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Body Composition, Dietary Practices and Physical Fitness Levels of Primary School Children from Multicultural Groups at a School in Northern Central District of Harare, Zimbabwe

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Abstract: The focus of the study was to determine the link between body composition, dietary practices and health related physical fitness between boys and girls and offer insights into prospective interventions and methods to increase physical activity and decrease sedentary behaviours among primary school students in the Northern Central District of Harare, Zimbabwe, by looking at these variables. The population of this study comprised of 55 participants, comprised of 32 boys and 23 aged between 11 and 13 years. The study used quantitative research method and data collection involved surveys and physical assessments to ensure a diverse representation of the district's population. Descriptive and inferential statistics were utilized to analyse the data, providing an overview of characteristics and investigating relationships, differences, and predictors within the dataset. The study found that girls had higher average BMI values than boys, suggesting differences in body composition or fat distribution. The American population in the school had the highest mean BMI, while African population had a lower mean BMI and less variability. Health-related fitness levels indicated potential concerns, with measurements exceeding standard measures. Dietary practices varied, with many students skipping breakfast or lunch. Skipping breakfast was associated with negative consequences. Excessive snack consumption interfered with appetite regulation and increased obesity. Higher BMI values were linked to lower physical fitness scores, indicating a negative relationship between body composition and physical fitness. The study recommends promoting awareness of gender-specific differences in body composition, implementing region-specific interventions, fostering healthy dietary practices, enhancing physical fitness programs, promoting cultural sensitivity, and encouraging collaboration between stakeholders.

Keywords: *Body Composition, Dietary, Multicultural, Physical Fitness, Harare.*

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I. INTRODUCTION

The prevalence of obesity has garnered significant attention worldwide in the past decade (WHO, 2010) and has emerged as a critical health and social concern for governments across the globe (Rosiek and Rosiek, 2015). In 2010, approximately 43 million children (35 million in emerging countries) were estimated to be overweight or obese, with an additional 92 million at risk of overweight (WHO (2016). The global occurrence of childhood overweight and obesity increased from 4.2% in 1990 to 6.7% in 2010 and this trend is particularly prominent in low- to middle-income countries, such as those in Africa, Asia, and the Pacific regions, as noted by (Mercedes et al. 2016).This research also projected a prevalence of 8.5% for childhood overweight and obesity in Africa in 2010, expected to rise to 12.7% in 2020.Moreover, Rosiek and Rosiek (2015) emphasized that approximately 20% of the world's population is obese and categorizing obesity as a condition influenced by lifestyle changes. Overweight and obesity have been also identified as significant risk factors for cardiovascular diseases, contributing to a considerable number of global deaths (WHO, 2016). It is noted that the persistent high rates of obesity in the United States and the world over is a cause for concern (Cynthia (2012). This however raises an alarm and the need for continued research in this area in order to curb this health risk especially in young children.

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Studies such as the USA National Health and Nutrition Examination Survey (2009-2012) and the Canadian Health Measures Survey (2009-2013) revealed concerning prevalence rates of obesity among children aged 3-6 years (ranging from 10% to 12.5%) and 7-12 years (ranging from 11% to 19.5%). These findings are alarming, as research indicates that overweight and obese children are more likely to develop obesity in adulthood. The rising incidence of obesity is attributed to factors such as sedentary behaviors facilitated by the excessive use of modern technology, including television, computers, and smartphones (Rosiek et al., 2015). Children are increasingly engaged in sedentary activities, spending a significant amount of time watching TV, playing video games, and browsing the internet, which result in inadequate energy expenditure and contribute to the problem of childhood overweight and obesity. In a country like Zimbabwe, 75% of children and youth spent at least two hours per day engaged in sedentary behaviors, with video games and television being the most commonly reported activities (Manyanga et al. 2016). It is noted that there is an urgent need to address the increasing prevalence of physical inactivity among children and youth as a significant public health issue especially in Zimbabwe (Manyanga et al. 2022).The current study focused on determine the link between body composition, dietary practices and health related physical fitness between boys and girls and offer insights into prospective interventions and methods to increase physical activity and decrease sedentary behaviours among primary school students in the Northern Central District of Harare, Zimbabwe, by looking at these variables.

The lack of physical activity facilities in schools and communities has also been identified as a contributing factor to sedentary behavior among children such as the allocation of residential stands on community playgrounds in areas like Chitungwiza, Zimbabwe as reported by the Herald (2011).This has been identified as allowing limited children's opportunities for active play. Inadequate transportation systems in urban areas further exacerbate sedentary time among children as this leads to limited transportation in Harare resulting in a substantial proportion of girls and boys expressing a preference for being driven to and from school, thereby adopting a sedentary lifestyle (Manyanga et al. 2016).

According to Cavill (2006), an active lifestyle offers individuals the chance to engage with others, the community, and the environment. Moreover, sport and active leisure pursuits provide opportunities for skill development, social interaction, and crime reduction. Regular physical activity has significant positive effects on chronic diseases, including improved physical fitness, muscular strength, and overall quality of life (Cavill et al., 2006). Adamo, Onywera, and Waudo (2011) emphasized the complex interplay between childhood obesity, comorbidities, psychosocial aspects, reduced life expectancy, and associated financial and societal burdens. Furthermore, physical inactivity and sedentary behaviors are independent risk factors for chronic non-communicable diseases such as obesity, hypertension, diabetes, and heart disease.

