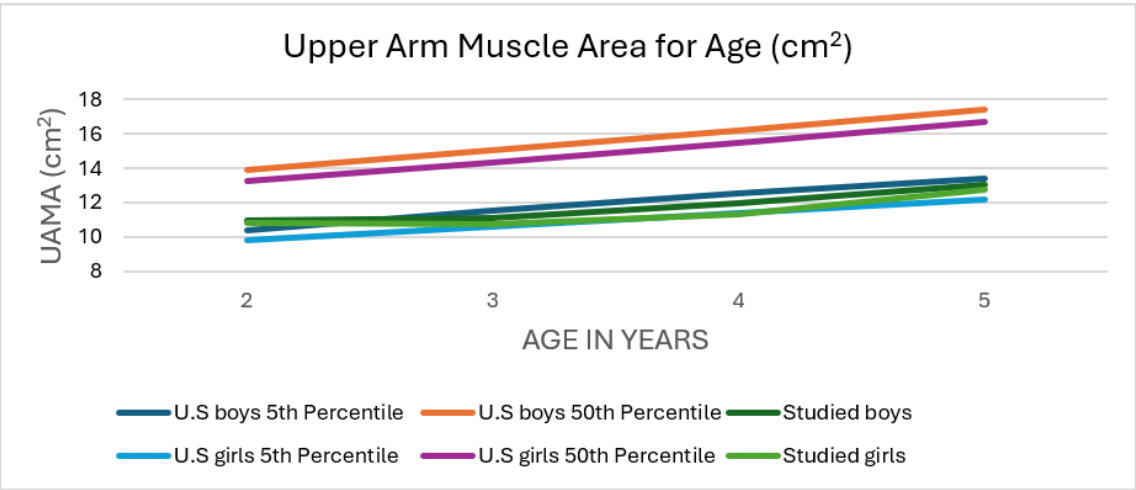

Figure 3: Comparison of upper arm muscle area (cm^2) for age with an international study.

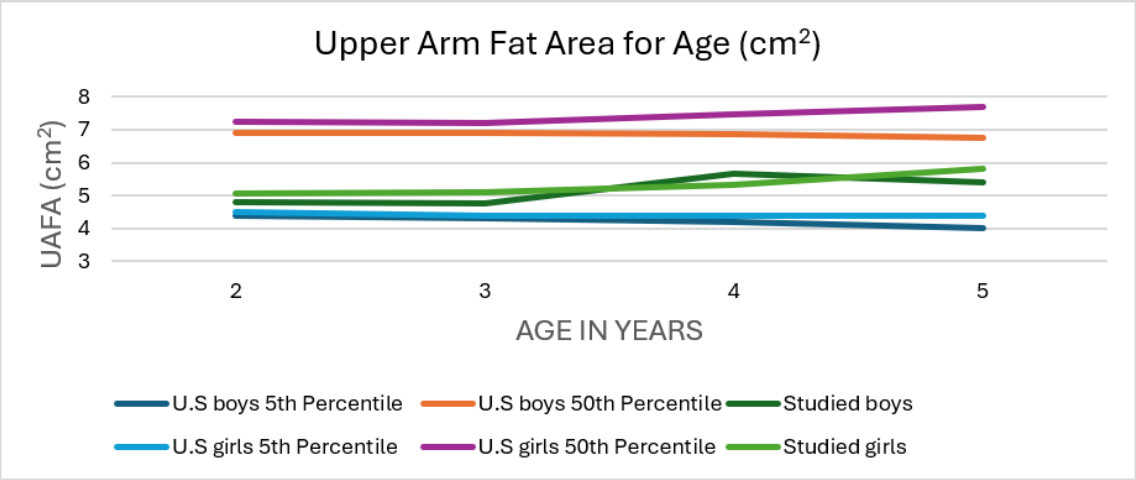

Figure 4: Comparison of upper arm fat area (cm^2) for age with an international study.

preschool children in the present study. The assessment of body composition allows a quantitative appraisal of muscle mass and adiposity that reflects nutritional intake, losses, and energy expenditure over time. The present study found evidence of poor caloric and protein reserve among the children, similar to previous studies (Wells, 2010; Thibault, 2012; Sen et al., 2015; Debnath et al., 2017; Dutta and Sengupta, 2023). The environmental conditions were more or less similar for all children in the present study, as they all were from the same ecological background. Published research studies have found that boys have a greater muscle area than girls, whereas girls have a greater amount of fat mass even before puberty (B. Khanra et al., 2024; Nuzzo, 2025; Olivieri et al., 2008; Ozturk et al., 2009; Rahman et al., 2024; Senbanjo et al., 2014), which is consistent with this study. Furthermore, our findings of gender differences in fat area are consistent with previous studies of prepubertal children (He et al., 2002). The mean of anthropometric variables such as height, weight, and BMI in both sexes at each age group of the present study was distinctly lower than the National Health Statistics Report, 2015-18, which represents the American children described by Fryar et al. (2021) (Figures 5, 6, and 7).

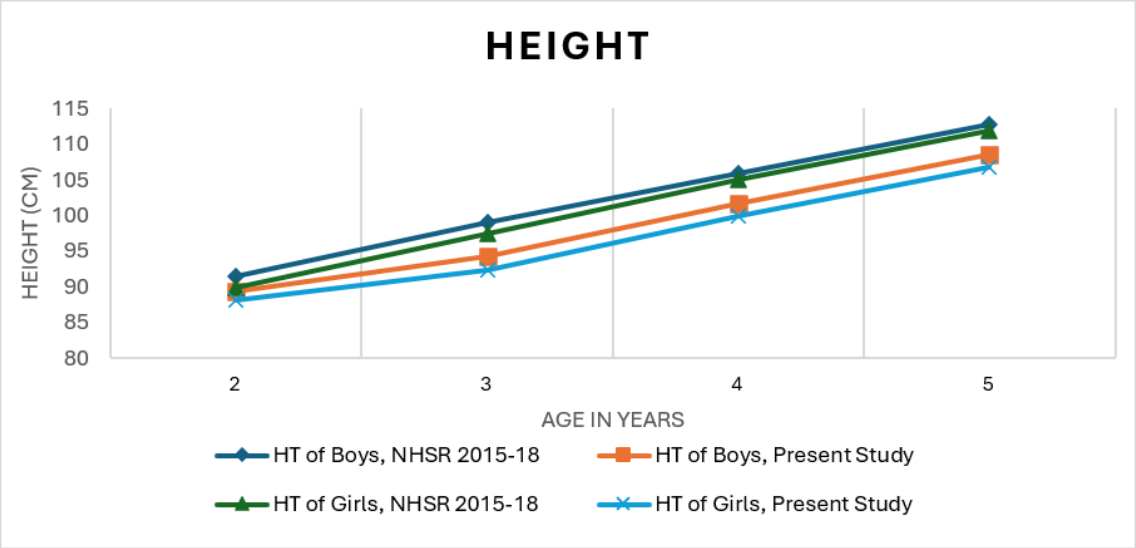

Figure 5: Comparison of mean height (cm) in the present study with the National Health Statistics Report Reference among both sexes.

Skeletal growth is reflected by height measurement, whereas UAMAH is a predictor of muscle mass.

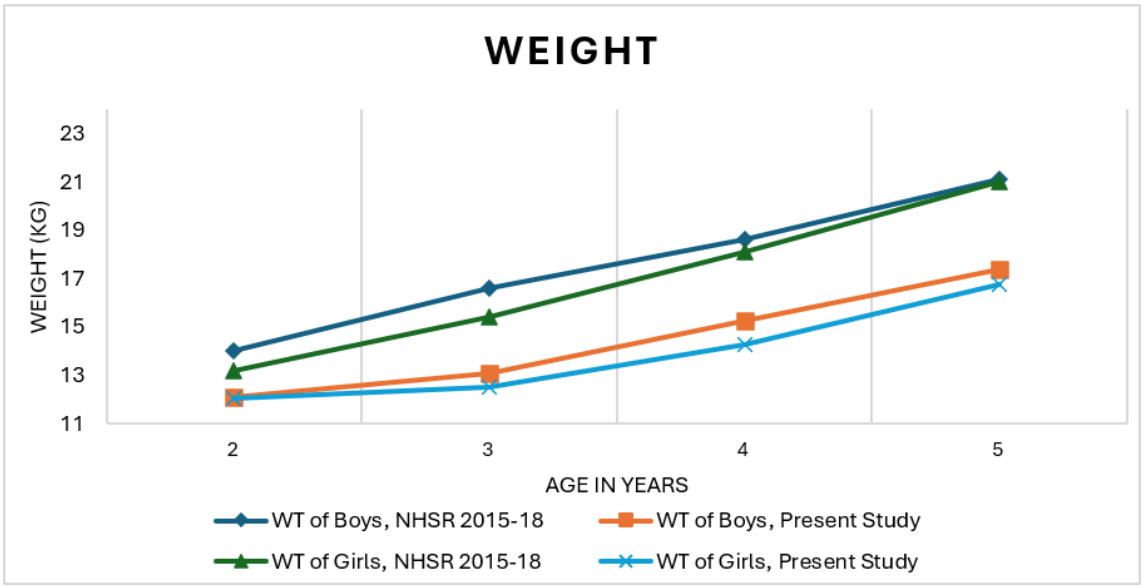

Figure 6: Comparison of mean weight (kg) in the present study with the National Health Statistics Report Reference among both sexes.

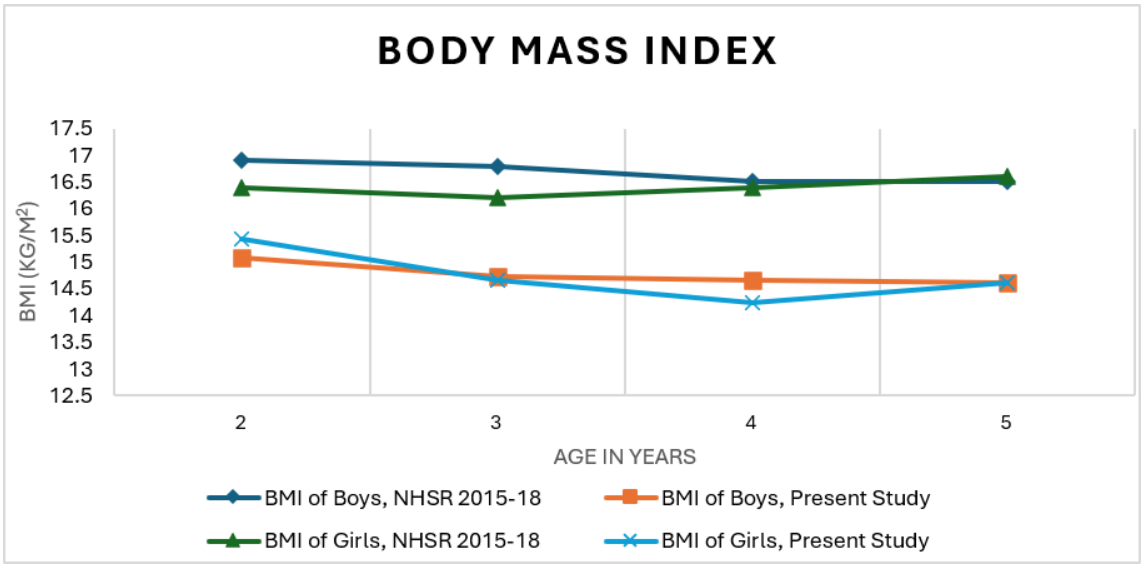

Figure 7: Comparison of mean BMI (kg/m^2) in the present study with the National Health Statistics Report Reference among both sexes.

It is a valuable index to identify the risk factors for undernutrition. The UAMAH shows that 48.13 per cent of both sexes combined come under the UAMAH category I, with a Z score value −1.60. Only 0.36 per cent fall into the UAMAH category IV with a Z score of +1.00 to +1.60 (Table 4). This study highlights the large differences in muscularity and body fat of preschool children in West Bengal when compared with children from other parts of the world. In the category of low-birth-weight children, most body composition variables showed significant age variations only among girls. These low-birth-weight girls have significant age variation of MUAC, TUA, UMA, UFA, UFE, and UME, but no age variation was found among boys.

The present study findings indicated that MUAC was highly correlated with TUA in both sexes because TUA is calculated using MUAC as a key component in the formula for arm area and because TSF is highly correlated with UFA and UFE in both sexes. The present study also reports that girls have higher adiposity than boys in all age groups related to UFA and AFI. The present findings show that girls have higher fat mass scores than boys, and boys have greater muscle mass scores, supporting the results of previous studies (Basu et al., 2010; Debnath et al., 2017; B. Khanra et al., 2024; Lipsberga & Kažoka, 2016; Sen et al., 2011; Yavuz & Özer, 2020) (Table 2). Girls have higher fat patterns than boys in terms of UFA, AFI, and UFE in all age groups (Table 3). The finding suggests that age, sex, birth weight, and catch-up growth have an impact on body composition in childhood (Wells, 2010). Most of the body composition measurements are extremely consistent with a prior study conducted on preschool children (Muñoz Esparza et al., 2019). Argentine preschoolers exhibited low and high protein and caloric reserves. The UAMAH reflects muscle mass relative to height, which is a proxy for protein reserves, whereas UFA reflects fat stores, which are proxies for caloric reserves indicated by upper arm composition (Agüero et al., 2023). The present research found a correlation between BMI, MUAC, and UMA in both sexes. This is consistent with previous research on children in Bahrain (Gharib & Rasheed, 2009), primary school children in China (Ma et al., 2015), Latvian children (Lipsberga & Kažoka, 2016), hospitalised children (Muñoz Esparza et al., 2019), and children of West Bengal (B. Khanra et al., 2024). A substantial association was identified between BMI and AFI, which contrasts with the previous consensus (Lipsberga & Kažoka, 2016) (Table 5). Previous research studies have found associations between BMI, UMA, and UFA (Gharib & Rasheed, 2009; Muñoz Esparza et al., 2019; Yavuz & Özer, 2020). Previous studies revealed that age changes in MUAC, UMA, and UFA indicate changes in upper arm composition in both sexes (Addo et al., 2017; Nwankwo et al., 2024; Oyhenart et al., 2019).

The hypothesis is that upper arm composition is a valuable tool for malnutrition, especially severe malnutrition, regardless of age group and clinical context (Muñoz Esparza et al., 2019; Ngaboyeka et al., 2025). The measurement of upper arm areas is beneficial in detecting both chronic and acute malnutrition, whereas BMI only indicates an acute deficit in hospitalised paediatric patients (Grellety & Golden, 2018; Lambebo et al., 2023; Muñoz Esparza et al., 2019), but UAMAH is a useful measure of undernutrition and as such is related to morbidity and mortality (Arps, 2023; Dutta & Sengupta, 2023; Nwankwo et al., 2024; Oyhenart et al., 2019). The upper arm anthropometric indices should be utilised by academicians and physicians to assess the prevalence of population-specific malnutrition (Debnath et al., 2017; Dutta & Sengupta, 2023; Sikdar, 2012). The measurement of arm anthropometry is a viable alternative method for determining nutritional status. As a result, UMA and UFA should be measured in conjunction with other anthropometric indices to provide a comprehensive assessment of nutritional health among preschool children. Upper arm anthropometric measurements derived from mid-upper arm circumference, arm muscle, and arm fat areas offer several advantages compared with advanced techniques like Dual-Energy X-ray Absorptiometry (DXA) and the Total Body Water Method (TBW). They are simple, rapid, and inexpensive and require minimal equipment, making them suitable for large field surveys and resource-limited settings. These measures can also provide indirect estimates of muscle and fat reserves. However, upper arm measurements are less precise than DXA or TBW, which directly assess body composition. Their accuracy can be influenced by factors like age, sex, and ethnic variation, and they provide only regional rather than whole-body estimates of fat and lean mass, which can affect the assessment of nutritional condition.

Further, the multiple linear regression analysis demonstrated that UMA was significantly associated with several socioeconomic and demographic factors (Table 7). Among the demographic variables, sex of the child showed a significant negative association with UMA (B = -0.417, $p<0.001$), indicating gender

differences in muscle area (i.e., boys > girls). Age exhibited the strongest positive association with UMA (B = 0.775, p<0.001), suggesting that UMA increased progressively with advancing age. Ethnicity also emerged as a significant predictor (B = -0.213, p < 0.001), indicating ethnic disparities in muscle development among the studied children. Type of delivery showed a significant positive association with UMA (B = 0.558, p<0.001), while birth weight demonstrated a strong positive relationship (B = 0.802, p<0.001), suggesting that children with a higher birth weight had greater UMA. Among the household characteristics, the use of cleaner cooking fuel was positively associated with UMA (B = 0.142, p<0.05), whereas poorer house type showed a significant negative association (B = -0.330, p<0.01). Monthly family income was positively associated with UMA (B = 0.431, p<0.001), indicating that children from economically better-off households had greater muscle area, possibly due to better healthcare access. Maternal BMI also showed a significant negative association with UMA (B = -0.089, p<0.05), suggesting that maternal nutritional status may influence the child's muscle development. However, the number of living rooms and bath places was not significantly associated with UMA (p>0.05) (Table 7).

Age, sex, birth order, maternal education and maternal BMI have been significantly associated with wasting in a previous study (Harding et al., 2018; Mutua et al., 2017; Pandey et al., 2024; Patil et al., 2017; Tigga et al., 2015). Low family income increased the prevalence of wasting among preschool children, similar to previous research (Tigga et al., 2015). Also, LBW has been reported as an independent risk factor for child undernutrition (Khaing et al., 2019; Nshimyiryo et al., 2019). An association of the number of living rooms with child undernutrition has also been reported by previous studies (Biswas & Bose, 2011; P. Khanra et al., 2020). Also, monthly family income has been described repeatedly as an influence on child undernutrition (P. Khanra et al., 2020; Sen et al., 2020). Unlike earlier studies (Sen et al., 2020), the present results show no association of house type with wasting. The type of fuel for cooking (smoked or smokeless) has a significant relationship with child undernutrition (P. Khanra et al., 2020; Mishra & Bera, 2024). Mode of delivery showed a significant association with child wasting, also revealed in the NFHS-5 (Pandey et al., 2024). The observed association between mode of delivery and child wasting likely reflects a combination of maternal health complications, neonatal risk, and poor economic background.

The present study has several limitations that should be considered while interpreting the findings. The small sample size and cross-sectional design cannot establish causal relationships between socioeconomic factors and UAMAH-based nutritional status. Although upper arm anthropometric indices were interpreted using the widely accepted Frisancho and Tracer (1987) reference standards derived from NHANES I and II, ethnic and environmental differences may influence the applicability of these reference standards. In the absence of validated population-specific reference standards for Indian preschool children, these international references were used to facilitate comparison with previous studies. A limitation of the present study is that dietary intake data and other indicators of nutritional status were not assessed.

5 Conclusion

Upper arm anthropometry seems to be an important technique, and its utilization with height by UAMAH can determine body composition and nutritional status. The present study suggests a high prevalence of insufficient protein and calorie reserves; it also provides more insight and further comparison with other studies. Upper arm anthropometry can identify adiposity, or the depletion of fat stores. In preschool children, BMI combined with upper arm anthropometry and UAMAH may be the most productive tool for the assessment of undernutrition as a screening tool. The present study recommends assessment of body composition and nutritional status to improve screening of undernutrition (e.g., wasting) using upper arm composition and/or UAMAH, especially in community or epidemiological settings and clinical checkups, research, and investigation among children. The estimates are reasonably accurate at the population or community level, especially for identifying children at risk of wasting or low protein reserves, but the accuracy depends on proper technique and sex-specific reference standards. Therefore, the improvement of health quality is necessary by evaluating various intervention schemes and supplementary programmes among the studied children.

Acknowledgements

The researchers would like to thank all the concerned ICDS workers and also the parents of the study participants for their cooperation. We thank those children who participated in this research work. Special thanks to the Child Development Project Officer (CDPO) of Maynaguri for his permission for data collection. However, the authors assume full responsibility for all data and content presented. The financial assistance is in the form of a University Grants Commission-Senior Research Fellowship (SRF-UGC-NET) by the Government of India, Ref ID - 200510232846.

Conflict of interest

There is no conflict of interest.

References

Addo, O. Y., Himes, J. H., & Zemel, B. S. (2017). Reference ranges for midupper arm circumference, upper arm muscle area, and upper arm fat area in US children and adolescents aged 1–20 y. *American Journal of Clinical Nutrition*, *105*(1), 111–120. https://doi.org/10.3945/ajcn.116.142190

Agüero, R. E. P., Araya, F. E., & Lomaglio, D. B. (2023). Nutritional assessment of preschool children inhabiting at high geographical altitude in the Antofagasta de la Sierra Department, Catamarca, Argentina. *International Journal of Pediatrics and Child Health*, *11*, 58–64.

Arps, S. (2023). Body composition and nutritional status of school-aged Haitian children living in urban and peri-urban areas of Puerto Plata, Dominican Republic. *American Journal of Human Biology*, *35*(6), e23873.

Ayele, B. A., Tiruneh, S. A., Ayele, A. A., Zemene, M. A., Chanie, E. S., & Hailemeskel, H. S. (2022). Prevalence and determinants of overweight/obesity among under-five children in Sub-Saharan Africa: A multilevel analysis. *BMC Pediatrics*, *22*(1), 585.

Balasubramanian, M., & Sheykhmaleki, P. (2025). Emerging roles of 3d body scanning in human-centric applications. *Technologies*, *13*(4), 126.

Basu, D., Sun, D., Banerjee, I., Singh, Y. M., Kalita, J. G., & Rao, V. R. (2010). Cross-sectional reference values of upper arm anthropometry of the Khasi tribal adolescents of Meghalaya, India. *Asia Pacific Journal of Clinical Nutrition*, *19*(2), 283–288.

Biswas, S., & Bose, K. (2011). Effect of number of rooms and sibs on nutritional status among rural Bengalee preschool children from eastern India. *Collegium Antropologicum*, *35*(4), 1017–1022.

Bolzan, A., Guimarey, L., & Frisancho, A. R. (1999). Study of growth in rural school children from Buenos Aires, Argentina using upper arm muscle area by height and other anthropometric dimensions of body composition. *Annals of Human Biology*, *26*(2), 185–193.

Chainoglou, A., Evripidou, K., & Stabouli, S. (2025). Assessment of obesity in pediatric kidney transplant recipients: An ongoing challenge. *Pediatric Nephrology*, *40*(7), 2113–2116. https://doi.org/10.1007/s00467-025-06706-4

Cherian, K. E., Kapoor, N., Meeta, M., & Paul, T. V. (2021). Dual-energy X-ray absorptiometry scanning in practice, technical aspects, and precision testing. *Journal of Mid-life Health*, *12*(4), 252–256. https://doi.org/10.4103/jmh.jmh_215_21

Cheruiyot, D. K. (2024). Socio-economic and demographic characteristics of caregivers as a determinant of nutritional status of children aged 6–59 months in Kericho County, Kenya. *Asian Journal of Medicine and Health*, *22*(12), 116–133. https://doi.org/10.9734/ajmah/2024/v22i121143

Chowdhury, S. D., & Ghosh, T. (2009). The upper arm muscle and fat area of Santal children: An evaluation of nutritional status. *Acta Paediatrica*, *98*(1), 103–106.

Çiçek, B., Öztürk, A., Mazıcıoğlu, M. M., Elmali, F., Turp, N., & Kurtoğlu, S. (2009). The risk analysis of arm fat area in Turkish children and adolescents. *Annals of Human Biology*, *36*(1), 28–37.

Çiçek, B., Öztürk, A., Mazıcıoğlu, M. M., & Kurtoğlu, S. (2014). Arm anthropometry indices in Turkish children and adolescents: Changes over a three-year period. *Journal of Clinical Research in Pediatric Endocrinology*, *6*(4), 216.

Cole, T. J., Faith, M. S., Pietrobelli, A., & Heo, M. (2005). What is the best measure of adiposity change in growing children: BMI, BMI%, BMI z-score or BMI centile? *European Journal of Clinical Nutrition*, *59*(3), 419–425.

Debnath, S., Mondal, N., & Sen, J. (2017). Use of upper arm anthropometry, upper arm muscle area-by-height (UAMAH) and midupper-arm-circumference (MUAC)-for-height as indicators of body composition and nutritional status among children. *Anthropological Review*, *80*(1), 85–102.

Dumitriu, A. M., Cobilinschi, C., Dumitriu, B., Vâlcea, S., Ungureanu, R., Popa, A., Ene, R., Țincu, R., Grințescu, I. M., & Mirea, L. (2025). Advancing nutritional care through bioelectrical impedance analysis in critical patients. *Nutrients*, *17*(3), 380. https://doi.org/10.3390/nu17030380

Dutta, D., & Sengupta, S. (2023). Use of upper arm anthropometry as an indicator of nutritional status and body composition among children. *Antrocom: Online Journal of Anthropology*, *19*(1), 227–236.

Erfan, M., El Ruby, M., Monir, Z., & Anwar, Z. (2003). Upper arm muscle area by height: An indicator for growth and nutritional status of Egyptian children and adolescents. *Egyptian Medical Journal*, *2*, 139–153.

Frisancho, A. R. (1981). New norms of upper limb fat and muscle areas for assessment of nutritional status. *American Journal of Clinical Nutrition*, *34*(11), 2540–2545. https://doi.org/10.1093/ajcn/34.11.2540

Frisancho, A. R. (1990). *Anthropometric Standards for the Assessment of Growth and Nutritional Status*. University of Michigan Press.

Frisancho, A. R., & Tracer, D. P. (1987). Standards of arm muscle by stature for the assessment of nutritional status of children. *American Journal of Physical Anthropology*, *73*(4), 459–465. https://doi.org/10.1002/ajpa.1330730408

Fryar, C. D., Kruszon-Moran, D., Gu, Q., Carroll, M., & Ogden, C. L. (2021). Mean body weight, height, waist circumference, and body mass index among children and adolescents: United States, 1999–2018. *National Health Statistics Reports*, *160*, 1–24. https://doi.org/10.15620/cdc:107559

Gharib, N. M., & Rasheed, P. (2009). Anthropometry and body composition of school children in Bahrain. *Annals of Saudi Medicine*, *29*(4), 58–69. https://doi.org/10.4103/0256-4947.55309

Gibson, R. S. (2005). *Principles of Nutritional Assessment*. Oxford University Press.

Grellety, E., & Golden, M. H. (2018). Severely malnourished children with a low weight-for-height have a higher mortality than those with a low mid-upper-arm-circumference: I. Empirical data demonstrates Simpson's paradox. *Nutrition Journal*, *17*(1), 79. https://doi.org/10.1186/s12937-018-0384-4

Gültekin, T., Özer, B. K., Katayama, K., & Akın, G. (2006). Age-related patterns of upper arm muscle and fat area in Turkish children and assessment of nutritional status. *International Journal of Anthropology*, *21*(3-4), 231–239. https://doi.org/10.1007/s11599-007-9025-6

Harding, K. L., Aguayo, V. M., & Webb, P. (2018). Factors associated with wasting among children under five years old in South Asia: Implications for action. *Plos One*, *13*(7), e0198749. https://doi.org/10.1371/journal.pone.0198749

He, Q., Horlick, M., Thornton, J., Wang, J., Pierson, R. N., Heshka, S., & Gallagher, D. (2002). Sex and race differences in fat distribution among Asian, African-American, and Caucasian prepubertal children. *Journal of Clinical Endocrinology & Metabolism*, *87*(5), 2164–2170. https://doi.org/10.1210/jcem.87.5.8452

Holmes, C. J., & Racette, S. B. (2021). The utility of body composition assessment in nutrition and clinical practice: An overview of current methodology. *Nutrients*, *13*(8), 2493. https://doi.org/10.3390/nu13082493

Kalami, V. S., Miller, L. C., Ausman, L., & Rogers, B. (2022). Measurement tools of pediatric nutrition and health suitable or adaptable for low- and middle-income countries in field research settings. *Current Developments in Nutrition*, *11*(2), 80–97. https://doi.org/10.6000/1929-4247.2022.11.02.3

Kang, J. H., Kim, H., Kim, J., Seo, J.-H., Cha, S., Oh, H., Kim, K., Park, S.-J., Kim, E., Kong, S., Lee, J.-H., Bae, J. S., Won, H.-H., Joung, J.-G., Yang, Y. J., Kim, J., & Park, W.-Y. (2021). Interaction of genetic and environmental factors for body fat mass control: Observational study for lifestyle modification and genotyping. *Scientific Reports*, *11*(1), 13180. https://doi.org/10.1038/s41598-021-92229-5

Khaing, H. T., Nomura, S., Yoneoka, D., Ueda, P., & Shibuya, K. (2019). Risk factors and regional variations of malnutrition among children under 5 in Myanmar: Cross-sectional analyses at national and subnational levels. *BMJ Open*, *9*(9), e030894. https://doi.org/10.1136/bmjopen-2019-030894

Khanra, B., Mahapatra, B., & Bose, K. (2024). Relationship between nutritional status and body composition among rural preschool children (3-5 years) in Kankabati Gram Panchayat, Paschim Medinipur, West Bengal, India. *Mankind Quarterly*, *65*(2), 275–283. https://doi.org/10.46469/mq.2024.65.2.11

Khanra, P., Chakraborty, R., & Bose, K. (2020). Factors affecting anthropometric failure in urban Bengalee. *Human Biology Review*, *53*(6), 309–327. https://doi.org/10.1017/s0021932020000577

Kontogianni, M. D., Panagiotakos, D. B., & Skopouli, F. N. (2005). Does body mass index reflect adequately the body fat content in perimenopausal women? *Maturitas*, *51*(3), 307–313.

Kriemler, S., Puder, J., Zahner, L., Roth, R., Meyer, U., & Bedogni, G. (2010). Estimation of percentage body fat in 6- to 13-year-old children by skinfold thickness, body mass index and waist circumference. *British Journal of Nutrition*, *104*(10), 1565–1572. https://doi.org/10.1017/s0007114510002357

Lambebo, A., Mezemir, Y., Tamiru, D., & Belachew, T. (2023). Sensitivity and specificity of mid-upper arm circumference for assessment of severe acute malnutrition among children ages 6 to 59 months: Systematic review and meta-analysis. *Nutrition*, *107*, 111918. https://doi.org/10.1016/j.nut.2022.111918

Lee, L.-W., Liao, Y.-S., Lu, H.-K., Hsieh, K.-C., & Chi, C.-C. (2020). Performance of bioelectrical impedance analysis in the estimation of bone mineral content in healthy children aged 6–12 years. *Journal of Clinical Densitometry*, *23*(3), 411–417. https://doi.org/10.1016/j.jocd.2019.03.002

Lipsberga, G., & Kažoka, D. (2016). Upper-arm anthropometry as nutritional assessment in preschool children in Latvian population. *Papers on Anthropology*, *25*(2), 25–35. https://doi.org/10.12697/poa.2016.25.2.03

Lohman, T. G., Roche, A. F., & Martorell, R. (1988). *Anthropometric Standardization Reference Manual*. Human Kinetics.

Ma, C. M., Li, Y., Gao, G. Q., Yin, F. Z., Wang, R., Liu, X. L., et al. (2015). Mid-upper arm circumference as a screening measure for identifying children with hypertension. *Blood Pressure Monitoring*, *20*(4), 189–193.

Malik, D., Narayanasamy, N., Pratyusha, V. A., Thakur, J., & Sinha, N. (2023). Nutritional assessment. In *Textbook of Nutritional Biochemistry*. Springer Nature. https://doi.org/10.1007/978-981-19-4150-4

Manikandan, A., Lewis, L. E. S., P.V., M., Varghese, A., & Shettigar, K. S. (2024). Under-five child mortality associated with infection: Retrospective study, 2018–2022. *Reviews and Research in Medical Microbiology*, *10*, 1097. https://doi.org/10.1097/MRM.0000000000000415

Manole, L. M., Ghiga, G., Iftinchi, O., Boca, L. O., Donos, M. A., Ţarcă, E., Ionuţ, N., Revenco, N., Margasoiu, I., & Trandafir, L. M. (2025). Bioelectrical impedance analysis versus dual X-ray absorptiometry for obesity assessment in pediatric populations: A systematic review. *Diagnostics*, *15*(12), 1505. https://doi.org/10.3390/diagnostics15121505

Messina, C., Albano, D., Gitto, S., Tofanelli, L., Bazzocchi, A., Ulivieri, F. M., Guglielmi, G., & Sconfienza, L. M. (2020). Body composition with dual-energy X-ray absorptiometry. *Quantitative Imaging in Medicine and Surgery*, *10*, 1687–1698. https://doi.org/10.21037/qims.2020.03.02

Mishra, R., & Bera, S. (2024). Geospatial and environmental determinants of stunting, wasting, and underweight: Empirical evidence from rural South and Southeast Asia. *Nutrition*, *120*, 112346. https://doi.org/10.1016/j.nut.2023.112346

Monir, Z., Galal, A., Erfan, M., & Ruby, M. E. (2008). Assessment of growth and nutritional status of Egyptian children and adolescents, using upper arm muscle area by height. *Research Journal of Medicine and Medical Sciences*, *3*, 60–66.

Muñoz Esparza, N. C., Vásquez Garibay, E. M., Larrosa Haro, A., & Romero Velarde, E. (2019). Relationship of anthropometric indexes and indicators of body composition by arm anthropometry on hospitalized pediatric patients. *Nutrición Hospitalaria*, *36*(3), 611–617. https://doi.org/10.20960/nh.2245

Mutua, R. N., Keriko, J., & Mutai, J. (2017). Factors associated with stunting, wasting and underweight among children aged 2-5 years in early childhood development and education centers in Masinga sub county, Machakos county. *European Journal of Health Sciences*, *1*(2), 44–69. https://doi.org/10.47672/ejhs.232

Mutunga, M., Frison, S., Rava, M., & Bahwere, P. (2020). The forgotten agenda of wasting in Southeast Asia: Burden, determinants and overlap with stunting: A review of nationally representative cross-sectional Demographic and Health Surveys in six countries. *Nutrients*, *12*(2), 559. https://doi.org/10.3390/nu12020559

Ngaboyeka, G., Mulume, A., Lurhangire, E., Neven, A., Zigabe, L., Balolebwami, S., Mwene-Batu, P., Dramaix, M., Donnen, P., & Bisimwa, G. (2025). The performance of upper arm circumference for age in diagnosing severe acute malnutrition in children aged 6 to 59 months in South Kivu, Eastern Democratic Republic of Congo: Lwiro Cohort. *BMC Public Health*, *25*(1), 229. https://doi.org/10.1186/s12889-025-21301-w

Nickerson, B. S., & Tinsley, G. M. (2018). Utilization of BIA-derived bone mineral estimates exerts minimal impact on body fat estimates via multicompartment models in physically active adults. *Journal of Clinical Densitometry*, *21*(4), 541–549. https://doi.org/10.1016/j.jocd.2018.02.003

Nooyens, A. C., Koppes, L. L., Visscher, T. L., Twisk, J. W., Kemper, H. C., Schuit, A. J., van Mechelen, W., & Seidell, J. C. (2007). Adolescent skinfold thickness is a better predictor of high body fatness in adults than is body mass index: The Amsterdam Growth and Health Longitudinal Study. *American Journal of Clinical Nutrition*, *85*(6), 1533–1539. https://doi.org/10.1093/ajcn/85.6.1533

Nshimyiryo, A., Hedt-Gauthier, B., Mutaganzwa, C., Kirk, C. M., Beck, K., Ndayisaba, A., et al. (2019). Risk factors for stunting among children under five years: A cross-sectional population-based study in Rwanda using the 2015 Demographic and Health Survey. *BMC Public Health*, *19*, 1–10.

