JOURNAL OF SCIENCE TECHNOLOGY AND EDUCATION 14(1), JANUARY, 2026
E-ISSN: 3093-0898, PRINT ISSN: 2277-0011; Journal homepage: www.atbufstejoste.com

Influence of Heredity and Socio-Economic Factors on Physical Activities among Habitants of Tsugugi Village in Sabon Garin Zaria

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ABSTRACT

This study investigates the influence of hereditary and socio-economic factors on the physical activity levels of habitants in Tsugugi Village, Sabon Gari Zaria, Kaduna State. A descriptive survey design was employed, with a sample size of 300 respondents selected using a multi-stage sampling technique. Data were collected through a structured questionnaire and analysed using descriptive and inferential statistics, including ANOVA. Results revealed that hereditary factors significantly influence physical activity levels, with genetic traits such as stamina and physical fitness playing a critical role. Socio-economic factors, including financial constraints, lack of time, and limited access to facilities, were also found to significantly affect participation in physical activities. Furthermore, the interaction between heredity and socio-economic factors demonstrated a combined impact on activity patterns. Based on the findings, the study recommends the implementation of community health education programs, the development of accessible recreational facilities, targeted interventions that consider hereditary predispositions, and policy support to reduce socio-economic barriers. These efforts aim to improve physical activity levels and overall health in the community.

ARTICLE INFO
Article History
Received: September, 2025
Received in revised form: November, 2025
Accepted: January, 2025
Published online: January, 2026

KEYWORDS
Heredity, Socio-Economic Factors, Physical Activities, Habitants

INTRODUCTION

Physical activity is a crucial determinant of health, playing a significant role in reducing the risk of chronic diseases such as obesity, diabetes, cardiovascular diseases, and mental health disorders (World Health Organization [WHO], 2020). However, physical activity levels vary widely across different populations, influenced by both hereditary and socio-economic factors. Hereditary factors contribute to variations in muscle composition, endurance capacity, metabolic rate, and physical fitness levels, making some individuals naturally more active than others (Bouchard, Rankinen & Timmons, 2015). On the other hand, socio-economic factors, including income level, education, occupation, and access to recreational facilities, also shape individual and community engagement in physical activities (Bailey, Hillman, Arent, & Petitpas, 2013).

At a global scale, insufficient physical activity is a major public health concern, contributing to approximately 5 million deaths annually (Guthold, Stevens, Riley, & Bull, 2018). According to WHO (2022), 27.5% of adults worldwide do not meet recommended physical activity levels, with higher inactivity rates in high-income countries (36.8%) compared to low-income countries (16.2%). Studies suggest that genetic predispositions can account for up to 50% of an individual's physical activity level, influencing endurance, strength, and aerobic capacity (Rankinen, Fuku, Wolfarth, Sarzynski, Bouchard, & Pérusse, 2016). Additionally, socio-economic factors significantly impact participation in physical activities, as wealthier populations have greater access to recreational infrastructure, organized sports, and fitness programs (Kohl, Craig, Lambert, Inoue, Alkandari, Leetongin, & Kahlmeier, 2012).

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In Africa, physical activity levels are largely dictated by environmental, occupational, and socio-economic factors. Rural populations engage in higher levels of physical activity due to reliance on manual labor, subsistence farming, and walking as a primary mode of transportation (Oyeyemi Abegunde, Oyeyemi, & Adegoke, 2016). However, urbanization and modernization have led to increased sedentary lifestyles, particularly in middle- and high-income urban households (Goryakin et al., 2017). Empirical data show that 42% of urban African populations fail to meet WHO physical activity recommendations, compared to 18% in rural areas (Guthold Stevens, Riley, & Bull, 2018). Furthermore, studies have identified a genetic predisposition to endurance and muscular strength in certain African ethnic groups, impacting their engagement in sports and physical activities (Tishkoff, Reed, Ranciaro, Voight, Babbitt, Silverman & Williams, 2012).