The President's Council on Physical Fitness and Sports in the United States has defined physical fitness as the ability to carry out daily tasks with vigour and alertness, without undue fatigue, while having sufficient energy for leisure activities and unexpected emergencies (Clarke, 1971). Sedentary behavior has been identified as a leading cause of major chronic diseases and despite high levels of physical activity in certain nations, a significant percentage of children and young people fail to meet recommended guidelines for moderate physical activity. Given the evidence linking physical activity and fitness to adulthood, it is essential to enhance participation levels among children and young people. The benefits of physical activity, current guidelines, and levels of physical activity among children and young people in the UK are summarized, emphasizing the need for actions to improve participation rates (World Health Organization, 2016).However, the current study focused on determine the link between body composition, dietary practices and health related physical fitness between boys and girls and offer insights into prospective interventions and methods to increase physical activity and decrease sedentary behaviours among primary school students in the Northern Central District of Harare, Zimbabwe, by looking at these variables.

The global rise in childhood obesity is a result of increasing sedentary behaviors, such as the consumption of processed foods and advancements in technology (Ostojic, 2011). Regular physical activity plays a crucial role in preventing overweight and obesity in children and adolescents, as well as reducing the risk of obesity in adulthood. Research by Ostojic (2011) found that 20.1% of the studied children were obese or overweight, exhibiting lower levels of physical activity and fitness compared to normal-weight children. This highlights the need for interventions to increase physical activity and improve fitness in obese and overweight children. Similarly, studies have shown that a significant percentage of children do not meet the recommended guidelines for physical activity, including boys and girls in the UK and Canadian children (British Heart Foundation, 2015; Janson & Leblanc, 2016). However, research in Zimbabwe found that over half of the children met the recommended levels of physical activity, with a higher percentage observed in rural areas compared to urban areas (Manyanga et al., 2016).

Obesity is a significant public health concern for children and adults, with various health consequences associated with excess body fat. These consequences include metabolic, gastrointestinal, pulmonary, orthopaedic, neurological, psychological, and social disorders (Hills, 2011). Obese children are also more likely to experience psychological and social health issues, such as low self-esteem, reduced quality of life, depression, and social discrimination (Hills, 2011). Ethnic differences have been observed in body composition, with variations in bone mineral content, lean tissue mass, body fat mass, and percentage fat among different ethnic groups (Ellis et al., 2022). Ethnic-specific equations have been developed to predict body composition based on age, weight, and height (Ellis et al., 2022). Several studies advocated for measures

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which ensure childhood fitness programmes are implemented in schools to curb obesity and other ailments related to obesity.

Several studies pointed out that childhood fitness is also growing concern globally, as the prevalence of childhood obesity and related health issues continues to increase (Raja et al., 2014). It had been noted that factors contributing to this trend include improved economic status, lifestyle choices, academic demands reducing physical activity time, safety concerns, and poor nutrition (Raja et al., 2014). Urban children are particularly affected by obesity and lower fitness levels compared to rural school children (Raja et al., 2014). The burden of promoting exercise in children often falls on schools, highlighting the importance of establishing baseline fitness levels in target children to develop appropriate school fitness programs (Raja et al., 2014). Therefore, the accurate measurement of body composition is essential for assessing health and nutritional status, the impact of disease, and the effectiveness of interventions (Clodagh, 2020). Various methods, both direct and indirect, have been used to measure body composition, with the literature reporting on their assumptions, accuracy, and precision (Clodagh, 2020). It is the essence of this study to examine some of the interventions which might help to reduce childhood obesity and increase childhood participation in physical activity.

A study conducted by Manyanga et al. (2022), concluded that lifestyle behaviours such as physical inactivity, sedentary behaviours, and the consumption of energy-dense diets are recognized as significant risk factors for childhood obesity, cardiovascular disease, diabetes, and certain cancers. There is growing research evidence indicating a global increase in physical inactivity, sedentary behaviours, and the consumption of energy-dense diets among children and adolescents, which is concurrently associated with the rise in childhood obesity. A study conducted in eight African countries, including Zimbabwe, on adolescent leisure time, physical activity, sedentary behaviours, and substance abuse, revealed that only 14.2% of adolescents engaged in sufficient physical activity. Surveys from 105 countries have shown that over 80% of 13-15-year-olds fail to meet the World Health Organization's recommendation of 60 minutes of moderate to vigorous physical activity per day. Zimbabwean children and adolescents are also affected by the physical inactivity epidemic, as highlighted by the 2016 and 2018 Zimbabwe Report Cards, which indicated suboptimal levels of physical activity and high levels of sedentary behaviours among children.

Additionally, nutritional status is a crucial health indicator for children and adolescents. Poor nutrition and physical inactivity increase the risk of non-communicable diseases, such as cancer, diabetes, and cardiovascular diseases, in later life, as outlined in the multi-sectorial food and nutrition security strategy for Zimbabwe (2021-2025). Moreover, inadequate nutrition negatively affects school performance and overall physical activity levels among children. In Zimbabwe, there is a dual burden of malnutrition, with obesity coexisting with under nutrition, further exacerbating the challenges related to physical activity. This situation calls for evidence-based interventions to address the multiple burdens of malnutrition among school-aged children. Factors such as severe droughts, socio-economic crises, rapid urbanization, shifts from active to motorized transportation, and transitions to energy-dense Western diets contribute to the complex landscape of malnutrition and physical inactivity in Zimbabwe. However, reliable prevalence estimates and accurate assessments of nutritional status are currently lacking, hindering the development of effective strategies and the evaluation of interventions. The 2022 Report Card on nutritional status and physical activity levels of children and adolescents in Zimbabwe aims to fill this gap by building on the insights from previous report cards and drawing inspiration from similar initiatives in Canada and other African countries. The development of this report card was motivated by the commitment of various stakeholders and the findings from global summits on the physical activity of children and the Active Healthy Kids Global Alliance, which seeks to promote healthy and active lifestyles for children and adolescents worldwide.