Nuzzo, J. L. (2025). Sex differences in grip strength from birth to age 16: A meta-analysis. *European Journal of Sport Science*, *25*(3), e12268.

Nwankwo, M., Danborno, B., Musa, S. A., & Akuyam, A. S. (2024). Reference percentiles for mid-upper arm circumference, upper arm muscle and fat areas of Nigerian children and adolescent population aged 0–19 years. *Rwanda Medical Journal*, *81*(1), 38–52.

Olivieri, F., Semproli, S., Pettener, D., & Toselli, S. (2008). Growth and malnutrition of rural Zimbabwean children (6–17 years of age). *American Journal of Physical Anthropology*, *136*(2), 214–222. https://doi.org/10.1002/ajpa.20797

Oukheda, M., Bouaouda, K., Mohtadi, K., Lebrazi, H., Derouiche, A., Kettani, A., et al. (2023). Association between nutritional status, body composition, and fitness level of adolescents in physical education in Casablanca, Morocco. *Frontiers in Nutrition*, *10*, 1268369.

Oyhenart, E. E., Torres, M. F., Garraza, M., Cesani, M. F., Navazo, B., Castro, L. E., et al. (2019). Reference percentiles for mid-upper arm circumference, upper arm muscle and fat areas in the Argentine child and adolescent population (4-14 years old). *Arch Argent Pediatr. Archivos Argentinos de Pediatría*, *117*(4), e347–e355.

Ozturk, A., Budak, N., Cicek, B., Mazicioglu, M. M., Bayram, F., & Kurtoglu, S. (2009). Cross-sectional reference values for mid-upper arm circumference, triceps skinfold thickness and arm fat area of Turkish children and adolescents. *International Journal of Food Sciences and Nutrition*, *60*(4), 267–281.

Paciência, I., Cavaleiro Rufo, J., Mendes, F., Farraia, M., Cunha, P., Silva, D., et al. (2021). A cross-sectional study of the impact of school neighbourhood on children obesity and body composition. *European Journal of Pediatrics*, *180*, 535–545.

Pandey, S., Sharma, J., & Ali, M. (2024). Associated factors of child wasting among children aged 0–23 months in India: Analysis of the National Family Health Survey-5. *International Journal of Population Studies*, *10*(3), 60–68.

Parua, S., Das, A., Hazra, A., Chaudhuri, P., Bhattacharya, K., Dutta, S., & Sengupta, P. (2024). *Clinical Physiology and Functional Imaging*, *45*(1). https://doi.org/10.1111/cpf.12905

Patil, C. R., Thakre, S. S., Khamgaonkar, M. B., & Thakre, S. (2017). Prevalence of stunting and wasting among Anganwadi school children of rural and urban area of Central India: A cross-sectional study. *International Journal of Medical Science and Public Health*, *6*(2), 413.

Pelc, A., Walicka-Cupryś, K., Puszkarz, G., Styś, K., Chmiel, E., Wilk, S., Ludwikowski, G., & Placek, K. (2024). Evaluation of the relationship between body composition and dietary habits of physically active people with disabilities. *Scientific Reports*, *14*(1), 10247. https://doi.org/10.1038/s41598-024-60735-x

Puttaswamy, D., Ramesh, V., Raj, T., Bhat, K., Selvam, S., Bharadwaj, V., Prakash, A., Murphy- Alford, A., & Kuriyan, R. (2024). Nutritional status and body composition at diagnosis, of South Indian children with acute lymphoblastic leukaemia (ALL). *Asian Pacific Journal of Cancer Prevention*, *25*(7), 2361. https://doi.org/10.31557/apjcp.2024.25.7.2361

Rahman, S., Tanjin, R., Binte, N., Naher, N., Khan, M. A., & Amin, S. (2024). Exploring body composition of pre-adolescent schoolers based on skinfold thickness and arm girth for assessing anthropometry. *Journal of Ad-din Women's Medical College*, *12*(1), 15–23. https://doi.org/10.3329/jawmc.v12i1.75255

Rolland-Cachera, M. F., Brambilla, P., Manzoni, P., Akrout, M., Sironi, S., Del Maschio, A., et al. (1997). Body composition assessed on the basis of arm circumference and triceps skinfold thickness: A new index validated in children by magnetic resonance imaging. *American Journal of Clinical Nutrition*, *65*(6), 1709–1713.

Sala, A., Webber, C., Halton, J., Morrison, J., Beaumont, L., Zietak, A., & Barr, R. (2007). Whole-body bone mineral content, lean body mass, and fat mass measured by dual-energy X-ray absorptiometry in a population of normal Canadian children and adolescents. *Canadian Association of Radiologists Journal*, *58*(1), 46–52.

Sen, J., Debnath, S., & Mondal, N. (2020). Socio-economic and demographic correlates of composite index of anthropometric failure among rural children in West Bengal, India. *Man in India*, *100*(1–2), 75–92.

Sen, J., Mondal, N., & Dey, S. (2011). Assessment of the nutritional status of children aged 5–12 years using upper arm composition. *Annals of Human Biology*, *38*(6), 752–759.

Sen, J., Mondal, N., & Ghosh, P. (2015). Upper arm composition as an Indicator of body composition and nutritional status of adolescent boys aged 10-18 years. *Journal of Nepal Paediatric Society*, *35*(2), 152–161.

Sen, J., & Mondal, N. (2013). Fat mass and fat-free mass as indicators of body composition among Bengalee Muslim children. *Annals of Human Biology*, *40*(3), 286–293. https://doi.org/10.3109/03014460.2013.764014

Senbanjo, I. O., Oshikoya, K. A., & Njokanma, O. F. (2014). Upper arm composition and nutritional status of school children and adolescents in Abeokuta, Southwest Nigeria. *World Journal of Pediatrics*, *10*(4), 336–342. https://doi.org/10.1007/s12519-014-0470-4

Sikdar, M. (2012). Nutritional status among the Mising tribal children of Northeast India with respect to their arm fat area and arm muscle area. *Human Biology Review*, *1*(4), 331–341.

Singh, J., & Mondal, N. (2014). Use of upper-arm anthropometry as measure of body-composition and nutritional assessment in children and adolescents (6-20 years) of Assam, Northeast India. *Ethiopian Journal of Health Sciences*, *24*(3), 243–252. https://doi.org/10.4314/ejhs.v24i3.8

Stone, T., Wingo, J., Nickerson, B., & Esco, M. (2018). Comparison of bioelectrical impedance analysis and dual-energy x-ray absorptiometry for estimating bone mineral content. *International Journal of Sport Nutrition and Exercise Metabolism*, *28*, 1–16.

Sun, S. S., Chumlea, W. C., Heymsfield, S. B., Lukaski, H. C., Schoeller, D., Friedl, K., Kuczmarski, R. J., Flegal, K. M., Johnson, C. L., & Hubbard, V. S. (2003). Development of bioelectrical impedance analysis prediction equations for body composition with the use of a multicomponent model for use in epidemiologic surveys. *American Journal of Clinical Nutrition*, *77*(2), 331–340. https://doi.org/10.1093/ajcn/77.2.331

Taylor, R. W., Grant, A. M., Williams, S. M., & Goulding, A. (2010). Sex differences in regional body fat distribution from pre- to postpuberty. *Obesity*, *18*(7), 1410–1416. https://doi.org/10.1038/oby.2009.399

Thibault, R., Genton, L., & Pichard, C. (2012). Body composition: Why, when and for WHO? *Clinical Nutrition*, *31*(4), 435–447.

Thibault, R., & Pichard, C. (2012). The evaluation of body composition: A useful tool for clinical practice. *Annals of Nutrition and Metabolism*, *60*(1), 6–16.

Thomas, D. M., Crofford, I., Scudder, J., Oletti, B., Deb, A., & Heymsfield, S. B. (2025). Updates on methods for body composition analysis: Implications for clinical practice. *Current Obesity Reports*, *14*(1), 1–20. https://doi.org/10.1007/s13679-024-00593-w

Tigga, P., Sen, J., & Mondal, N. (2015). Association of some socio-economic and socio-demographic variables with wasting among pre-school children of North Bengal, India. *Ethiopian Journal of Health Sciences*, *25*(1), 63–72. https://doi.org/10.4314/ejhs.v25i1.9

Tinsley, G. M., Moore, M. L., Benavides, M. L., Dellinger, J. R., & Adamson, B. T. (2020). 3-dimensional optical scanning for body composition assessment: A 4-component model comparison of four commercially available scanners. *Clinical Nutrition*, *39*(10), 3160–3167. https://doi.org/10.1016/j.clnu.2020.02.008

van Beijsterveldt, I. A., Dorrepaal, D. J., de Fluiter, K. S., de Ridder, M. A., & Hokken-Koelega, A. C. (2023). Skinfold-based equations to assess longitudinal body composition in children from birth to age 5 years. *Clinical Nutrition*, *42*(7), 1213–1218.

Wali, N., Agho, K. E., & Renzaho, A. (2021). Wasting and associated factors among children under 5 years in five South Asian countries (2014–2018): Analysis of demographic health surveys. *International Journal of Environmental Research and Public Health*, *18*(9), 4578. https://doi.org/10.3390/ijerph18094578

Wells, J. C. (2010). *The Evolutionary Biology of Human Body Fatness: Thrift and Control*. Cambridge University Press.

Yavuz, C. M., & Özer, B. K. (2020). Evaluation of upper arm muscle and fat area of children and adolescents from Ankara, Turkey. *Anthropological Review*, *83*(2), 197–208.

Zemel, B. S. (2021). Body composition during growth and development. In N. Cameron (Ed.), *Human Growth and Development* (pp. 271–294). Academic Press.

Zimmermann, M. B., Gübeli, C., Püntener, C., & Molinari, L. (2004). Detection of overweight and Obesity in a national sample of 6–12-y-old Swiss children: Accuracy and validity of reference values for body mass index from the US Centers for Disease Control and Prevention and the International Obesity Task Force. *American Journal of Clinical Nutrition*, *79*(5), 838–843. https://doi.org/10.1093/ajcn/79.5.838

MANKIND QUARTERLY Mankind Quarterly, 67(1), 103-122 2026 Fall Edition
ISSN: 0025-2344

Prevalence of Morbidity and Healthcare-Seeking Behavior among the Chuktia Bhunjia, a Particularly Vulnerable Tribal Group in Western Odisha

Debaprakash Patra[†] Arpita Santra[†*] Bharathi Karri[†]

Abstract

The Particularly Vulnerable Tribal Groups (PVTGs) of India experience a high burden of morbidity due to their geographic isolation, limited access to healthcare, and persistent socioeconomic disadvantages. These conditions not only shape the types of illnesses they face, but also influence their healthcare-seeking behavior. The present study sought to examine the prevalence of morbidity and the associated healthcare-seeking behavior of adult males and females belonging to the Chuktia Bhunjia PVTG residing in the Nuapada district of Western Odisha, India. The study incorporated a total of 112 adults aged 18–80 years belonging to the Chuktia Bhunjia community, comprising 55 males and 57 females. A cross-sectional survey was conducted to document self-reported and clinically diagnosed morbidities over six months. Healthcare-seeking behavior was classified into modern, traditional, informal, and no care sought categories. Results showed that musculoskeletal disorders and general symptoms (such as fever, fatigue, loss of appetite, etc.) were most prevalent, followed by respiratory problems. Non-communicable diseases were emerging, with hypertension at 17% and diabetes at 1.8%. Correspondence analysis revealed that healthcare-seeking varied by condition, with modern care primarily used for respiratory, gastrointestinal, and musculoskeletal problems, traditional healers consulted for ear and oral ailments, dermatological and minor complaints often managed through informal care, and hepatic, deficiency-related, and eye conditions largely left untreated. The findings highlight a substantial burden of physical and general morbidity and selective utilization of healthcare systems. Interventions should integrate culturally sensitive health education, strengthen primary care, and collaborate with traditional healers to improve health outcomes among this PVTG.

Keywords: Medical pluralism, Indigenous health, Epidemiological transition, Tribal health, India, Health service utilization, Correspondence analysis

1 Introduction

Health inequalities remain a persistent challenge in many low- and middle-income countries, particularly among indigenous and tribal populations who experience significant socio-economic and geographic disadvantages (Rami et al., 2023). In India, Scheduled Tribes (STs) constitute one of the most marginalized social groups, with health indicators consistently lagging behind national averages (Maity, 2017); Punetha and Pandey (2023). Empirical studies have documented a disproportionately higher burden of infectious diseases, poor maternal and child health outcomes, and an emerging prevalence of non-communicable diseases among ST populations compared to non-tribal communities (Akkiraju, 2022; Singh et al., 2025; Subramanian & Joe, 2023). These disparities are shaped by factors such as poverty, low literacy, and inadequate access to healthcare services (Haddad et al., 2012; Sahu et al., 2024), further compounded by social exclusion and cultural differences in health beliefs that influence health-related decision-making (Acharya, 2022; Sahoo et al., 2023).

Morbidity, defined as the presence of illness, symptoms or functional impairment (Hernandez & Kim, 2022), is a key indicator of population health and is particularly consequential in tribal communities, where

† Department of Anthropology, Sambalpur University, Jyoti Vihar, Burla, Sambalpur, Odisha – 768019, India
* Corresponding author, email: santra91arpita@gmail.com

subsistence-based livelihoods make even minor illnesses disruptive to daily survival (Balgir, 2006). Existing research highlights a high prevalence of communicable diseases such as respiratory infections, diarrheal diseases, malaria and skin diseases, along with emerging evidence of hypertension, diabetes, and other non-communicable conditions in many tribal populations of India (Jain et al., 2015; Maramraj et al., 2020; Rizwan et al., 2014; Shriraam et al., 2021). However, available evidence remains uneven and is largely derived from relatively accessible tribal populations, with limited attention to smaller and more isolated groups.

Healthcare-seeking behavior is closely associated with morbidity patterns and the perceived seriousness of illness. A study among the tribal population of India reported that treatment-seeking behavior was higher for acute conditions than for chronic conditions (Raushan & Acharya, 2019). This may be because acute conditions, which are often characterized by evident symptoms such as fever or infections, are more likely to prompt treatment-seeking as they cause immediate discomfort and interfere with routine activities. In contrast, many chronic non-communicable diseases remain asymptomatic or minimally disabling during their early stages; consequently, affected individuals may not perceive an urgent need for medical attention, resulting in delayed or inadequate healthcare-seeking and prolonged periods of untreated morbidity (Haridoss et al., 2025). Again, in tribal populations of India, healthcare decisions are influenced by cultural beliefs, perceived effectiveness of treatment, financial constraints, and accessibility of services (Asokan et al., 2025; Islary, 2014). Studies conducted in tribal-dominated states such as Odisha and Chhattisgarh indicate a continued reliance on traditional healing practices, delayed engagement with formal healthcare providers, and underutilization of available public health facilities (Balgir, 2011; Lenka & Mohapatra, 2015; Sabar & Midya, 2023). The interaction between morbidity and healthcare-seeking behavior is therefore critical for understanding disease burden, treatment pathways, and health outcomes in these communities.

Within the broader tribal population in India, Particularly Vulnerable Tribal Groups (PVTGs) represent the most socio-economically disadvantaged segments, characterized by small population size, relative isolation, and limited access to basic services (Ministry of Tribal Affairs, Government of India, 2024; Ota & Mohanty, 2015). Odisha is home to the largest number of PVTGs in India, making it a critical setting for examining health vulnerabilities among these groups. Despite this, empirical evidence on morbidity patterns and healthcare-seeking behavior among PVTGs in Odisha remains limited, particularly at the community level. Among these PVTGs in Odisha, the Chuktia Bhunjia represent a relatively understudied community residing in the remote regions of Western Odisha. Their geographic isolation and socio-economic conditions are likely to influence both their exposure to illness and their access to healthcare services. However, no systematic empirical study has specifically examined the prevalence of morbidity or healthcare-seeking behavior among the Chuktia Bhunjia PVTG. As a result, reliable data on their disease burden and treatment practices remain largely unavailable. The present study seeks to fill this critical knowledge gap by generating community-level evidence on morbidity prevalence and healthcare-seeking behavior among this PVTG.

In this context, the present study aims to generate empirical evidence on morbidity prevalence and healthcare-seeking behavior among the Chuktia Bhunjia PVTG in Western Odisha. Specifically, the study seeks to answer the following research questions:

1. What is the prevalence of morbidity among adult members of the Chuktia Bhunjia PVTG?
2. What types of healthcare-seeking behaviors are undertaken by adult members of the Chuktia Bhunjia PVTG in response to morbidity?

2 Materials and methods

2.1 Study design and setting

A cross-sectional research design was adopted to conduct the study among the Chuktia Bhunjia PVTG. The study focused on a portion of the community residing in the Komna Block of the Nuapada district, Odisha. Within the block, Sunabeda Gram Panchayat was selected for data collection. Two villages, Sunabeda and Junapani, were chosen for participant recruitment. These two selected villages represent

major habitation clusters of the Chuktia Bhunjia community within Komna Block. These villages share comparable socio-economic conditions, livelihood patterns, geographic remoteness, and access to public healthcare services with other Chuktia Bhunjia settlements in the region. Villages were selected purposively based on the concentration of Chuktia Bhunjia households, ensuring that major habitation clusters of the community in the study area were included. Logistical accessibility and feasibility of repeated field visits were also considered.

2.2 Study population

The present study was conducted among the Chuktia Bhunjia, one of the 13 officially recognized PVTGs of Odisha. The community is predominantly concentrated in the Sunabeda plateau of the Nuapada district in Western Odisha (Sabar, 2014). Ota et al. (2020), on the basis of a baseline survey, reported that the community's population totals 3,086, comprising 1,593 males and 1,493 females across 938 households. They belong to the Proto-Australoid racial group and speak the Bhunjia dialect, a blend of Odia and Chhattisgarhi (Pradhan & Rout, 2025; Sabar & Midya, 2024). Their livelihood mainly depends on agriculture, supplemented by livestock rearing and the collection of forest products sold in local markets (Sabar, 2014). This PVTG lives in remote and difficult-to-access forest areas where health services remain limited, irregular, and culturally mismatched with community practices. Their socio-economic marginalization and traditional subsistence activities are likely to make them highly vulnerable to illness.

2.3 Study participants

Data for the current study were collected from a total of 112 adults aged 18-80 years belonging to the Chuktia Bhunjia community, comprising 55 males and 57 females. The first author (DP) approached the participants after compiling census data from households in the selected villages. Eligible adults who were available during the data collection period were approached for participation.

Those participants who were available during the data collection period, able to communicate in the Odia language and willing to voluntarily participate in the current study were considered for inclusion. A total of 64 individuals approached were excluded from the study for various reasons: reluctant to participate – 55, unable to communicate properly – 4, and severely ill – 5. Participants were included in the study after the nature and purpose of the study were clearly explained, followed by obtaining their verbal consent. An in-person interview was conducted to collect information on socio-demographic details, perceived morbidity, and related healthcare-seeking behavior. Prior fieldwork had been conducted in the same community, which helped in establishing familiarity and trust among the participants. Repeated interactions during the study period further strengthened rapport. The objectives were explained clearly in the local language. A local field guide from the same community assisted during interviews to facilitate communication and enhance participant comfort. The questions were administered orally, and responses were recorded by the investigator after ensuring clear understanding. The entire data collection was carried out throughout the month of January 2025.

2.4 Measures

Socio-demographic data

A structured schedule was employed to collect socio-demographic data, which included current age (in completed years), sex, educational attainment, type of occupation, monthly household income (in INR), number of family members, etc. Another structured schedule was also used to gather information on household characteristics, which incorporated information on their sanitation facility, source of drinking water, water treatment prior to drinking, number of living rooms inside the house, and availability of electricity. Further, a crowding index (Melki et al., 2004) was calculated to assess household density, as overcrowding is an important socio-environmental factor associated with health risks, particularly communicable diseases. It was calculated using the formula: number of family members aged >1 year/total number of living rooms in

the house. Based on the obtained values, three categories were created: up to 1 (denoting less crowding), up to 2 (denoting moderate crowding), and more than 2 (denoting high crowding).

Data on morbidity

Each of the study participants included in the study was questioned on whether he/she experienced any type of morbidity in the six-month period prior to the study. A six-month recall period was selected to capture both acute and chronic morbidity episodes while minimizing excessive recall bias. A pre-tested schedule containing a total of 84 morbidity symptoms and clinically evaluated diseases was canvassed to obtain comprehensive data on the morbidity profile of this study population (Santra, 2025).

The morbidity schedule was organized into major categories of health conditions. General symptoms included fever, fatigue, loss of appetite, and episodes of weakness. Respiratory conditions comprised symptoms like prolonged cough, breathlessness, and clinically diagnosed conditions such as tuberculosis. Gastrointestinal problems included abdominal pain, vomiting, dysentery, peptic ulcer, etc. Musculoskeletal, rheumatologic and other pain-related conditions covered back pain, joint pain, joint swelling, stiffness, and frequent headache. Dermatological conditions included rash, itching, and wounds. Hepatic morbidity included jaundice. Eye-related conditions comprised poor vision, redness, discharge, and night blindness. Ear and oral morbidities included ear pain, discharge, hearing problems, dental caries, gum bleeding, and toothache. Injury and bite cases were recorded separately. Non-communicable diseases included hypertension, diabetes mellitus, heart diseases, hypercholesterolemia, etc. Deficiency symptoms covered signs such as cheilosis, glossitis, Bitot's spot, goiter, etc. Self-reported symptoms were recorded based on participants' responses. Certain physical conditions were identified through direct field-based clinical examination using standard visual inspection and palpation techniques commonly employed in community health screening. These assessments were conducted under natural light and followed basic screening procedures appropriate for field settings. Diagnosed conditions such as tuberculosis, pleuritis, peptic ulcer, diabetes mellitus, hypertension, and jaundice were included only when supported by valid medical prescriptions. Medical prescriptions were evaluated to verify the clinically diagnosed diseases.

Healthcare-seeking behavior for morbidity

Along with the morbidity symptoms, associated healthcare-seeking behaviors were also assessed. The participants were asked to report the type of healthcare they sought for their health problems or whether they did nothing. Based on their responses, this variable was later converted into four major categories: no care sought, traditional healthcare, modern healthcare, and informal care. This categorization was guided by the pluralistic healthcare framework, which recognizes the coexistence of multiple therapeutic systems within rural and tribal contexts. In such settings, formal biomedical services, indigenous healing practices, and informal providers operate simultaneously, shaping healthcare-seeking behavior.

'No care sought' referred to instances where individuals did not seek any form of treatment despite experiencing morbidity. 'Traditional healthcare' included consultation with indigenous healers, herbal practitioners, or faith-based healers whose practices are rooted in culturally transmitted ethno-medical knowledge. 'Modern healthcare' comprised services obtained from formally trained and licensed medical practitioners and government or private biomedical health facilities. 'Informal care' referred to treatment sought from unlicensed or unregulated providers, including local drug sellers, self-medication through pharmacies without prescription, or practitioners lacking formal medical certification.

2.5 Statistical analyses

Descriptive statistics

To summarize the continuous variables like age and monthly household income, means and standard deviations were calculated. Frequencies and percentages were computed to show the distribution of the categorical variables.

Correspondence analysis

Correspondence analysis (CA), an exploratory multivariate technique, was applied to examine patterns of association between morbidities and the types of healthcare consulted. The types of healthcare availed were considered as column profile and morbidities as row profile in this analysis. CA was selected as an appropriate analytical technique because both morbidity categories and types of healthcare sought were categorical variables with multiple levels. CA enabled multidimensional exploration of relationships and provides a visual representation of patterns between categories. This approach facilitated identification of clustering tendencies and underlying structures in the data within an exploratory framework. For the purpose of CA, individual morbidity sub-categories were grouped into broader clinically meaningful categories (e.g., gastrointestinal, respiratory, musculoskeletal) to avoid sparse cell frequencies and ensure analytical stability.

The chi-square test first established a significant overall association between the two categorical variables. CA then decomposed this association into dimensions, each characterized by a canonical correlation whose square represents the inertia explained by that dimension. The first two dimensions captured the maximum inertia, thereby summarizing most of the relationship between the variables. A bi-plot was generated to simultaneously display both row and column categories. In this graphical representation, the horizontal and vertical axes (Dimension 1 and Dimension 2) summarize the major patterns of association between morbidity categories and types of healthcare sought. Categories positioned closer together in the plot indicate stronger associations, whereas those located farther apart reflect weaker or no association. The entire data analysis was performed using IBM SPSS Statistics version 24.0.

2.6 Ethical considerations

The study was approved by the Institutional Ethics Committee of Sambalpur University (IEC No.: 43/IEC-SU/25). The research was conducted in accordance with the ethical guidelines involving human participants of the Indian Council of Medical Research (Indian Council of Medical Research (ICMR), 2018). Prior to data collection, the nature and purpose of the study were clearly explained to all participants in their local language. Verbal informed consent was obtained from each participant before inclusion in the study.

3 Results

Table 1 shows that the mean age of the participants was 42.8 years (SD = 16.4 years), and the distribution of males and females in the study population was proportionate. The table also indicates that the majority of participants were married (86.6%), had no formal education (45.5%), and a substantial proportion (58.0%) were engaged in agricultural activities as their occupation. Regarding household characteristics, a significant portion had no access to improved sanitation (64.3%). However, access to electricity was observed to be nearly ubiquitous within the study population, with 99.1% of the participants reporting its availability. Nearly 70% of the participants collected drinking water from wells located within their household premises; however, overall, the majority (54.5%) did not employ any method of water treatment prior to consumption. The crowding index indicated that a considerable proportion of respondents (57.1%) lived in overcrowded conditions, with more than two individuals residing in a single room, while fewer than 10% lived in comparatively better housing conditions, characterized by one person per room.

Table 2 outlines the self-reported morbidity symptoms and clinically diagnosed conditions experienced by the participants within the six months preceding the survey. Overall, musculoskeletal, rheumatologic and other pain-related conditions were the most commonly reported health issues (68.8%), followed by general symptoms or illnesses (57.1%) and respiratory-related problems (48.2%). The most commonly cited symptoms included joint pain (46.4%), fatigue (44.6%), back pain (34.8%), frequent headaches (33.9%), abdominal pain (30.4%), loss of appetite (27.7%), fever of any type (27.7%), and a persistent cough lasting more than a week (26.8%). Symptoms such as ear-related issues, tuberculosis, jaundice, and deficiency-related conditions (e.g., Bitot's spots and goiter) were reported less frequently (less than 1%). Hypertension exhibited a moderate prevalence among the population (17.0%), while diabetes mellitus was reported by only a negligible proportion (1.8%). No cases of other non-communicable diseases such as

Table 1: Socio-demographic and household characteristics of the participants

Characteristics	Mean ± SD / n (%)
Mean age (years)	42.8 ± 16.4 [range: 18–80 years]
Sex	
Male	55 (49.1)
Female	57 (50.9)
Marital status	
Married	97 (86.6)
Unmarried	12 (10.7)
Widowed/Separated/Divorced	3 (2.7)
Education level	
Non-literate	51 (45.5)
Up to primary level	21 (18.8)
Up to upper primary level	24 (21.4)
Secondary and above	16 (14.3)
Occupation	
Unemployed	8 (7.1)
Agricultural activities	65 (58.0)
*Laborer**	7 (6.2)
Household works	29 (25.9)
Animal husbandry	2 (1.8)
Service	1 (0.9)
Mean monthly household income (INR)	9044.6 ± 4362.8
Sanitation facility	
Unimproved	72 (64.3)
Improved	40 (35.7)
Source of drinking water	
Tap/bore well	11 (9.8)
Tube well	8 (7.1)
Well	78 (69.6)
River	15 (13.4)
Water treatment prior to drinking	
No	61 (54.5)
Yes	51 (45.5)
Electricity	
No	1 (0.9)
Yes	111 (99.1)
Crowding index	
Up to 1	11 (9.8)
Up to 2	37 (33.1)
More than 2	64 (57.1)

* Laborer at construction site, brick field, daily wage earners, etc.
Source: Authors' calculation based on the primary data collected by the authors through field survey, 2025.

cardiovascular conditions, hyperuricemia, or arthritis were identified. Remarkably, there were no reported instances of communicable diseases such as typhoid, leprosy, measles, or chickenpox in this population.

Table 2: Prevalence of morbidity among the participants

Morbidity symptoms/Diagnosed diseases	n (%)	95% CI
General symptoms/illnesses	64 (57.1)	47.5–66.5
Any type of fever	31 (27.7)	19.6–36.9
Fatigue	50 (44.6)	35.2–54.3
Loss of appetite	31 (27.7)	19.6–36.9
Sudden attack of weakness and fainting	14 (12.5)	7.0–20.1
Sleeplessness	12 (10.7)	5.7–18.0
Respiratory	54 (48.2)	38.7–57.9
Coughed > 1 week	30 (26.8)	18.9–36.0
Coughed out phlegm > 2 weeks	26 (23.2)	15.8–32.1
Coughed out blood	1 (0.9)	0.0–4.9
Shortness of breath	3 (2.7)	0.6–7.6
Tuberculosis[#]	1 (0.9)	0.0–4.9
Pleuritis[#]	12 (10.7)	5.7–18.0
Gastrointestinal	47 (42.0)	32.7–51.7
Abdominal pain	34 (30.4)	22.0–39.8
Vomited > 1 day	7 (6.3)	2.6–12.5
Dysentery	19 (17.0)	10.5–25.2
Peptic ulcer[#]	1 (0.9)	0.0–4.9
Musculoskeletal, rheumatologic and other pain-related conditions	77 (68.8)	59.3–77.9
Back pain	39 (34.8)	26.1–44.4
Joint pain	52 (46.4)	37.0–56.1
Joint swelling	3 (2.7)	0.6–7.6
Waking up with stiff joint	7 (6.3)	2.6–12.5
Frequent headache	38 (33.9)	25.2–43.5
Dermatological	14 (12.5)	7.0–20.1
Rash	7 (6.3)	2.6–12.5
Itching	8 (7.1)	3.1–13.6
Wound	1 (0.9)	0.0–4.9
Hepatic (Jaundice[#])	1 (0.9)	0.0–4.9
Eye	31 (27.7)	19.6–36.9
Poor vision	19 (17.0)	10.5–25.2
Eye discharge	17 (15.2)	9.1–23.2
Night blindness	2 (1.8)	0.2–6.3
Red eyes	2 (1.8)	0.2–6.3
Ear	10 (8.9)	4.4–15.8
Ear pain	8 (7.1)	3.1–13.6
Discharge from ear	1 (0.9)	0.0–4.9
Hearing	1 (0.9)	0.0–4.9
Ear infection	1 (0.9)	0.0–4.9
Oral	34 (30.4)	22.0–39.8
Dental caries	28 (25.0)	17.3–34.1
Bleeding gums	2 (1.8)	0.2–6.3
Toothache	16 (14.3)	8.4–22.2
Injury and bite	3 (2.7)	0.6–7.6
Non-communicable diseases[#]	21 (18.8)	12.0–27.2
Diabetes mellitus[#]	2 (1.8)	0.2–6.3
Hypertension[#]	19 (17.0)	10.5–25.2
Deficiency symptoms	14 (12.5)	7.0–20.1
Cheilosis	2 (1.8)	0.2–6.3
Glossitis	10 (8.9)	4.4–15.8
Bitot's spot	1 (0.9)	0.0–4.9
Goiter	1 (0.9)	0.0–4.9

[#] Diagnosed diseases; CI: Confidence Interval.
Source: Authors' calculation based on the primary data collected by the authors through field survey, 2025.

The results of the CA on the data in Table 3, as presented in the summary table (Table 4), indicate a statistically significant association between morbidity and healthcare-seeking behavior, evidenced by

Table 3: Correspondence table showing healthcare-seeking behaviour for different morbidities

Morbidity	Healthcare-seeking behaviour				
	No care sought	Traditional healthcare	Modern healthcare	Informal care	Total
General symptoms/diseases	18	2	44	0	64
Respiratory	8	3	42	1	54
Gastrointestinal	11	3	32	1	47
Musculoskeletal, rheumatologic and other pain-related conditions	17	6	51	2	76
Dermatological	3	2	8	1	14
Hepatic	0	1	0	0	1
Eye	19	2	11	0	32
Ear	1	2	6	1	10
Oral	14	7	12	1	34
Injury and bite	3	0	3	0	6
Non-communicable diseases	0	1	19	0	20
Deficiency symptoms	6	3	5	0	14
Total	100	32	233	7	372

Source: Authors' calculation based on the primary data collected by the authors through field survey, 2025.

a chi-square value of 77.9 and a *p* value of .000. The total inertia of the model is 0.209, indicating that approximately 20.9% of the variability in the relationship between morbidity and healthcare-seeking behavior is explained by the CA. Among the extracted dimensions, Dimension 1 accounts for the highest inertia and explains 59.5% of the total variance, followed by Dimension 2 with an inertia of 0.069, contributing 33.1% to the overall variance. These two dimensions together capture 92.7% of the explained variance, suggesting that they sufficiently summarize the relationship between the variables. The third dimension contributes only 7.3% of the variance and may offer limited additional insight. Canonical correlation values for the three dimensions—0.353, 0.263, and 0.124—indicate that Dimension 1 holds the strongest discriminatory power in representing the associations within the data.

Table 4: Summary of the correspondence analysis

Dimension	Canonical correlation	Inertia	χ^2	*p* value	Proportion of inertia	
					Accounted for	Cumulative
1	0.353	0.125			0.595	0.595
2	0.263	0.069			0.331	0.927
3	0.124	0.015			0.073	1.000
Total		0.209	77.9	0.000	1.000	1.000

Source: Authors' calculation based on the primary data collected by the authors through field survey, 2025.

Table 5 presents the distance values derived from the CA, which quantify the degree of association between various morbidity categories and types of healthcare-seeking behavior. Figure 1, which depicts the bi-plot from the CA, visually illustrates these relationships between morbidity types and healthcare-seeking behavior. As indicated in both Table 5 and Figure 1, respiratory (0.109), gastrointestinal (0.252), and musculoskeletal, rheumatologic and other pain-related conditions (0.294) are most closely associated with the modern healthcare system category. General symptoms/diseases (0.479) along with non-communicable diseases (0.674) also show a moderate association with modern care. The *traditional* healthcare *system*

category shows the closest proximity to ear-related conditions (0.916) and oral morbidities (0.932). *Informal care* is most closely linked to ear conditions (0.094) and dermatological issues (0.761). The category "*no care sought"* is most closely associated with eye-related conditions (0.396), injury and bite (0.571), and deficiency symptoms (0.809). Conversely, the CA displays that hepatic conditions are positioned distantly from all categories of healthcare behavior, with only a weak association observed with traditional care.

Table 5: Euclidean distances between morbidities and healthcare-seeking behaviors

Morbidity category	No care sought	Traditional healthcare	Modern healthcare	Informal care
General symptoms/diseases	0.967	2.047	0.479	1.857
Respiratory	1.426	1.897	0.109	1.468
Gastrointestinal	1.082	1.745	0.252	1.487
Musculoskeletal, rheumatologic and other pain-related conditions	1.119	1.630	0.294	1.359
Dermatological	1.373	1.016	0.882	0.761
Hepatic	5.894	4.122	5.925	4.467
Eye	0.396	2.174	1.673	2.487
Ear	2.031	0.916	1.417	0.094
Oral	0.942	0.932	1.473	1.415
Injury and bite	0.571	2.358	1.321	2.460
Non-communicable diseases	1.995	2.262	0.674	1.632
Deficiency symptoms	0.809	1.087	1.489	1.561

Source: Authors' calculation based on the primary data collected by the authors through field survey, 2025.