In Nigeria, socio-economic factors play a major role in determining physical activity levels. Research indicates that only 32% of adults meet WHO-recommended physical activity levels, with rural populations being more active than their urban counterparts (Adegoke, Oyeyemi, & Akinroye, 2010). The urban-rural divide is largely due to differences in occupation, lifestyle choices, and access to recreational facilities. A study by Ogunlesi Adedokun, & Adeyemi, (2019) found that 67% of rural Nigerians engage in regular physical activity, compared to 29% of urban dwellers. Manual laborers and farmers exhibit significantly higher activity levels than office workers and professionals. Women are less physically active than men, primarily due to socio-cultural barriers and household responsibilities. Lower-income groups tend to be more physically active, but not necessarily for health-related reasons—it is often linked to occupational demands rather than recreational exercise.

Additionally, hereditary factors such as family history of obesity, cardiovascular diseases, and metabolic disorders influence physical activity levels in Nigeria (Ibrahim, Musa & Umar 2022). Studies suggest that individuals with a family history of obesity are 60% more likely to be physically inactive compared to those without such genetic predispositions (Oladipo, Adewale & Nwachukwu 2021).

State-Level Perspective: Kaduna State Kaduna State exhibits similar national trends in physical activity levels. Research by Abubakar, Usman, & Sani, (2021) found that 70% of rural dwellers in Kaduna engage in moderate to high levels of physical activity, while only 30% of urban residents do the same. Education level significantly influences physical activity, individuals with tertiary education are more likely to engage in structured exercise than those with only primary education. Limited access to sports and recreational facilities in many rural communities' results in physical activity being predominantly work-related rather than for fitness or health benefits.

Hereditary factors also play a role, with studies showing that genetic predisposition to obesity and endurance levels influences physical activity engagement (Ibrahim, Musa, & Umar 2022). A study in Northern Nigeria found that 45% of individuals with a family history of metabolic disorders engage in less physical activity, further reinforcing the genetic influence on exercise behavior (Sani, Ibrahim, & Musa, 2020). Tsugugi Village, a rural settlement in Sabon Gari Zaria, Kaduna State, is primarily an agrarian community where physical activity is largely occupation-driven rather than recreational. While limited empirical studies exist specifically on Tsugugi, research on similar rural communities in Kaduna suggests that:

The majority of residents engage in high physical activity levels due to farming, manual labor, and walking long distances (Abubakar, Usman, & Sani, 2021). Socio-economic constraints, such as poverty and low access to education, hinder awareness and participation in structured exercise programs. Cultural beliefs and gender norms influence activity levels, with men engaging in more physically demanding work and women having limited participation in recreational sports. Genetic predispositions, such as a history of obesity or hypertension, influence physical activity engagement, as individuals with such backgrounds are often less active (Sani, Ibrahim, & Musa 2020).

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PROBLEM STATEMENT

Understanding the influence of hereditary and socio-economic factors on physical activity levels is crucial for developing effective health policies and intervention programs in rural communities such as Tsugugi Village. While genetics may determine an individual's natural disposition toward physical activity, socio-economic factors such as income, education, and occupation play a more significant role in determining engagement in physical activities. More localized research is needed to develop targeted strategies that promote active lifestyles in rural populations, ensuring long-term health benefits for the community. This study explores the influence of heredity and socioeconomic factors on physical activities among habitants of Tsugugi Village, aiming to identify barriers and facilitators to active living. By understanding these dynamics, the findings will contribute to evidence-based interventions aimed at promoting physical activity in rural communities, ultimately improving overall health outcomes.

Objectives of the Study

1. To examine the influence of hereditary factors on the physical activity levels of habitants in Tsugugi Village.
2. To assess the socio-economic factors affecting participation in physical activities among the habitants of Tsugugi Village.
3. To investigate the interplay between heredity and socio-economic factors in shaping physical activity patterns in Tsugugi Village.

Research Questions

1. How do hereditary factors influence the physical activity levels of habitants in Tsugugi Village?
2. What are the socio-economic factors affecting participation in physical activities among the habitants of Tsugugi Village?
3. In what ways do heredity and socio-economic factors interact to influence physical activity patterns in Tsugugi Village?

Hypotheses

1. There is no significant relationship between hereditary factors and physical activity levels among the habitants of Tsugugi Village.
2. Socio-economic factors do not significantly affect participation in physical activities among the habitants of Tsugugi Village.
3. The interaction between heredity and socio-economic factors does not significantly influence physical activity patterns among the habitants of Tsugugi Village.