There is an urgent need to reposition child health within a global plan that emphasizes the "survive, thrive, and transform" framework (Piper et .al 2021). This approach requires a holistic perspective that recognizes the importance of all stages of childhood in terms of growth and development, taking into account the negative exposures and positive opportunities that occur from conception to adulthood. By understanding the interconnectedness and variations among growth, health, physical and cognitive function, interventions can target multiple areas of development. Furthermore, Pier et al. (2021) highlight the limited focus on school-age health outcomes, particularly in low- and middle-income countries (LMICs), due to the lack of comprehensive health information systems for this age group. Mortality rates between 5 and 14 years of age are disproportionately high in LMICs, especially in sub-Saharan Africa. While there is some knowledge about child growth and development before the age of 5, little is known about the trajectory after this age, despite evidence suggesting that height and BMI trends in response to social, nutritional, and environmental factors can vary significantly and have long-term health implications. Understanding school-age risk factors and protective factors, as well as the ability to mitigate early disadvantages, is crucial for improving growth and development trajectories.

A literature gap analysis reveals that there is a need to explore the body composition, dietary practices, and physical fitness levels of primary school children from different multicultural groups in the Northern Central District of Harare, Zimbabwe. Existing research in this specific context is limited, and there is a lack of comprehensive studies that integrate measures of school-age growth, body composition, physical function, and cognitive function. To address these research gaps, an integrated test battery can be developed to assess various aspects of children's health and development. This test battery should

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consider measures such as anthropometric indicators of body composition (e.g., height, weight, body mass index), dietary practices (e.g., food intake, nutrient intake), and physical fitness levels (e.g., cardiovascular fitness, muscular strength, endurance) among primary school children from different multicultural groups in the Northern Central District of Harare, Zimbabwe. Furthermore, it is important to design the test battery with the specific needs of low-resource communities in mind. Portable equipment should be utilized to ensure accessibility during testing, considering the limited resources available in these communities. By employing this approach, researchers can gather comprehensive data on body composition, dietary practices, and physical fitness levels, which will contribute to a better understanding of the health status and development trajectories of primary school children in this multicultural context. Overall, conducting a study that examines the body composition, dietary practices, and physical fitness levels of primary school children from different multicultural groups in the Northern Central District of Harare, Zimbabwe, using an integrated test battery, would fill an existing literature gap and provide valuable insights into the health and well-being of this population.

In accordance with the guidelines propounded by WHO (2016) for adults and children to engage in regular physical activity, this study aims to determine the body composition, dietary practices, and health-related fitness levels of children attending a multicultural school in the Northern Central district of Harare, Zimbabwe. In order to develop a thorough understanding of the factors influencing physical inactivity and sedentary behaviours in this population, the study seeks to determine the body composition, dietary habits, and levels of physical fitness of these children. The impetus for the present study is investigate to causal relationship between body composition, dietary habits, and levels of physical fitness among multicultural children and offer insights into prospective interventions and methods to increase physical activity and decrease sedentary behaviours among primary school students in the Northern Central District of Harare, Zimbabwe, by looking at these variables.

II. RESEARCH METHODOLOGY

➢ *Research design*

The research design in this study played a crucial role in outlining the plan and structure of investigation devised to address the research questions at hand. It encompassed the overall scheme and program of the research, providing a framework for the systematic exploration of the subject (Robson, 2002). To achieve the research objectives, a descriptive research design was employed, aiming to gather comprehensive information about the characteristics of the population or phenomenon under study (Mugenda & Mugenda, 2003). By employing a descriptive approach, this study laid the foundation for subsequent quantitative research designs, offering valuable insights and guidance for determining which variables warranted further quantitative testing.

To collect data efficiently and effectively, a cross-sectional survey design was chosen for this study. This approach involved gathering data from each participant at a single point in time, capturing a snapshot of the variables of interest. Compared to longitudinal surveys that require following participants over an extended period, a cross-sectional survey was more cost-effective and time-efficient. By collecting data at a specific moment, the study could provide a snapshot of the population's characteristics and draw inferences about the larger population based on the sample findings.

It is important to acknowledge that in a cross-sectional survey, observed changes in the variables of interest could be influenced by factors unrelated to the independent variable under investigation. Various external factors, such as individual differences, environmental conditions, or other uncontrolled variables, might contribute to the observed changes. However, despite these potential confounding factors, the cross-sectional survey design provided valuable insights into the characteristics and relationships among the variables, contributing to a better understanding of the research topic.

➢ *Research Instruments*

Research instruments referred to devices or tools used to collect data, such as questionnaires, interviews, document analyses, and checklists (Veal & Darey, 2014; Giddens & Sutton, 2013). For this study, the research instruments were selected in accordance with the research design to ensure the collection of desirable data. The following instruments were utilized:

- Questionnaire for dietary practices
- Anthropometric measurements for body composition
- Physical fitness tests for health-related physical fitness components

➢ *Data Collection Procedure*

The following tests were administered: body composition assessment, sit-and-reach test for trunk flexibility, Sit-ups for abdominal strength and endurance, and push-up test for upper body strength. Body composition Anthropometric measurements were conducted to assess variables such as mass and height, following the standards described by the International Society for the Advancement of Kinanthropometry (ISAK).