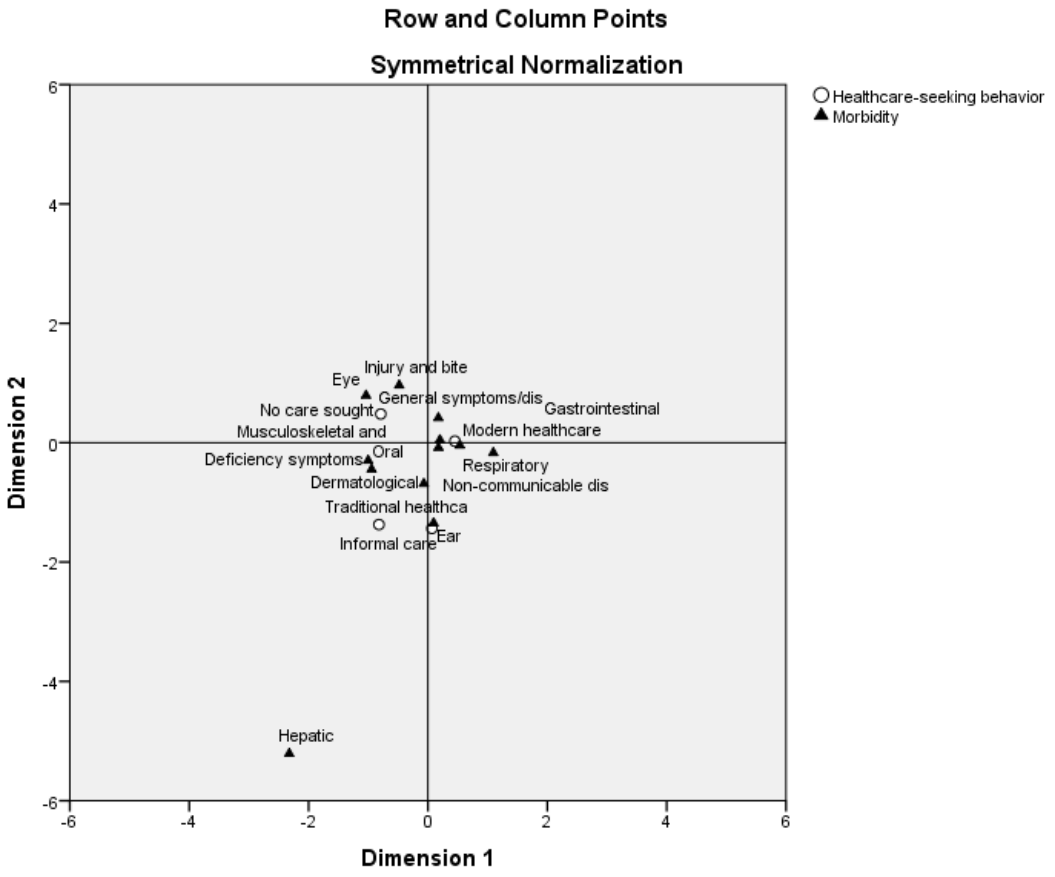

Figure 1: Bi-plot showing the association between morbidity categories and healthcare-seeking behavior types

4 Discussion

To our knowledge, this is the first study to investigate the prevalence of morbidity and related healthcare-seeking behavior among the Chuktia Bhunjia PVTG. The findings of the study are of considerable significance, as they provide baseline evidence on the burden of illness and healthcare-seeking behavior within this community. In the subsequent sections, these results, including the observed prevalence rates and associated behaviors, are discussed in detail to highlight their implications for understanding the health situation of this marginalized group.

The study revealed that the prevalence of musculoskeletal issues, especially back pain and joint pain, is quite high in the studied population. A recent study reported that the PVTG population in Odisha experiences a high burden of back pain (Kavitha et al., 2025). The Chuktia Bhunjia primarily depend on agriculture, forest-based livelihood activities and other labor-intensive activities, which involve repetitive physical strain. Previous studies in India established that many different tribal populations engaged in physically demanding jobs and agriculture face a high burden of musculoskeletal problems (Mullerpatan et al., 2021; Santra et al., 2024). In the context of the present study population, these occupational risks are further intensified by environmental and infrastructural constraints such as uneven terrain, forest-based work settings, lack of mechanization, and absence of ergonomically designed tools. Activities such as prolonged bending during cultivation, carrying heavy loads of firewood or forest produce, and working in awkward postures for extended periods contribute significantly to cumulative physical stress. These factors, operating together, increase the likelihood of musculoskeletal conditions and related functional limitations (Bang et al.,

2021; Mullerpatan et al., 2021; Santra et al., 2024). A study of another tribal group that depends mainly on forest-related activities yielded similar results (Mandi et al., 2019). The PVTG studied by us shares many characteristics with the participants of the previously mentioned studies. The high prevalence observed among the Chuktia Bhunjia thus reflects not only the nature of their occupations but also the environmental conditions under which these activities are performed, highlighting the persistent occupational health burden faced by PVTGs.

General symptoms such as fatigue, headache, abdominal pain, fever, and loss of appetite were also highly prevalent. These nonspecific complaints might be linked to both nutritional inadequacies (Bresnahan & Tanumihardjo, 2014) and recurrent infectious exposures (El-Radhi, 2019). Studies among Koraga people, a PVTG of Karnataka (Mallya et al., 2022), and various tribal individuals of West Bengal (Dhanuka et al., 2019) have documented high levels of undernutrition and anemia, which typically manifest as fatigue or weakness. The frequent reporting of fever and abdominal pain in the present study is consistent with the high burden of infections, particularly gastrointestinal and vector-borne diseases, commonly observed in tribal communities (Dwibedi et al., 2024; Maramraj et al., 2020). In the present study population, these symptoms are closely associated with environmental conditions that increase exposure to infections and limit nutritional security. The Chuktia Bhunjia reside in remote forested areas where access to safe drinking water and sanitation facilities is limited. Dependence on natural water sources, often untreated, and open defecation practices can increase the risk of gastrointestinal infections and parasitic infestations. Additionally, poor housing conditions, close proximity to forested areas, and seasonal exposure to vectors may further contribute to recurrent febrile illnesses. Intestinal parasites, including hookworms and other helminths, are likely to be significant contributors, as they thrive in conditions of poor sanitation and contaminated soil and water.

Respiratory-related problems, including prolonged cough, affected nearly half of the population surveyed. This finding is echoed by a study conducted among tribal women in Darjeeling District, West Bengal (Sarkar, 2016). Indoor air pollution from biomass fuel use is a well-documented risk factor in tribal households across India (Mitra et al., 2023; Rabha et al., 2019). Among PVTGs who depend heavily on firewood for cooking, exposure to smoke is continuous and often exacerbated by poorly ventilated housing. It suggests that such environmental exposures possibly contributed to chronic cough and respiratory morbidity in the current study.

The results suggest that while hypertension is emerging as an important health concern even among remote tribal groups, the prevalence of diabetes remains very low in this PVTG. Hypertension was reported in 17% of the population, which is relatively low compared to other PVTGs (Bhoi & Acharya, 2024; Nayak et al., 2024). Previous studies evidenced that hypertension is rising among tribal populations as well as PVTGs in India as a result of the nutritional transition, increased salt intake, psychosocial stress, and reduced physical activity (B. V. Babu et al., 2024; Hazarika & Babu, 2024). In the case of this PVTG, a high consumption of alcohol may be another contributing factor that further elevates the risk of hypertension. In contrast, diabetes prevalence was negligible (1.8%). This stands in sharp contrast to national averages (Anjana et al., 2017) and to findings from some other Indian tribal communities (Chinnaiyan et al., 2023; Shriraam et al., 2021) where prevalence is relatively higher, but it aligns with findings of a study conducted among PVTGs of Odisha (Nayak et al., 2024). The lower occurrence of diabetes among the Chuktia Bhunjia may be partly explained by protective dietary practices such as limited reliance on refined carbohydrates, alongside the possibility of under-diagnosis due to poor awareness and inadequate screening in PVTG areas. However, this contrasting pattern of rising hypertension with continuing low diabetes prevalence has important implications in the context of the epidemiological transition. It suggests that the study population may be in an early stage of transition, where certain cardiovascular risk factors are beginning to emerge while metabolic disorders such as diabetes remain relatively uncommon. This indicates a potential shift in disease patterns driven by gradual lifestyle and behavioral changes. Importantly, this pattern suggests that managing these risk factors early may help reduce the future burden of non-communicable diseases.

Interestingly, communicable diseases such as typhoid, measles, or leprosy were not reported among the Chuktia Bhunjia. The absence of typhoid and leprosy in our study population may indicate the positive effects of control programs, although studies from Odisha confirm that these diseases continue to be

reported in other PVTGs (Kerketta et al., 2009). However, the possibility of underreporting cannot be excluded, as stigma and lack of access to formal healthcare facilities often lead to nondisclosure of such diseases (Jacob & Franco-Paredes, 2008). Furthermore, the low prevalence of communicable diseases in this PVTG may signal an epidemiological transition in line with patterns seen in the broader Indian population (Narain, 2022).

Regarding healthcare-seeking behavior, the findings indicate a higher utilization of modern healthcare systems for various morbidities among this PVTG. This contrasts with earlier studies, which have shown that tribal communities in India predominantly rely on traditional medicine (Bhuyan & Pradhan, 2025; Tiwari et al., 2022). A recent study similarly reported that traditional medicine remains the primary mode of treatment for different morbidities among the Juang PVTG of Odisha, particularly in remote and hilly regions (Kanrar, 2024). On the contrary, the increased use of modern healthcare observed in the present study may be attributed to greater acceptance of modern medical practices, improved access to public health services and ongoing socio-economic changes, especially in the context of chronic and debilitating conditions among the studied PVTG.

The CA reveals that the healthcare-seeking behavior of the Chuktia Bhunjia PVTG shows distinct patterns that closely align with both cultural traditions and accessibility to health services. The spatial proximity observed in the biplot and the smaller Euclidian distance indicate that modern healthcare was most often sought for respiratory, gastrointestinal, musculoskeletal, and non-communicable conditions. Existing literature suggests that PVTGs in India often perceive several illnesses as less severe, which in turn leads to reduced care-seeking and greater reliance on traditional practices (Sonowal & Konc, 2021). It is likely that these previously mentioned illnesses are generally perceived as more severe and debilitating, which may explain the stronger reliance on modern biomedical services. Similar trends have been reported among other tribal groups in India, where chronic conditions such as musculoskeletal pain and chronic non-communicable diseases like hypertension are increasingly linked with visits to government or private health centers (Bang et al., 2022; Raushan & Acharya, 2019). This reflects a gradual integration of modern care into PVTG health practices, although barriers such as distance, cost, and limited infrastructure may affect their access (Raushan & Acharya, 2019).

The CA and biplot indicate that other conditions, such as ear- and oral-related problems, were more closely associated with traditional healthcare. The relatively smaller Euclidean distances between these conditions and traditional care categories suggest a stronger relationship, indicating that these morbidities are more likely to be managed within traditional systems. However, there is insufficient evidence regarding healthcare-seeking behaviors for these health problems among tribal populations in India. The preference for traditional care in such cases may be attributed to cultural familiarity, previous successful experiences, lower cost, or the perception that these issues are less life-threatening. Further research is required to gain a deeper understanding of this phenomenon.

In this study, the relative proximity, as indicated by the shorter Euclidean distances, suggests that dermatological issues in this PVTG are more closely associated with informal or over-the-counter care, which can be explained by the community's perception of such conditions as minor and easily manageable. Previous studies conducted among tribal communities in Odisha (Bindhani & Nayak, 2021) and Gujarat (Singhal et al., 2020) have reported that a substantial proportion of individuals rely either on traditional healing practices or on formal healthcare providers. Within the PVTG community, common dermatological problems such as rashes, itching, and fungal infections are likely to be managed using readily available creams, balms, or antiseptic agents purchased directly from local shops at low cost. Non-pharmacy general storekeepers in tribal areas might often dispense these medications without prescription, and prior positive treatment experiences could further reinforce the community's reliance on such informal care practices.

The finding that no care was sought for eye conditions, injuries, bites, and deficiency-related symptoms is particularly concerning. The results of CA indicate a close association between these conditions and the "no care sought" category, as reflected in their relative proximity (smaller Euclidean distances), suggesting that such conditions are less likely to prompt treatment-seeking behavior. This may reflect the normalization of certain health issues and limited awareness of their long-term consequences. The Tribal Odisha Eye Disease Study, conducted among the Dongaria Kandha PVTG in Rayagada district, identified ignorance,

poverty, time constraints, distance, and fear of treatment as major barriers to seeking care for eye disorders (Scheduled Castes and Scheduled Tribes Research and Training Institute (Scheduled Castes and Scheduled Tribes Research and Training Institute (SCSTRTI), Development Department Government of Odisha, 2022)). Similarly, a study among the Sahariya tribes of Madhya Pradesh reported neglect of various nutritional deficiency conditions, often attributable to low awareness (Ghosh-Jerath et al., 2013). In this study population, the absence of care-seeking appears to be influenced by a combination of factors. Lack of specialized healthcare services, geographic isolation, poor transport facilities, and treatment costs may act as important structural barriers to seeking care. At the same time, certain conditions, such as visual impairment, may be considered a normal part of ageing and therefore may not lead to care-seeking. Fear or mistrust of biomedical treatment may further discourage individuals from seeking care. As a result, even when healthcare services are available, their use remains low for conditions that are not seen as immediately serious. The neglect of deficiency-related symptoms also reflects the broader issue of chronic undernutrition among PVTGs, where such conditions are common and often not recognized as health problems requiring medical attention, partly due to low awareness. However, the limited availability of empirical research makes it difficult to explain these patterns in greater detail. Further in-depth studies are needed to provide clearer insights.

In this study, the correspondence analysis indicated that hepatic conditions were most closely associated with traditional care. Among the tribal population, utilization of traditional remedies may be preferred due to cultural familiarity, local availability, perceived efficacy, and alignment with community perceptions of illness and health, particularly in the absence of accessible biomedical diagnostics. Previous studies among other tribal populations have documented extensive traditional management of jaundice, including the use of 66 plant species by the Bagata and Khond tribes of Visakhapatnam (M. H. Babu et al., 2020) and 40 species by the Bhoxa, Tharu, and nomadic Gujjar communities of Uttarakhand (Sharma et al., 2012).

4.1 Cultural context and transitional dynamics

The morbidity profile and healthcare-seeking behavior observed among the Chuktia Bhunjia PVTG reflect not only epidemiological patterns but also deep-rooted socio-cultural and transitional dynamics. Health perceptions among the study population are highly likely to be influenced by their beliefs and practices, which often determine how symptoms are recognized and treated. Previous studies documented that cultural perceptions of illness play a significant role in shaping both morbidity reporting and treatment-seeking behavior. The present study identified a high burden of musculoskeletal, respiratory and gastrointestinal conditions, whereas certain conditions which were frequently reported in other PVTGs across the country, such as ear problems, jaundice, tuberculosis, and deficiency-related disorders are rare. Conditions perceived as minor or routine are often normalized within the community, leading to delayed or no care-seeking, whereas more severe or functionally limiting conditions are more likely to prompt engagement with modern healthcare services. At the same time, traditional beliefs and indigenous healing practices continue to influence initial health responses, particularly for ear, oral, and dermatological conditions.

The findings also reflect a transitional phase in healthcare behavior among PVTG communities, where traditional and biomedical systems coexist. Increasing exposure to public health services and changing socio-economic conditions are contributing to greater utilization of modern healthcare, particularly for chronic and disabling conditions. However, cultural interpretations of illness, accessibility barriers, and long-standing reliance on traditional systems continue to shape healthcare decisions.

Thus, the observed morbidity patterns and healthcare-seeking behaviors should be understood within a broader cultural and ecological framework, where disease prevalence and treatment choices are interlinked with lived experiences, subsistence practices, and ongoing health system transitions.

4.2 Limitations of the study

This study has certain limitations that warrant consideration. The relatively small sample size and focus on a single PVTG community within a specific geographic region may limit the generalizability of the

findings to other groups with different socio-cultural and environmental contexts. The cross-sectional design further restricts causal interpretation of the observed associations between morbidity patterns and healthcare-seeking behavior. As the data were primarily self-reported, recall bias and social desirability bias may have influenced the reporting of certain conditions, particularly those associated with stigma. Also misclassification of symptoms due to low health literacy cannot be ruled out. Additionally, the lack of clinical validation of many self-reported conditions may have affected the accuracy of morbidity estimates. Diagnostic verification was constrained by limited clinical resources in remote field settings, and information on chronic conditions was based on self-report, which may have resulted in underestimation of chronic or asymptomatic conditions due to undiagnosed cases. The small sample size and non-random (purposive) sampling of villages limit the representativeness of the findings, and therefore, the results should be interpreted within the context of the selected villages rather than generalized to the entire Chuktia Bhunjia population. Additionally, the exclusion of severely ill individuals who were unable to participate may have introduced selection bias, potentially resulting in an underestimation of the overall morbidity burden in the study population. The study adopts a quantitative approach using structured instruments, which effectively captures biomedical aspects of morbidity and healthcare utilization. However, it does not incorporate qualitative methods to explore emic perspectives or the cultural reasoning behind healthcare choices. This may limit a deeper understanding of socio-cultural influences, particularly in tribal contexts. Future studies may incorporate qualitative methods such as in-depth interviews, illness narratives, and engagement with traditional healers to better understand the cultural perceptions and reasoning underlying healthcare choices. Despite these limitations, the study provides important evidence on the morbidity profile and healthcare-seeking behavior of a marginalized PVTG, contributing valuable insights for designing culturally appropriate health interventions.

5 Conclusion

The Chuktia Bhunjia show a high burden of musculoskeletal, rheumatologic and other pain-related conditions, and several general health problems with common symptoms including joint pain, fatigue, and back pain, alongside frequent respiratory conditions. Conditions such as ear problems, jaundice, tuberculosis, and deficiency-related disorders are rare, while non-communicable diseases like hypertension are emerging. Healthcare-seeking behavior among the Chuktia Bhunjia is highly condition-specific. Modern care is primarily utilized for respiratory, gastrointestinal, and musculoskeletal conditions, while traditional care is more associated with ear and oral morbidities, and minor ailments often rely on informal sources. Eye disorders, injuries, and deficiency-related symptoms are largely neglected, and hepatic conditions show minimal engagement with any care.

The high prevalence of musculoskeletal disorders, general symptoms, and emerging non-communicable diseases underscores the need for public health interventions that address occupational, nutritional, and lifestyle-related risks within the community. The selective use of modern medicine for severe conditions, reliance on traditional healers for culturally defined ailments, and neglect of conditions such as eye problems and deficiency-related morbidities highlight both limited awareness and cultural interpretations of illness severity, which shape healthcare-seeking behavior.

The findings of this study also have broader societal implications. They highlight the persistent health inequalities faced by marginalized tribal populations and the need for more inclusive and equitable healthcare systems. The limited care-seeking for certain conditions reflects not only structural barriers but also gaps in awareness and social recognition of health needs. Addressing these challenges requires greater attention to culturally sensitive health communication and community engagement to ensure that vulnerable populations are not left behind in ongoing health transitions.

There is a clear need for integrated health strategies that combine accessible primary healthcare services with culturally appropriate health education and active engagement of traditional healers. Such approaches can improve awareness, promote timely care-seeking, and ensure that both biomedical and indigenous systems work together to address the health needs of this vulnerable population.

Statements and Declarations

Clinical trial number: Not applicable.

Acknowledgements: The authors are indebted to the study participants for taking part in this research.

Author contributions: BK and AS conceptualized the study. DP was responsible for data collection and data curation. Data analysis and interpretation were done by AS. BK reviewed the first draft of the manuscript. The final draft was reviewed by all authors.

Funding: The study received no funding.

Conflict of interest: There is no competing interest to declare.

Data availability statement: The data supporting the findings of this study are available from the corresponding author upon reasonable request.

Authors' statement: The paper has not been previously published or concurrently submitted to an editorial office of another journal, and it has also been approved by all authors and the institutions where it was developed.

References

Acharya, S. S. (2022). Health equity & tribal populations: Challenges & way forward. *Indian Journal of Medical Research*, *156*(2), 179–181. https://doi.org/10.4103/ijmr.ijmr_1931_22

Akkiraju, V. S. (2022). A comparative study of maternal and child health indicators of tribal and non-tribal areas of selected states in India. *International Journal of Health Sciences and Research*, *12*(12), 17–24. https://doi.org/10.52403/ijhsr.20221203

Anjana, R. M., Deepa, M., Pradeepa, R., Mahanta, J., Narain, K., Das, H. K., Adhikari, P., Rao, P. V., Saboo, B., Kumar, A., Bhansali, A., John, M., Luaia, R., Reang, T., Ningombam, S., Jampa, L., Budnah, R. O., Elangovan, N., Subashini, R., . . . Yajnik, C. S. (2017). Prevalence of diabetes and prediabetes in 15 states of India: Results from the ICMR–INDIAB population-based cross-sectional study. *Lancet Diabetes & Endocrinology*, *5*(8), 585–596. https://doi.org/10.1016/s2213-8587(17)30174-2

Asokan, D., Gate, N., Waghmare, R., Mall, A., & Pardeshi, G. (2025). A cross-sectional study to assess the healthcare-seeking behaviour of tribal communities in a district of Maharashtra. *Cureus*, e85687. https://doi.org/10.7759/cureus.85687

Babu, B. V., Hazarika, C. R., Raina, S. K., Masoodi, S. R., Basappa, Y. C., Thomas, N., Kerketta, A. S., & Jebasingh, F. K. (2024). Hypertension prevalence, awareness, treatment, control and risk factors in tribal population of India: A multi-centric cross-sectional study. *Journal of Racial and Ethnic Health Disparities*, *11*(6), 3678–3689. https://doi.org/10.1007/s40615-023-01817-w

Babu, M. H., Sri, B. S., & Reddi, T. V. V. S. (2020). Herbal remedies for jaundice in tribal system of medicine from Visakhapatnam district, Andhra Pradesh. *Journal of Traditional and Folk Practices*, *7/8*, 115–126. https://doi.org/10.25173/jtfp.134

Balgir, R. S. (2006). Tribal health problems, disease burden and ameliorative challenges in tribal communities with special emphasis on tribes of Orissa. *Proceedings of National Symposium on "Tribal Health" 19th-20th October*, 161–176.

Balgir, R. S. (2011). Genetic disease burden, nutrition and determinants of tribal health care in Chhattisgarh state of Central-East India: A status paper. *Online Journal of Health & Allied Sciences*, *10*.

Bang, A. A., Bhojraj, S. Y., Deshmukh, M., Joshi, V. R., Yarmal, T., Kalkotwar, S., & Bang, A. T. (2021). Burden of pain in back and extremities in rural population: A community-based estimation of 12-month prevalence, distribution and duration of pain in rural Gadchiroli, India. *Journal of Global Health*, *11*, 12001. https://doi.org/10.7189/jogh.11.12001

Bang, A. A., Bhojraj, S. Y., Deshmukh, M., Joshi, V. R., Yarmal, T., Kalkotwar, S., & Bang, A. T. (2022). Healthcare seeking behavior for pain in back and extremities in rural population: A community-based estimation of treatment seeking, types and choice of care giver during a period of twelve months in rural Gadchiroli, India. *Journal of Global Health Reports*, *5*, e2021001. https://doi.org/10.29392/001c.30747

Bhoi, N., & Acharya, S. K. (2024). Health status of particularly vulnerable tribal groups (PVTGs) of Odisha: A narrative review. *Journal of Health, Population and Nutrition*, *43*(1), 176. https://doi.org/10.1186/s41043-024-00671-8

Bhuyan, R., & Pradhan, S. (2025). Traditional medicine practice among savara tribe gajapati district- a study. *International Journal of History and Cultural Studies*, *11*(2), 39–43. https://doi.org/10.20431/2454-7654.1102004

Bindhani, B. K., & Nayak, J. K. (2021). Common health problems and health-seeking behavior among the tribals of Odisha, India. *Oriental Anthropologist*, *21*(2), 303–310. https://doi.org/10.1177/0972558x211049094

Bresnahan, K. A., & Tanumihardjo, S. A. (2014). Undernutrition, the acute phase response to infection, and its effects on micronutrient status indicators. *Advances in Nutrition*, *5*(6), 702–711. https://doi.org/10.3945/an.114.006361

Chinnaiyan, S., Palanisamy, B., & Ayyasamy, L. (2023). Prevalence of diabetes mellitus in Indian tribal population: A systematic review and meta-analysis. *International Journal of Diabetes in Developing Countries*, *43*, 173–183.

Dhanuka, A., Goswami, B. K., Goswami, S. B., & Chakrabarti, S. (2019). Profile of nutritional anemia and its correlation with serum iron, Vitamin B_12, and folic acid level among the tribal population of northern districts of West Bengal, India. *Archives of Medicine and Health Sciences*, *7*, 201–205.

Dwibedi, B., Sahu, P., Somalkar, N., Kerketta, A. S., Khuntia, H. K., & Kar, S. K. (2024). Prevalence and pattern of morbidity, febrile illness, and treatment-seeking behavior in a tribal-dominated district in Odisha, India: An observational study. *Cureus*, *16*, e58613.

El-Radhi, A. S. (2019). Fever in common infectious diseases. In A. El-Radhi (Ed.), *Clinical Manual of Fever in Children* (pp. 85–140). Springer International Publishing. https://doi.org/10.1007/978-3-319-92336-9_5

Ghosh-Jerath, S., Singh, A., Bhattacharya, A., Ray, S., Yunus, S., & Zodpey, S. P. (2013). Dimensions of nutritional vulnerability: Assessment of women and children in Sahariya tribal community of Madhya Pradesh in India. *Indian Journal of Public Health*, *57*, 260–267.

Haddad, S., Mohindra, K. S., Siekmans, K., Màk, G., & Narayana, D. (2012). "Health divide" between indigenous and non-indigenous populations in Kerala, India: Population based study. *BMC Public Health*, *12*(1), 390. https://doi.org/10.1186/1471-2458-12-390

Haridoss, M., Nandi, D., Rajesh Lenin, R., John, S. P., Anantharaman, V. V., & Janardhanan, R. (2025). Health-seeking behavior and its determinants for non-communicable diseases in India - a systematic review and meta-analysis. *Frontiers in Public Health*, *13*, 1580824.

Hazarika, C. R., & Babu, B. V. (2024). Prevalence of hypertension in Indian tribal population: A systematic review and meta-analysis. *Journal of Racial and Ethnic Health Disparities*, *11*, 451–467.

Hernandez, J. B. R., & Kim, P. Y. (2022). Epidemiology, morbidity and mortality [[Updated 2022 Oct 3]. Available from: https://www.ncbi.nlm.nih.gov/books/NBK547668/]. In *Statpearls [Internet]*. StatPearls Publishing.

Indian Council of Medical Research (ICMR) (2018). *Handbook on National Ethical Guidelines for Biomedical and Health Research Involving Human Participants*. ICMR.

Islary, J. (2014). Health and health seeking behaviour among tribal communities in India: A socio-cultural perspective. *Journal of Tribal Intellectual Collective India*, *2*, 1–16.

Jacob, J. T., & Franco-Paredes, C. (2008). The stigmatization of leprosy in India and its impact on future approaches to elimination and control. *PLoS Neglected Tropical Diseases*, *2*(1), e113. https://doi.org/10.1371/journal.pntd.0000113

Jain, Y., Kataria, R., Patil, S., Kadam, S., Kataria, A., Jain, R., Kurbude, R., & Shinde, S. (2015). Burden & pattern of illnesses among the tribal communities in Central India: A report from a community health programme. *Indian Journal of Medical Research*, *141*, 663–672.

Kanrar, P. (2024). Health status of Hill Juang and Plain Juang populations. A comparative study on a particularly vulnerable tribal group of Odisha India [Doctoral dissertation, University of Calcutta] [Shodhganga: a reservoir of Indian theses @ INFLIBNET]. http://hdl.handle.net/10603/550468.

Kavitha, A. K., Kshatri, J. S., van den Akker, M., Hussain, M. A., Bhattacharya, H., & Pati, S. (2025). Epidemiology of multimorbidity among indigenous adults: Insights from a large-scale population survey of 53 different indigenous groups in East India. *Global Epidemiology*, *10*, 100226.

Kerketta, A. S., Bulliyya, G., Babu, B. V., Mohapatra, S. S., & Nayak, R. N. (2009). Health status of the elderly population among four primitive tribes of Orissa, India: A clinico-epidemiological study. *Zeitschrift für Gerontologie und Geriatrie*, *42*, 53–59.

Lenka, D., & Mohapatra, A. (2015). Traditonal health care practices among Kondh and Bhuyan Tribes of Odisha. *International Journal of Emerging Trends in Science and Technology*, *2*, 1752–1757.

Maity, B. (2017). Comparing health outcomes across scheduled tribes and castes in India. *World Development*, *96*, 163–181.

Mallya, S. D., Shreedhar, S., Sudhakaran, D., Aravindhkumar, B., Nair, S., & Shetty, R. S. (2022). Health status of Koraga community: A pilot study among a particularly vulnerable tribal group of Udupi District, Karnataka, India. *Indian Journal of Medical Research*, *156*(2), 275–283. https://doi.org/10.4103/ijmr.ijmr_3209_21

Mandi, S., Majumdar, P., & Sahu, S. (2019). Work-related musculoskeletal disorders of tribal female Sal leaf platemakers: An unperceived issue. *BLDE University Journal of Health Sciences*, *4*(2), 78–84.

Maramraj, K. K., Subbalakshmi, G., Ali, M. S., Dikid, T., Yadav, R., Sodha, S. V., Jain, S. K., & Singh, S. K. (2020). A community-wide acute diarrheal disease outbreak associated with drinking contaminated water from shallow bore-wells in a tribal village, India, 2017. *BMC Public Health*, *20*(1), 231. https://doi.org/10.1186/s12889-020-8263-2

Melki, I. S., Beydoun, H. A., Khogali, M., Tamim, H., & Yunis, K. A. (2004). Household crowding index: A correlate of socioeconomic status and inter-pregnancy spacing in an urban setting. *Journal of Epidemiology and Community Health*, *58*(6), 476–480. https://doi.org/10.1136/jech.2003.012690

Ministry of Tribal Affairs, Government of India (2024). Empowering tribal communities: Government initiatives for tribal welfare in India [Press release]. https://static.pib.gov.in/WriteReadData/specificdocs/documents/2024/oct/doc2024103406801.pdf.

Mitra, P., Chakraborty, D., Nayek, S., Kundu, S., Mishra, D., Dan, U., & Mondal, N. K. (2023). Biomass using tribal women exhibited respiratory symptoms, hypertensive risks and abnormal pulmonary function. *Chemosphere*, *311*, 136995. https://doi.org/10.1016/j.chemosphere.2022.136995

Mullerpatan, R., Nahar, S., Singh, Y., Cote, P., & Nordin, M. (2021). Burden of spine pain among rural and tribal populations in Raigad District of Maharashtra State of India. *European Spine Journal*, *30*(4), 1004–1010. https://doi.org/10.1007/s00586-020-06585-3

Narain, J. P. (2022). India at 75: Transforming the health of tribal populations through evidence-based policymaking. *Indian Journal of Medical Research*, *156*(2), 174–177. https://doi.org/10.4103/ijmr.ijmr_1988_22

Nayak, B. C., Mohanty, S., Epari, V., Mohapatra, G., Mohanty, S., Saha, S. B., & Mahapatra, S. (2024). Prevalence of risk factors of non-communicable diseases (NCDs) among vulnerable tribal groups (PVTGs) in the intensive area of Rayagada district of Odisha, India. *International Research Journal of Multidisciplinary Scope*, *05*(01), 224–231. https://doi.org/10.47857/irjms.2024.v05i01.0196

Ota, A. B., Mohanty, B. N., & Mohanty, S. C. (2020). Particularly vulnerable tribal groups of Odisha. https://repository.tribal.gov.in/bitstream/123456789/75101/1/SCST_2020_handbook_0440.pdf.

Ota, A. B., & Mohanty, S. C. (2015). Particularly vulnerable tribal groups (PTGs) of Odisha. https://www.repository.tribal.gov.in/bitstream/123456789/74412/1/SCST_2015_book_0323.pdf.

Phatak, A., Singhal, R., Talati, K., Gandhi, B., Shinde, M., & Nair, P. (2020). Prevalence and pattern of skin diseases in tribal villages of Gujarat: A teledermatology approach. *Indian Journal of Community Medicine*, *45*(2), 199–203. https://doi.org/10.4103/ijcm.ijcm_76_19

Pradhan, S., & Rout, G. K. (2025). Integrating ethnopedagogical practices in science learning: Insights from the indigenous knowledge system of Chuktia Bhunjia tribe. *International Journal of Literacy and Education*, *5*(1), 10–22271. https://doi.org/10.22271/27891607.2025.v5.i1f.295

Punetha, N., & Pandey, L. (2023). Comparative analysis of nutritional status among tribal and non-tribal women in India: A comprehensive review. *Journal of Acharaya Narendra Dev Research Institute*, *33*, 38–48.

Rabha, R., Ghosh, S., & Padhy, P. K. (2019). Effects of biomass burning on pulmonary functions in tribal women in northeastern India. *Women & Health*, *59*(3), 229–239. https://doi.org/10.1080/03630242.2018.1452834

Rami, F., Thompson, L., & Solis-Cortes, L. (2023). Healthcare disparities: Vulnerable and marginalized populations. In H. R. Searight (Ed.), *Covid-19: Health Disparities and Ethical Challenges across the Globe* (pp. 111–145). Springer. https://doi.org/10.1007/978-3-031-26200-5_6

Raushan, R., & Acharya, S. S. (2019). Morbidity and treatment-seeking behaviour among scheduled tribe in India: A cross-sectional study. *Journal of Social Inclusion Studies*, *4*(2), 325–340. https://doi.org/10.1177/2394481118818594

Rizwan, S. A., Kumar, R., Singh, A. K., Kusuma, Y. S., Yadav, K., & Pandav, C. S. (2014). Prevalence of hypertension in Indian tribes: A systematic review and meta-analysis of observational studies. *PLoS ONE*, *9*(5), e95896. https://doi.org/10.1371/journal.pone.0095896

Sabar, B. (2014). Chuktia bhunjia: A neglected tribe of Orissa, India. *Antrocom Online Journal of Anthropology*, *52*(5), 99–109. https://doi.org/10.1177/0021909615605552

Sabar, B., & Midya, D. K. (2023). Encountering illness: Local knowledge, institutions and the science of healthcare practices among the Chuktia Bhunjia tribe of Odisha, India. *Journal of Asian and African Studies*, *58*, 1349–1372. https://doi.org/10.1177/00219096211069643

Sabar, B., & Midya, D. K. (2024). Intersecting knowledge with landscape: Indigenous agriculture, sustainable food production and response to climate change–a case study of Chuktia Bhunjia tribe of Odisha, India. *Journal of Asian and African Studies*, *59*, 123–141. https://doi.org/10.1177/00219096221139801

Sahoo, K., Nayak, S. R., & Khurana, P. (2023). The pattern of health-seeking behavior among juang tribe - a particularly vulnerable tribal group of odisha, India. *Indian Journal of Community Medicine*, *48*(5), 696–701. https://doi.org/10.4103/ijcm.ijcm_821_22

Sahu, M., Kujur, A., Venugopal, V., Govil, P., Sinha, R., Mathur, M., Rehman, T., Rana, R. K., & Kumar, D. (2024). Tribal health: A public health exigency and road map to future. *Indian Journal of Community Medicine*, *49*(Suppl 2), S217–S221. https://doi.org/10.4103/ijcm.ijcm_807_24

Santra, A. (2025). Health related pain cognition and threshold of the urban and rural santals of howrah and purba bardhaman districts of West Bengal [Doctoral dissertation, University of Calcutta] [Shodhganga: A reservoir of Indian theses @ INFLIBNET]. http://hdl.handle.net/10603/632763.