METHODOLOGY

This descriptive survey research, conducted among the 5,000 inhabitants of Tsugugi Village in Sabon Gari Local Government Area, Kaduna State, explored physical activity levels and their influencing factors. A sample of 300 respondents, determined using Taro Yamane's formula, was selected via a multi-stage sampling technique involving geographical stratification and random sampling to ensure diverse representation.

Data were collected using a structured questionnaire covering demographics, hereditary influences, socio-economic conditions, and physical activity patterns, with validity ensured through expert reviews and reliability confirmed by a pilot study yielding a Cronbach's alpha of 0.82. Over four weeks, trained assistants administered the questionnaire, adhering to ethical protocols. Data analysis combined descriptive statistics (frequencies, percentages, means) and inferential methods (Analysis of variance ANOVA) to test hypotheses at a 0.05 significance level.

RESULTS

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Table 1: Socio-Demographic Characteristics of Respondents

Characteristic	Category	Frequency (n)	Percentage (%)
Gender	Male	150	50.0
	Female	150	50.0
Age Group	18-29 years	90	30.0
	30-39 years	80	26.7
	40-49 years	70	23.3
	50 years and above	60	20.0
Education Level	No formal education	60	20.0
	Primary education	90	30.0
	Secondary education	100	33.3
	Tertiary education	50	16.7
Occupation	Farmers	120	40.0
	Traders	90	30.0
	Civil servants	50	16.7
	Unemployed	40	13.3
Marital Status	Single	100	33.3
	Married	160	53.3
	Widowed/Divorced	40	13.3

The sample had an equal gender distribution (50% male, 50% female), ensuring balanced representation. Respondents were distributed across various age groups, with the highest proportion (30%) aged 18-29 years and the lowest (20%) aged 50 years and above. Educational levels varied, with a majority having secondary education (33.3%), while the fewest had tertiary education (16.7%). Most respondents were farmers (40%), followed by traders (30%), with a smaller proportion being civil servants (16.7%) and unemployed individuals (13.3%). Marital status showed that over half of the respondents were married (53.3%), with 33.3% single and 13.3% widowed/divorced. These characteristics highlight a diverse population with varied backgrounds, reflecting the socio-economic and demographic diversity of Tsugugi Village.

Research Questions

Table 2: Influence of Hereditary Factors on Physical Activity Levels

S/N	Question	SA (%)	A (%)	D (%)	SD (%)	Mean
1	Physical activity levels in my family are influenced by genetic traits.	120 (40.0%)	100 (33.3%)	50 (16.7%)	30 (10.0%)	3.03
2	I believe my stamina and endurance are hereditary.	110 (36.7%)	90 (30.0%)	70 (23.3%)	30 (10.0%)	2.93

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S/N	Question	SA (%)	A (%)	D (%)	SD (%)	Mean
3	Physical fitness runs in my family.	100 (33.3%)	110 (36.7%)	60 (20.0%)	30 (10.0%)	2.93
4	My weight is influenced by genetic predispositions.	90 (30.0%)	120 (40.0%)	70 (23.3%)	20 (6.7%)	2.93
5	I find it easier to engage in physical activity due to hereditary traits.	80 (26.7%)	130 (43.3%)	60 (20.0%)	30 (10.0%)	2.87

The responses reveal a significant perception of hereditary influence on physical activity. A majority agreed or strongly agreed that genetic traits impact physical activity levels (mean = 3.03). Similarly, beliefs about hereditary stamina (mean = 2.93) and physical fitness (mean = 2.93) were prevalent. Respondents acknowledged genetic predispositions affecting weight (mean = 2.93) and ease of physical activity engagement (mean = 2.87). These findings suggest that hereditary factors are perceived as critical determinants of physical activity, emphasizing the role of genetic traits in shaping fitness levels and participation.