- *Weight*

Weight measurements were taken using an automated bathroom scale. Participants were instructed to remove their shoes and any excess clothing or accessories. A SECA electronic scale, accurate to the nearest 0.1 kg, was used. The subjects stood barefooted on the center of the scale with weight evenly distributed on both feet. The reading was recorded to the nearest 0.1 kg (ISAK, 2001)

- *Height*

Height measurements were taken using a stadiometer, ensuring that participants were without shoes and any additional clothing or accessories. A stadiometer with a

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precision of 0.1cm was utilized for accurate measurements. Participants were instructed to stand with their feet together, heels, buttocks, and upper back touching the scale, and their head positioned in the Frankfort plane. Following these guidelines, participants took a deep breath and maintained the position while the measurement was taken, recorded to the nearest 0.1cm (WHO procedures were adhered to).

- *The Body Mass Index (BMI)*

The Body Mass Index (BMI) served as an indicator of a person's weight relative to their height. It is a calculation that aims to determine the range of healthy weight for an individual based on their height and body weight. The BMI was calculated by dividing the weight in kilograms by the square of the height in meters:

BMI = Weight (kg) / Height (m^2)

According to W.H.O (2016), the following indicators were used for underweight, normal weight, and obese categories, specifically for children:

Table 1 Percentile used for Children

Weight Status Category	Percentile Range
Underweight	Less than the 5th percentile
Healthy weight	5th percentile to less than the 85th percentile
Overweight	85th percentile to less than the 95th percentile
Obesity	Equal to or greater than the 95th percentile

(Adapted from Division of Nutrition, Physical Activity, and Obesity, USA, 2021)

- *Skinfolds*

In order to measure skinfold thickness, a skinfold calliper was employed. The calliper measured the thickness of a double layer of subcutaneous fat and skin at various parts of the body, including the triceps, subscapular, and biceps. Prior to measuring the skinfolds, the skinfold site was marked. As a general guideline, all skinfold measurements were taken on the right side of the body (Marfell-Jones et al., 2006).

- *Physical Fitness Test*

Physical fitness testing was conducted to assess health-related physical fitness components, including cardiorespiratory endurance, muscular endurance and strength, and flexibility. The EUROFIT testing batteries were utilized for these measurements.

- *Nutritional Questionnaire*

The nutritional questionnaire assessed the Knowledge, Attitudes, and Practices related to five healthier habits. It consisted of three sections.

In the first section, Nutritional Practices were addressed, including information on breakfast (time and place), lunch (time and place), dinner (time and place), snacks, and other foods purchased using pocket money. The second section focused on Knowledge about nutrition. The third section explored Attitudes towards nutrition; specifically attitudes related to ideal or desired nutritional practices.

➢ *Data Analysis*

In this study, a quantitative research paradigm was adopted, involving the analysis of statistical data based on mathematical principles. Quantitative data was obtained from Body Mass Index (BMI) measurements and physical fitness tests conducted on children aged 11 to 13. The data was analysed using the SPSS statistical program (SPSS for Windows version 26). Standard statistical methods, such as calculation of means, standard deviation, and t-tests, were used. The criterion for significance was set at an alpha level of $p>0.05$. The analysis was presented using tables, graphs, and pie charts.

III. DATA PRESENTATION, INTERPRETATION AND DISCUSSION

The primary objective of this chapter is to present, analyse and have a discussion on the findings of the body composition, dietary practices, and physical fitness levels of primary school children belonging to different multicultural groups in the Northern Central District of Harare. The data was collected through a combination of surveys, physical assessments, and interviews, targeting a diverse sample of primary school children from various multicultural groups. The chapter will use descriptive and inferential statistics.

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The chapter will begin with descriptive statistics such as gender, age, nativity and other descriptive statistics. The study will go on to analyse inferential analysis which include t-test and ANOVA. The chapter seeks to gain a comprehensive understanding of the body composition, dietary practices, and physical fitness levels of primary school children from different multicultural groups in the Northern Central District of Harare. Data analysis in this chapter was carried out using SPSS Version 26.

A. Response Rate

A high response rate is crucial for the validity and reliability of survey results. It indicates the level of participation and engagement of the target population, allowing for more accurate generalizations and inferences. Based on the response rate of 49 out of 55 respondents (89.1%), it can be concluded that the questionnaire instrument achieved a satisfactory level of participation and engagement. The high response rate indicates a balanced representation of the target population and provides a substantial amount of data for analysis. These factors enhance the validity and reliability of the study's findings, allowing for meaningful interpretations and generalizations.

B. Demographic Data Analysis

This section seeks to analyse demographic data which was characteristic of the study's respondents. This will include gender, age and nativity.

➢ *Gender*

The participants were requested to specify their gender, and the subsequent figure provides an overview of the gender distribution among the respondents.