Santra, A., Roy, S. K., Goswami, M., & Chatterjee, D. (2024). An exploratory study on sex differences in musculoskeletal pain and its associated factors among the Santal indigenous people of West Bengal, India. *Discover Social Science and Health*, *4*(1), 67. https://doi.org/10.1007/s44155-024-00123-y

Sarkar, R. (2016). A study on the health and nutritional status of tribal women in Godam Line village of Phansidewa block in Darjeeling district. *IOSR Journal of Humanities and Social Science*, *21*, 15–18.

Scheduled Castes and Scheduled Tribes Research and Training Institute (SCSTRTI), Development Department Government of Odisha (2022). Tribal Odisha eye disease study (TOES): Report #10. disability inclusive eye health survey in a tribal district (Rayagada) in Odisha, India [Report, Government of India, Ministry of Tribal Affairs]. https://repository.tribal.gov.in/bitstream/123456789/75350/1/SCST_2022_research_0504.pdf.

Sharma, J., Gairola, S., Gaur, R. D., & Painuli, R. M. (2012). The treatment of jaundice with medicinal plants in indigenous communities of the sub-Himalayan region of Uttarakhand, India. *Journal of Ethnopharmacology*, *143*, 262–291.

Shriraam, V., Mahadevan, S., & Arumugam, P. (2021). Prevalence and risk factors of diabetes, hypertension and other non-communicable diseases in a tribal population in South India. *Indian Journal of Endocrinology and Metabolism*, *25*, 313–319.

Singh, N., Shukla, S. K., Dubey, R., John, P., Sengupta, R., Pushkar, R. R., Singh, N., Chugh, P., Yadav, N., & Sadanandan, R. (2025). Burden on the burdened: Tuberculosis among Scheduled Tribes and non-Scheduled Tribes in constitutionally protected Scheduled and non-Scheduled areas of India. *Infectious Diseases of Poverty*, *14*(1), 111. https://doi.org/10.1186/s40249-025-01375-9

Sonowal, C. J., & Konc, P. (2021). Disease burden, health-belief and treatment-seeking behaviour among the particularly vulnerable tribal groups of India. *Ethno Medicine*, *15*(1-2), 60–73. https://doi.org/10.31901/24566772.2021/15.1-2.624

Subramanian, S., & Joe, W. (2023). Population, health and nutrition profile of the Scheduled Tribes in India: A comparative perspective, 2016–2021. *Lancet Regional Health. Southeast Asia*, *20*, 100266. https://doi.org/10.1016/j.lansea.2023.100266

Tiwari, A. K., Mehta, R., & Sen, K. K. (2022). Traditional health practices among the tribal belt of Chhattisgarh, India: An indigenous knowledge from indigenous peoples. *International Journal of Pharmaceutical Research and Allied Sciences*, *11*, 95–106.

MANKIND QUARTERLY
Mankind Quarterly, 67(1), 123-134 2026 Fall Edition
ISSN: 0025-2344

Adiposity and Skeletal Muscle Distribution among Older Adults in Southern West Bengal: Emergence of a Sarcopenic Obesity-like Phenotype

Sambaran Mondal[†] Sudipta Banerjee[†] Mala Dey[†] Sandipan Chatterjee[†]
Shankarashis Mukherjee[†*]

Abstract

Ageing is accompanied by marked changes in body composition, reflecting long-term biological, nutritional, and lifestyle processes. In populations undergoing nutritional and epidemiological transitions, older adults may exhibit a distinct phenotype characterized by the coexistence of adiposity and reduced skeletal muscle mass, commonly described as sarcopenic obesity. Most Indian studies are hospital-based, urban-focused, or rely on national datasets that do not capture regional variation. Furthermore, little information exists regarding the coexistence of adiposity and reduced muscle mass among older adults in West Bengal. The present study aimed to examine sex-specific body composition patterns and identify body composition profiles suggestive of sarcopenic obesity-like phenotypes among community-dwelling older adults in southern West Bengal. A community-based cross-sectional study was carried out on 331 individuals aged 60-80 years (186 females and 145 males) from southern West Bengal following simple random procedure. Anthropometric measurements were obtained using standard protocols, and nutritional status was classified using body mass index (BMI). Body composition parameters like the percentage of body fat, visceral fat, whole-body subcutaneous fat and whole-body skeletal muscle were measured using bioelectrical impedance analysis (BIA). Sex-wise comparisons and differences across nutritional categories were examined using descriptive statistics and one-way analysis of variance. Progressive increases in the percentage of total body fat, visceral fat, and subcutaneous fat were observed with increasing BMI categories in both sexes. In contrast, skeletal muscle percentage showed a tendency to plateau or decline among overweight and obese individuals. The concurrent presence of elevated adiposity and relatively reduced muscle mass in higher BMI categories indicates the emergence of a sarcopenic obesity-like body composition phenotype within this ageing population. Such patterns likely reflect long-term nutritional transition and lifestyle changes and have important implications for understanding biological ageing and population variation in contemporary Indian populations.

Keywords: Sarcopenic obesity, Body composition, Nutritional transition, Aging

1 Introduction

Human ageing is a multifaceted biological process shaped by the dynamic interaction of genetic inheritance, environmental exposures, nutritional history, and socio-cultural context (Guo et al., 2022; Rodriguez-Rodero et al., 2011). Rather than representing a uniform or linear decline, ageing manifests through diverse physiological trajectories that vary across populations and ecological settings (Arbeev et al., 2011). Among the most visible and biologically consequential changes associated with ageing is the redistribution of body tissues, particularly the progressive increase in adiposity alongside a decline in skeletal muscle mass (Palmer & Jensen, 2022). These changes are not merely cosmetic but are strongly associated with functional limitation, metabolic disorders, frailty, and mortality (Crews, 1993; Mondal, Chakraborty, Banerjee, et al., 2025). In recent years, the concurrent presence of excess adiposity and reduced muscle mass has

† Public Health Analytics Unit, Department of Food and Nutrition, West Bengal State University, Kolkata 700126, West Bengal, India
* Corresponding author, email: msasish@yahoo.co.in

been conceptualized as sarcopenic obesity, a phenotype of growing clinical and public health concern (Axelrod et al., 2023).

Sarcopenia is currently defined according to consensus guidelines such as those proposed by the European Working Group on Sarcopenia in Older People and the Asian Working Group for Sarcopenia. These frameworks emphasize low skeletal muscle mass in combination with reduced muscle strength and/or impaired physical performance as diagnostic criteria (Larsson et al., 2018). Sarcopenia reflects both intrinsic biological ageing and cumulative lifestyle influences such as physical activity, nutritional adequacy, and disease burden (Mondal, Banerjee, & Mukherjee, 2025; Tieland et al., 2018). Simultaneously, many ageing populations experience an increase in total and central adiposity, a pattern increasingly observed across both high-income and low- and middle-income countries (Popkin & Slining, 2013). Obesity, on the other hand, is conventionally defined using body mass index (BMI), although body fat percentage provides a more direct indicator of adiposity (Mainous et al., 2025).When these two processes occur concurrently, they give rise to a distinctive body composition phenotype known as sarcopenic obesity (Zamboni et al., 2008). This phenotype is associated with heightened vulnerability to function impairment, metabolic disorders, frailty, and reduced quality of life, making it a critical issue for ageing societies (How et al., 2025; Murawiak et al., 2022).

India provides a particularly important context for examining sarcopenic obesity-like phenotypes due to its rapid nutritional, epidemiological, and lifestyle transitions over recent decades (Pal et al., 2021). The country has witnessed a marked shift from traditional diets rich in coarse grains and plant-based foods toward more energy-dense, processed diets, accompanied by declining levels of habitual physical activity (N. Banerjee, Biswas, et al., 2021; Bardhan, Mondal, & Mukherjee, 2024; Mukhopadhyay et al., 2025). These changes have contributed to rising levels of overweight, obesity, and non-communicable diseases across much of the population (N. Banerjee, Chatterjee, et al., 2021; Bardhan, Saha, Mondal, Chatterjee, et al., 2024). While the health consequences of this transition have been documented extensively among children, adolescents, and working-age adults (N. Banerjee et al., 2022; Bardhan, Saha, Mondal, Das, et al., 2024; M. Dey et al., 2025; Saha et al., 2024), comparatively little attention has been given to older adults who have lived through multiple phases of nutritional and socioeconomic change (Mondal, Chakraborty, Chatterjee, et al., 2025).

For ageing individuals, contemporary body composition patterns cannot be understood solely in terms of current lifestyle (St-Onge & Gallagher, 2010). They rather reflect cumulative life-course exposures, including early-life undernutrition, episodes of infectious disease, reproductive history, occupational labor, and later-life shifts in diet and activity (Alam et al., 2019; Song et al., 2025). Many older Indians were born and raised during periods of food scarcity and high physical demands, followed by adulthood or later life in increasingly obesogenic environments (Kandapan et al., 2023). Sarcopenic obesity thus represents not merely a pathological condition, but a phenotypic outcome of long-term biological and cultural processes operating across the lifespan (Roh & Choi, 2020).

Globally, the prevalence of the sarcopenic obesity-like phenotype among older adults varies widely depending on definitions and measurement techniques, ranging from approximately 5% to over 20% in community-dwelling populations (Ji et al., 2022). Despite growing recognition of the sarcopenic obesity-like phenotype as an important geriatric health concern, empirical evidence from community-dwelling older adults in Eastern India remains limited. Existing Indian studies have largely focused on urban populations, hospital-based samples, or national datasets that may not adequately capture regional variation in body composition patterns (Pal et al., 2021; Verma et al., 2022). Furthermore, information on the coexistence of increased adiposity and reduced skeletal muscle mass among older adults in West Bengal is scarce (Majumder et al., 2023; Mondal, Banerjee, Parvin, et al., 2025). Understanding these patterns is important in the context of rapid nutritional and lifestyle transitions occurring in the region. Therefore, the present study aimed to examine sex-specific body composition characteristics among older adults in southern West Bengal and to identify body composition profiles suggestive of a high adiposity low muscle mass phenotype.

2 Materials and methods

2.1 Study population, design and sampling

The present study involved a community setting oriented cross-sectional method conducted in selected districts of southern West Bengal, India [Howrah (n:51), Nadia (n:56), Hooghly (n:46), Kolkata (n:50), North (n:74) and South (54) 24 Parganas)] between November 2024 and November 2025. A house-to-house survey was conducted in selected localities of the study districts. A sampling frame of households was prepared for each locality, and households were selected using a simple random sampling technique. Eligible older adults (60-80 years) residing in the selected households were invited to participate after providing informed consent. Initially, 414 individuals were screened. After applying the inclusion and exclusion criteria, 331 participants aged 60–80 years were included in the final analysis. The study protocol was ethically approved by the Institutional Human Ethics Committee of the university.

2.2 Inclusion and exclusion criteria

Individuals aged 60–80 years were included because 60 years is the commonly accepted threshold for defining older adults in India, while participants above 80 years were excluded due to the greater likelihood of severe comorbidities, mobility limitations, and measurement difficulties that could influence body composition assessment. Initially 414 people participated in the present study, but those aged below 60 years and above 80 years and those not able to complete the tests were excluded. Individuals with neurodegenerative diseases and/or taking medications that can alter body composition were also excluded.

2.3 Anthropometry and body composition assessment

Body height (cm) was measured while the individuals stood erect, without shoes and without holding any support, using the anthropometric measurement set (D. Dey et al., 1999). Body weight (nearest to 0.1 kg) was taken using a weighing scale while participants were wearing minimum socially acceptable clothing (Atiea et al., 1994). Body Mass Index or BMI was calculated as body weight in kg divided by body height in meters squared and categorized as per WHO recommendation for the South Asian population (<18.5: Underweight, 18.5-22.9: Normal, 23-24.9: overweight or at risk of obesity, 25-29.9: Obese I and $\geq$30: Obese II). Body composition parameters such as percentage of body fat (PBF), visceral fat (VF%), whole-body subcutaneous fat (WBSC%) and whole-body skeletal muscle (WBMS%) were measured using a bioelectrical impedance analysis (BIA) device under standardized conditions and procedure (Roubenoff et al., 1997).

2.4 Operational definition of high-adiposity – low-muscle phenotype

Sarcopenia is conventionally defined according to the Asian Working Group for Sarcopenia (AWGS) and the European Working Group on Sarcopenia in Older People (EWGSOP), requiring assessment of muscle mass together with muscle strength and/or physical performance. As these parameters were not included, the study focused on identifying a body composition pattern suggestive of a sarcopenic obesity-like phenotype among the older adults, rather than estimating and/or measuring the prevalence of sarcopenic obesity. High adiposity was defined as body fat percentage (PBF) above the sex-specific 75^{th} percentile (Weber et al., 2013), while low muscle mass was defined as whole-body skeletal muscle percentage (WBMS%) below the sex-specific 25^{th} percentile (Yu et al., 2014). Participants exhibiting both characteristics were classified as having a high adiposity-low muscle phenotype. This operational approach was adopted to identify individuals demonstrating body composition characteristics suggestive of sarcopenic obesity while avoiding formal clinical diagnosis.

2.5 Statistical analysis

IBM SPSS 31 was used to carry out all statistical analyses for the present study. Descriptive statistics were used to summarize anthropometric and body composition variables. Sex-wise differences were assessed using independent samples t-tests. To examine the relationship between adiposity and skeletal muscle distribution, participants were stratified into sex-specific quartiles based on whole-body skeletal muscle percentage (WBMS%). Differences in body fat percentage (PBF), visceral fat percentage (VF%), and whole-body subcutaneous fat percentage (WBSC%) across WBMS quartiles were assessed using one-way analysis of variance (ANOVA). Pearson correlation analysis was performed separately for males and females to examine relationships between age, BMI, PBF, VF%, WBSC%, and WBMS%. Multiple linear regression analysis was conducted separately for males and females to evaluate whether body fat percentage (dependent variable) was independently predicted by skeletal muscle percentage and age (independent variables). Regression assumptions were checked prior to analysis. The prevalence of the high adiposity–low muscle phenotype was calculated separately for males and females and expressed as percentages with 95% confidence intervals. A p value of <.05 was considered statistically significant.

3 Results

The study included 331 older adults among whom 186 (56.2%) were females and 145 (43.8%) were males. The average age of participants was comparable between females (67.5 $\pm$ 6.08 years) and males (67.5 $\pm$ 5.85 years; t = 0.01, p =.991). The characteristics of the study variables are presented in Table 1.

Table 1: Characteristics of the study variables

Characteristics	Females (n=186)			Males (n=145)			t	p value
	AM $\pm$ SD	Min	Max	AM $\pm$ SD	Min	Max		
Body height (cm)	147.9 $\pm$ 6.18	130	164	162.2 $\pm$ 7.36	136	181.5	19.20	.001
Body weight (kg)	52.0 $\pm$ 11.18	27.9	77.6	59.9 $\pm$ 10.89	34	87	6.47	.001
BMI (kg/m^2)	23.7 $\pm$ 4.50	14	34.7	22.7 $\pm$ 3.53	14.3	32.3	2.09	.038
PBF	39.0 $\pm$ 5.00	22.3	49.2	28.5 $\pm$ 5.07	14.3	46	18.78	.001
VF%	8.3 $\pm$ 4.90	0.5	22	9.8 $\pm$ 5.19	0.5	23.5	2.76	.006
WBSC%	30.8 $\pm$ 5.08	17	42.5	19.5 $\pm$ 3.99	9.6	37.2	21.93	.001
WB MS%	20.0 $\pm$ 2.15	14.4	27	26.5 $\pm$ 2.57	18	32	24.80	.001

Note. AM: Arithmetic mean; SD: Standard deviation; Min: Minimum; Max: Maximum; BMI: Body mass index; PBF: Percent body fat; VF%: Visceral fat percentage; WBSC%: Whole body subcutaneous fat percentage; WBMS%: Whole body skeletal muscle percentage.

Table 1 shows that females exhibited significantly (p <.05) higher mean body fat percentage and subcutaneous fat percentage than males, whereas males showed significantly higher skeletal muscle percentage. Descriptive statistics for the body composition variables of the study participants measured with BIA as per their nutritional status category are presented in Table 2.

Table 2 presents sex-specific differences in adiposity and skeletal muscle indicators across BMI categories. Although body fat percentage, visceral fat percentage, and subcutaneous fat percentage increased progressively with higher BMI categories, skeletal muscle percentage remained unchanged or declined. This divergence between adiposity and muscle mass was more evident among obese participants and suggests the coexistence of elevated adiposity with relatively low skeletal muscle mass. The BIA measured adiposity indicators classified according to the WBMS% quartiles are presented in Table 3.

Table 2 shows that in both females and males, participants belonging to the lowest muscle mass quartile (Q1) exhibited the highest body fat percentage (PBF), visceral fat percentage (VF%), and whole-body subcutaneous fat percentage (WBSC%), whereas those in the highest muscle mass quartile (Q4) demonstrated the lowest adiposity levels. These findings demonstrate a significant (p<.05) inverse relation-

Table 2: Descriptive statistics for the body composition variables of the study participants measured with BIA

Nutritional status	PBF		VF%		WBSC%		WBMS%	
category (n)	Female	Male	Female	Male	Female	Male	Female	Male
Underweight (F:25, M:15)	34.4±5.27	26.2±9.02	2.1±0.91	2.0±1.32	23.9±2.88	17.0±5.52	19.9±2.44	26.8±3.76
Normal (F:64, M:60)	37.6±5.22	27.0±4.57	5.1±1.45	6.8±2.03	28.1±2.96	18.1±3.11	20.4±2.48	27.0±2.50
At risk of obesity (F:22, M:30)	39.4±3.63	28.6±3.31	8.3±1.47	11.3±1.74	31.3±1.81	19.9±2.91	20.3±1.69	26.9±1.78
Obese-I (F:62, M:36)	41.2±3.24	31.1±2.85	11.8±2.09	15.8±2.28	34.5±2.50	21.8±2.68	19.8±1.85	25.3±2.35
Obese-II (F:13, M:4)	43.3±3.01	36.4±2.11	19.2±2.48	20.9±3.04	39.6±2.08	28.0±6.21	19.5±1.79	24.2±0.90

Note. AM ± SD: Arithmetic mean ± Standard deviation. Abbreviations as in Table 1.

Table 3: Adiposity indicators according to WBMS% quartiles of the study participants

WBMS%	**Female**				**Male**			
Quartiles	**n (WBMS% range)**	**PBF**	**VF%**	**WBSC%**	**n (quartile range)**	**PBF**	**VF%**	**WBSC%**
Q1 (lowest)	45 (<18.7)	43.7 ± 3.01	9.3 ± 5.28	33.3 ± 4.36	34 (<25.1)	33.0 ± 4.38	11.9 ± 5.92	23.3 ± 4.37
Q2	44 (18.7–19.99)	40.1 ± 3.40	9.0 ± 5.64	31.8 ± 5.28	34 (25.1–26.79)	30.3 ± 3.08	10.8 ± 5.69	20.4 ± 2.30
Q3	49 (20–21.19)	39.0 ± 2.49	9.0 ± 4.03	31.5 ± 3.48	41 (26.8–28.04)	28.1 ± 3.19	9.6 ± 3.96	19.2 ± 2.17
Q4 (highest)	48 (≥21.2)	33.5 ± 4.36	6.0 ± 3.93	26.8 ± 4.74	36 (≥28.05)	23.1 ± 3.69	7.3 ± 4.20	15.6 ± 2.66
		F=73.57, p<.001	F=5.15, p=.002	F=18.40, p<.001		F=48.09, p<.001	F=5.62, p=.001	F=39.98, p<.001

Note. Abbreviations as in Table 1.

ship between skeletal muscle percentage and multiple indicators of adiposity, suggesting that individuals with lower muscle mass tend to exhibit substantially greater fat accumulation. To further identify individuals exhibiting concurrent low muscle mass and high adiposity, participants were classified according to sex-specific quartile cut-offs. Low muscle mass was defined as WBMS% within the lowest quartile (Q1), whereas high adiposity was defined as PBF within the highest quartile (Q4; ≥42.8% in females and ≥32.0% in males). Participants exhibiting both characteristics were classified as having a high adiposity–low muscle (HALM) phenotype.

A total of 55 participants (16.6%) were identified as having the HALM phenotype. The prevalence was 17.2% (32/186) among females and 15.9% (23/145) among males. These findings indicate that approximately one in six older adults in the study population exhibited the coexistence of elevated adiposity and relatively low skeletal muscle percentage.

Pearson correlations were performed separately for females and males and the correlation coefficient (*r*) values are presented in Tables 4 and 5 in matrix form. The tables show that in both sexes, body fat percentage showed a strong negative correlation with skeletal muscle percentage. BMI showed strong positive correlations with PBF, VF% and WBSC%. Age demonstrated a modest positive relation with body fat percentage and a negative association with skeletal muscle percentage. These findings indicate that increasing adiposity is accompanied by relative muscle depletion.

Multiple linear regression analysis was conducted separately for females and males to evaluate whether skeletal muscle percentage and age independently predicted body fat percentage. The results are presented in Table 6.

Among females, the overall model was statistically significant (F=158.6, p<.001) and explained 63.4% of the variance in body fat percentage (adjusted R^2 = .63). Skeletal muscle percentage emerged as a strong negative predictor (β = -.838, p<.001), indicating that higher muscle percentage was associated with lower adiposity. Age also showed a modest but significant negative association (β = -.125, p =.011).

Among males, the model was also significant (F = 80.4, p<.001) and explained 53.1% of the variance (adj. R^2 = .52). Skeletal muscle percentage was a significant independent predictor (β = -.750, p<.001), whereas age did not show a significant independent effect (p = .322).

Table 4: Correlation coefficient (*r*) values of the study variables in female study participants

	Age (years)	Height (cm)	Weight (kg)	BMI (kg/m^2)	PBF	VF%	WBSC%	WBMS%
Age	1	-.11	-.09	-.06	.21**	.02	.09	-.40**
Height		1	.51**	.15*	-.18*	.07	.02	.59**
Weight			1	.93**	.40**	.86**	.78**	.12
BMI				1	.52**	.96**	.89**	-.10
PBF					1	.61**	.82**	-.79**
VF%						1	.90**	-.24**
WBSC%							1	-.48**

* $p < .05$, ** $p < .01$
Note. Abbreviations as in Table 1.

Table 5: Correlation coefficient (*r*) values of the study variables in male study participants

	Age (years)	Height (cm)	Weight (kg)	BMI (kg/m^2)	PBF	VF%	WBSC%	WBMS%
Age	1	-.16*	-.07	.01	.27**	.09	.18*	-.38**
Height		1	.54**	.05	-.29**	.01	-.22**	.58**
Weight			1	.87**	.26**	.82**	.37**	.07
BMI				1	.45**	.97**	.55**	-.23**
PBF					1	.44**	.89**	-.73**
VF%						1	.46**	-.26**
WBSC%							1	-.68**

* $p < .05$, ** $p < .01$
Note. Abbreviations as in Table 1.

Table 6: Multiple linear regression predicting total body fat percentage (PBF) with whole-body skeletal muscle percent (WBMS%) and age

Sex	Predictor	B	SE	β	t	p	Adj. R^2
Female	WBMS%	-1.944	0.113	-0.838	-17.188	<0.001	0.63
	Age	-0.103	0.040	-0.125	-2.569	0.011	
Male	WBMS%	-1.480	0.123	-0.750	-12.055	<0.001	0.52
	Age	-0.054	0.054	-0.062	-0.993	0.322	

* $p < .05$, ** $p < .01$
Note. Abbreviations as in Table 1.

It was observed that 7.5% of females and 10.3% of males have the combination of low muscle mass and high subcutaneous fat, indicating the phenotype of sarcopenic obesity among them.

4 Discussion

The principal finding of the present study is the strong inverse relationship between skeletal muscle percentage and adiposity indicators among older adults. Participants belonging to the lowest WBMS quartile consistently exhibited the highest levels of body fat percentage, visceral fat percentage, and subcutaneous fat percentage, whereas those in the highest muscle quartile showed the lowest adiposity levels. This pattern was evident in both females and males and demonstrates that reduced muscle mass is accompanied by increased fat accumulation in later life. These findings are consistent with recent evidence indicating that ageing is characterized by a progressive redistribution of body composition involving skeletal muscle loss and fat accumulation. Recent studies have highlighted that excess adiposity promotes chronic low-grade inflammation, insulin resistance and anabolic resistance, thereby accelerating muscle loss and contributing to the development of sarcopenic obesity-related phenotypes (Axelrod et al., 2023; How et al., 2025; Li et al., 2022).

The correlation and regression analyses further reinforced this relationship. Skeletal muscle percentage demonstrated strong inverse correlations with body fat percentage in both females ($r = -.79$) and males ($r = -.73$). Moreover, skeletal muscle percentage emerged as the strongest independent predictor of body fat percentage, explaining 63.4% of the variance among females and 53.1% among males. These findings suggest that muscle depletion is more closely associated with adiposity than chronological ageing itself. Similar observations have been reported in recent investigations demonstrating that muscle mass is a key determinant of metabolic health in older adults and may be a stronger predictor of adverse outcomes than BMI alone (How et al., 2025; Mainous et al., 2025). The findings therefore support growing recommendations that body composition assessment should include both adiposity and muscle-related measures rather than relying exclusively on BMI.

A notable finding of the present study is that 16.6% of participants exhibited a high adiposity–low muscle (HALM) phenotype, with similar prevalence among females (17.2%) and males (15.9%). Although the present study did not assess muscle strength or physical performance and therefore cannot establish a clinical diagnosis of sarcopenic obesity, the identified HALM phenotype reflects the coexistence of elevated adiposity and reduced skeletal muscle percentage. The observed prevalence falls within the range reported internationally for body composition profiles suggestive of sarcopenic obesity among community-dwelling older adults. Recent studies have reported prevalence estimates varying from approximately 5% to over 20%, depending on diagnostic criteria, ethnicity, and measurement techniques (Axelrod et al., 2023; Ji et al., 2022). Similarly, analyses from Indian populations have documented measurable burdens of sarcopenic obesity-related conditions among older adults, although prevalence estimates vary according to operational definitions (Pal et al., 2021; Verma et al., 2022).

Collectively, these findings suggest that a substantial proportion of older adults in southern West Bengal experience concurrent fat accumulation and muscle depletion. Given the established associations of such body composition patterns with frailty, impaired physical function, metabolic disorders and reduced quality of life, early identification through routine body composition assessment may facilitate targeted interventions focused on physical activity, resistance exercise, and nutritional optimization.

In the Indian context, such patterns underscore the importance of considering ageing within frameworks of nutritional transition and socio-cultural change. Such population-level evidence is essential not only for informing public health strategies, but also for advanced perspectives on human variability in ageing processes across diverse ecological and cultural contexts.

4.1 Limitation and future scopes

The study is cross-sectional in nature and the sample size was determined pragmatically, based on the feasibility of community-based data collection, and is comparable to that used in previous anthropological

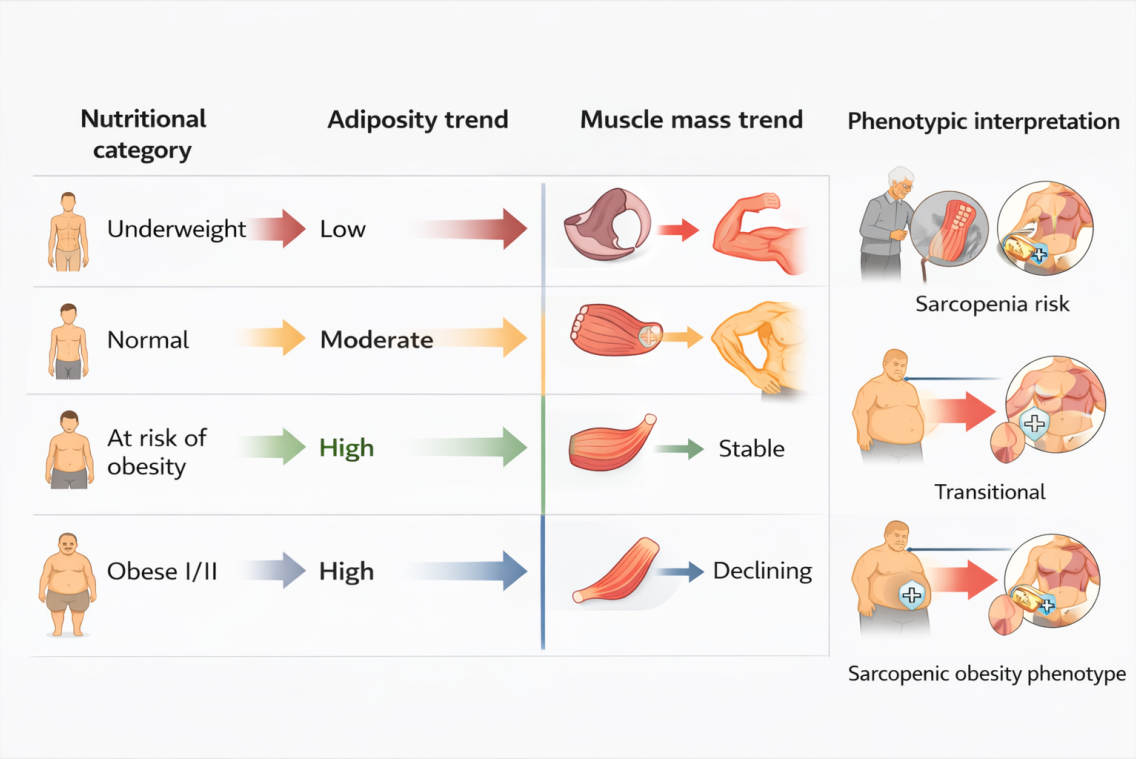

Figure 1: Conceptual representation of the High Adiposity–Low Muscle (HALM) phenotype suggestive of sarcopenic obesity among older adults

and population-based studies of body composition among older adults in India. Although the study was not designed to estimate prevalence, the sample is adequate for describing population-level patterns of body composition and phenotypic variation. Importantly, this work serves as a preliminary report on the presence of the sarcopenic obesity-like phenotype in the study population. Future longitudinal and analytical studies examining causal pathways, exposure-outcome relationships, and susceptibility factors may provide deeper insights into this condition.

4.2 Conclusion

The present study demonstrated a significant ($p<.05$) inverse relationship between skeletal muscle percentage and adiposity among older adults in southern West Bengal. Approximately 16.6% of participants exhibited a high adiposity–low muscle (HALM) phenotype, highlighting the importance of assessing body composition beyond BMI.

Acknowledgements

The authors acknowledge all participants for their support and cooperation during the study. Figure 1 was created using ChatGPT (openAI, USA).

Conflict of interest

None declared.

Funding

Nil.

References

Alam, I., Almajwal, A. M., Alam, W., Alam, I., Ullah, N., Abulmeaaty, M., Razak, S., Khan, S., Pawelec, G., & Paracha, P. I. (2019). The immune-nutrition interplay in aging–facts and controversies. *Nutrition and Healthy Aging*, *5*(2), 73–95. https://doi.org/10.3233/nha-170034

Arbeev, K. G., Ukraintseva, S. V., Akushevich, I., Kulminski, A. M., Arbeeva, L. S., Akushevich, L., Culminskaya, I. V., & Yashin, A. I. (2011). Age trajectories of physiological indices in relation to healthy life course. *Mechanisms of Ageing and Development*, *132*(3), 93–102. https://doi.org/10.1016/j.mad.2011.01.001

Atiea, J., Haboubi, N., Hudson, P., & Sastry, B. (1994). Body weight estimation of elderly patients by nomogram. *Journal of the American Geriatrics Society*, *42*(7), 763–765. https://doi.org/10.1111/j.1532-5415.1994.tb06538.x

Axelrod, C. L., Dantas, W. S., & Kirwan, J. P. (2023). Sarcopenic obesity: Emerging mechanisms and therapeutic potential. *Metabolism*, *146*, 155639. https://doi.org/10.1016/j.metabol.2023.155639

Banerjee, N., Biswas, P., Chatterjee, S., Santra, T., Chatterjee, S., & Mukherjee, S. (2021). Impact of Bharatnatyam dancing on obesity and diabetes risk status: A study in Bengalee female human resources engaged in sedentary occupations. In M. Muzammil, A. A. Khan, & F. Hasan (Eds.), *Ergonomics for Improved Productivity* (pp. 921–929). Springer Nature.

Banerjee, N., Chatterjee, S., Chatterjee, S., Bhattacherjee, S., De, S., & Mukherjee, S. (2021). Relation between occupational sitting duration and central obesity? A study in Bengalee female human resources engaged in sedentary occupation. In M. Muzammil, A. A. Khan, & F. Hasan (Eds.), *Ergonomics for Improved Productivity* (pp. 911–920). Springer Nature.

Banerjee, N., Santra, T., Bardhan, S., De, S., & Mukherjee, S. (2022). Impact of practicing Bharatnatyam dancing on obesity status in terms of adiposity indices in human resources engaged in white collar jobs: A study in Bangalee females. In *Ergonomics for Design and Innovation* (pp. 1521–1529). Springer International Publishing. https://doi.org/10.1007/978-3-030-94277-9_130

Bardhan, S., Mondal, S., & Mukherjee, S. (2024). Dietary intake and risk of diabetes: A study in Bengalee young adult females. *Brazilian Journal of Development*, *10*(6), e70489.

Bardhan, S., Saha, S., Mondal, S., Chatterjee, S., Banerjee, N., & Mukherjee, S. (2024). Assessment of T2DM onset risk: A study in Bengalee young adult females. *Science and Culture*, *90*(9–10), 399–404.

Bardhan, S., Saha, S., Mondal, S., Das, A., Banerjee, N., & Mukherjee, S. (2024). Comparison between procedures for assessment of physical activity that reduces risk of T2DM: A study in Bengalee young adult females in southern region of West Bengal, India. *African Journal of Biological Sciences*, *6*(13), 2519–2527.