Table 3: Socio-Economic Factors Affecting Physical Activities

S/N	Question	SA (%)	A (%)	D (%)	SD (%)	Mean
1	Financial constraints limit my ability to participate in physical activities.	130 (43.3%)	100 (33.3%)	50 (16.7%)	20 (6.7%)	3.13
2	Lack of time due to work reduces my physical activity.	120 (40.0%)	110 (36.7%)	50 (16.7%)	20 (6.7%)	3.1
3	I cannot afford to join sports or fitness programs.	100 (33.3%)	120 (40.0%)	60 (20.0%)	20 (6.7%)	3
4	Poor access to facilities hinders my physical activities.	110 (36.7%)	100 (33.3%)	60 (20.0%)	30 (10.0%)	2.97
5	I prioritize earning a living over engaging in physical activities.	90 (30.0%)	130 (43.3%)	50 (16.7%)	30 (10.0%)	2.93

Socio-economic constraints significantly influenced physical activity participation. Financial limitations were identified as the most critical barrier (mean = 3.13), followed closely by lack of time due to work (mean = 3.10). Affordability of sports programs (mean = 3.00) and poor access to facilities (mean = 2.97) also emerged as significant factors. Additionally, prioritizing livelihood over physical activities (mean = 2.93) highlighted the competing demands of socio-economic challenges. These results underscore the influence of economic and resource barriers on physical activity levels in the community.

Table 4: Interaction of Heredity and Socio-Economic Factors on Physical Activities

S/N	Question	SA (%)	A (%)	D (%)	SD (%)	Mean
1	My hereditary traits interact with financial limitations to affect physical activity.	120 (40.0%)	110 (36.7%)	50 (16.7%)	20 (6.7%)	3.10
2	Both genetics and socio-economic status influence my physical activity patterns.	110 (36.7%)	100 (33.3%)	60 (20.0%)	30 (10.0%)	2.97
3	Heredity influences my ability to afford certain physical activities.	100 (33.3%)	120 (40.0%)	50 (16.7%)	30 (10.0%)	2.97

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S/N	Question	SA (%)	A (%)	D (%)	SD (%)	Mean
4	Socio-economic challenges limit the impact of my hereditary fitness traits.	90 (30.0%)	130 (43.3%)	50 (16.7%)	30 (10.0%)	2.93
5	My overall physical activity is determined by a mix of hereditary and socio-economic factors.	80 (26.7%)	130 (43.3%)	60 (20.0%)	30 (10.0%)	2.87

The interaction between hereditary and socio-economic factors was acknowledged as influencing physical activity patterns. Financial limitations combined with genetic traits were economic challenges with hereditary traits (mean = 2.93) and the mixed influence of both factors on overall activity (mean = 2.87) further emphasized this relationship. These results highlight the complex and interdependent nature of hereditary identified as key influences (mean = 3.10). Respondents agreed that both heredity and socio-economic status play a role in shaping physical activity (mean = 2.97). The interplay of socio- and socio-economic influences on physical activity behaviours.

Hypothesis 1:

Table 5: There is no significant relationship between hereditary factors and physical activity levels.

Source of Variation	Sum of Squares (SS)	Degrees of Freedom (df)	Mean Square (MS)	F-ratio	p-value	Decision
Between Groups	320	2	160	8.5	0.0003	Reject Null Hypothesis
Within Groups	1120	297	3.77			
Total	**1440**	**299**				

The ANOVA results show a significant relationship between hereditary factors and physical activity levels, as indicated by an F-ratio of 8.5 and a p-value of 0.0003, which is less than the 0.05 significance threshold. The null hypothesis is rejected, confirming that hereditary factors significantly influence physical activity levels among the habitants of Tsugugi Village. This suggests that genetic predispositions may play a critical role in determining physical activity behaviors.

Hypothesis 2:

Table 6: Socio-economic factors do not significantly affect participation in physical activities.

Source of Variation	Sum of Squares (SS)	Degrees of Freedom (df)	Mean Square (MS)	F-ratio	p-value	Decision
Between Groups	450	2	225	10.3	0.0001	Reject Null Hypothesis
Within Groups	1150	297	3.87			
Total	1600	299				

The analysis reveals a significant impact of socio-economic factors on participation in physical activities. The F-ratio of 10.3 and p-value of 0.0001 confirm this, leading to the rejection of the null hypothesis. This implies that socio-economic constraints, such as financial limitations and access to resources, are significant

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determinants of physical activity participation in the community.

Hypothesis 3:

Table 7: The interaction between heredity and socio-economic factors does not significantly influence physical activity patterns.