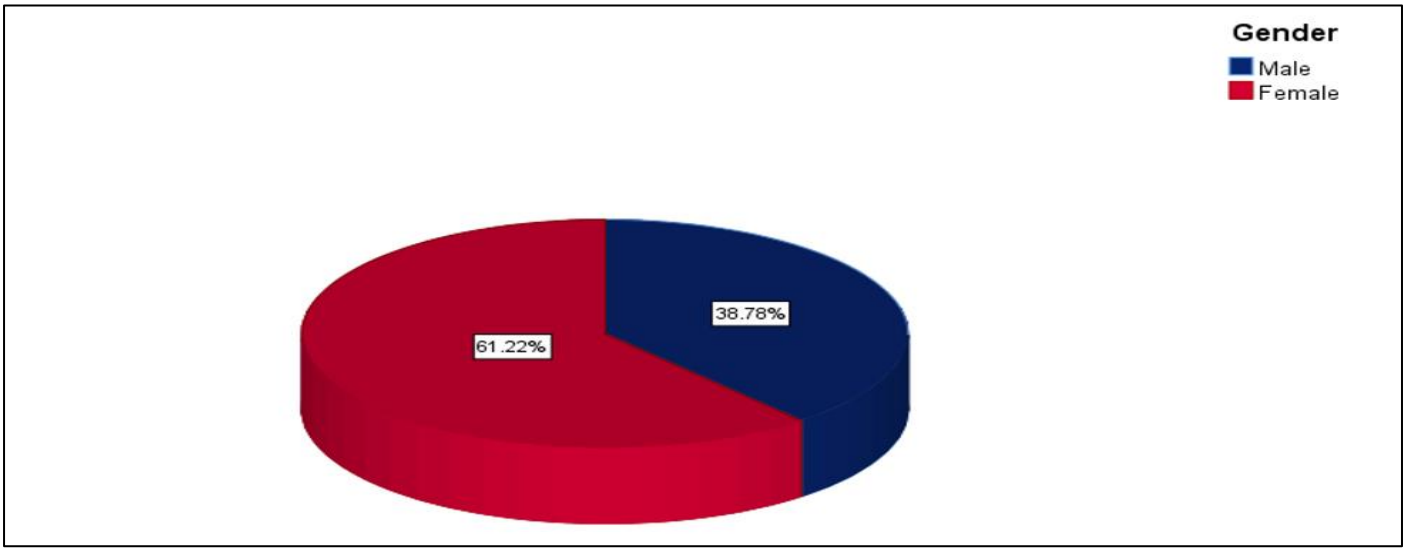

Fig 1 Gender Distribution

The data shows that among the 49 primary school children in the study, 38.8% are male and 61.2% are female. These findings offer valuable insights into the gender composition of the primary school population in the Northern Central District of Harare, Zimbabwe, demonstrating a higher representation of female students.

➢ *Age*

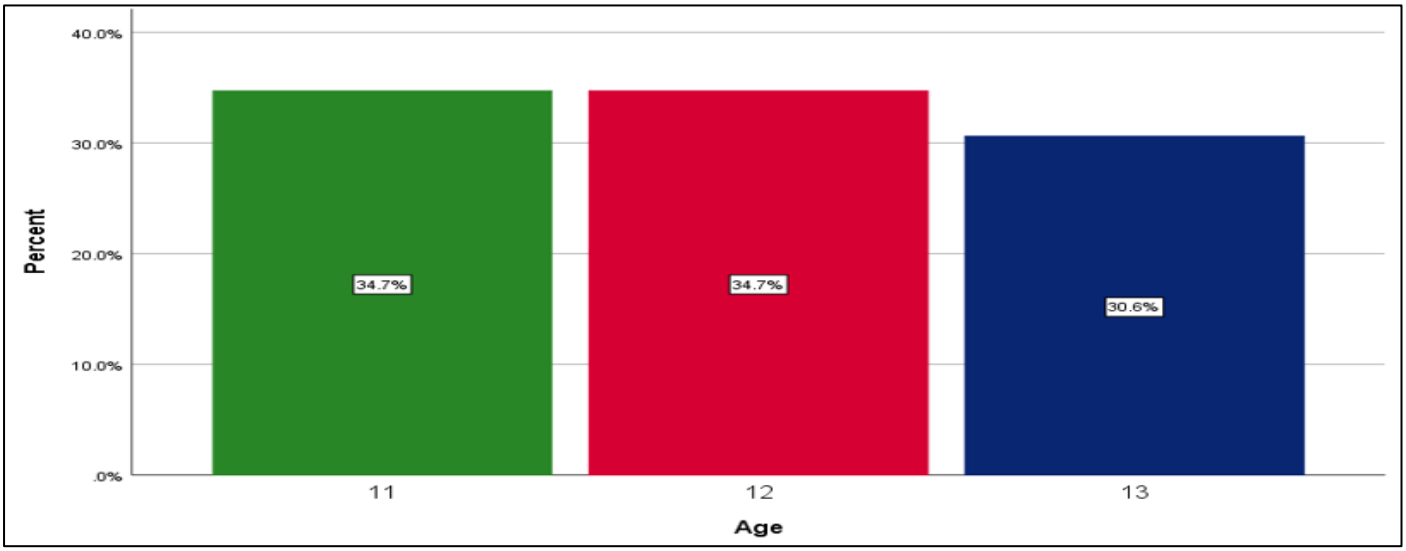

Fig 2 Age

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The data in the figure above shows the distribution of ages among the primary school children in the study. Among the 49 children, 34.7% are 11 years old, another 34.7% are 12 years old, and 30.6% are 13 years old. These findings show that there a fair balance on the age distribution of the selected students in the ranges 11, 12 and 13 years.

➢ *Native*

Table 2 Native

Native					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Africa	22	44.9	44.9	44.9
	America	11	22.4	22.4	67.3
	Europe	5	10.2	10.2	77.6
	Asia	11	22.4	22.4	100.0
	Total	49	100.0	100.0	

In the given data, the variable "Native" represents the cultural or geographic origin of the primary school children participating in the study. The data for the variable "Native" reveals the distribution of cultural or geographic backgrounds among the primary school children in the study. Among the 49 children, 44.9% are native to Africa, 22.4% to America and Asia each, and 10.2% to Europe. The findings demonstrate the multicultural diversity present within the primary school population in the Northern Central District of Harare, Zimbabwe.