Crews, D. E. (1993). Biological anthropology and human aging: Some current directions in aging research. *Annual Review of Anthropology*, *22*(1), 395–423. https://doi.org/10.1146/annurev.an.22.100193.002143

Dey, D., Rothenberg, E., Sundh, V., Bosaeus, I., & Steen, B. (1999). Height and body weight in the elderly. I. a 25-year longitudinal study of a population aged 70 to 95 years. *European Journal of Clinical Nutrition*, *53*(12), 905–914. https://doi.org/10.1038/sj.ejcn.1600852

Dey, M., Mondal, S., Banerjee, S., Banerjee, N., & Mukherjee, S. (2025). Evaluation of growth status among the children aged 1 to 5 years using various anthropometric indices. *Goya*, *13*(8), 43–54. https://doi.org/10.18203/2394-6040.ijcmph20262728

Guo, J., Huang, X., Dou, L., Yan, M., Shen, T., Tang, W., & Li, J. (2022). Aging and aging-related diseases: From molecular mechanisms to interventions and treatments. *Signal Transduction and Targeted Therapy*, *7*(1), 391. https://doi.org/10.1038/s41392-022-01251-0

How, L. A., Lee, X. X., Lee Hui-En, S. A., Teo, Y. H., Goh, K. C., & Tan, L. F. (2025). The impact of sarcopenic obesity on frailty, cognition, and function in community-dwelling older adults. *Journal of Frailty, Sarcopenia and Falls*, *10*(3), 150. https://doi.org/10.22540/jfsf-10-150

Ji, T., Li, Y., & Ma, L. (2022). Sarcopenic obesity: An emerging public health problem. *Aging and Disease*, *13*(2), 379. https://doi.org/10.14336/ad.2021.1120-1

Kandapan, B., Pradhan, I., & Pradhan, J. (2023). Food insecurity and malnutrition among Indian older adults: Findings from longitudinal ageing study in India, 2017-18. *Journal of Population Ageing*, *16*(3), 639–659. https://doi.org/10.1007/s12062-022-09378-2

Larsson, L., Degens, H., Li, M., Salviati, L., Lee, Y. i., Thompson, W., Kirkland, J. L., & Sandri, M. (2018). Sarcopenia: Aging-related loss of muscle mass and function. *Physiological Reviews*, *99*(1), 427–511. https://doi.org/10.1152/physrev.00061.2017

Li, C.-w., Yu, K., Shyh-Chang, N., Jiang, Z., Liu, T., Ma, S., Luo, L., Guang, L., Liang, K., Ma, W., Miao, H., Cao, W., Liu, R., Jiang, L.-j., Yu, S.-l., Li, C., Liu, H.-j., Xu, L.-y., Liu, R.-j., . . . Liu, G.-s. (2022). Pathogenesis of sarcopenia and the relationship with fat mass: Descriptive review. *Journal of Cachexia, Sarcopenia and Muscle*, *13*(2), 781–794. https://doi.org/10.1002/jcsm.12901

Mainous, A. G., Yin, L., Wu, V., Sharma, P., Jenkins, B. M., Saguil, A. A., Nelson, D. S., & Orlando, F. A. (2025). Body mass index vs body fat percentage as a predictor of mortality in adults aged 20-49 years. *Annals of Family Medicine*, *23*(4), 337–343. https://doi.org/10.1370/afm.240330

Majumder, S., Roy, S., Bose, A., & Chowdhury, I. R. (2023). Understanding regional disparities in healthcare quality and accessibility in West Bengal, India: A multivariate analysis. *Regional Science Policy & Practice*, *15*(5), 1086–1114. https://doi.org/10.1111/rsp3.12607

Mondal, S., Banerjee, S., & Mukherjee, S. (2025). Handgrip strength cut off value estimation in Indian older adults using LASI-1 dataset. *Indian Journal of Physiology and Pharmacology*, *69*(2), 171–176.

Mondal, S., Banerjee, S., Parvin, N., Dey, M., Saha, S., & Mukherjee, S. (2025). Screening of cognitive status in older adults and cluster analysis with the health variables. *Indian Journal of Gerontology*, *39*(4), 589–604.

Mondal, S., Bardhan, S., Chatterjee, S., Chatterjee, S., Banerjee, N., & Mukherjee, S. (2024). Relationship between body balance and nutritional status in Indian elderly. *Indian Journal of Gerontology*, *38*(3), 384–394.

Mondal, S., Chakraborty, E., Banerjee, S., Banerjee, N., & Mukherjee, S. (2025). Deciphering body composition by techniques of anthropometry and bioelectrical impedance analysis: A study in community-dwelling older adults of West Bengal. *Goya*, *18*(1), 76–86.

Mondal, S., Chakraborty, E., Chatterjee, S., Banerjee, N., & Mukherjee, S. (2025). Assessment of the nutritional status by anthropometry and MNA-SF: A study in Bengalee elderly. *Science and Culture*, *91*(3–4), 264–268.

Mondal, S., Chakraborty, E., Saha, S., Bhattacharya, B., & Mukherjee, S. (2024). Visceral fat related with the indicators of increased metabolic complications and comorbidities: A study in Bengali elderly. *Indian Journal of Gerontology*, *38*(4), 395–406.

Mukhopadhyay, S., Bardhan, S., Mondal, S., Saha, S., Banerjee, S., Banerjee, N., et al. (2025). Pattern of protein consumption of animal and plant origins – possible implications: A study in Bengali young adult educated urban females. *Science and Culture*, *91*(5–6), 318–325. https://doi.org/10.36094/sc.v91.2025.pattern_of_protein_consumption_of_animal.mukhopadhyay.318

Murawiak, M., Krzymińska-Siemaszko, R., Kaluźniak-Szymanowska, A., Lewandowicz, M., Tobis, S., Wieczorowska-Tobis, K., & Deskur-Śmielecka, E. (2022). Sarcopenia, obesity, sarcopenic obesity and risk of poor nutritional status in Polish community-dwelling older people aged 60 years and over. *Nutrients*, *14*(14), 2889. https://doi.org/10.3390/nu14142889

Pal, R., Bhadada, S. K., Aggarwal, A., & Singh, T. (2021). The prevalence of sarcopenic obesity in community-dwelling healthy Indian adults–the Sarcopenic Obesity-Chandigarh Urban Bone Epidemiological Study (SO-CUBES). *Osteoporosis and Sarcopenia*, *7*(1), 24–29. https://doi.org/10.1016/j.afos.2020.12.003

Palmer, A. K., & Jensen, M. D. (2022). Metabolic changes in aging humans: Current evidence and therapeutic strategies. *Journal of Clinical Investigation*, *132*(16), e158451. https://doi.org/10.1172/jci158451

Popkin, B. M., & Slining, M. M. (2013). New dynamics in global obesity facing low- and middle-income countries. *Obesity Reviews*, *14*(S2), 11–20. https://doi.org/10.1111/obr.12102

Rodriguez-Rodero, S., Fernandez-Morera, J. L., Menendez-Torre, E., Calvanese, V., Fernandez, A. F., & Fraga, M. F. (2011). Aging genetics and aging. *Aging Dis. 2*(3), 186–195.

Roh, E., & Choi, K. M. (2020). Health consequences of sarcopenic obesity: A narrative review. *Frontiers in Endocrinology*, *11*, 332. https://doi.org/10.3389/fendo.2020.00332

Roubenoff, R., Baumgartner, R. N., Harris, T. B., Dallal, G. E., Hannan, M. T., Economos, C. D., Stauber, P. M., Wilson, P. W., & Kiel, D. P. (1997). Application of bioelectrical impedance analysis to elderly populations. *Journals of Gerontology Series A: Biological Sciences and Medical Sciences*, *52A*(3), M129–M136. https://doi.org/10.1093/gerona/52a.3.m129

Saha, S., Bardhan, S., Mondal, S., Saha, B., Das, A., & Mukherjee, S. (2024). Contribution of institutional mid-day meal towards RDA accomplishment: A study in Bengali boys of age range 10-12 y in West Bengal, India. *African Journal of Biological Sciences*, *6*(15), 7627–7640.

Song, S., Zhang, L., Du, H., Zhang, Y., Jiang, Y., Li, D., Hu, Y., Chen, S., Zhu, H., Shan, G., & Pan, H. (2025). Impact of early life famine exposure on body composition and metabolic profiles in adulthood. *Maternal & Child Nutrition*, *21*(2), e13777. https://doi.org/10.1111/mcn.13777

St-Onge, M. P., & Gallagher, D. (2010). Body composition changes with aging: The cause or the result of alterations in metabolic rate and macronutrient oxidation? *Nutrition*, *26*(2), 152–155.

Tieland, M., Trouwborst, I., & Clark, B. C. (2018). Skeletal muscle performance and ageing. *Journal of Cachexia, Sarcopenia and Muscle*, *9*(1), 3–19. https://doi.org/10.1002/jcsm.12238

Verma, M., Kapoor, N., Chaudhary, A., Sharma, P., Ghosh, N., Sidana, S., Kakkar, R., & Kalra, S. (2022). Prevalence and determinants of sarcopenic obesity in older adults: Secondary data analysis of the Longitudinal Ageing Study in India (LASI) wave 1 survey (2017–18). *Advances in Therapy*, *39*(9), 4094–4113. https://doi.org/10.1007/s12325-022-02216-z

Weber, D. R., Moore, R. H., Leonard, M. B., & Zemel, B. S. (2013). Fat and lean BMI reference curves in children and adolescents and their utility in identifying excess adiposity compared with BMI and percentage body fat. *American Journal of Clinical Nutrition*, *98*(1), 49–56. https://doi.org/10.3945/ajcn.112.053611

Yu, S., Appleton, S., Adams, R., Chapman, I., Wittert, G., Visvanathan, T., & Visvanathan, R. (2014). The impact of low muscle mass definition on the prevalence of sarcopenia in older Australians. *BioMed Research International*, *2014*, 361790. https://doi.org/10.1155/2014/361790

Zamboni, M., Mazzali, G., Fantin, F., Rossi, A., & Di Francesco, V. (2008). Sarcopenic obesity: A new category of obesity in the elderly. *Nutrition, Metabolism and Cardiovascular Diseases*, *18*(5), 388–395. https://doi.org/10.1016/j.numecd.2007.10.002

MANKIND QUARTERLY Mankind Quarterly, 67(1), 135-144 2026 Fall Edition
ISSN: 0025-2344

Critiquing the Default Hypothesis: The Importance of Group Identity

Curtis S. Dunkel[†*]

Abstract

The hypothesis that group identity is important in predicting Jewish positive ethnocentrism was tested using survey data from the United States. While intermarriage also predicted positive ethnocentrism, a relative weight analysis showed that the effect of group identity was much stronger. A model in which group identity mediated the relationship between antisemitism threat and positive ethnocentrism was also supported, although the direct effect of antisemitism threat remained significant. Political orientation was also examined with group identity and positive ethnocentrism being associated with conservativism and antisemitism threat and intermarriage associated with liberalism. The results are discussed in relation to the Default and Group Evolutionary Strategy hypotheses.

Keywords: Group identity, Positive ethnocentrism, Antisemitism, Political orientation

1 Introduction

In the article *Still No Evidence for a Jewish Group Evolutionary Strategy,* Cofnas (2023) reiterates support for his so-called "default hypothesis" (DH) contrasting it with MacDonald's "Group Evolutionary Strategy" (GES) hypothesis (Dutton, 2019b; MacDonald, 1994, MacDonald, 1998). In the current investigation two of Cofnas' arguments are challenged. First, to refute GES, Cofnas (2018); Cofnas (2019); Cofnas (2023) states that Jews do not have greater in-group favoritism than Gentiles as solely evidenced by Jews' decreasing endogamy or high rates of interreligious marriage. In this study (also see Dutton (2019a)) it is argued that intermarriage should not be the lone factor considered when assessing religio- or ethno-centrism. Not all marriages are equal. Dutton (2019a) found that Jew-Gentile marriages are more likely to be second marriages — when reproductive capacity is reduced or has ceased. Additionally, these interrelgious marriages are twice as likely to dissovle as endogamous Jewish marriages. In the current study it is argued that social or group identity plays an additional, if not larger, role than intermarriage in determining in-group favoritism.

Second, Cofnas' hypothesis states because Jews are highly intelligent (with a noted verbal tilt) and reside in urban centers they will often be at the vanguard of political, intellectual, and social movements. A caveat being that Jews will shy away from movements that are explicitly antisemitic. This is used to explain Jews' overrepresentation in progressivism. Thus, to the degree that factors other than intelligence and urban residence account for Jewish political orientation, Cofnas is incorrect in his assessment. As with in-group favoritism, it is hypothesized that group identity is a significant factor in Jews' being left-wing.

† Independent Researcher
* Corresponding author, email: curtdunkel@protonmail.com

2 Evidence for Jewish in-group favoritism and reconciliation with intermarriage

C. S. Dunkel and Dutton (2016) constructed a scale of in-group favoritism from items (sample item: How much do you prefer to be with other people who are the same religion as you?) in a large nationally representative U.S. sample. They found that that except for the Baptists, Jews scored higher on the scale of in-group favoritism than members of Christian denominations (e.g., Methodists), despite being less religious. These results were replicated in another large sample with Jews and Baptists scoring higher than Catholics and Lutherans on a similarly constructed scale of in-group favoritism and Jews also exhibiting low levels of religiosity (C. S. Dunkel, 2019). Additionally, when asked how important various identities were, Jews were found to place more importance on ethnic identity than Baptists, Catholics, and Lutherans and more importance on political identity than Lutherans. Despite the replicated findings of high Jewish in-group favoritism, Cofnas (2023) ignored the results in his review of Jewish ethnocentrism even after being confronted about the omission (C. Dunkel, 2022).

This is not to deny Cofnas' assertion of high intermarriage among Jews, albeit with the caveats described by Dutton (2019a), but this needs to be reconciled with the findings of higher in-group favoritism described in the preceding paragraph. It is posited that these two seemingly contradictory findings can be explained by simply thinking about the level at which each occurs. At the level of the individual and in the context of long-term relationships (Li et al., 2002), fitness is maximized by securing a mate with the highest mate value (i.e., high status, physically attractive, intelligent, kind) even if that partner is of a different religious or ethnic group. Note as well that the financial and social success of Jews increases their mate value, widening the pool of potential long-term mates, making intermarriage to an individual from the larger Gentile population more attractive. However, at the small cost of hypocrisy, simultaneously advocating and supporting in-group cohesion would further advance one's fitness. This may be an example of antagonistic multilevel selection, but it is not necessary to rely upon a group selection dynamic. That is, the benefits of in-group favoritism may directly aid the group, but benefits to the individual should also indirectly accrue as the returns of group success are allocated to individuals (e.g, patronage). Soldiers and warriors may benefit the tribe by helping secure additional lands and resourses, but may also gain advantage indivdiually by mating with the defeated rival's females. Likewise, negative outcomes may accrue for the individual if the group is diminished in status or is threatened.

3 The source of Jewish in-group favoritism

While Cofnas frames the issue of Jewish ethnocentrism as the default hypothesis (DH) versus group evolutionary strategy (GES), there is not a dialectic, and the current study is not an attempt at synthesis. Disagreement with tenets of the DH are not signals of agreement with GES. GES is premised on ultimate causes specific to high Jewish in-group favoritism. In the current analysis generalized (i.e., not specific to Jews) and proximate causes associated with in-group favoritism are explored. Specifically, the precepts of social identity theory (e.g., R. Brown, 2000) are used to explore an aspect of Jewish in-group favoritism. In his response to Cofnas, Dutton (2019b) distinguishes between positive and negative ethnocentrism. Positive ethnocentrism is behaviours or attitudes that benefit the in-group. Negative ethnocentrism is behaviors or attitudes that disadvantage outgroups. In the current study, only positive ethnocentrism is examined.

Humans readily adopt group membership and show preference for their group based on the smallest of, even arbitrary, boundaries (i.e., Tajfel et al., 1971). Furthermore, group membership becomes woven into individuals' self-concept and consequently self/group favoritism emerges. What is good for the group becomes good for the individual. For example, self-esteem is positively associated with group identification and in-group biases (Aberson et al., 2000). Consistent with these findings and proposed ideas, Weisskirch et al. (2016) found group identity in Jews was positively correlated with self-esteem; and L. M. Brown et al. (2003) found positive associations between Jewish identity and collective self-esteem and collectivism.

A central finding of social identity theory is that group identification strongly influences partiality toward the in-group (Perreault and Bourhis, 1998; Spadaro et al. (2024)). The effect of group identification

on in-group bias may be especially pronounced in minorities (Leonardelli and Brewer, 2001) like Jews (L. M. Brown et al., 2003). The largest intranational number of Jews lives in the United States where they are estimated to be between 2 – 3% of the population. Additionally, competition for resources or threats to the group should act to increase group identification and cohesion (e.g., R. Brown, 2000). Given the history of pogroms against Jews and the genocide of the Holocaust, Jews may be especially attuned to group threats. Indeed, over three quarters of Jews (76%) report remembering the Holocaust is an essential part of being Jewish. In fact, of the list of possible options (e.g., following Jewish religious law) supplied by the Pew Research Center in a survey of Jewish Americans, Holocaust remembrance was endorsed more often than any of the other possibilities (https://www.pewresearch.org/religion/2021/05/11/jewish-americans-in-2020/). This result has held for several decades (Herman, 1988). These survey results point toward not just the importance for Jews of remembering the Holocaust, but also the importance of vigilance lest it happen again.

This leads to the general hypothesis that perceived threats, in the form of antisemitism, will account for variance in group identity and positive ethnocentrism beyond that accounted for by intermarriage. Consistent with the ideas outlined in the introduction, a mediation model is proposed (see Figure 1) in which group identity mediates the association between antisemitic threats and positive ethnocentrism. Because the dynamics are thought to be independent of those of intermarriage, intermarriage is controlled for in the mediation model.

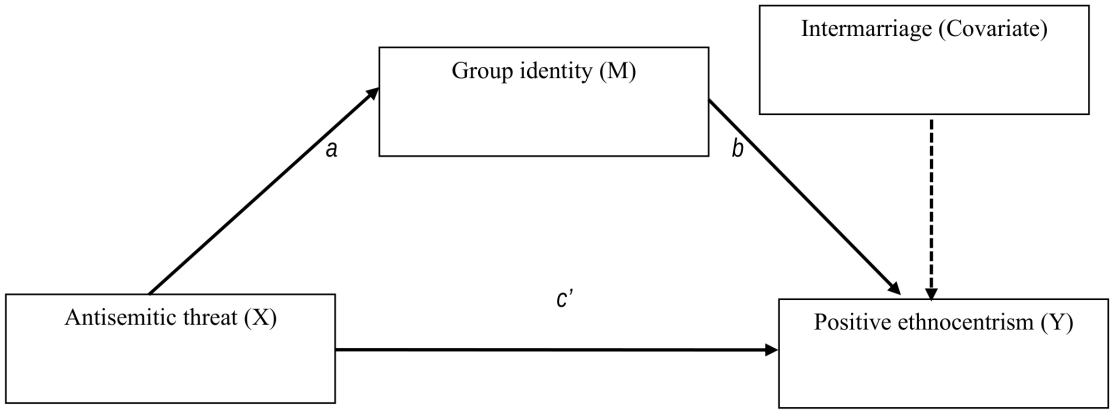

Figure 1: Mediation model predicting positive ethnocentrism.

4 Group identity and Jewish progressivism

C. S. Dunkel (2020) used aspects of DH and GES as predictors to try and explain Jewish progressivism. Indeed, Jews were found to be significantly more left-wing than Christian religious groups. However, the DH variables of urbanization and intelligence were not significant predictors of this difference. Likewise, the GES variable of in-group favoritism also supported the null hypothesis.

Given that Jews weight politics as especially important in their identity (C. S. Dunkel, 2019), and reasoning that group identity plays a significant role in Jewish attitudes and behavior, the role of Jewish group identity on political orientation is also explored. Specifically, it is predicted that Jewish group identity will be positively associated with a liberal political orientation. The possible roles of intermarriage and positive ethnocentrism are also tested although it is expected that the previous null findings will be replicated.

5 Method

5.1 Participants and data set

Data from the Pew survey *Jewish Americans in 2020* (https://www.pewresearch.org/religion/2021/05/11/jewish-americans-in-2020/) was used in the analyses. The national sample was administered the survey online and by mail from Nov. 19, 2019, to June 3, 2020. The extended dataset consisted of 5,881 respondents. Further culling was necessary as the sample included individuals who either had a Jewish parent or were raised Jewish but no longer consider themselves to be Jewish and individuals who had some sort of affinity to Judaism (e.g., married to a Jewish partner), but were not Jewish. The final sample included individuals who said their present religion was Jewish or individuals who indicated that they have no religion but consider themselves Jewish and have a Jewish parent or were raised Jewish. The final sample included 4,718 participants (2,406 = male, 2,283 = female, 29 = no answer).

5.2 Measures[1]

Group identity

Group identity was measured using a sum of five items. The first item was, “How important is being Jewish in your life?” with responses anchored at 1 = not at all important and 4 = very important. The second item was, “How much, if at all, do you feel a sense of belonging to the Jewish people?” anchored at 1 = not at all and 4 = a great deal. The third item was, “How many of your close friends are Jewish?” with responses anchored at 1 = none of them and 5 = all of them. The fourth item was, “Regardless of whether you have any grandchildren right now, imagine for a moment that you do have grandchildren. How important would it be to you that your grandchildren are Jewish?” with responses anchored at 1 = not at all important and 4 = very important. The fifth item was, “Regardless of whether you have any grandchildren right now, imagine for a moment that you do have grandchildren. How important would it be to you that your grandchildren marry someone who is Jewish?” with responses anchored at 1 = not at all important and 4 = very important. To create the scale the items were standardized (i.e., converted to *z*-scores) and summed. The internal consistency was α = .87.

Intermarriage

Participants who were married or living with a partner were asked, “Did your spouse or partner have a Jewish parent or was your spouse or partner raised Jewish?” Responses were 1 = yes and 2 = no.

Positive ethnocentrism

Positive ethnocentrism was measured using three items. The first item was, “How much responsibility, if any, do you feel you have to help fellow Jews in need around the world?” with responses anchored at 1 = not at all and 4 = a great deal. The second item was, “In the past 12 months, did you make a financial donation to any Jewish charity or cause, such as a synagogue, Jewish school or a group supporting Israel?” with responses 1 = no and 2 = yes. The third item was, “How emotionally attached are you to Israel?” with responses anchored at 1 = not at all attached and 4 = very attached. To create the scale, the items were standardized (i.e., converted to z-scores) and summed. The internal consistency was α = .74.

Antisemitic threat

Three sections of the PEW survey were separately totaled and then summed to create a measure of antisemitic threat. In the first section participants responded “yes” or “no” in reference to six separate

[1] When appropriate responses were reverse coded from the original scale for clarity so that higher values represent greater agreement.

antisemitic occurrences (e.g., Have you been physically threatened or attacked because of your Jewish background?). The number of affirmative responses across these six occurrences was tallied.

The second section included three items that reference hearing or reading the following: (1) Jews care too much about money; (2) The Holocaust did not happen or its severity has been exaggerated; (3) American Jews care more about Israel than about the United States. Each item was rated using a three-point Likert type scale anchored at 1 = Have not heard someone say this and 3 = Have heard someone say this in my presence. Responses for the three items were summed.

The third section contained three items referring to the overall level of antisemitism in the country. The first item was, "Now thinking about the country as a whole, how much anti-Semitism do you think there is in the United States today?" with the four-point Likert-type scale anchored at 1 = None at all and 4 = A lot. The second item was, "And compared with five years ago, do you think there is. . . " Responses on the three-point scale were anchored at 1 = Less anti-Semitism in the U.S. today and 3 = More anti-Semitism in the U.S. today. The third item was, "As a Jewish person in the United States, do you personally feel. . . " Responses on the three-point scale were anchored at 1 = More safe today than five years ago to 3 = Less safe today than five years ago. Responses to the three items were standardized and summed. All three section scores were then standardized and summed (α = .52).

Political orientation

Political orientation was measured using two items. The first item was: "In general, would you describe your political views as..." Responses were recorded using a five-point scale anchored at 1 = very conservative and 5 = very liberal. The second item was a dichotomous variable signifying the participant's preferred political party. Based on participant responses to other questions concerning the participant's preferred political party, Pew categorized participants as either 1 = Republican/lean Republican or 2 = Democrat/lean Democrat. The two items were standardized and summed. The correlation between the items was r = .66.

6 Results

6.1 Positive ethnocentrism

The correlations between the study variables can be seen in Table 1. Group identity, positive ethnocentrism, and antisemitism threat were all positively correlated. Intermarriage was negatively correlated with group identity, positive ethnocentrism, and antisemitism threat. It was positively correlated with liberal political orientation. To further examine the key relationship between intermarriage and positive ethnocentrism, intermarriage was kept as a dichotomous variable and a t-test was run, $t(1987.84) = 25.55$, $p < .001$, Cohen's d = .99. The results shows that Jews who marry non-Jews are much less ethnocentric.

Table 1: Bivariate correlations [and 95% confidence intervals] between study variables, n = 2,969 – 4,454. Intermarriage is a dichotomous variable. All correlations are statistically significant at $p < .001$.

Measures	1	2	3	4
1. Group identity				
2. Intermarriage	-.54 [-.52, -.57]			
3. Positive ethnocentrism	.75 [.74, .77]	-.44 [-.46, -.41]		
4. Antisemitism threat	.25 [.23, .28]	-.11 [-.14, -.07]	.28 [.25, .31]	
5. Political orientation	-.32 [-.34, -.29]	.21 [.18, .25]	-.30 [-.32, -.27]	.07 [.04, .10]

To test the hypothesized roles of intermarriage and group identity on positive ethnocentrism, first positive ethnocentrism was regressed on intermarriage and group identity. Both intermarriage (β = -.03, $p <$ .05) and group identity (β = .74, $p < .001$) were significant predictors with a total variance explained of R^2 = .58. Next relative weight analysis (Johnson, 2000) was performed. Relative weight analysis assesses the

unique contribution of each predictor to the total variance explained (i.e., the R^2 = .58). The online tool at https://www.scotttonidandel.com/rwa-web was used for the analysis (Tonidandel & LeBreton, 2015). The results of the relative weight analysis showed that group identity accounted for 83.54% and intermarriage 16.46% of the total variance.

Next, the PROCESS macro for SPSS (Hayes, 2012) was used to test for mediation and following the recommendations of Zhao et al. (2010) the output from the bootstrap test for the indirect effect was used to determine significance. In PROCESS the number of bootstrap samples was kept at the default of 5,000, the confidence intervals were kept at 95%, and the mediation model was set to the specified model (i.e., model 4).

In the model shown in Figure 1, group identity mediates the relationship between antisemitic threat and positive ethnocentrism. Following instructions from Zhao et al. (2010) the indirect path with confidence intervals ($a \times b$) along with the unstandardized regression coefficients from predictor to the mediator (*a*), from the mediator to the outcome (*b*), and the direct path from the predictor to the outcome (*c'*) along with a significance test are reported in Table 2. As seen in Table 2, both the indirect and direct paths were significant[2]

Table 2: Mediation analysis predicting in-group favoritism

Variable	$a \times b$	95% CI	*a*	*b*	*c'*
Positive ethnocentrism	.16	.13, .18	.35	.45	.09, $p < .001$

Note. CI = Confidence interval.

6.2 Political orientation

The results of the correlations, as seen in Table 1, show that group identity and positive ethnocentrism were negatively associated with leftist political orientation, the opposite of the hypothesized direction. Intermarriage and antisemitism threat were positively correlated with leftist political orientation. While a hypothesis concerning antisemitism threat was not advanced, it is included in the subsequent analysis.

Political orientation was regressed on group identity, positive ethnocentrism, intermarriage, and antisemitism threat. The total variance explained was R^2 = .15 with the following regression weights for the predictors: group identity (β = -.23, $p < .001$); intermarriage (β = .03, p = .20); positive ethnocentrism (β = -.18, $p < .001$); antisemitism threat (β = .17, $p < .001$). Thus all of the variables, sans intermarriage, were significant predictors of leftist political orientation.

The results of the relative weight analysis showed that each variable accounted for the following percent of the total R^2: group identity (39.38%); intermarriage (12.74%); positive ethnocentrism (35.39%); antisemitism threat (12.49%). In contrast to the regression weights, the relative weight analysis suggests that intermarriage may be worth considering when accounting for Jewish political orientation.

7 Discussion

The overarching goal of the study was to bring data to bear on the debate concerning Jewish ethnocentrism. A model is proposed that is at odds with aspects of both DH and GES. For example, it is proposed that the DH's use of intermarriage as the indicator of ethnocentrism is severe construct underrepresentation. Relying on foundational findings of evolutionary and social psychology, it was proposed that group identity is an additional and more important variable. Further reasoning based on the findings on social identity, it was proposed that a perceived threat, in the form of antisemitism, would act to further increase ethnocentrism. Because DH and GES largely deal with the political ramifications of Jewish ethnocentrism, political orientation was also explored. It was hypothesized that group identity would be associated with a liberal

[2]Using the steps outlined by Baron and Kenny (1986) also indicated partial mediation.

political orientation, while null results were predicted for intermarriage and ethnocentrism. No hypothesis was advanced for antisemitic threat, but because it was found to be significantly correlated its relation to political orientation was explored as well.

In support of DH there was a significant negative relationship between intermarriage and positive ethnocentrism, with Jews whose partners were not Jewish scoring lower. However, group identity had a stronger association as indicated by the results of regression and relative weight analyses. Also consistent with hypotheses, there was support for a proposed model in which group identity mediated the effect of antisemitism threat on positive ethnocentrism. However, unexpectedly the direct effect from antisemitism threat to positive ethnocentrism remained significant (see proposed explanation for the direct effect in the subsequent paragraph).

It was predicted that group identity would be positively associated with a liberal political orientation, but the opposite relationship was found. Group identity was positively associated with a *conservative* political orientation, as was positive ethnocentrism. Intermarriage and antisemetism threat were positively associated with a liberal orientation.This pattern of associations remained in regression and relative weight analyses, with the exception of intermarriage in the regression analysis. These results are interpreted as running counter to those predicted by GES as heightened Jewish ethnocentrism is expected to manifest in progressive social movements detrimental to the majority population. Indeed, in retrospect it is well established that more conservative (e.g., orthodox) Jewish groups are more likely to vote for Republicans. Their values may be more similar to those of other conservatives (e.g., importance of religious freedom), or they may believe they have more influence within the Republican party.

The antisemitism threat-liberal political orientation relationship was small in effect, but intriguing given the result runs in the opposite direction of the relationships found with the other variables. It is speculated that the association may be a function of the awareness or sensitivity of liberals toward incidences of sexism, racism, and antisemitism (Rios et al., 2024). Or, as analyzed/advised by Lewin (Lewin, 1997), Jews should strategically align with other minority groups to advance their interests. This dynamic may be enhanced under threat (perceived or real).

8 Conclusions and limitations

Along with Dutton (2019a), the results of the current study further disconfirm the foundational position of DH that intermarriage is the sine qua non for gauging Jewish ethnocentrism. As such the results indirectly support, as intermarriage can't be used to refute other findings, the position that Jews have a greater degree of ethnocentrism than Gentiles. This does mean that support for GES is gained. In contrast to GES, Jewish ethnocentrism is explained by group dynamics applicable to any ethnic or religious group. The results are specific to Jews only in the sense that they behave within a specific historical and sociological context. There is no need to postulate an evolved genetic predisposition, although the results do not preculde such a dynamic. The results and impetus for Jewish group identity and positive ethnocentrism seem very much in line with Lewin (1997)'s description/prescription in *Bringing up the Jewish Child*:

> *He will see that the main criterion of belongingness is* interdependence of fate*. Young American Jews may abhor Jewish national mysticism, they may not be willing to suffer for cultural or religious values which they do not fully understand, or perhaps even dislike, but they must be sufficiently fact-minded to see clearly their interdependence of fate with the rest of the American Jews and indeed with the Jews all over the world. (p.184).*

Future research could address several of the study's limitations. For in-group favoritism, only one side of the coin, positive ethnocentrism was examined. Negative ethnocentrism could be examined as well. Given the mixed findings for political orientation, it may be important to explore differences between branches of Judaism and/or opinions on individual political issues. Lastly, the study is correlational meaning that causation and even the direction of influence is indeterminable. For example, while the hypothesized model suggests antisemitism threat and group identity play a role in positive ethnocentrism, it is quite likely that positive ethnocentrism also acts upon antisemitism threat and group identity.

Funding

No funds, grants, or other support were received during the preparation of this manuscript.

Conflict of interest

There are no relevant financial or non-financial interests to disclose.

Data sources

The study was conducted using publicly available data.

References

Aberson, C. L., Healy, M., & Romero, V. (2000). Ingroup bias and self-esteem: A meta-analysis. *Personality and Social Psychology Review*, *4*(2), 157–173. https://doi.org/10.1207/s15327957pspr0402_04

Baron, R. M., & Kenny, D. A. (1986). The moderator–mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations. *Journal of Personality and Social Psychology*, *51*(6), 1173–1182. https://doi.org/10.1037/0022-3514.51.6.1173

Brown, L. M., McNatt, P. S., & Cooper, G. D. (2003). Ingroup romantic preferences among Jewish and non-Jewish White undergraduates. *International Journal of Intercultural Relations*, *27*(3), 335–354. https://doi.org/10.1016/s0147-1767(03)00015-4

Brown, R. (2000). Social identity theory: Past achievements, current problems and future challenges. *European Journal of Social Psychology*, *30*(6), 745–778. https://doi.org/10.1002/1099-0992(200011/12)30:6<745::AID-EJSP24>3.0.CO;2-O

Cofnas, N. (2018). Judaism as a group evolutionary strategy: A critical analysis of Kevin MacDonald's theory. *Human Nature*, *29*(2), 134–156. https://doi.org/10.1007/s12110-018-9310-x

Cofnas, N. (2019). Is Kevin MacDonald's theory of Judaism "plausible"? A response to Dutton (2018). *Evolutionary Psychological Science*, *5*(1), 143–150. https://doi.org/10.1007/s40806-018-0162-8

Cofnas, N. (2023). Still no evidence for a Jewish group evolutionary strategy. *Evolutionary Psychological Science*, *9*(2), 236–259. https://doi.org/10.1007/s40806-022-00352-x

Dunkel, C. (2022). A response to Cofnas' the anti-Jewish narrative. *OpenPsych*. https://doi.org/10.26775/op.2022.08.05

Dunkel, C. S. (2019). Religious in-group preference: A replication and extension into the domain of identity. *Mankind Quarterly*, *59*(4), 509–520. https://doi.org/10.46469/mq.2019.59.4.4

Dunkel, C. S. (2020). An empirical test of the competing Cofnas and MacDonald hypotheses on religious and political orientation. *Mankind Quarterly*, *61*(1), 47–55. https://doi.org/10.46469/mq.2020.61.1.5

Dunkel, C. S., & Dutton, E. (2016). Religiosity as a predictor of in-group favoritism within and between religious groups. *Personality and Individual Differences*, *98*, 311–314. https://doi.org/10.1016/j.paid.2016.04.063

Dutton, E. (2019a). Can you marry a foreigner yet still be ethnocentric? A response to Cofnas' criticisms of Kevin MacDonald's *Culture of Critique*. *Mankind Quarterly*, *59*(3), 335–356. https://doi.org/10.46469/mq.2019.59.3.4

Dutton, E. (2019b). Jewish group evolutionary strategy is the most plausible hypothesis: A response to Nathan Cofnas' critical analysis of Kevin MacDonald's theory of Jewish involvement in twentieth century ideological movements. *Evolutionary Psychological Science*, *5*(1), 136–142. https://doi.org/10.1007/s40806-018-0158-4

Hayes, A. F. (2012). PROCESS: A versatile computational tool for observed variable mediation, moderation, and conditional process modeling [White paper] [Retrieved from http://www.afhayes.com/public/process2012.pdf]. http://www.afhayes.com/public/process2012.pdf.