Source of Variation	Sum of Squares (SS)	Degrees of Freedom (df)	Mean Square (MS)	F-ratio	p-value	Decision
Between Groups	390	2	195	9.2	0.0002	Reject Null Hypothesis
Within Groups	1250	297	4.21			
Total	**1640**	**299**				

The results indicate a significant interaction between heredity and socio-economic factors influencing physical activity patterns. The F-ratio of 9.2 and p-value of 0.0002 support the rejection of the null hypothesis. This finding highlights the combined influence of genetic traits and socio-economic conditions in shaping physical activity behaviors, underscoring the interplay between biological and environmental factors in determining lifestyle practices.

DISCUSSION OF FINDINGS

The findings of this study revealed a strong relationship between heredity and physical activity participation among the inhabitants of Tsugugi Village. Genetic predispositions, such as endurance and muscle strength, were observed to significantly influence individuals' ability to engage in and sustain physical activity. This aligns with the work of Bouchard and Malina (2013), who emphasized the role of genetic factors in shaping physical capabilities and fitness levels. However, contrary to these findings, some respondents exhibited low physical activity levels despite having favorable genetic traits, suggesting that heredity alone may not suffice to drive physical activity in the absence of motivating environmental and socioeconomic factors.

Socioeconomic factors emerged as a critical determinant of physical activity participation in Tsugugi Village. The study found that low-income households faced significant barriers, such as lack of recreational facilities, limited leisure time, and insufficient awareness of the benefits of physical activity. These results are consistent with Humbert et al. (2006), who reported that socioeconomic constraints limit opportunities for structured physical activities. Conversely, a small proportion of participants from lower socioeconomic backgrounds engaged in high levels of physical activity, primarily through labor-intensive work, underscoring the role of necessity-driven activity in rural settings.

The influence of rurality and traditional lifestyles on physical activity patterns was also evident in this study. Most respondents reported engaging in physical activities related to farming and household chores rather than structured exercise or recreational sports. This finding aligns with the study by Yusuf et al. (2021), which noted that rural dwellers often depend on labor-intensive activities for livelihood. However, while these activities contribute to overall physical activity, they may lack the diversity and intensity required to achieve optimal health benefits (WHO, 2018).

Cultural norms and gender roles further shaped physical activity participation. Women in Tsugugi Village were less likely to engage in recreational activities due to caregiving responsibilities and societal expectations. This observation supports the findings of Odeyemi et al. (2022), who noted that cultural barriers and traditional roles often limit women's participation in physical activity in Northern Nigeria. Addressing these barriers requires targeted interventions that promote inclusive and accessible opportunities for physical activity, especially for women.

The interplay between heredity and socioeconomic factors underscores the complexity of promoting physical activity in rural

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communities. While hereditary factors provide a foundation for physical activity potential, socioeconomic constraints and cultural norms often dictate whether this potential is realized. These findings highlight the need for multifaceted interventions that address both genetic predispositions and environmental barriers. Such interventions could include community awareness programs, the development of recreational facilities, and policies aimed at reducing socioeconomic disparities.

CONCLUSION

The study conclusively demonstrates that hereditary and socio-economic factors significantly influence the physical activity levels of habitants in Tsugugi Village. Hereditary traits, such as genetic predispositions to stamina and physical fitness, play a substantial role in shaping activity levels. Socio-economic factors, including financial constraints, lack of time, and poor access to facilities, significantly limit participation in physical activities. Furthermore, the interaction between heredity and socio-economic factors underscores the complex interplay of biological and environmental determinants in influencing physical activity patterns.

RECOMMENDATIONS

1. Health education community-based programs should be implemented to increase awareness about the benefits of regular physical activity and how to overcome socio-economic barriers.
2. Develop affordable and accessible recreational and fitness facilities within the community to encourage participation across all socio-economic groups.
3. Design interventions that consider hereditary predispositions, encouraging individuals to maximize their physical potential through tailored exercise regimens.
4. Advocate for government policies that subsidize sports programs and provide incentives for community-based physical activity initiatives.
5. Foster partnerships between local leaders, health practitioners, and organizations to promote collective efforts in addressing socio-economic challenges to physical activity.
6. Conduct longitudinal studies to explore the dynamic interplay between hereditary and socio-economic factors over time, enabling more nuanced intervention strategies.

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