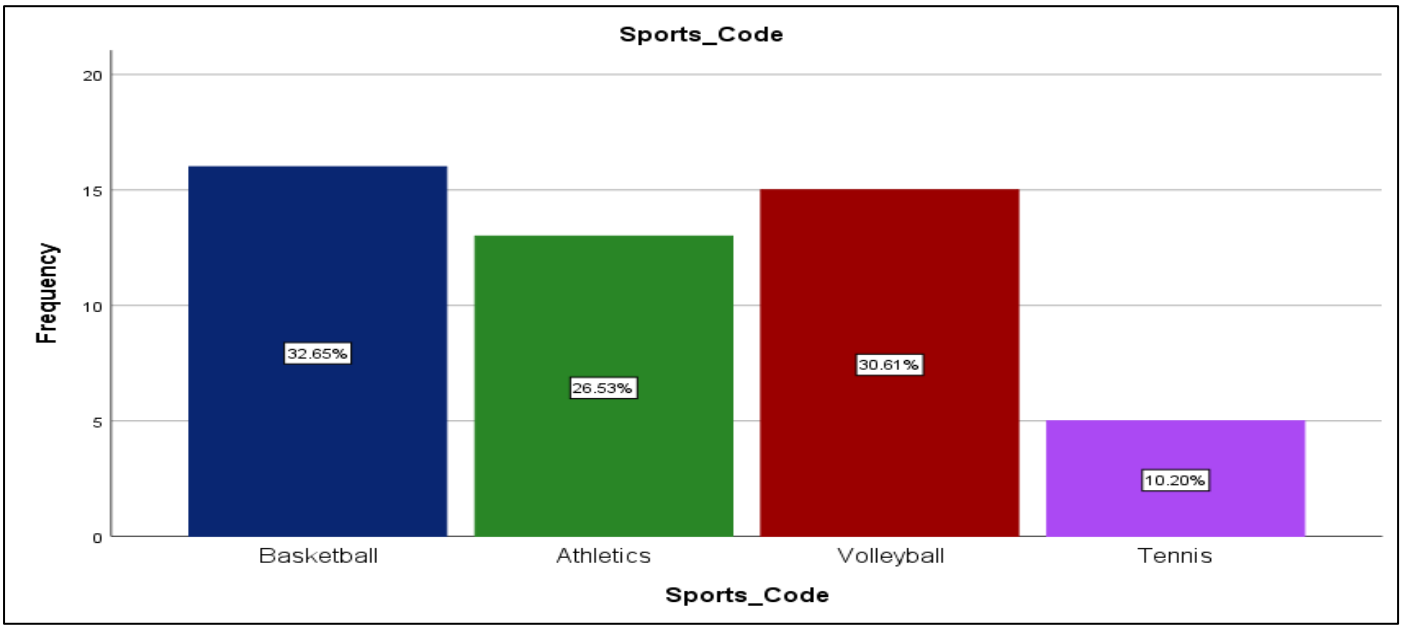

Fig 3 Sports Code

The Sports Code table shows that the most popular sport is basketball, with 16 participants (32.7%). The second most popular sport is volleyball, with 15 participants (30.6%). The third most popular sport is athletics, with 13 participants (26.5%). The least popular sport is tennis, with 5 participants (10.2%).

The cumulative percent column shows the percentage of participants who participate in the sport and all of the sports before it. For example, 32.7% of participants play basketball, and 59.2% of participants play basketball or athletics.

The results of the Sports code table suggest that basketball is the most popular sport among the participants in this study. This could be due to a number of factors, including the availability of basketball courts, the popularity of basketball in the media, or the perceived benefits of playing basketball.

The results of the sports code table also suggest that athletics and volleyball are also popular sports among the participants in this study. This could be due to the fact that these sports are relatively easy to learn and play, and they can be enjoyed by people of all ages and skill levels.

The results of the sports code table suggest that tennis is the least popular sport among the participants in this study. This could be due to the fact that tennis is a more expensive sport to play, and it requires more specialized equipment and facilities.

➢ *Descriptive Statistics*

The table is a summary of the descriptive statistics of the study.

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Table 3 Descriptive Statistics

Descriptive Statistics					
	N	Minimum	Maximum	Mean	Std. Deviation
Height	49	1.25	1.59	1.3959	.06991
Weight	49	23.0	67.0	39.078	9.1792
Tricep	49	5	28	15.80	6.181
Bicep	49	3	26	12.35	5.692
Abdominal	49	4	36	20.82	9.420
Subscapular	49	7	30	17.43	6.526
Flexibility	49	13.5	37.9	25.935	7.3155
Push_Ups	49	4	23	14.67	4.993
Sit_Ups	49	4	22	13.33	4.269
Seat_to_Stand	49	6	21	14.63	3.734
Vertical_Jump	49	.90	14.00	1.9961	3.10209
Speed	49	18	40	27.43	6.055
Beep_Test_20	49	2.0	5.2	3.335	.9182
Valid N (listwise)	49				

The data in the descriptive above indicates that the individuals in the sample have a range of heights, with the minimum recorded height being 1.25 meters and the maximum recorded height being 1.59 meters. The average height, or mean, is calculated to be 1.3959 meters, representing the average height of the individuals in the sample. The standard deviation for height is 0.06991, indicating a relatively small amount of variability or dispersion in the height values within the sample.

The recorded weights of the individuals in the sample vary, with the minimum weight being 23.0 kg and the maximum weight being 67.0 kg. The mean weight is calculated to be 39.078 kg, representing the average weight of the individuals in the sample. The standard deviation for weight is 9.1792 kg, indicating a moderate amount of variability or dispersion in the weight values within the sample.

- *Body Measurements or Skinfold Thickness.*

The Centre for Disease Control and Prevention (CDC) determined the standard measures of skinfold (biceps, triceps, abdominal, and subscapular) in 11-13 year olds are as follows: Biceps: 10-25 millimetres (mm), Triceps: 10-25 mm, Abdominal: 15-30 mm, Subscapular: 10-25 mm.