Herman, S. N. (1988). *Jewish Identity: A Social Psychological Perspective* (2nd). Routledge.

Johnson, J. W. (2000). A heuristic method for estimating the relative weight of predictor variables in multiple regression. *Multivariate Behavioral Research*, *35*(1), 1–19. https://doi.org/10.1207/s15327906mbr3501_1

Leonardelli, G. J., & Brewer, M. B. (2001). Minority and majority discrimination: When and why. *Journal of Experimental Social Psychology*, *37*(6), 468–485. https://doi.org/10.1006/jesp.2001.1475

Lewin, K. (1997). Bringing up the Jewish child (1940). In *Resolving social conflicts and field theory in social science*. (pp. 122–132). American Psychological Association. https://doi.org/10.1037/10269-011

Li, N. P., Bailey, J. M., Kenrick, D. T., & Linsenmeier, J. A. W. (2002). The necessities and luxuries of mate preferences: Testing the tradeoffs. *Journal of Personality and Social Psychology*, *82*(6), 947–955. https://doi.org/10.1037/0022-3514.82.6.947

MacDonald, K. (1994). *A People that Shall Dwell Alone: Judaism as a Group Evolutionary Strategy*. Praeger.

MacDonald, K. (1998). *The Culture of Critique: An Evolutionary Analysis of Jewish Involvement in Twentieth-Century Intellectual and Political Movements*. Praeger.

Perreault, S., & Bourhis, R. Y. (1998). Social identification, interdependence and discrimination. *Group Processes & Intergroup Relations*, *1*(1), 49–66. https://doi.org/10.1177/1368430298011005

Pew Research Center (2020). Jewish americans in 2020. https://www.pewforum.org/2021/05/11/jewish-americans-in-2020.

Rios, K., Finkelshteyn, S., Markman, K. D., & Cohen, A. B. (2024). Jewish Americans' identity salience and effects on attitudes toward diversity. *Scientific Reports*, *14*(1), 21676. https://doi.org/10.1038/s41598-024-72753-w

Spadaro, G., Liu, J. H., Zhang, R. J., Gil de Zúñiga, H., & Balliet, D. (2024). Identity and institutions as foundations of ingroup favoritism: An investigation across 17 countries. *Social Psychological and Personality Science*, *15*(5), 592–602. https://doi.org/10.1177/19485506231172330

Tajfel, H., Billig, M. G., Bundy, R. P., & Flament, C. (1971). Social categorization and intergroup behaviour. *European Journal of Social Psychology*, *1*(2), 149–178. https://doi.org/10.1002/ejsp.2420010202

Tonidandel, S., & LeBreton, J. M. (2015). RWA web: A free, comprehensive, web-based, and user-friendly tool for relative weight analyses. *Journal of Business and Psychology*, *30*(2), 207–216. https://doi.org/10.1007/s10869-014-9351-z

Weisskirch, R. S., Kim, S. Y., Schwartz, S. J., & Whitbourne, S. K. (2016). The complexity of ethnic identity among Jewish American emerging adults. *Identity*, *16*(3), 127–141. https://doi.org/10.1080/15283488.2016.1190724

Zhao, X., Lynch, J. G., & Chen, Q. (2010). Reconsidering Baron and Kenny: Myths and truths about mediation analysis. *Journal of Consumer Research*, *37*(2), 197–206. https://doi.org/10.1086/651257

MANKIND QUARTERLY Mankind Quarterly, 67(1), 145-169 2026 Fall Edition
ISSN: 0025-2344

Intersection of Religious, Ethnic and Gender Identities in Central Asian Countries: Theoretical Framework and Practical Conflicts

Dinara Osmonova[†*] Batmakhan Koshbakova[‡] Klara Alimova[§] Saikal Orozovna[‡]
Aidai Kozubaeva[†]

Abstract

The aim of this study was to develop and verify an integrated model for analysing how religious, ethnic, and gender identities intersect and generate social conflicts in Central Asian countries. The study employed qualitative coding, frequency analysis, and statistical testing of census data, official statistics, international reports, and academic publications from 2010 to 2025. The reported percentages refer to aggregated demographic, social, and textual indicators derived from these sources, including religious participation rates, coded thematic intersections, and education and employment statistics. The results obtained show a gender difference in regular participation in religious practices in the Kyrgyz Republic (women – 70%, men – 50%). In all three countries (Kyrgyz Republic, Kazakhstan, and Tajikistan), a substantial portion of the population belongs to ethnic minorities. Qualitative coding of academic, official, and media texts revealed consistent intersections between the themes of "law", "tradition", "religious practice" and "gender roles": at least two categories are present simultaneously in 38% of cases; in materials about *ala-kachuu* (bride capture), 55% of mentions combine legal and traditional frameworks, with a religious component added in another 27%. Frequency analysis revealed a difference between the language used in official documents and research texts: the former predominantly use formulas of equal rights, freedom of conscience and gender equality (approximately 210, 183 and 127 mentions), while the latter use lexemes of control, restrictions and vulnerability (approximately 96, 87 and 73 mentions). Statistical verification established differences between women and men in terms of completed higher education (range 15-34%). The results demonstrate that conflicts in the legal, educational, labour and public spheres arise at the points where gender, ethnic and religious parameters overlap.

Keywords: Social differences, Cultural practices, Traditional norms, Intergroup conflicts, Status of women, Freedom of conscience

1 Introduction

The intersection of religious, ethnic, and gender identities in Central Asia influences the structure of social relations and forms of collective participation, including the distribution of access to education, employment, and political representation, practices of public religiosity, and regulatory decisions in the sphere of school rules and freedom of conscience. In the context of the cultural diversity of the region, religious norms, ethnic differences and gender roles interact and intertwine, resulting in regulatory and practical conflicts over dress codes and religious symbols in schools, restrictions on public demonstrations, diverse requirements for registering religious associations, and disputes over the distribution of access to administrative and land resources. The novelty of this study lies in its integrated analysis of religious, ethnic, and gender identities as intersecting factors of social conflict in Central Asia. It illustrates how legal norms, customs, religious

† Department of Religious Studies and Theology, Kyrgyz National University named after Jusup Balasagyn, Bishkek, Kyrgyz Republic
‡ Department of Sociology and Social Work, Kyrgyz National University named after Jusup Balasagyn, Bishkek, Kyrgyz Republic
§ Department of Humanities and Social Sciences, Kyrgyz State Technical University named after I. Razzakov, Bishkek, Kyrgyz Republic
* Corresponding author, email: osmonovad791@gmail.com

practices, and gender roles overlap in Kyrgyzstan, Kazakhstan, and Tajikistan using qualitative coding, frequency analysis, and statistical testing.

Umarov (2020) demonstrated that regional security is not limited solely to military or diplomatic parameters. That study concluded that it is the ethno-confessional dimension that determines states' susceptibility to threats and influences their ability to build cooperation in the field of security. Sharipova and Burkhanov (2021) emphasised that nation-building in the region goes beyond political and administrative practices. Their study determined that the process of constructing national identity inevitably involves the regulation of the religious sphere and the distribution of gender roles, which leads to additional social contradictions and limits real equality, understood here as equal opportunities for all. However, equal opportunities do not always lead to equal outcomes, and achieving equal outcomes may require remedial actions to address existing disparities. Yilmaz (2020) demonstrated that the prospects for the unification of Central Asian states directly depend on the recognition of ethnocultural and religious diversity. This researcher emphasised that ignoring these differences makes integration projects difficult, because it is identities, not economic indicators, that set the limits of possible regional consolidation.

A study by Terzyan (2021) demonstrates that in Kazakhstan, Kyrgyzstan, and Uzbekistan, the rights of ethnic and religious minorities are only partially realised; there is multiple discrimination against women from minority groups based on gender, origin, and religion. These findings are relevant to the analysis of the Kyrgyz Republic, where there is increasing inequality in access to institutions for vulnerable groups with intersecting identities. The work of Rybina and Lee (2021) describes how sacred spaces in the region perform religious and socio-cultural functions; they show that the ethno-confessional content of holy places shapes long-term spatial attachment and the structure of cultural experience, strengthening identities through tourism and pilgrimage practices. The study by Krol (2021) presents the transformation of legislative institutions under authoritarian regimes in Eurasia; it shows that ethnic and religious groups have a direct and indirect influence on the mechanisms of power distribution and that the social structure sets the framework for political compromises. Arynov (2021) demonstrated that attitudes towards the European Union (EU) in Kazakhstan and Kyrgyzstan are determined by the ethno-religious context. This researcher identified two dominant interpretations: the EU is perceived either as a partner in modernisation or as a source of cultural pressure, which indicates that assessments of external actors are formed through the prism of local identities.

Ismailbekova (2023) noted an increase in female Islamic activism in Kyrgyzstan, highlighting that women's participation in religious initiatives has become more consistent. The study demonstrated that activism is manifested not only in the spiritual sphere but also in social practices, reflecting the expansion of women's roles in public life. In another article, Ismailbekova (2022) noted that female Islamic activism contributes to the strengthening of social ties and the formation of support networks. The study concluded that through religious initiatives, women gain additional channels of inclusion in the public sphere, where religious identity becomes the basis for social interaction.

Stephan-Emmrich and Toktogulova (2023) analysed the activities of Muslim women participating in self-development programmes. Their findings showed that religious identity is increasingly combined with professional careers and education, which formed a group of women combining religious values and modern professional self-realisation. Agadjanian (2023) determined that women in Kyrgyzstan are more often involved in religious practices than men, and ethno-regional differences reinforce the picture of social heterogeneity. These results confirm the significance of the gender dimension in the study of religious identities. A study by Zholalieva and Koylu (2022) showed that religious education in Kyrgyzstan's state schools causes institutional and cultural contradictions. The study emphasised that the inclusion of elements of religious education remains a controversial issue, as there is still a need for a balance between secular and religious norms.

Kurmanbekova (2020) examined the characteristics of girls' madrasahs in Kyrgyzstan. The conclusions stated that such educational institutions shape the educational trajectories of Muslim women but remain only partially integrated into the national education system, creating tension between the religious and secular sectors. A study by Usenov (2022) noted that state policy in the religious sphere in Kyrgyzstan has contributed to the institutionalisation of several areas (such as the regulation of religious associations,

the registration of places of worship, and the oversight of religious education), but at the same time, it is accompanied by unresolved issues. The study concluded that the main challenge remains finding a balance between state control and the freedom of religious associations. This control is largely driven by the state's desire to manage religious identity as part of national identity, ensuring that religious practices align with the political goals of fostering nationalism and maintaining social stability, while avoiding the rise of religious extremism.

Botokanova (2022) found that traditional gender perceptions continue to be reproduced in Kyrgyz society. The study demonstrated that the philosophy of gender roles is entrenched in social norms and influences the perception of modern ideas of equality. A collective study by D. Osmonova et al. (2024) identified the characteristics of the religious identity of young people in Kyrgyzstan and Poland. The study noted that among Kyrgyz youth, there is a growth in religious self-identification, which is becoming a significant part of social belonging, while in Poland, religion is perceived primarily as an individual choice, with a noticeable decline in religious affiliation.

Although religion, ethnicity, and gender have all been extensively covered in earlier research, they are frequently looked at as distinct facets of social life in Central Asia. The ways in which these identities overlap in particular institutional and everyday contexts (such as law, education, employment, marriage customs, and public participation) have received less attention. The research problem is that there is still a lack of explanation regarding the mechanisms through which intersecting gender, ethnic, and religious identities lead to social conflicts in Central Asia. Additionally, studies that integrate theoretical interpretation with textual, statistical, and documentary analysis are lacking in a number of Central Asian nations. The need for a methodical model that explains how intersecting identities create and organise social conflicts in the area is thus addressed by this study.

The study aimed to develop and verify an integrated model of the intersection of religious, ethnic, and gender identities for Central Asian countries. The central research question of this study is how religious, ethnic, and gender identities intersect to shape the forms and mechanisms of social conflict in Central Asian countries. The main objectives of this study are:

- to develop an integrated theoretical framework for analysing the intersection of religious, ethnic, and gender identities;
- to identify how these intersections manifest in legal, educational, labour, and public spheres;
- to compare Kyrgyzstan with Kazakhstan and Tajikistan in order to distinguish national specificities from broader regional patterns.

2 Materials and methods

The study was conducted in January-June 2025 in the Kyrgyz Republic and was mixed-methods in nature, including a comparative analysis with Kazakhstan and Tajikistan to identify common and divergent trends after the Central Asian countries gained independence in 1991.

The first stage defined the theoretical framework for analysis. The methodological basis was the concept of intersectionality developed by K. Crenshaw (Crenshaw, 1991), which explains the intersection of gender, religious and ethnic identities, as well as approaches by R. Brubaker (Brubaker, 2011) to identity politics in the context of post-Soviet transformations after 1991. Crenshaw's intersectionality framework was adapted to the Central Asian context by focusing on the interaction of gender, ethnicity, and religion in post-Soviet societies. The analysis considered how Soviet secular legacies, Islamic revival, ethnic minority status, community structures, and traditional gender norms jointly shape access to education, employment, public participation, and legal protection in Kyrgyzstan, Kazakhstan, and Tajikistan. These theories were supplemented by regional studies: Khalid (Khalid, 2014) on Islam and gender in Central Asia and Beller-Hann and Hann (Bellér-Hann & Hann, 2020) on the relationship between religion and nation, which provided analytical sensitivity to the intersection of discriminatory practices and the ability to compare the Kyrgyz Republic (KR) with neighbouring countries. These studies were selected to reconstruct the

dynamics of identities during the period of independence and provide tools for identifying the mechanisms of their transformation.

The theoretical framework included key events shaping the context in Kyrgyzstan: the ethno-religious conflict in Osh in 2010 (Solvang et al., 2010), bans on women's marches on 8 March in Bishkek (Jabbarova, 2019), and debates on wearing the hijab in schools in Jalal-Abad in 2007 (Mamaraimov, 2008). For comparison, functionally similar cases in the region were used: restrictions on women's marches in Almaty and regulation of school uniforms in Tajikistan, which clarified which conflicts are typical for Central Asia and which have local specifics (United States Commission on International Religious Freedom, 2011; U.S. Department of State, 2025).

In the second stage, a collection of documentary and statistical materials was compiled. The basis included: the Population and Housing Census of the Kyrgyz Republic 2022 (National Statistical Committee of the Kyrgyz Republic, 2025); the National Statistical Committee of the Kyrgyz Republic (National Statistical Committee of the Kyrgyz Republic, 2021), including "Women and Men of the Kyrgyz Republic"; the Law of the Kyrgyz Republic No. 18 "On Freedom of Religion and Religious Associations" (2025); the Law of the Kyrgyz Republic No. 184 (2008); United Nations Women (United Nations Women, 2025) reports on early marriage and gender-based violence; the United Nations Development Programme (UNDP) analysis of the situation of women in the labour market (UNDP, 2025); Bertelsmann Stiftung (Bertelsmann Stiftung, 2024); reports by the Organisation for Security and Co-operation in Europe (OSCE) (OSCE, 2022), Freedom House (Freedom House, 2024), and the U.S. Department of State (U.S. Department of State, 2025). For comparison, data from the Kazakhstan census (Bureau of National Statistics, 2025) and the Tajikistan census (Agency on Statistics under the President of the Republic of Tajikistan, 2025), as well as the Law of the Republic of Kazakhstan No. 483-IV "On Religious Activities and Religious Associations" (Law of the Republic of Kazakhstan No. 483-IV, 2011) and the Law of the Republic of Tajikistan No. 739 "On Freedom of Conscience and Religious Associations" (Law of the Republic of Tajikistan No. 739, 2011), were used. The inclusion of documents from different countries made it possible to verify the extent to which social and legal conditions in the Kyrgyz Republic reflect trends common to the region or form their own vector of development.

In the third stage, academic research was used to identify factors of conflict. The works of V. Agadjanian (Agadjanian, 2023) on gender differences in religiosity, M. Stephan-Emmrich and M. Toktogulova (Stephan-Emmrich & Toktogulova, 2023) on women's Islamic initiatives in Bishkek, Z. Zholalieva and M. Koylu (Zholalieva & Koylu, 2022) on the interaction between secular and religious education, and an article by D.A. Osmonova (D. A. Osmonova, 2018) on gender-religion conflicts in Central Asia. For regional comparison, studies on Kazakhstan were used: G. Abdiraiymova and A. Saimassayeva (Abdiraiymova & Saimassayeva, 2023) on the relationship between socio-economic inequality and religious identity; as well as studies on Tajikistan: T. Epkenhans (Epkenhans, 2016) on the transformation of Islamic practices and the role of political Islam in the conflict and post-war context of Tajikistan. These publications identified common patterns and differences, confirming the conclusion that the processes observed in the Kyrgyz Republic since 1991 are part of a broader dynamic but have unique manifestations.

MAXQDA Analytics Pro was used for coding and semantic analysis, AntConc 4.2.0 for frequency analysis of terms, and IBM SPSS Statistics 28 for statistical testing. MAXQDA was chosen to find and code recurring thematic intersections in textual materials between gender roles, tradition, religion, and law. The frequency of important lexical markers in official, scholarly, and media texts was measured using AntConc, and statistical relationships in demographic and social indicators were tested using SPSS. To ascertain whether quantifiable textual and demographic trends supported qualitative interpretations, the outputs were integrated by comparing coded thematic patterns, lexical frequencies, and statistical findings. In the comparative sections, Pearson's χ^2 (α=0.05) and 95% confidence intervals were used to analyse differences between countries; reliability was ensured by triangulation, in which each fact was confirmed by at least two independent sources.

3 Results

3.1 Theoretical framework of intersecting identities: The experience of Kyrgyzstan in the comparative context of Central Asia

The application of the concept of intersectionality, developed by K. Crenshaw (Crenshaw, 1991), has shown that in the Kyrgyz Republic, social status is shaped not by isolated characteristics but by their combination. Gender, ethnicity and religious affiliation act simultaneously, creating different conditions for access to education, employment, and political participation. The intersection of these factors revealed that women from ethnic minorities in conditions of religious conservatism face restrictions that are exacerbated when the three axes are imposed simultaneously. A comparative analysis with Kazakhstan confirmed that socio-economic inequality is exacerbated when gender and religious identity intersect. Data from Tajikistan showed that in the post-war context, religious affiliation is central in political and gender stratification (Abdiraiymova & Saimassayeva, 2023; Epkenhans, 2016).

According to the social construction theory of Berger and Luckmann (Berger & Luckmann, 1966), gender roles and religious norms in Kyrgyzstan are reproduced as a result of social interactions. An analysis of practices showed that ethnocultural traditions are enshrined as religious prescriptions, while religious norms are interpreted as cultural heritage. A comparison with Kazakhstan and Tajikistan revealed that a similar mechanism of interpreting social practices forms different frameworks of legitimisation: in Kazakhstan, through the institutionalisation of “traditional values”, in Tajikistan, through the normative regulation of women’s clothing and behaviour.

The approach of R. Brubaker (Brubaker, 2011) to identity politics after 1991 showed that, in Kyrgyzstan, identities took on an institutional form after independence. Ethnicity became interrelated with the distribution of political representation, religious identity became the basis for mobilisation, and gender identity entered the sphere of normative regulation. A comparison with Kazakhstan shows that the institutionalisation of religious identity is accompanied by an emphasis on state control, while in Tajikistan, religious and gender identities are regulated primarily through legal restrictions (United States Commission on International Religious Freedom, 2011).

Figure 1 presents a conceptual model reflecting the intersection of gender, religious and ethnic identities in Kyrgyz society and their influence on social practices, with parallels noted in Kazakhstan and Tajikistan to demonstrate common and local characteristics of regional dynamics.

Figure 1 demonstrates a conceptual model based on three theoretical approaches: intersectionality by Crenshaw (1991), social construction by Berger and Luckmann (1966), and the concept of identity politics by R. Brubaker (2011). Each of the three circles represents a separate dimension of identity: gender, religion, and ethnicity. These dimensions do not exist in isolation: they constantly overlap and intersect in real life, forming key lines of social tension. Gender identity reflects the distribution of roles and access to opportunities, whether in education, political participation or the labour market. In Kyrgyz society, it is closely intertwined with religious prescriptions and cultural norms, making it an integral part of institutional and everyday practice. Religious identity sets the system of norms that regulate behaviour and collective forms of solidarity. In the post-Soviet period, its importance has increased, as religious institutions have become one of the platforms for mobilisation and self-organisation.

The primary points of intersection in the Kyrgyz and larger Central Asian context are where the same social situations are governed by legal norms, customs, religious interpretations, and gender expectations. Formal equality may clash with community norms, religiously framed morality, and inherited gender roles, as evidenced by school dress codes, women’s public participation, marriage customs like *ala-kachuu* (bride capture), and access to political or economic resources. These overlaps demonstrate that multiple identity factors interact simultaneously in institutional, cultural, and legal contexts to produce social conflicts rather than a single identity factor acting alone.

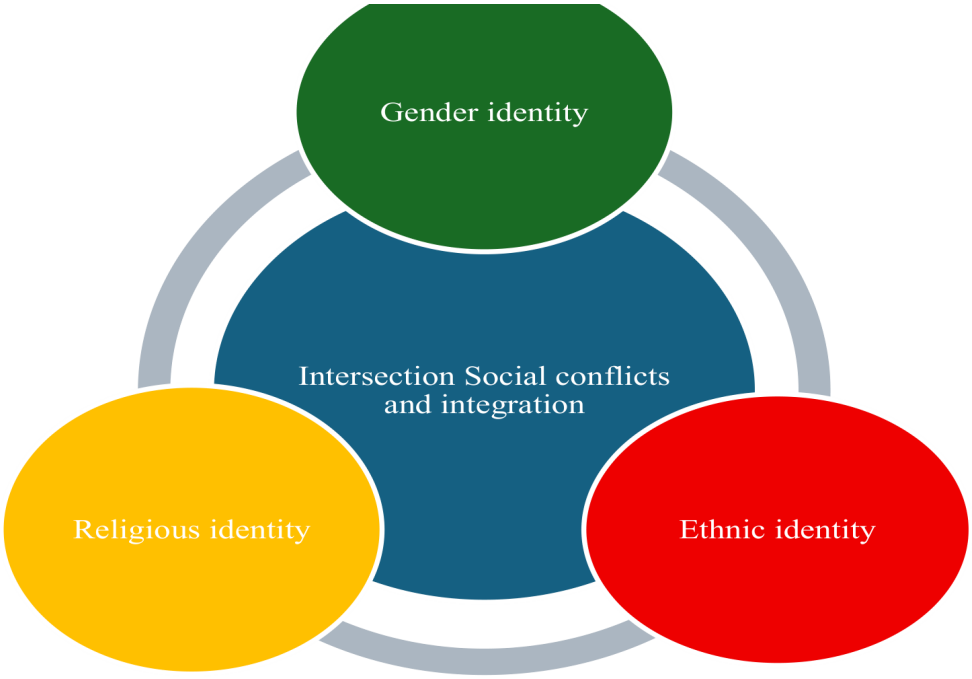

Figure 1: Conceptual model of the intersection of gender, religious and ethnic identities in Kyrgyzstan, with comparison to Kazakhstan and Tajikistan

Source: compiled by the authors based on K. Crenshaw (1991), P.L. Berger and T. Luckmann (1966), V. Agadjanian (2023), M. Stephan-Emmrich and M. Toktogulova (2023).

3.2 Intersection of gender, ethnicity, and religion in Central Asia (2007-2022)

Ethnic identity reinforces the boundaries between groups, defining membership of cultural communities. It is related to language, traditions and historical memory, and is often used as a marker in the distribution of political and social resources. The central intersection of the three circles represents a situation in which an individual or group simultaneously bears all three identities. This is what the concept of intersectionality refers to as “multiple layers of discrimination”. For example, a woman from an ethnic minority who practises Islam may face restrictions in three areas at once: based on gender, ethnicity and religious precepts (Omarova et al., 2026). This creates a unique social position that cannot be explained by any single theory.

Discussions regarding religious clothing in schools revealed that the choice of clothing for schoolgirls was subject to several interpretations. In 2007, there were reports of girls being refused entry to school for wearing the hijab in Jalal-Abad, and in 2011, the Tajik Ministry of Education introduced official restrictions on the wearing of religious clothing in schools (Mamaraimov, 2008; United States Commission on International Religious Freedom, 2011). In the Kyrgyz context, school uniforms were interpreted as a manifestation of religious practice, an element of ethno-cultural identity, and an indicator of compliance with gender expectations. In the educational environment, this created contradictions between the requirements of school administrations and the practices of families and communities, demonstrating the complexity of reconciling institutional and cultural-religious norms.

An example in Kyrgyz society is the 2010 Osh conflict, a violent ethnic clash between Kyrgyz and Uzbeks in southern Kyrgyzstan, which resulted in significant loss of life and widespread displacement. The conflict was fuelled by a complex mix of political, economic, and ethnic tensions, with historical grievances exacerbated by the breakdown of law and order following the overthrow of the president. It showed that ethnicity, in the context of religious labelling and gender-distributed roles, creates different levels of vulnerability for the population. For women belonging to the Uzbek minority, the intersection of ethnicity, gender and religious affiliation meant limited access to protection and an increased risk of violence, as

they were caught between the violence of the conflict and the traditional gender norms that restricted their mobility and agency. The conflict highlighted the ways in which intersecting identities can compound social vulnerabilities and how marginalised groups, particularly women, suffer disproportionately during periods of ethnic violence (Spytska, 2023).

Similar intersections were also observed in other countries in the region: In Kazakhstan, socio-economic inequality within the country was exacerbated at the intersection of gender and religious identity, with rural and religiously conservative areas facing greater disadvantages than urban, secular regions. In Tajikistan in the period following the 1992-1997 civil war, the combination of ethnicity and Islamic identity had a direct impact on the position of women in society (Abdiraiymova & Saimassayeva, 2023; Epkenhans, 2016). Although Muslims make up the majority of people in Central Asia, including Tajikistan, the influence of Islamic identity extends beyond religious affiliation. It interacts with cultural customs and ethnic identification, which can impact women's responsibilities, especially in more conservative areas. Central Asia's Islamic identity is defined by regional customs and diverse interpretations of Islam, frequently impacted by historical, political, and social factors despite the lack of a notable Sunni-Shia division (Azhimov et al., 2026). This demonstrates how religion can produce many layers of identity that influence social outcomes when combined with gender and ethnicity. The inclusion of these comparisons emphasises that the model presented in the figure applies not only to the analysis of Kyrgyzstan, but also to the identification of wider regional patterns.

The bans on women's marches in Bishkek in 2019-2021 demonstrated that gender initiatives in the public sphere were accompanied by religious and ethnocultural interpretations (OSCE, 2022). Participants in the marches were promoting women's rights protection, gender equality, and acknowledging women's contributions to society. These demands included the right to bodily autonomy, equal access to work and education, and stricter legislation against domestic abuse. This movement, which combined international feminist goals with the realities of Kyrgyz culture, was formed by the local sociocultural setting despite having its roots in global feminist ideas of gender equality and women's rights. The participants in the marches were simultaneously identified as women, as representatives of certain communities, and as actors whose actions were interpreted through the prism of religious and cultural norms. In official discourse, participation was defined as a political action, in religious interpretations as a violation of moral norms, and in cultural and community practices as transgressing traditional gender roles. This produced uneven consequences: for some participants, participation meant greater access to the public sphere, while for others it meant increased social pressure from their communities. Similar disputes were recorded in Kazakhstan, where feminist marches in Almaty were restricted in 2020-2022 (U.S. Department of State, 2025).

Figure 2 shows a timeline of key events from 2007 to 2022 that had a significant impact on the formation and transformation of gender, religious, and ethnic identities in Kyrgyzstan, with parallels noted in Kazakhstan and Tajikistan to identify regional patterns.

Figure 2 captures three events that influenced social processes in Kyrgyzstan between 2007 and 2019. In 2007, discussions about religious clothing in schools were accompanied by different interpretations of schoolgirls' choices: Some viewed it as a manifestation of religious practice, others as part of cultural identity, and still others as an indicator of compliance with gender expectations. The 2010 Osh conflict demonstrated that ethnicity, combined with religious labelling and traditional role distribution, had different consequences for different population groups; women from the Uzbek minority faced limited access to protection due to the combination of ethnicity, gender and religious identity. The bans on women's marches in Bishkek in 2019 were accompanied by an interpretation of the participants' actions through several dimensions: they were identified as women, as representatives of specific communities, and as actors whose actions were assessed in terms of religious "modesty" and cultural "decency". These cases demonstrate that social processes in Kyrgyzstan developed under the simultaneous influence of gender, religious and ethnic factors.

These events show how social dynamics and personal experiences in Central Asia are shaped by the junction of gender, ethnicity, and religion. The complicated ways in which these overlapping identities result in varying degrees of vulnerability, social involvement, and access to resources are illustrated by the 2010 Osh dispute, the prohibitions on women's marches, and the discussions around religious attire in schools. These examples demonstrate the applicability of the study's theoretical framework, which emphasises

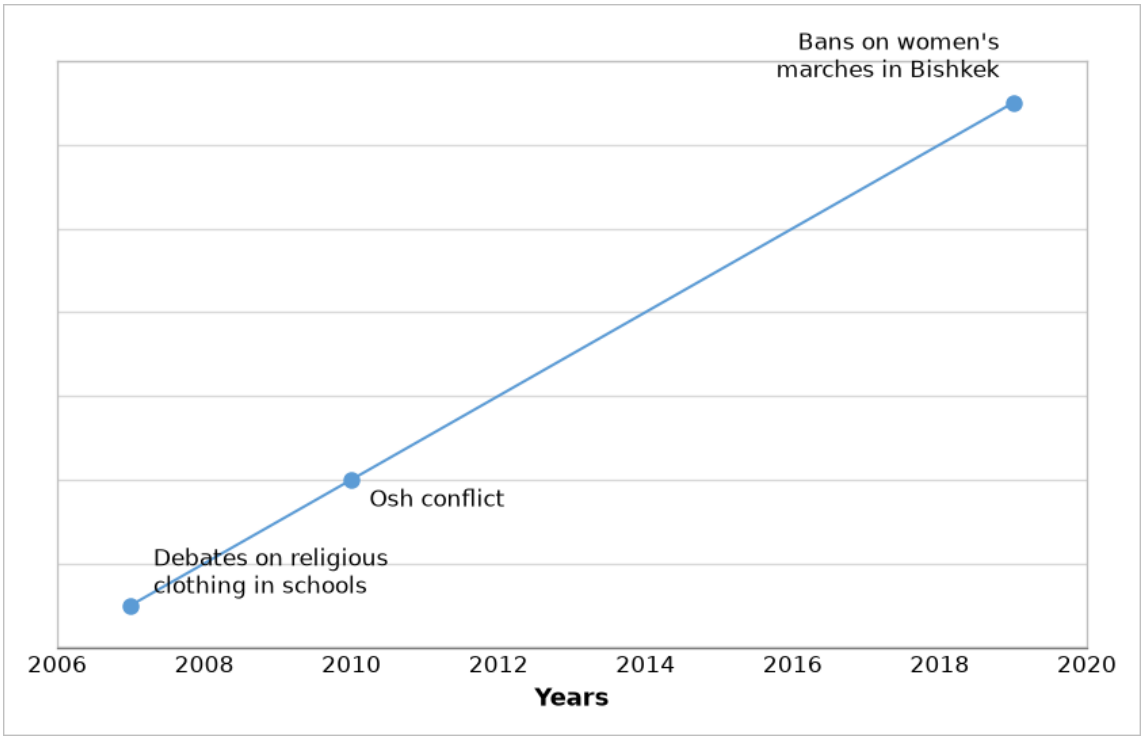

Figure 2: Chronology of events that influenced the formation and transformation of gender, religious and ethnic identities in Kyrgyzstan (2007-2022)

Source: compiled by the authors based on Solvang et al. (2010), OSCE (2022), Freedom House (2024), U.S. Department of State (2025).

how the intersections of gender, ethnicity, and religion produce particular obstacles that disproportionately impact marginalised groups, underscoring the necessity of investigating these intersecting identities in social settings. The framework proves valuable in explaining the persistent inequalities and the role of cultural, religious, and gender norms in shaping these outcomes across Kyrgyzstan, Kazakhstan, and Tajikistan.

3.3 Documentary and statistical database for the analysis of social contradictions

The 2022 census of the Kyrgyz Republic (National Statistical Committee of the Kyrgyz Republic, 2025) recorded that the ethnic composition of the country is predominantly Kyrgyz (about 73%), Uzbek (14%) and Russian (6%), with the remainder consisting of Dungans, Uyghurs, Tajiks and other minorities. This structure determines the uneven distribution of resources and access to institutions, which is reflected in regional differences between the north and south of the country. The compilation Women and Men of the Kyrgyz Republic (National Statistical Committee of the Kyrgyz Republic, 2021) showed that women make up 57% of the employed population, but their share in political representation does not exceed 20%. In the education system, women account for about 52% of higher education graduates, while less than 15% of managers in government structures are women. These indicators highlight a gap between the level of education and actual access to positions of power.

The 2021 census of the Republic of Kazakhstan revealed similar disparities: Kazakhs are approximately 70% of the population, Russians – 15%, Uzbeks, Uyghurs, Tatars and other minorities less than 10% each (Agency on Statistics under the President of the Republic of Tajikistan, 2025). In terms of employment, women make up about 49% of the workforce, but their share in political representation is about 20%. The 2020 census of the Republic of Tajikistan (Agency on Statistics under the President of the Republic of Tajikistan, 2025) recorded that Tajiks make up 84% of the population, Uzbeks 13%, and women account for

about 45% of the workforce, with less than 17% in political structures. These data compare the ethnic and gender gaps in Kyrgyzstan with those in other countries in the region.

These Central Asian republics have greater rates of female labour force participation than many other Muslim-majority nations. This is largely a legacy of the Soviet system, which supported gender equality and women's employment. The Soviet government's programmes promoted women's participation in both private and public domains, resulting in notable advancements in female work and education. But with the fall of the Soviet Union, religion has become more important in Central Asia, and the resurrection of Islamic identity is frequently linked to the region's cultural and national renewal (Chukhanov & Kairbekov, 2024; Zholmukhan et al., 2024). This shift has influenced gender roles, with religious and traditional norms sometimes limiting women's rights, particularly in rural areas. The junction of these identities is more complicated than it was under the Soviet secular system due to the growing importance of religious identification in addition to ethnicity and gender. As a result, changing religious and cultural standards that intersect with their ethnic identities may have an impact on women's participation in politics and the workforce, in addition to state regulations.

Law of the Kyrgyz Republic No. 18 (Law of the Kyrgyz Republic No. 18, 2025) established the legal status of religious communities, the vast majority of which (over 90%) represent Sunni Islam. Smaller groups such as Orthodox Christians, Protestants and Jehovah's Witnesses face restrictions on registration and activities. Law of the Kyrgyz Republic No. 184 (Law of the Kyrgyz Republic No. 184, 2008) formally established equal rights, but statistics on employment and political participation indicate a discrepancy between regulatory provisions and actual practice. Specifically, women and ethnic minorities, despite legal guarantees, are underrepresented in both the workforce and political structures, with lower access to leadership positions and economic opportunities compared to their male or majority counterparts.

Law of the Republic of Kazakhstan No. 483-IV (Law of the Republic of Kazakhstan No. 483-IV, 2011) established strict registration procedures, limiting the activities of religious minorities. In Tajikistan, Law of the Republic of Tajikistan No. 739 "On Freedom of Conscience and Religious Associations" (Law of the Republic of Tajikistan No. 739, 2011) imposed significant restrictions on Islamic associations and banned religious activities in state schools. These regulatory differences show that Kyrgyzstan is formally more liberal in freedom of conscience but in practice faces similar restrictions to its neighbouring countries, especially when it comes to the practical barriers faced by religious minorities. However, the unequal results in terms of political and employment representation (where women, religious minorities, and other marginalised groups are underrepresented) do not always indicate overt discrimination (Kobroń-Gąsiorowska, 2026). These results may also be explained by variations in the average human capital of different groups. For example, members of religious minorities may have less education, which may have an impact on their representation in politics and the workforce (Podoprigora et al., 2019). Therefore, in addition to outright discriminatory actions, differences in human capital, such as educational achievement, can contribute to these inequities.

Reports by the United Nations Women (United Nations Women, 2025) have recorded that more than 13% of girls are married before reaching the age of 18, and the practice of *ala-kachuu* (a traditional and often coercive form of bride kidnapping) remains at a level of up to 20% of marriages in some rural areas. The level of gender-based violence remains high: More than 30% of women have experienced physical or psychological violence in the family at least once in their lives (Altynbekova et al., 2026). These data show that legal guarantees do not provide sufficient protection against traditional practices. UNDP analysis shows that the employment rate for women (ages 18-65) is 57%, but they are concentrated in low-paid sectors (education, health care, social services), while in industry and construction, the share of women does not exceed 20% (UNDP, 2025). This creates persistent economic segregation based on gender.

In Kazakhstan, according to UNDP data, women account for about 48% of the workforce, but they are concentrated in the service sector, and the level of women's political participation, specifically representation in parliament, remains below 25% (UNDP, 2025). In Tajikistan, United Nations Women (United Nations Women, 2025) has reported that up to 15% of marriages involve minors, and the practice of religious marriages without state registration remains widespread.

The Bertelsmann Transformation Index (BTI) Kyrgyzstan report (Bertelsmann Stiftung, 2024) noted a

discrepancy between formally enshrined principles of equality and actual restrictions. The gender equality index was rated at 4.3 out of a possible 10 points, indicating structural barriers to the realisation of rights. Reports by the OSCE (OSCE, 2022) described ongoing episodes of ethnic tension in the southern regions of Kyrgyzstan, where conflicts between Kyrgyz and Uzbeks are accompanied by discrimination in access to land and administrative resources. Freedom House (Freedom House, 2024) classified Kyrgyzstan as a "partly free country" where restrictions on freedom of assembly have been recorded, and the U.S. Department of State (U.S. Department of State, 2025) highlighted cases of pressure on religious minorities and restrictions on freedom of religion. According to the BTI Kazakhstan Report, the gender equality index was 4.7 points, which is slightly higher than the Kyrgyz Republic's figures, but similar barriers for women in accessing power were recorded (Bertelsmann Stiftung, 2024). In the BTI Tajikistan Report, the equality index was lower at 3.9 points, reflecting more stringent institutional restrictions (Bertelsmann Stiftung, 2024). Freedom House (Freedom House, 2024) classified Kazakhstan and Tajikistan as "not free countries" where freedoms of assembly and religion are more severely restricted than in the Kyrgyz Republic. Table 1 presents the main documentary, statistical and regulatory sources, as well as their analytical significance for the analysis of ethnic, gender and religious processes in Kyrgyzstan, comparing them with Kazakhstan and Tajikistan.

Table 1 reflects the body of documentary sources that can be used to analyse social contradictions in Kyrgyzstan in comparison with neighbouring countries in Central Asia. Demographic data, including population censuses, confirm the multi-ethnic nature of society: in Kyrgyzstan, the Kyrgyz ethnic group predominates, with significant Uzbek and Russian minorities; in Kazakhstan, statistics indicate greater diversity, with large Russian, Uzbek and Uyghur communities; while in Tajikistan, the population is characterised by high ethno-confessional homogeneity. A comparative analysis of these data traced how the ethnic factor is incorporated into the system of identities in different ways depending on the structure of society.

Official statistical compilations and legal acts set the institutional framework for the formation of social practices. In Kazakhstan, Law of the Republic of Kazakhstan No. 483-IV (2011) introduced a strict system of registration and control over religious organisations and their activities, while in Tajikistan, Law of the Republic of Tajikistan No. 739 (2011) limits the number of mosques and the activities of religious educational institutions, while in Kyrgyzstan, legislation formally remains more liberal. A comparison of these norms with data on employment and political participation reveals differences between officially enshrined guarantees and the actual conditions for the realisation of rights, indicating contradictions at the intersection of gender, ethnic and religious identities.

Russians and other ethnic groups in Kazakhstan typically have better socioeconomic outcomes than Kazakhs, especially in urban areas where Russian-speaking minorities predominate. On average, Russians are wealthier, have more access to political power, and work in more skilled occupations (Volkov, 2025a). Despite these financial benefits, they are frequently under-represented in political systems and encounter prejudice in certain domains, like company ownership and university admissions. Compared to the Uzbek minority, which experiences political under-representation and economic marginalisation, the majority Kyrgyz population of Kyrgyzstan enjoys more political authority and access to state resources. Despite sometimes better economic standing, ethnic minorities in Kazakhstan and Kyrgyzstan lack political clout.

This dual pattern, where some ethnic or religious groups have superior socio-economic success but endure discrimination in other areas, demonstrates how unequal outcomes can lead to discriminatory practices. The goal of equalising outcomes at the group level is a difficult task because, for example, wealthier or more economically successful groups may have better access to education or employment, but their political under-representation and exclusion from important societal sectors can also reinforce social divisions (Volkov, 2025b).

International reports and indices suggest that the situation is evolving regionally. Materials from the United Nations Women (2025), the United Nations Development Programme (UNDP, 2025) and the Bertelsmann Transformation Index (Bertelsmann Stiftung, 2024) record persistent gender gaps and the continuing practice of early marriage. Data from the Organisation for Security and Co-operation in Europe (OSCE, 2022), the international human rights organisation Freedom House (2024) and the U.S. Department

Table 1: Documentary, statistical and regulatory sources of research and their analytical significance

Source	Analytical meaning
Population and Housing Census of the Kyrgyz Republic 2022 (National Statistical Committee of the Kyrgyz Republic, 2025)	Determination of ethnic composition and basic demographic parameters for the analysis of ethnicity, gender and religion.
Women and Men of the Kyrgyz Republic (National Statistical Committee of the Kyrgyz Republic, 2021)	Gender indicators of employment, education and political participation; identifying the "education-power" gap.
Law of the Kyrgyz Republic No. 18 (2025)	Legal status of religious communities; scope of freedom of religion and registration of organisations.
Law of the Kyrgyz Republic No. 184 (2008)	Regulatory consolidation of gender equality: correlation between law and actual practice.
United Nations Women (2025)	Indicators of early marriage and gender-based violence: the link between traditional practices and women's vulnerability.
UNDP (2025)	The position of women in the labour market: sectoral differences and gender segregation.
Bertelsmann Stiftung (2024)	Institutional barriers to equality: indicators of gender policy and legal guarantees.
Organisation for Security and Co-operation in Europe (2022)	Characteristics of interethnic tensions in southern regions: access to land and administrative resources.
Freedom House (2024)	Assessment of the level of freedoms, including freedom of assembly and religion, in the Kyrgyz Republic.
U.S. Department of State (2025)	Documentation of cases of pressure on religious minorities and restrictions on freedom of religion.
Census of the Republic of Kazakhstan (Bureau of National Statistics, 2025)	Comparison of ethnic structure and gender imbalances with KR data for regional validation of conclusions.
Agency on Statistics under the President of the Republic of Tajikistan (2025)	Comparison of ethno-demographic parameters and women's participation with KR indicators.
Law of the Republic of Kazakhstan No. 483-IV (2011)	Comparison of registration procedures and freedom of religion regimes with the KR.
Law of the Republic of Tajikistan No. 739 (2011)	Comparison of regulatory restrictions on religious practice and school uniforms with the KR.
U.S. Department of State (2025) – Kazakhstan: limitations on women's marches	Documentary evidence of restrictions on public gender initiatives in a regional context.
United States Commission on International Religious Freedom (2011)	Documentary record of regulatory restrictions on religious clothing in schools for regional comparison.

Source: compiled by the authors

of State (2025) show that the level of ethnic and religious tension in Kyrgyzstan is significantly lower than in Tajikistan but higher than in Kazakhstan, where state mechanisms for controlling the religious sphere are more strictly institutionalised.

Even though Tajikistan is more ethnically homogeneous than Kazakhstan, there is more ethnic and religious tension there, which calls into question the notion that conflict is caused mainly by diversity. Tensions between different ethnic and religious groups are more closely related to how countries handle diversity than to the degree of diversity itself. Although ethnic groups in Tajikistan are more homogeneous, ethnic and religious divisions have been exacerbated by political unrest, economic hardship, and previous civil wars. Kazakhstan, on the other hand, has imposed stringent state regulations on religion and ethnicity despite its greater ethnic diversity. While this may lessen overt conflict, it may also stifle expression and fuel underlying unhappiness. Even while they stabilise things temporarily, these regulations frequently hinder the growth of more inclusive social structures that could lessen more serious problems of marginalisation and inequality.

In this setting, it becomes obvious that the relationship between ethnic and religious variety and

conflict is more nuanced than a straightforward cause-and-effect dynamic. Diversity does not always result in conflict; rather, outcomes are more significantly shaped by institutional responses, whether they are inclusive or controlling. Although authoritarian regimes, like the one in Kazakhstan, frequently restrict the room for disagreement, they can also suppress liberties and foster animosity, which may result in longer-term instability (Smagulova et al., 2018). Long-term, however, democratic or inclusive institutions might encourage more integration and a sense of ownership among various groups, which could lower the likelihood of conflict.

This research emphasises how crucial it is to comprehend the function of political institutions and how they can either reduce or increase community conflicts. Effective governance can assist in addressing the issues brought on by diversity, whether through inclusive policies or well-managed controls. Achieving long-term stability and social cohesiveness in Central Asia continues to depend on striking the correct balance between inclusion and control (Tleshaliyev et al., 2025).

The 2022 census records the ethnic diversity of Kyrgyzstan, while UN Women data documents the prevalence of early marriage and gender inequality. When compared with Kazakhstan, where statistics highlight the growth of an urbanised female population with a high level of education, and Tajikistan, where women's participation in the economy remains low, a comprehensive picture of regional differences emerges. International reviews confirm that the intersection of ethnic, religious and gender identities takes different forms: In Kyrgyzstan, they are reflected in local ethnic conflicts, particularly involving the Uzbek minority, where tensions have erupted into violence, such as during the 2010 Osh conflict; in Tajikistan, they are seen in institutionally entrenched restrictions on women, particularly in rural areas, where the secular state's policies impose values that conflict with traditional Muslim practices; and in Kazakhstan, they manifest in the balancing act between modernisation and strict state regulation of religious practices, including the control over the registration and activities of religious groups, which limits the space for religious expression, especially for minority faiths.

Figure 3 shows the distribution of ethnic groups and the proportion of women in parliament in three countries. In Kyrgyzstan, Kyrgyz make up 73%, Uzbeks – 14%, Russians – 6%, and others – 7%; women make up 20% of parliament. In Kazakhstan, Kazakhs account for about 70% of the population, and women account for 27% of parliament. In Tajikistan, Tajiks make up about 80% of the population, and women make up 18% of parliament. The combined presentation of indicators highlights the gap between the demographic structure and the representation of women in the legislative branch in all three jurisdictions, with female parliamentary representation ranging from 18% to 27%. A summary analysis of documentary and statistical materials for 2010-2025 reveals a persistent discrepancy between regulatory guarantees and practice, manifested in gender segregation in employment, underrepresentation of women in government bodies, and regional disparities between the north and south. Although laws in many nations ostensibly ensure that men and women have equal chances, these rules have not produced equal results because diverse groups of people have distinct interests and skills. This disparity can be seen in things like the number of women in leadership roles or in particular professions.

The data reflect episodes of inter-ethnic tension and the vulnerability of religious minorities in registration and organisational procedures, despite the formal recognition of freedom of religion and assembly. A comparison with Kazakhstan and Tajikistan reveals similar patterns with varying degrees of regulatory strictness, confirming the pan-Central Asian nature of some key trends while also acknowledging the national characteristics of Kyrgyzstan.

3.4 Academic interpretations of the mechanisms of conflict in Kyrgyzstan and the region

Academic research on gender and religion in Kyrgyzstan reveals mechanisms of social conflict that are not reflected in official statistics. The work of Agadjanian (2023) contains data on differences in the level of religious involvement of men and women in Kyrgyzstan: about 70% of women regularly pray and participate in religious rituals, while among men, the figure is approximately 50%. This gender gap in religious participation is consistent with the global pattern. In nearly every country for which data is available,

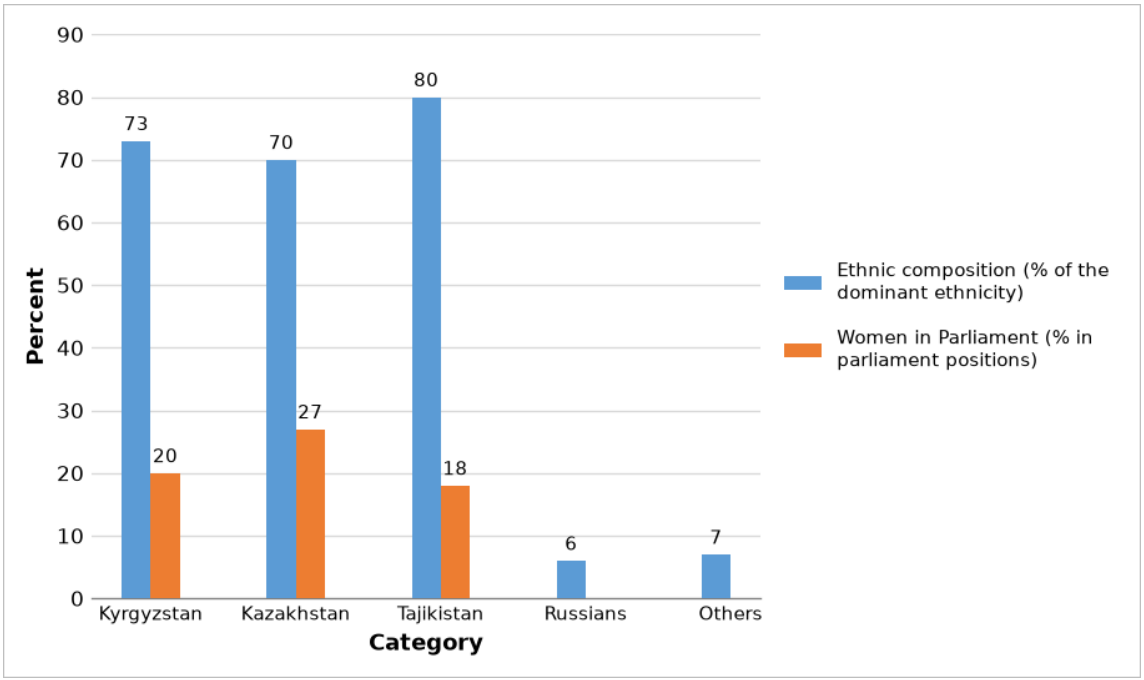

Figure 3: Ethnic structure and gender representation in politics: Kyrgyzstan, Kazakhstan and Tajikistan (comparison based on official statistics for 2020-2025)

Source: compiled by the authors based on United States Commission on International Religious Freedom (2011), Law of the Republic of Tajikistan No. 739 (2011), Law of the Republic of Kazakhstan No. 483-IV (2011), National Statistical Committee of the Kyrgyz Republic (2021, 2023, 2025), United Nations Women (2025), Agency on Statistics under the President of the Republic of Talikistan (2025), UNDP (2025), U.S. Department of State (2025), Bureau of National Statistics (2025).

women are generally more religious than men. Regional differences are pronounced along the south-north axis: Religious practice is more prevalent in the southern regions, while the northern regions remain more secular in orientation. This is reflective of a larger global pattern in which higher levels of education and socioeconomic growth are linked to a more secular orientation with diminished religious belief and power of organised religion.

The resurgence of traditional religious traditions in Central Asia, especially in rural regions, could be viewed as a short-term reaction to the legacy of state-imposed atheism during the Soviet era, which repressed religious expression for many years. Materials by Epkenhans (2016) on Tajikistan for the period 1998-2016 show a correlation between religious affiliation and the distribution of female roles in community structures, with religious women often taking on more active roles in communal and philanthropic activities, reflecting a stronger involvement in social and cultural initiatives compared to non-religious women. Research by Abdiraiymova and Saimassayeva (2023) on Kazakhstan links religious identity with parameters of socio-economic inequality, particularly in terms of income disparities, access to education, and employment opportunities, with religious minorities facing greater challenges than the majority population in these areas.

A study by Stephan-Emmrich and Toktogulova (2023) describes women's Islamic initiatives in Bishkek. The project sample included more than 60 women aged 20-40 who combined wearing the hijab with entrepreneurial and educational activities. Religious identity is associated with access to new forms of professional and social activity (training, management and psychology courses), while conflicts are noted in interactions with state and secular institutions and within religious communities. According to Abdiraiymova and Saimassayeva (2023), in Kazakhstan, religiously motivated gender norms, combined with low incomes and rural residence, correlate with the limited participation of women in entrepreneurship and civic initiatives.

A study by Zholalieva and Koylu (2022) on the teaching of religious subjects notes an increase in the number of schools where optional courses on the basics of religion have been introduced since 2018. The increase is estimated at approximately one-third, based on the number of schools that previously offered such courses. About 80% of these programmes focus on the Islamic tradition. Female students are more often than male students subject to restrictions by the administration and their families (dress codes, participation in extracurricular activities, choice of educational paths). The educational space acts as a point of intersection between religious, gender, and ethnic identities. Restrictions are manifest in the form of consistent micro-practices, such as limiting dress options, controlling participation in activities deemed inappropriate, and guiding career choices based on gender norms, which gradually affect the long-term social and professional status of women. The normative framework of Tajikistan after 1997 (Epkenhans, 2016) tightens control over public religiosity, with the secular, atheist political elite imposing restrictions on religious practices in public life, particularly in educational settings. This strategy is similar to the situation in Kyrgyzstan, where the government enforces laws that limit the amount of religious expression in schools despite the country's greater religious diversity, frequently giving secular norms precedence over individual religious convictions.

The study by D. A. Osmonova (2018) contains data on contradictions between religious prescriptions and legal norms in matters of marriage and family relations. In some regions of Kyrgyzstan, up to 20% of marriages were concluded under the *ala-kachuu* tradition, which is subject to criminal law prohibitions; within communities, the practice is justified on religious or cultural grounds. It is important to note that *ala-kachuu* is a local custom rather than a religiously sanctioned practice; it is not prescribed by Islam but rather justified by cultural traditions, despite being prohibited under Kyrgyzstan's criminal law. The intersection of gender and religious identities leads to the justification of marriages without state registration and tolerance of the *ala-kachuu* practice; in Uzbek communities in southern Kyrgyzstan, a higher level of collective control over the conditions of marriage has been recorded. A comparison with Kazakhstan indicates the reproduction of gender restrictions through a combination of religious identity and socio-economic status, with differences in institutional settings (Abdiraiymova & Saimassayeva, 2023). Figure 4 presents an aggregated visualisation of gender differences in religious practice in Kyrgyzstan, with comparable trends for Kazakhstan and Tajikistan for the period after 1991 (Agadjanian, 2023). Figure 4 shows gender differences in religious practices identified in academic research, reflecting the characteristics of women's and men's participation in religious life in Kyrgyzstan.

Figure 4 shows the difference in the level of religious involvement between men and women in Kyrgyzstan, Kazakhstan and Tajikistan. According to data from Agadjanian (2023), about 70% of women regularly participate in rituals and observe religious practices, while among men this figure is approximately 50%. Thus, the difference reaches 20 percentage points. In Kazakhstan, according to Abdiraiymova and Saimassayeva (2023), socio-economic status correlates negatively with participation of women in religious and social practices in rural areas. In Tajikistan, according to Epkenhans (2016), regulation supporting religion has been strengthened since 1997, and there is greater institutional control over women's participation in the religious sphere. These data indicate that it is women who play a prominent role in the reproduction of religious identity in society. In Kyrgyzstan, this is reflected in family and ethnic traditions, as it is through the female population that religious norms are passed on to subsequent generations and maintained as part of cultural practice. The gap in the level of involvement also indicates that gender and religion form a specific area of intersection between identities. Women are not only participants in rituals but also mediators between religious precepts and ethnic community life. At the same time, the lower rate among men demonstrates that their identity is formed in more variable conditions, with some oriented towards religious traditions and others towards secular or hybrid practices, such as materialism, which prioritises career, money, and individual achievement. This difference becomes a source of tension between the formal principles of equality and the actual structure of everyday life (Apakhayev et al., 2024).

The use of MAXQDA, AntConc, and SPSS software identified a range of stable categories and confirmed their statistical significance. During the semantic coding of texts (academic articles, legal documents, and cultural reports) in MAXQDA for 2010-2025, four main categories were identified: "law", "tradition", "religious practice", and "gender role". In 38% of the recorded cases, these categories overlapped

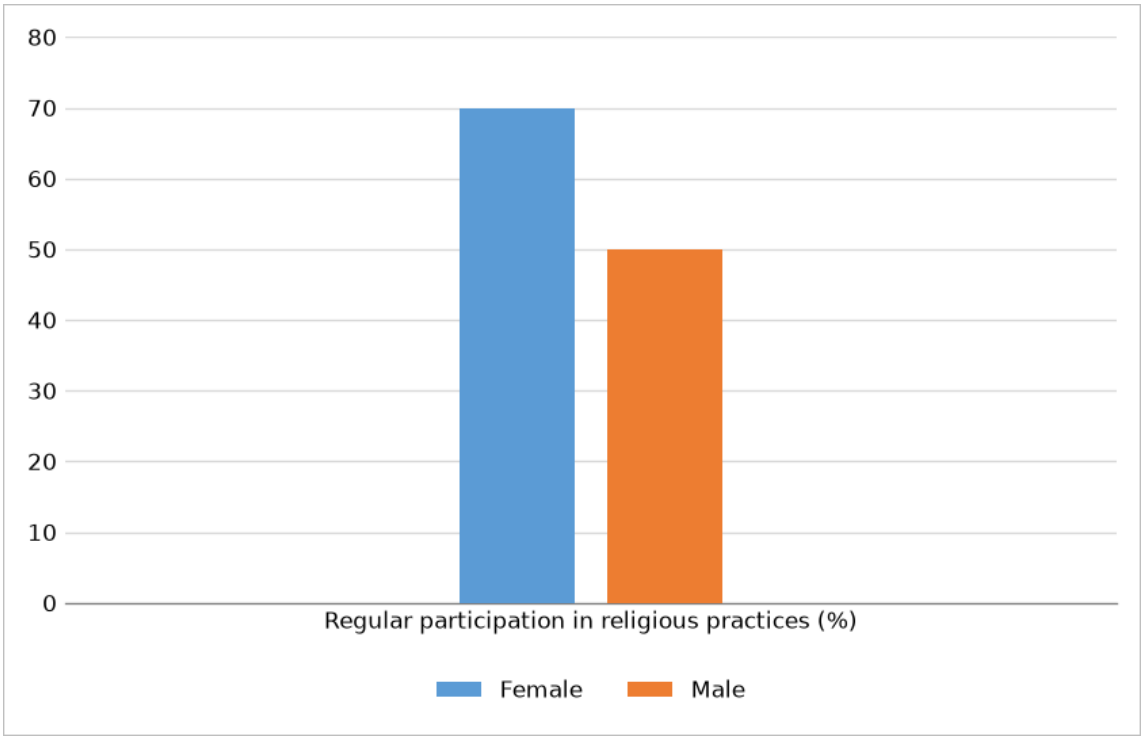

Figure 4: Gender differences in religious practices according to academic research

Source: compiled by the authors based on Osmonova (2018), Zholalieva and Koylu (2022), Agadjanian (2023), Stephan-Emmrich & Toktogulova (2023), Abdiraiymova & Saimassayeva (2023).

in several areas, demonstrating the complexity of identity structures. For example, in materials related to *ala-kachuu*, 55% of references were related to both the legal and traditional frameworks, and in 27% of cases they also included religious discourse, which turned the practice of bride kidnapping into a triple knot of identities. A comparison with cases in Kazakhstan (restrictions on women's marches; U.S. Department of State (2025)) and Tajikistan (regulation of school uniforms; United States Commission on International Religious Freedom (2011)) showed a similar configuration of codes: in Kazakhstani materials, the intersection of "law-tradition-public order" is recorded more often, while in Tajik materials, the intersection of "law-religious practice-clothing/education" is recorded more often.

Frequency analysis in AntConc on a corpus of normative acts and reports from international organisations revealed differences in lexical distribution. In official documents, the most frequently occurring phrases were "equal rights" (about 210 mentions), "freedom of conscience" (183 mentions) and "gender equality" (127 mentions). However, academic publications showed a predominance of the words "control" (96 mentions), "restriction" (87 mentions) and "vulnerability" (73 mentions). This difference indicates that normative discourse focuses on principles and guarantees, while research discourse records real social practices in which these principles are not always implemented. In the comparative corpora of Kazakhstan (Law of the Republic of Kazakhstan No. 483-IV, 2011; materials on public actions), the proportion of lexemes such as "registration", "order", and "traditional values" is higher, while in the Tajikistan corpus (Law of the Republic of Tajikistan No. 739, 2011; recommendations on school uniforms), the terms "prohibition", "dress code" and "compliance" are more common; this reflects the difference in regulatory emphasis despite the similarity of the areas under consideration.

Processing quantitative data in SPSS correlated statistics with theoretical models. For instance, cross-tabulation of data from the 2022 census and United Nations Women (2025) showed that among women of Kyrgyz nationality, the level of completed higher education was 19%, among Uzbek women – 15%, while among women of Russian nationality, this figure reached 34%. Comparable data on male educational achievement show that the percentage of working-age men in Kyrgyzstan who had completed

higher education was roughly 18% in 2020, compared to 19% for women ("UNESCO Higher Education Global Data Report: Working document May 2022", 2022). This suggests a reduced gender gap in tertiary qualification within the labour force.

Men in Russia likewise have high rates of postsecondary education, but women make up a larger percentage of students in this field than men do (57% of tertiary enrolment is made up of female students), suggesting that women are generally more engaged than men in higher education ("UNESCO Higher Education Global Data Report: Working document May 2022", 2022). The χ^2 test confirmed the statistical significance of the differences ($p< 0.01$). In the field of employment, UNDP (2025) data show that the female employment rate in Kyrgyzstan was 57%, but for women of the Uzbek community in Kyrgyzstan, it was 9 percentage points lower, indicating an ethnic component in access to the labour market (UNDP, 2025). A comparison with Kazakhstan and Tajikistan at the regulatory level confirms the role of religious and ethnic affiliation as moderators of access to resources: in Kazakhstan, stricter procedures for registering religious associations (Law of the Republic of Kazakhstan No. 483-IV, 2011) correlate with an emphasis on "order/registration", in Tajikistan, restrictions on religious clothing in schools (Law of the Republic of Tajikistan No. 739, 2011) correlate with an increased frequency of the lexemes "prohibition/compliance" and the barriers to women's participation described in the literature.

Table 2 summarises: (i) the MAXQDA code matrix for key cases (including *ala-kachuu*) with the proportion of intersections between "law-tradition-religious practice-gender role"; (ii) the frequency of key AntConc lemmas across three corpora (KR/KZ/TJ) and relative indices; (iii) the results of χ^2 tests for the contingency tables "education$\times$ethnicity" and "employment$\times$ethnicity", with 95% confidence intervals.

Table 2 demonstrates the consistent results of the three analytical blocks. The MAXQDA (2010-2025) array records four key categories ("law", "tradition", "religious practice", "gender role") and their intersections: at least two categories are present simultaneously in 38% of cases; in materials about *ala-kachuu*, 55% of mentions combine legal and traditional frameworks, and in 27%, religious discourse is added, forming a triple intersection. Comparative markers indicate different configurations of intersections in the region: For Kazakhstan, the combination of "law-tradition-public order" is more frequently recorded (Human Rights Watch, 2020), while for Tajikistan it is "law-religious practice-clothing/education" (United States Commission on International Religious Freedom, 2011).

The SPSS block links discursive differences with empirical indicators of inequality. Overall, the integration of coding, lexical frequencies and cross-tabulations of education/employment indicators confirms the difference between the normative declaration of principles and the practices identified in texts and statistics.

The empirical findings and the study's theoretical framework were found to be internally consistent when the results from MAXQDA, AntConc, and SPSS were compared. The intersectionality perspective is supported by thematic overlaps between law, tradition, religious practice, and gender roles, which demonstrate how multiple identity dimensions interact simultaneously to produce social inequalities. The social construction approach is supported by lexical differences between normative and research corpora, since academic texts document the contested application of equality in daily practices, while official discourse presents it as a legal principle. Since access to resources is influenced by the institutional regulation of ethnic, religious, and gender belonging in Kyrgyzstan, Kazakhstan, and Tajikistan, statistical disparities in education and employment among women of various ethnic groups further reflect identity politics.

Table 2: Integrated results from MAXQDA, AntConc, and SPSS: codes for intersections of "law-tradition-religious practice-gender role," frequency markers, and χ^2 tests (Kyrgyzstan; comparison with Kazakhstan and Tajikistan, 2010-2025)

Analytical block	Indicator/test	Result	N	χ^2	df	p-value
MAXQDA coding	Main categories identified	law; tradition; religious practice; gender role	120 coded text segments	–	–	–
MAXQDA coding	Cases with two or more overlapping categories	46 cases / 38%	120 coded text segments	–	–	–
MAXQDA coding	Ala-kachuu: legal + traditional framework	24 references / 55%	44 references	–	–	–
MAXQDA coding	Ala-kachuu: legal + traditional + religious discourse	12 references / 27%	44 references	–	–	–
AntConc frequency analysis	Official documents: "equal rights", "freedom of conscience", "gender equality"	210; 183; 127 mentions	45 documents / 150,000 tokens	–	–	–
AntConc frequency analysis	Academic and research texts: "control", "restriction", "vulnerability"	96; 87; 73 mentions	60 texts / 180,000 tokens	–	–	–
SPSS statistical testing	Higher education $\times$ ethnicity among women	Kyrgyz women – 19%; Uzbek women – 15%; Russian women – 34%	3,000	90.58	2	<0.001
SPSS statistical testing	Employment $\times$ ethnicity among women	Kyrgyz women – 58%; Uzbek women – 48%; Russian women – 59%	3,000	25.49	2	<0.001

Source: compiled by the authors based on Law of the Kyrgyz Republic No. 184 (2008), Law of the Republic of Tajikistan No. 739 (2009), United States Commission on International Religious Freedom (2011), Law of the Republic of Kazakhstan No. 483-IV (2011), Presidential Statistical Agency of the Republic of Tajikistan (2020), Human Rights Watch (2020), OSCE (2022), Bertelsmann Stiftung (2024), Freedom House (2024), National Statistical Committee of the Kyrgyz Republic (2021, 2023, 2025), Bureau of National Statistics (2025), U.S. Department of State (2025), Law of the Kyrgyz Republic No. 18 (2025), United Nations Women (2025), UNDP (2025).

4 Discussion

A comparison of the data obtained on gender differences in religious involvement and ethnic stratification with international studies shows that the patterns identified have a broader social context. These comparisons are used to situate the Kyrgyz and Central Asian findings within wider debates on intersectional inequality, rather than to suggest full equivalence between different regional contexts. The recorded inequality in women's access to education and the labour market in Kyrgyzstan is consistent with the findings of Ozawa et al. (2026), establishing that the political and economic structure of education in Central Asia reproduces social divisions and limits the potential for social integration. In both cases, there is a correlation between educational trajectories and ethnic and gender factors, as evidenced by differences in higher education completion rates between Kyrgyz (19%), Uzbek (15%) and Russian women (34%). The data obtained on the high prevalence of gender-based violence (more than 30% of women) correlates with the results of Bansal et al. (2023), who note that gender-based violence in low- and middle-income countries often takes institutionalised forms, including restricting women's access to digital technologies and educational resources. The relevance of this comparison lies in the shared mechanism of exclusion, where gender-based vulnerability is reinforced through limited access to institutional, educational, and communicative resources. It is important to recognise that varying definitions and measurement methods of gender-based violence across countries may limit meaningful comparisons with socio-economic and cognitive measures, making precise conclusions difficult (Kobroń-Gąsiorowska, 2021). Restrictions imposed in Kyrgyzstan, such as bans on women's marches and denial of access to schools, are consistent with this trend as examples of technologically and culturally mediated forms of exclusion.

The data on the low representation of women in parliament (20%) and in leadership positions (less than 15%) is comparable to the conclusions of Lipovka and Nugmanova (2025), noting that women's participation in civil society in Central Asia remains limited by structural barriers and cultural expectations. In the present study, these barriers are interpreted not only as gender-based but also as shaped by ethnic affiliation, religious norms, and community expectations. Similarly, the differences identified in the study between formally enshrined rights and their practical implementation correspond to the observations of Carter (2021), demonstrating that gender inequality in the Eastern Neighbourhood is sustained by institutional factors and legal uncertainty. The identified ethno-religious conflicts, including the events of 2010 in Osh and the challenges faced by ethnic minorities in the southern regions, correlate with the findings of Cabieses et al. (2024) on the intersections of gender, migration, and health in Latin America and the Caribbean. In both cases, cultural practices and limited access to resources contribute to the risks of discrimination and vulnerability for certain ethnic groups, although the social outcomes for different minorities can vary. Thus, the comparison supports the intersectional interpretation of conflict as a product of overlapping social positions rather than of a single identity factor.

In the religious sphere, the gender differences identified (70% of women versus 50% of men regularly participate in rituals) are consistent with the findings of Matthews et al. (2025), describing how socio-cultural and historical contexts shape different levels of inclusion of gender and sexual minorities in Asian countries. Although the empirical focus of that study differs from the present research, it is relevant because it shows how religious and cultural environments define the boundaries of public participation for different social groups. However, it is important to note that higher religiosity among women compared to men is a widely observed global pattern, not limited to specific regions or countries. In both cases, it is emphasised that religious practice and cultural expectations determine the boundaries of participation in the public sphere. Additionally, the results echo those of Silva (2025), noting the importance of gender identities as an analytical category that influences the structure of social interactions. Taken together, these findings confirm that gender identity should be analysed in connection with religious practice and ethnic belonging, especially in societies where community norms strongly influence access to public and institutional spaces.

The finding that the practice of *ala-kachuu* remains prevalent in up to 20% of marriages in rural areas indicates the persistence of coercive marital practices that restrict women's consent and autonomy. This practice should not be directly equated with transnational marriage. As demonstrated by Lu and Yeung (2024), transnational marriage may provide women with additional marital, social, and mobility opportunities

that might otherwise be unavailable to them, although individual outcomes may vary depending on legal and socioeconomic conditions. Therefore, the comparison is relevant only as a contrast between a coercive domestic practice and a form of marriage that may expand women's choices and agency, rather than as evidence that both practices create equivalent structural barriers. In the Kyrgyz context, this confirms that marriage practices are shaped not only by gender norms but also by traditional authority, ethnic community expectations, and the limits of legal enforcement.