The summary of the descriptive statistics for the variables tricep, bicep, abdominal, and subscapular, which represent different body measurements or skinfold thickness, reveals important information about these measurements. The average tricep measurement is found to be 15.80, with a standard deviation of 6.181, indicating some variation in triceps' thickness among the individuals in the sample. For the bicep measurement, the mean value is 12.35, with a standard deviation of 5.692, suggesting a moderate level of variability in bicep thickness. The abdominal measurement has mean of 20.82, and a standard deviation of 9.420, indicating a relatively higher level of variation in abdominal skinfold thickness. Lastly, the subscapular measurement shows a mean of 17.43, with a standard deviation of 6.526, suggesting a moderate level of variability in subscapular skinfold thickness. These statistics provide insights into the average values and variability of these body measurements.

In terms of flexibility, the mean is 25.935, with a moderate level of variability indicated by a standard deviation of 7.3155. For push-ups, the average count is 14.67, with a standard deviation of 4.993, suggesting moderate variation in performance. Sit-ups have an average count of 13.33, with a standard deviation of 4.269, indicating moderate variability. The seat-to-stand test shows a mean score of 14.63, with a standard deviation of 3.734, suggesting consistent performance. The average vertical jump height is 1.9961 units, with a standard deviation of 3.10209, indicating some variability. The mean speed recorded is 27.43, with a standard deviation of 6.055, suggesting moderate variation in running speed. Lastly, the beep test yields an average score of 3.335, with a standard deviation of 0.9182, indicating relatively consistent performance in this endurance test.

The standard measures for fitness (flexibility, sit-ups, push-ups, seat to stand, vertical jump, speed, beep test 20m) for 11-13 years are as follows: Flexibility-Sit and reach: 15 inches (38 cm) Back scratch: 20 inches (51 cm), Sit-ups, 30 sit-ups in 1 minute Push-ups, 20 push-ups in 1 minute Seat to stand- 30 seat to stands in 1 minute Vertical jump- 12 inches (30 cm) Speed- 50-yard dash: 8 seconds or less Beep test 20m- Level 12 or higher.

- *Determining the Body Composition of Primary School Children*

The objective of this section is to assess the body composition of boys and girls who are the respondents in this study.

- *Body Mass Index*

The data below summarise the Body Mass Index of the respondents.

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Table 4 Body Mass Index Results

Statistics		
BMI		
N	Valid	49
	Missing	0
Mean		22.700
Skewness		.212
Kurtosis		-1.120
Percentiles	5	14.100
	85	30.250
	95	33.300

The provided statistics present an analysis of the BMI (Body Mass Index) variable. The mean BMI is 22.700. This represents the average BMI value across the sample of 49 individuals. The skewness value of 0.212 suggests a slight right skewness, indicating that the distribution is slightly skewed towards higher BMI values. The positive skewness indicates that there are relatively fewer cases with lower BMI values and a slightly longer tail towards higher BMI values. With a kurtosis value of -1.120, the distribution can be classified as platykurtic, which signifies a flatter and less peaked shape compared to a normal distribution. The negative kurtosis value indicates a scarcity of extreme values or outliers within the distribution. The 5th percentile value of 14.100, it indicates that 5% of the individuals in the sample have a BMI lower than or equal to 14.100, this value serves as a threshold below which only a small proportion (5%) of the individuals' BMI falls. Similarly, the individuals' BMI values in the 85^{th} percentile are 30.25 and the 95^{th} percentile value is 33.3. The data show that there are number of school children who are in range of overweight to obese. The higher the percentile value, the more individuals have a BMI at or below that value. In this case, the 85th percentile BMI of 30.25 indicates that a significant majority (85%) of the individuals have a BMI within a higher range, which may be indicative of being overweight or obese. Similarly, the 95th percentile BMI of 33.3 suggests that only a small proportion (5%) of the individuals have a BMI above this threshold, further emphasizing the presence of individuals with higher BMI values.

➢ *Gender and BMI Cross tabulation*

The data in the table below provides information about the BMI (Body Mass Index) distribution for males, females, and the overall sample.

Table 5 Gender and BMI Cross tabulation

Descriptive								
BMI								
					95% Confidence Interval for Mean			
	N	Mean	Std. Deviation	Std. Error	Lower Bound	Upper Bound	Minimum	Maximum
Male	19	19.921	5.9370	1.3620	17.059	22.783	13.6	30.4
Female	30	24.460	5.6675	1.0347	22.344	26.576	14.8	33.7
Total	49	22.700	6.1333	.8762	20.938	24.462	13.6	33.7

For males, the average BMI is 19.921 with a standard deviation of 5.9370. The BMI values range from 13.6 to 30.4. For females, the average BMI is higher at 24.460 with a standard deviation of 5.6675. The BMI values range from 14.8 to 33.7. Comparing the two genders, it is evident that females have a higher average BMI compared to males. This suggests that, on average, females in the sample have a higher body mass index than males. Additionally, the standard deviation indicates that there is more variability in BMI among females compared to males. Based on these statistics, it can be inferred that the females in the sample tend to have higher BMI values on average compared to males. This may indicate a difference in body composition or distribution of body fat between the genders. These differences may be due to a number of factors, including genetics, lifestyle, and cultural norms.

➢ *ANOVA Test Results on Gender.*

In another study conducted by Ostojic (2011) it is revealed that the country-level fitness rankings, indicating that Northern and Central European countries tend to have fitter children and adolescents compared to Southern European countries and the UK. Notably, a moderate positive correlation between cardiorespiratory fitness (CRF) and muscular strength was observed, suggesting that individuals with higher CRF levels generally exhibited higher muscular strength levels. This study also introduces the FitBack web platform, which supports fitness monitoring and education, providing researchers, practitioners in physical education, sports, and health, and policymakers across Europe with a free, multilingual resource. The platform offers individual and group-based fitness reports, educational materials, and interactive European fitness maps based on reference values, promoting fitness literacy and enhancing physical well-being (Biddle, et .al, 2021).