The gender distribution in employment and education in Kyrgyzstan, as identified in the study, is comparable to the observations of Zhao (2022) on changes in male migration patterns and the transformation of masculinity in post-Soviet Uzbekistan. In both cases, the study demonstrated that the redistribution of economic roles, with men migrating for work, results in an increased burden on women, who are expected to manage both family responsibilities and their own careers. This often leads to women shouldering additional domestic duties while facing limitations in access to opportunities in the public and professional spheres. This shows how post-Soviet economic restructuring can transform gender roles while preserving unequal access to institutional and professional resources (Mazhibayeva et al., 2026). The identified differences in the level of involvement of men and women in religious practices (70% versus 50%) are consistent with the conclusions of Bosson (2025), which suggest that gender identity influences social behaviours and attitudes, such as participation in religious activities and emotional engagement. These differences can be understood as part of broader psychological patterns of gendered behaviour. At the same time, in Central Asia these patterns are mediated by religious expectations, family structures and community norms, which gives them a specifically regional form.

The findings on unequal access to education and employment among Kyrgyz, Uzbek and Russian women are comparable to the conclusions of Nazari (2024), establishing that the ethnic and religious affiliation of highly skilled migrants in host countries significantly affects their economic integration. Both studies note that ethnicity and religion are significant factors limiting professional opportunities. In the present study, this limitation is observed within national societies rather than migration contexts, but the mechanism remains similar: Ethnic and religious belonging affect access to social and economic mobility. The low level of political representation of women (20% in parliament) is reflected in the observations of Cassese and Friesen (2025), who showed in an analysis of twenty years of publications that gender is one of the key factors determining electoral behaviour and political inclusion. However, gender barriers in the electoral system itself are not always the cause of the gender gap in political representation. Rather, it is a reflection of larger structural and societal issues that restrict women's full engagement in politics, such as social standards, leadership chances, and gendered access to political networks. For Kyrgyzstan, this means that political underrepresentation should be interpreted together with ethnic hierarchy, religious expectations, and unequal access to public authority.

The documented concentration of female employment in low-paid sectors (education, health care, social services) is consistent with the findings of Rao et al. (2025) in South Asian countries, where the predominance of female labour in agriculture and services is linked to the reproduction of structural inequality and limited access to innovative practices. In both cases, economic segregation coincides with the gender dimension. The events of the 2010 Osh conflict, accompanied by ethnic violence, find parallels in the analysis by Rutland (2022), who demonstrated that racism and nationalism form the basis for mass clashes in multi-ethnic societies. In both cases, ethnicity becomes a determining factor in the distribution of resources and the vulnerability of groups. This supports the argument that ethnic identity becomes conflict-generating when it intersects with unequal access to protection, territory, administrative resources, and gendered vulnerability.

Additionally, the documented restrictions on women's access to educational and social resources illustrate how institutional structures may reproduce exclusion when they fail to address the specific needs of particular social groups. Heward-Belle et al. (2025) similarly identified institutional barriers affecting transgender and gender-diverse individuals in healthcare, including discrimination, limited access to appropriately trained professionals, and insufficiently responsive services. However, these findings concern a distinct population and institutional context and should not be treated as directly equivalent to the barriers experienced by women. The comparison is therefore limited to the broader analytical observation that

institutional arrangements may disadvantage different groups through context-specific mechanisms of exclusion.

Thus, a comparison of the results obtained with international studies shows that the intersection of ethnic, religious and gender identities in Kyrgyzstan creates persistent social conflicts comparable to similar processes in other regions of Asia. Marriage practices, the distribution of employment and political representation, as well as ethnic clashes, reproduce the same structural barriers identified in transnational literature. In the Kyrgyz context, these factors are evident in persistent institutional and cultural forms, confirming the universality of the identified patterns while preserving local specificity.

5 Conclusions

The study adds to the understanding of Central Asian societies by showing that gender, ethnicity, and religion should not be considered as separate factors. Their intersection creates particular mechanisms that give rise to social conflicts in public participation, marriage customs, employment, education, and legal regulation. The suggested integrated framework demonstrates how formal guarantees of equality may become less effective in practice when they come into contact with religious interpretations, community expectations, traditional authority, and unequal access to institutional resources. In this way, the study explains why conflicts in the area are caused by the combined operation of cultural, religious, and gender differences within specific institutional and daily contexts rather than by these factors acting alone.

The study's practical significance stems from its applicability to social monitoring, educational regulation, legal reform, and policy design in Tajikistan, Kazakhstan, and Kyrgyzstan. Therefore, policies intended to lessen inequality should take into account the contexts in which gender, ethnicity, and religion overlap and reinforce one another in addition to addressing these factors independently. Policies pertaining to school rules, women's involvement in public life, protection from forced marriage, employment opportunities, and minority group representation are especially crucial. In terms of science, the study broadens the application of intersectionality to the post-Soviet Central Asian context and demonstrates the benefits of integrating statistical testing, lexical frequency analysis, qualitative coding, and documentary analysis for the study of intricate social conflicts.

The limitations of the study were the lack of field interviews and surveys, the incomplete comparability of gender indicators of religious practice for Kazakhstan and Tajikistan, and the limited detail of ethnic cross-sections in statistical sources. Promising areas for further work include the collection of harmonised gender indicators of religious practice based on uniform surveys, the use of mixed methods (focus groups, semi-structured interviews), longitudinal monitoring after 2025, and the expansion of the comparative block to other Central Asian countries.

References

Abdiraiymova, G., & Saimassayeva, A. (2023). Social and economic inequality in Kazakhstan: The contextual factor of religious identity. *Bulletin of Religious Studies*, *35*(3), 3–15. https://doi.org/10.26577/EJRS.2023.v35.i3.r1

Agadjanian, V. (2023). An uneven revival: Gendered ethno-regional intersections of religiousness in Kyrgyzstan. *Problems of Post-Communism*, *70*(3), 317–328. https://doi.org/10.1080/10758216.2021.1974889

Agency on Statistics under the President of the Republic of Tajikistan (2025). Results of population census and housing 2020 (in Tajik and Russian languages). https://www.stat.tj/en/population-and-housing-census.

Altynbekova, G., Iskakova, B., Sattarov, G., Altynbekov, K., Izdenov, A., Yessimov, N., Tanabayeva, S., & Fakhradiyev, I. (2026). Suicidal behavior in the Republic of Kazakhstan, 2023–2024: Trends in suicide deaths and attempts, regional and age-related differences, and factors associated with fatal outcomes. *Psychiatry International*, *7*(3), 114. https://doi.org/10.3390/psychiatryint7030114

Apakhayev, N., Adilova, K., Bugybay, D., Toktybaev, A., & Kopbayev, D. (2024). The problem of protecting the rights and legitimate interests of the child in the family and outside it. *Danube*, *15*(3), 221–236. https://doi.org/10.2478/danb-2024-0013

Arynov, Z. (2021). Opportunity and threat perceptions of the EU in Kazakhstan and Kyrgyzstan. *Central Asian Survey*, *41*(4), 734–751. https://doi.org/10.1080/02634937.2021.1917516

Azhimov, B., Kairbekov, N., Bulan, Z., & Imammadi, T. (2026). Researching a new religious phenomenon of the Central Asia: Digital Sufism. *Occasional Papers on Religion in Eastern Europe*, *46*(1), 90–110. https://doi.org/10.55221/2693-2229.2710

Bansal, V., Rezwan, M., Iyer, M., Leasure, E., Roth, C., Pal, P., & Hinson, L. (2023). A scoping review of technology-facilitated gender-based violence in low- and middle-income countries across Asia. *Trauma, Violence & Abuse*, *25*(1), 463–475. https://doi.org/10.1177/15248380231154614

Bellér-Hann, I., & Hann, C. (2020). *The Great Dispossession: Uyghurs between Civilizations*. LIT Verlag. https://www.eth.mpg.de/5729552/book_325.

Berger, P. L., & Luckmann, T. (1966). *The Social Construction of Reality: A Treatise in the Sociology of Knowledge*. Penguin Books. https://amstudugm.wordpress.com/wp-content/uploads/2011/04/social-construction-of-reality.pdf.

Bertelsmann Stiftung (2024). Bti 2024 country report: Kyrgyzstan. https://www.ecoi.net/en/document/2105908.html.

Bosson, J. K. (2025). Gender identity and aggression. *Annual Review of Psychology*, *76*(1), 635–661. https://doi.org/10.1146/annurev-psych-020124-115456

Botokanova, G. T. (2022). Traditional Kyrgyz society and gender philosophy. *Alatoo Academic Studies*, *22*(2), 248–254. https://doi.org/10.17015/aas.2022.222.32

Brubaker, R. (2011). Religion and nationalism: Four approaches. *Nations and Nationalism*, *18*(1), 2–20. https://doi.org/10.1111/j.1469-8129.2011.00486.x

Bureau of National Statistics (2025). Results of the national population census 2021. https://stat.gov.kz/en/national/2021/.

Cabieses, B., Velázquez, B., Blukacz, A., Farante, S., Bojórquez, I., & Mezones-Holguín, E. (2024). Intersections between gender approaches, migration and health in Latin America and the Caribbean: A discussion based on a scoping review. *Lancet Regional Health - Americas*, *40*, 100538. https://doi.org/10.1016/j.lana.2023.100538

Carter, B. (2021). *Gender Inequalities in the Eastern Neighbourhood Region*. Institute of Development Studies. https://doi.org/10.19088/K4D.2021.062

Cassese, E. C., & Friesen, A. (2025). A look back at 20 years of research on gender and voting in Politics & Gender. *Politics & Gender*, *21*(1), 51–65. https://doi.org/10.1017/s1743923x24000461

Chukhanov, S., & Kairbekov, N. (2024). The importance of a semantic approach in understanding the texts of the holy quran and sunnah. *Pharos Journal of Theology*, *105*(3). https://doi.org/10.46222/pharosjot.105.36

Crenshaw, K. (1991). Mapping the margins: Intersectionality, identity politics, and violence against women of color. *Stanford Law Review*, *43*(6), 1241–1299. https://doi.org/10.2307/1229039

Epkenhans, T. (2016). The origins of the civil war in Tajikistan: Nationalism, Islamism and violent conflict in post-Soviet space. *World of Islam*, *58*(1), 107–114. https://doi.org/10.1163/15700607-00581P06

Freedom House (2024). Nations in transit 2024: Kyrgyzstan. https://freedomhouse.org/country/kyrgyzstan/nations-transit/2024.

Heward-Belle, S., Ciftci, S., & Lovell, R. (2025). Analysing the scientific literature on transgender and gender diverse persons' experiences with sexual and reproductive health care services from an intersectional perspective: A scoping review. *International Journal for Equity in Health*, *24*(1), 12. https://doi.org/10.1186/s12939-024-02328-8

Human Rights Watch (2020). Kazakhstan: Women's day activists convicted: Revise draft law on peaceful protests. https://www.hrw.org/news/2020/03/18/kazakhstan-womens-day-activists-convicted.

Ismailbekova, A. (2022). The importance of female Islamic activism in Kyrgyzstan. https://thediplomat.com/2022/12/the-importance-of-female-islamic-activism-in-kyrgyzstan.

Ismailbekova, A. (2023). Women's Islamic activism rises in Kyrgyzstan. *Current History*, *122*(846), 268–272. https://doi.org/10.1525/curh.2023.122.846.268

Jabbarova, A. (2019). How Kyrgyz authorities almost banned a women's rally on International Women's Day. https://globalvoices.org/2019/03/08/how-kyrgyz-authorities-almost-banned-a-womens-rally-on-international-womens-day.

Khalid, A. (2014). *Islam after Communism: Religion and Politics in Central Asia*. University of California Press. https://www.ucpress.edu/book/9780520282155/islam-after-communism.

Kobroń-Gąsiorowska, Ł. (2021). Censorship and whistleblowing in a workplace: Selected issues. *Acta Universitatis Lodziensis. Folia Iuridica*, *97*, 131–142. https://doi.org/10.18778/0208-6069.97.07

Kobroń-Gąsiorowska, Ł. (2026). Volatility as a legal challenge: Rethinking labor law responses to workplace violence – European approach. *Review of European and Comparative Law*, *64*(1), 169–194. https://doi.org/10.31743/recl.19828

Krol, G. (2021). Amending legislatures in authoritarian regimes: Power sharing in Post-Soviet Eurasia. *Democratization*, *28*(3), 562–582. https://doi.org/10.1080/13510347.2020.1830065

Kurmanbekova, A. (2020). Unveiling girls' madrasahs in Kyrgyzstan [CAP Fellows Paper No. 228]. https://centralasiaprogram.org/wp-content/uploads/2020/02/CAP-Papers-228-Aichurek-Kurmanbekova.pdf.

Law of the Kyrgyz Republic No. 18 (2025). On freedom of religion and religious associations. https://cbd.minjust.gov.kg/4-5465/edition/25082/kg.

Law of the Kyrgyz Republic No. 184 (2008). On state guarantees of equal rights and equal opportunities for men and women. https://cbd.minjust.gov.kg/202398/edition/382698/kg.

Law of the Republic of Kazakhstan No. 483-IV (2011). On religious activities and religious associations. https://adilet.zan.kz/rus/docs/Z1100000483.

Law of the Republic of Tajikistan No. 739 (2011). On freedom of conscience and religious associations. https://www.wto.org/english/thewto_e/acc_e/tjk_e/wtacctjk26_leg_6.pdf.

Lipovka, A. V., & Nugmanova, M. (2025). Perspectives on the role of women in future civil societies in Central Asia. In *Central Asian Women in Leadership: Challenges and Opportunities* (pp. 161–190). Palgrave Macmillan. https://doi.org/10.1007/978-3-031-81950-6_8

Lu, S., & Yeung, W.-J. J. (2024). The rise in cross-national marriages and the emergent inequalities in East and Southeast Asia. *Sociology Compass*, *18*(5), e13219. https://doi.org/10.1111/soc4.13219

Mamaraimov, A. (2008). Headscarf ban remains live issue in Central Asia. https://iwpr.net/global-voices/headscarf-ban-remains-live-issue-central-asia.

Matthews, A. K., Kittiteerasack, P., Inwanna, S., Ogata, A., Tran-Chi, V.-L., Loa, R., & Waluyo, A. (2025). A description of the social, cultural, and historical context for sexual and gender minority individuals in ASEAN countries. *Sexuality & Culture*, *29*(5), 2457–2575. https://doi.org/10.1007/s12119-025-10374-9

Mazhibayeva, G., Kenesbayev, S. M., Idrissov, S. N., Salgozha, I. T., & Akhmetova, Z. A. (2026). Use of innovative methods in the creation of testing and assessment materials for future computer science teachers. *Higher Learning Research Communications*, *16*(1). https://doi.org/10.18870/hlrc.v16i1.1623

National Statistical Committee of the Kyrgyz Republic (2021). Women and men of the Kyrgyz Republic: 2016-2020. https://kyrgyzstan.unfpa.org/sites/default/files/pub-pdf/8f7fc721-c04b-4376-b411-03777feef9a5.pdf.

National Statistical Committee of the Kyrgyz Republic (2023). Demographic yearbook of the Kyrgyz Republic 2018-2022. https://www.lifetable.de/File/GetDocument/data/KGZ/KGZ000020222022CU1.pdf.

National Statistical Committee of the Kyrgyz Republic (2025). Population and housing census of the Kyrgyz republic 2022. https://stat.gov.kg/en/publications/perepis-naseleniya-i-zhilishnogo-fonda-kyrgyzskoj-respubliki-2022-goda-kniga-i-osnovnye-socialno-demograficheskie-harakteristiki/.

Nazari, S. (2024). The intersectional effects of race, gender, and religion on the economic integration of high-skilled immigrants: A literature review. *Journal of International Migration and Integration*, *25*(4), 2213–2252. https://doi.org/10.1007/s12134-024-01171-8

Omarova, A., Sarybayeva, I., Shedenova, N., Aryn, D., & Zhakypbek, A. (2026). Gender aspects of external labor migration of the economically active population of Kazakhstan. *Gender, Work & Organization*, *33*(4), 1504–1515. https://doi.org/10.1111/gwao.70143

OSCE (2022). Osce annual report 2021 [Organisation for Security and Co-operation in Europe]. https://www.osce.org/annual-report/2021.

Osmonova, D. A. (2018). Features of contradictions and interactions between gender and religion in modern Central Asia. *International Journal of Applied and Fundamental Research*, *11*(1), 170–174. https://applied-research.ru/ru/article/view?id=12471.

Osmonova, D., Zhunushova, S., Kostuk, S., Bekboeva, A., & Alykulova, G. (2024). Sociological study of the religious identity of young people in Central Asia and Europe. *Pharos Journal of Theology*, *105*(3). https://doi.org/10.46222/pharosjot.105.316

Ozawa, V., Durrani, N., & Thibault, H. (2026). The political economy of education in Central Asia: Exploring the fault lines of social cohesion. *Globalisation, Societies and Education*, *24*(4), 1192–1205.

Podoprigora, R., Apakhayev, N., Zhatkanbayeva, A., Baimakhanova, D., Kim, E. P., & Sartayeva, K. R. (2019). Religious freedom and human rights in Kazakhstan. *Statute Law Review*, *40*(2), 113–127. https://doi.org/10.1093/slr/hmx024

Presidential Statistical Agency of the Republic of Tajikistan (2020). Dissemination of 2020 Tajikistan population and housing census data. https://unece.org/sites/default/files/2023-09/WS10RizoevENG.pdf.

Rao, N., Sathe, R., & Grist, N. (2025). Gender, intersectionality and climate smart agriculture in South Asia: A review. *PLoS Climate*, *4*(2), e0000482. https://doi.org/10.1371/journal.pclm.0000482

Rutland, P. (2022). Racism and nationalism. *Nationalities Papers*, *50*(4), 629–642. https://doi.org/10.1017/nps.2021.60

Rybina, L., & Lee, T. (2021). Traveler motivation and destination loyalty: Visiting sacred places in Central Asia. *Tourism and Hospitality*, *2*(1), 1–14. https://doi.org/10.3390/tourhosp2010001

Sharipova, D., & Burkhanov, A. (2021). Nation-building in Central Asia: Policy and discourse. In *Routledge Handbook of Contemporary Central Asia* (pp. 101–114). Routledge. https://doi.org/10.4324/9780429057977-10

Silva, T. (2025). Sexual identities: The state of the field and future directions. *Sex & Sexualities*, *1*(1), 172–181. https://doi.org/10.1177/3033371251331903

Smagulova, D. S., Rakhmetov, Y. S., Smanova, A. B., Konysbai, B., & Shansharbayeva, B. (2018). The role of the Republic of Kazakhstan in international legal support of energy security. *Journal of Environmental Management and Tourism*, *9*(7). https://doi.org/10.14505/jemt.v9.7(31).10

Solvang, O., Neistat, A., & Denber, R. (2010). "Where is the justice?": Interethnic violence in Southern Kyrgyzstan and its aftermath [Human Rights Watch].

Spytska, L. (2023). The nature of sexual violence: The criminological concept of victimisation. *Pakistan Journal of Criminology*, *15*(4), 1–20.

Stephan-Emmrich, M., & Toktogulova, M. (2023). Female, veiled, active: Muslim professionals in self-development training in today's Kyrgyzstan. *International Quarterly for Asian Studies*, *54*(4), 363–388. https://doi.org/10.11588/iqas.2023.4.21064

Terzyan, A. (2021). Minority rights in Central Asia: Insights from Kazakhstan, Kyrgyzstan & Uzbekistan. *Journal of Liberty and International Affairs, Institute for Research and European Studies - Bitola*, *7*(2), 103–115. https://doi.org/10.47305/jlia21720103t

Tleshaliyev, N., Tleubayev, A., Duisenbayeva, G., Tsoy, A., & Smanova, A. (2025). State information policy in the context of hybrid threats: Legal and political aspects. *Social and Legal Studios*, 131–143. https://doi.org/10.32518/sals2.2025.131

Umarov, A. (2020). Central Asia: Construction of the new regional security complex? *Journal of Cross-Regional Dialogues*, *1*, 69–82. https://doi.org/10.25518/2593-9483.135

UNDP (2025). Fact sheet on gender equality 2025. https://www.undp.org/kyrgyzstan/publications/undp-fact-sheet-gender-equality-2025.

UNESCO Higher Education Global Data Report: Working document May 2022 [UNESCO] (2022). https://www.right-to-education.org/sites/right-to-education.org/files/resource-attachments/UNESCO_Higher%20Education%20Global%20Data%20Report_Working%20document_May2022_EN_0.pdf?utm_source=chatgpt.com.

United Nations Women (2025). Kyrgyzstan: Strategic note period 2023-2027. https://open.unwomen.org/en/country-results/KG.

United States Commission on International Religious Freedom (2011). Annual Report of May 2011 – Tajikistan. https://www.osce.org/files/f/documents/3/b/82950.pdf.

U.S. Department of State (2025). Kyrgyz Republic. https://www.state.gov/reports/2023-country-reports-on-human-rights-practices/kyrgyz-republic.

Usenov, A. (2022). Religious politics in Kyrgyzstan: Analysis of achievements and issues. https://cabar.asia/en/religious-politics-in-kyrgyzstan-analysis-of-achievements-and-issues.

Volkov, V. (2025a). Features of the linguistic identity of the Russian population in Latvia. *Forum for Linguistic Studies*, *7*(2), 882–902. https://doi.org/10.30564/fls.v7i2.8320

Volkov, V. (2025b). The Russian ethnic minority in the organizational and entrepreneurial culture of Latvia. In C. J. Lin (Ed.), *Ethnic Minorities: Cultural Perspectives, Stereotypes and Social Challenges* (pp. 59–80). Nova Science Publishers.

Yilmaz, S. (2020). A model proposal for the Union of Central Asian States in the context of region and regional integration. *İnsan ve Toplum Bilimleri Araştırmaları Dergisi*, *9*(5), 3229–3243. https://doi.org/10.15869/itobiad.768896

Zhao, Y. (2022). Breadwinning, migration, and nation-building: A critical scoping review of men, masculinities, and social change in post-Soviet Uzbekistan. *Norma: International Journal for Masculinity Studies*, *17*(2), 124–142. https://doi.org/10.1080/18902138.2022.2026106

Zholalieva, Z., & Koylu, M. (2022). Religious education at public schools of Kyrgyzstan: History and current situation. *British Journal of Religious Education*, *44*(3), 403–409. https://doi.org/10.1080/01416200.2022.2046547

Zholmukhan, T., Smagulov, M., Kairbekov, N., & Sydykova, R. (2024). Conceptual approach to understanding the social aspects of the educational potential of the Islamic studies. *Pharos Journal of Theology*, *105*(3). https://doi.org/10.46222/pharosjot.105.313

MANKIND QUARTERLY Mankind Quarterly, 67(1), 170-171 2026 Fall Edition
ISSN: 0025-2344

Corrigendum for the article "Ethnic Vigilantism Propensity Index: Evidence from the Russian Federation", *Mankind Quarterly* 64(4), 690–720 (doi: 10.46469/mq.2024.64.4.7)

Pavel V. Ivanov

(Revision of interpretation and additional robustness checks for the relationship between ethnic heterogeneity and ethnic vigilantism propensity index)

Following the publication of the original article in 2024, post-hoc robustness analyses revealed that the reported association between ethnic heterogeneity (EH) and the Ethnic Vigilantism Propensity (EVP) index—which, due to incompletely addressed short non-stationary time series issues, yielded a strong positive association between the aforementioned covariates—is likely sensitive to temporal specification and may be partially described as a result of co-trending over the studied time interval. Neither first-difference transformations nor cointegration tests (including the Bartlett correction) revealed a signal of a stable linear association. A nonlinear detrending based on generalized additive models (GAMs) retained a weakened but statistically significant residual association between EH and EVP, suggesting that some possible association remained after nonlinear detrending under conventional testing. Nevertheless, Monte Carlo simulations calibrated to the observed series characteristics indicated that the magnitude of this residual association was only marginally unusual relative to that expected under independent trending processes.

Additionally, a segmented regression analysis indicated a potential break in the suggested relationship, where the model identified a sharp breakpoint at EH = 23.135 (approximately the midpoint of the time series). Prior to this threshold, the association is positive and statistically significant (β = .520, p = .006). However, beyond this breakpoint, the effect of EH vanishes with the slope dropping to zero (β = -0.010). These findings should be interpreted cautiously given the small sample size because they tend to indicate that the EH–EVP association may be more complex than originally assumed.

On a purely theoretical level, we may suggest the possibility that EVP rises with rising ethnic heterogeneity when the proportion of ethnic minority individuals is low. Greater exposure to ethnic diversity may reduce the marginal effect of further increases in EH on EVP. But any interpretation is very tentative with this kind of time series. Another possibility to think of is that the effect of rising ethnic diversity has a delayed effect on EVP. But, given the non-stationarity issue, such pattern also can be a result of spurious regression. Accordingly, the interpretation of EH in the original paper as a robust predictor of EVP has to be revised. Nevertheless, the idea of operationalizing political system erosion via a complex index as a possible marker still remains relevant because of its theoretical potential.

Analysis	Key metric	Statistical significance
Raw level correlation (Kendall's τ)	τ = .579	p = .0005 (Strong association in levels)
Linear detrending (Time controlling)	$\tau = -.285$	p = .074
GAM non-linear detrending	τ = .323	p = .041 (Weakened residual effect)
Monte Carlo testing of non-linear detrending GAM		p = .114
First-difference transformation	$\tau = -.042$	p = .825 (No short-run dynamic)
Lead–lag correlation (*Lead-lag correlations on raw levels remain inflated due to the shared temporal trend*)	τ = .600	p = .0004
Lead–lag correlation EVP(t-1) $\rightarrow$ EH(t)	τ = .535	p = .0019
Baseline Time GAM	R^2 = .79	p $<$ .0001 (Time trend explains most variance)
Extended Model GAM	EH's signal	p = .239 (sadly, EH adds no incremental power)
Segmented Regression (Slope before break: EH $<$ 23.135)	β = .520	p = .0059 (Significant)
Segmented Regression (Slope after break: EH $>$ 23.135)	$\beta = -0.010$	p $>$ .10 (Effect fades)

All supplementary diagnostic outputs have been deposited in the original public repository (https://doi.org/10.17605/OSF.IO/FNUME) associated with the article to ensure full transparency and reproducibility.

About Mankind Quarterly

Mankind Quarterly was founded as a quarterly journal of anthropology, in the broadest sense of "the science of man," in 1961. This was a time when the study of man had already diversified into physical anthropology, ethnography, quantitative cross-cultural research, archaeology and other subspecialties.

These developments took place against the background of a widening gulf between the biological and social sciences. Following the leading dogma of the day, cultural and social anthropologists in academe had begun to deny the importance of biology for behavioral and cultural phenomena. Conversely, biological (physical) anthropologists aligned themselves with the "hard" sciences, many describing themselves as human biologists rather than anthropologists in an attempt to distance themselves from a social anthropology that they no longer saw as scientifically sound. In many places, these divisions persist to the present day. *Mankind Quarterly* was founded as a response to these centrifugal trends. Its founders believed in the interdependence of human biology, behavior and culture, and they understood biological and cultural diversity as the outcomes of evolutionary, ecological, and historic processes.

In short, *Mankind Quarterly* was established as a journal for those scholars who still believed in a unified "science of man" that studies the interactions between biological and cultural diversity. It was first published in Edinburgh, Scotland in 1961, and then, from 1979 to 2014, by the Council for Social and Economic Studies (chaired by Roger Pearson) in Washington, D.C. In January 2015, publication was transferred to the Ulster Institute for Social Research, a non-profit organization in London, England. Throughout its existence, *Mankind Quarterly* has maintained its character as a journal devoted to the interdisciplinary study of man. New developments in the field were reflected in the journal early on. When first sociobiology and then evolutionary psychology developed descriptions of human nature and explanations for cultural universals, the new developments found expression in the journal. The same happened with behavioral genetics, which like sociobiology saw major advances during the last three decades of the 20^{th} century.

Today the editorial board includes scholars from 12 countries who represent a wide variety of disciplines including primatology, physical anthropology, archaeology, cultural anthropology, human genetics, differential psychology, sociology, and history. Despite their varied expertise and views, the editors share a common interest in the evolutionary and historical processes that generate human diversity, and in the universal features of human nature that constrain this diversity. Because history and biological evolution are ongoing processes, this includes an interest in the social, cultural, demographic and biological changes that are taking place in modern societies.

Some of the articles the journal publishes deal with the evolutionary and historic processes that have created the racial, ethnic, linguistic and cultural diversity we see today. Others describe present-day cultural diversity and ongoing trends, especially at the psychological level. During the last years, intelligence and its change over time have been especially active research areas, and a substantial part of this work has been published in *Mankind Quarterly*. The subject is important because education and intelligence are considered the key drivers of cultural change and economic growth, not only in developing countries but also in mature postindustrial societies. Other areas of special interest are the demographic changes that are taking place in countries today and that are shaping the world of the future.

Historically, *Mankind Quarterly* has earned a reputation for publishing articles in controversial areas, including behavioral race differences and the importance of mental ability for individual outcomes and group differences. During the "Bell Curve wars" of the 1990s, it became a target of attack when opponents realized that some of the work cited by Herrnstein and Murray had first been published in *Mankind Quarterly*. However, much of this science has stood the test of time. For example, the importance of genes for individual differences in intelligence is no longer controversial, and genetic effects on individual and group differences that were merely inferred in earlier research are now studied at the molecular level. There is nothing wrong with being at the embattled forefront of new scientific developments.

Most of the research that *Mankind Quarterly* publishes today is "normal" science, but the editors still welcome controversy and new ideas. They see it as part of the journal's mission to provide a forum for the presentation and discussion of theories and empiric research that challenge entrenched beliefs. Of course, the often contradictory views that are represented in *Mankind Quarterly* are those of the individual authors, not those of the journal's publishers or editors.

Notes for Authors

As a peer-reviewed academic journal of anthropology, *Mankind Quarterly* publishes articles on all aspects of the science of man, ranging from cultural and physical anthropology, and psychology and behavioral genetics, to demography, mythology, and the history of religion.

However, the editors are especially interested in articles relating to cultural and biological evolution, and to the interaction between biology and culture. Such topics include

(1) the historical origins of present-day cultural and biological diversity using approaches from history, archaeology, linguistics, mythology, and population genetics;

(2) the study of cultural and biological trends in contemporary societies including cross-cultural studies of personality, intelligence, and culturally transmitted beliefs and values, as well as the study of demographic trends and trends in physical characters and gene frequencies over time; and

(3) the implications of current trends for future human evolution.

Included in these areas of special interest are articles dealing with the evolution of personality, its expression in varying cultural, ecological, and economic conditions, and its implications for future cultural and biological evolution. Interdisciplinary approaches that integrate findings from historically separate disciplines and subdisciplines are especially encouraged.

Mankind Quarterly publishes research reports, theoretical articles, data-driven reviews, book reviews, and short communications on new discoveries or critical comments on published papers, either in *Mankind Quarterly* or elsewhere. Because *Mankind Quarterly* is read by individuals from diverse backgrounds, the authors of highly specialized or technical articles are asked to present the background and significance of their work clearly and concisely. Book reviews should also deal with publications that will be of interest to a non-specialist audience.

Theoretical articles may be speculative or controversial or both, but must be based on solid data. Submissions are evaluated only based on scientific soundness, relevance, and interest. Manuscripts should be composed in **Microsoft Word** and submitted electronically to:

submissions@mankindquarterly.org

The editors may request a printed copy of any article which is accepted for review by the journal's referees. The review process usually takes 1-3 months. Every effort is made to publish articles within six months after final acceptance.

Typography

Required typography for manuscripts that have been accepted for publication. Please read the requirements carefully, as they may have been updated.

Authors and Affiliations

Please include the city, country, and/or institution for each author. If an author wishes to stay anonymous, we may put "Independent Researcher" as the affiliation.

Abstracts and Keywords

All manuscripts should include keywords, a brief abstract, and an email or postal address for correspondence.

Numbering and Naming Sections

All sections and subsections (and subsubsections) must be numbered. Sections, Subsections, and Subsubsections are separated by a full stop ".", such as "1" or "2.1" or 4.1.2". After numbering the section/subsection/subsubsection, include the name of said (sub/subsub)section, such as "2 Methodology", "2.1 Data Gathering" or "2.1.1 Survey Design". The very first section of the manuscript should be named "1 Introduction".

Hyphens

Please do not manually hyphenate words at the ends of lines – not even when preparing tables.

Indents and Tables

Tables must be constructed using the MS Word table-building function. Images of tables will not suffice. Kindly do not create columns and indents by pressing the space bar multiple quantity of times.

References to Figures, Tables, Quotes, and Equations

In the interest of clarity, when referring to a Figure, Table, Quote, and/or Equation, do so by numbering each one of them, such as "See Figure 1", or "We calculated the results utilizing the method from Equation 5". Avoid spatial references such as "See the Table below", as the placement of Figures, Tables, Quotes, and Equations may be changed.

Figures and Images

When submitting a manuscript for publication, please ensure that any Figures or Images referenced in the text are included as separate files along with your complete manuscript. This means attaching the Figures or Images separately in the email if you are submitting via email.

Note on Image Quality: For optimal clarity, especially as *Mankind Quarterly* transitions to a fully digital format in the next issue, authors are encouraged to submit high-quality Figures and Images at a resolution of 300 ppi (pixels per inch) at the intended display size. This ensures that graphs, charts, and text within Figures remain sharp and legible, addressing issues with low-resolution submissions (e.g., below 75 ppi) where text may be illegible. To balance quality and practicality, aim for file sizes between 1 MB and 50 MB per image, depending on complexity. Avoid excessively large files (e.g., over 1 GB) by using efficient formats like PNG or JPEG for raster images or PDF for vector graphics. If you have concerns about file size or format, please contact the editorial team for guidance.

Lists

Lists must be created using the MS Word facility for building lists.
An example of an itemized/un-numbered list:

- First item.
- Second item.

An example of an enumerated/numbered list:

1. First item.
2. Second item

Footnotes

Footnotes must be created using the MS Word facility for building footnotes so that the footnote number in the text is digitally linked to the footnote itself. Footnote numbers must be “superscript”, not “raised”. *Mankind Quarterly* does not use endnotes.

References

References at the end of the article must be alphabetically by author, or, where necessary, by name of publication. If available, references must include a Digital Object Identifier (DOI). References and bibliographic data must be formatted according to the following examples:

Journal articles:

Lynn, R. & Irwing P. (2002). Sex differences in general knowledge, semantic memory, and reasoning ability. *British Journal of Psychology 93*(4), 545–556. doi: 10.1348/000712602761381394.

Books:

Lynn, R. & Vanhanen, T. (2012). Intelligence: A Unifying Construct for the Social Sciences. London: Ulster Institute for Social Research.

Articles in edited collections:

Rushton, J. P. (2003). Race differences in *g* and the Jensen effect. In: H. Nyborg (ed): The Scientific Study of General Intelligence: A Tribute to Arthur R. Jensen. Amsterdam: Pergamon.

Material published online:

Statistics New Zealand (2013). http://www.indexmundi.com/new_zealand/demographics_profile.html. Retrieved 10th of February 2025.

MANKIND QUARTERLY

Mankind Quarterly is published by Mankind Publishing House.