The ANOVA (Analysis of Variance) results for BMI indicate that there is a significant difference in BMI gender groups.

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Table 6 ANOVA Test Result on Gender

ANOVA					
BMI					
	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	239.656	1	239.656	7.193	.010
Within Groups	1565.984	47	33.319		
Total	1805.640	48			

The F-value is 7.193, which is the ratio of the mean square between groups to the mean square within groups. It measures the difference in variation between groups compared to the variation within groups. The significance level (p-value) associated with the F-value is .010, which is less than the commonly used significance level of .05. This indicates that the difference in BMI between groups is statistically significant. The ANOVA results suggest that there is a significant difference in BMI between the groups being analysed. This finding indicates that the group or category variable has a significant effect on BMI scores.

➢ *Summary BMI and Native Descriptive.*

The data below summarise the descriptive statistics of BMI based on the region of origin of the school children.

Table 7 Summary BMI and Native Descriptives

Descriptives								
BMI								
					95% Confidence Interval for Mean			
	N	Mean	Std. Deviation	Std. Error	Lower Bound	Upper Bound	Minimum	Maximum
Africa	22	17.582	3.1935	.6809	16.166	18.998	13.6	25.1
America	11	28.927	4.4596	1.3446	25.931	31.923	18.9	33.7
Europe	5	27.460	5.4390	2.4324	20.707	34.213	20.2	33.0
Asia	11	24.545	3.4731	1.0472	22.212	26.879	18.1	28.8
Total	49	22.700	6.1333	.8762	20.938	24.462	13.6	33.7

The descriptive statistics for BMI across different populations (Africa, America, Europe, and Asia). The highest mean BMI is from America with 28.927, which is considerably higher than the other regions. The standard deviation is 4.4596, indicating a moderate amount of variation in BMI within this group. The minimum BMI in this group is 18.9, and the maximum BMI is 33.7. The mean BMI for individuals in Africa is 17.582. The standard deviation is 3.1935, indicating a relatively small amount of variation in BMI within this group. The minimum BMI in this group is 13.6, and the maximum BMI is 25.1.

The mean BMI for individuals in Europe is 27.460. The standard deviation is 5.4390, indicating a relatively large amount of variation in BMI within this group. The minimum BMI in this group is 20.2, and the maximum BMI is 33.0. The mean BMI for individuals in Asia is 24.545. The standard deviation is 3.4731, indicating a moderate amount of variation in BMI within this group. The minimum BMI in this group is 18.1, and the maximum BMI is 28.8.

➢ *ANOVA Test for BMI and Nativity of the Children*

The ANOVA table shows the results of an analysis of variance (ANOVA) for the variable BMI.

Table 8 ANOVA Test for BMI and Nativity of the Children

ANOVA					
BMI					
	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	1153.626	3	384.542	26.540	.000
Within Groups	652.014	45	14.489		
Total	1805.640	48			

The analysis examines the differences in BMI variation between groups (regions) and within groups. The sum of squares (SS) for the between groups factor is 1153.626, representing the extent of BMI variation attributable to regional differences. The degrees of freedom (df) for the between groups factor is 3, equivalent to the number of regions minus 1. The mean square (MS) for the between groups factor is 384.542, calculated by dividing the sum of squares by the degrees of freedom.

In this test, the F-value obtained is 26.540. The F-value is utilized to examine the null hypothesis that there is no significant disparity in the mean BMI among the regions. The p-value, denoted as "0.000," is extremely low ($p < 0.001$). This indicates compelling evidence to reject the null hypothesis and affirm that there are noteworthy variations in the mean BMI between the regions.

The ANOVA results indicate that there are significant differences in the mean BMI between the regions. The variation in BMI between the regions (between groups) is

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significantly larger than the variation within each region (within groups). This method compares all possible pairs of means and evaluates whether they are significantly different from each other.

- Africa vs. America: The mean BMI in America is significantly higher than in Africa, with a mean difference of -11.3455. The negative sign indicates that America has a higher mean BMI compared to Africa.
- Africa vs. Europe: The mean BMI in Europe is significantly higher than in Africa, with a mean difference of -9.8782. Again, the negative sign indicates that Europe has a higher mean BMI compared to Africa.
- Africa vs. Asia: The mean BMI in Asia is significantly higher than in Africa, with a mean difference of -6.9636. Once again, the negative sign indicates that Asia has a higher mean BMI compared to Africa.
- America vs. Asia: The mean BMI in Asia is significantly higher than in America, with a mean difference of 4.3818. The positive sign indicates that Asia has a higher mean BMI compared to America.

Both Tukey HSD and Bonferroni corrections confirm the significant differences in mean BMI between the populations, with Africa consistently having lower mean BMI values compared to America, Europe, and Asia. In summary, the multiple comparisons indicate that America, Europe, and Asia have significantly higher mean BMI values compared to Africa.

➢ *Health-related Fitness Levels of Primary School Children*

This section seeks to provide analysis which determines the health-related fitness levels of the respondents.

➢ *Descriptive*

The statistic below gives insight on the distribution of data for different variables.

The Triceps variable exhibited measurements ranging from 5 to 49 mean of 23.94 and standard deviation of 11.022. Similarly, the Bicep variable demonstrated measurements ranging from 7 to 48, a mean of 23.41 and a standard deviation of 11.249. The Abdominal variable had measurements that spanned from 6 to 53, yielding a mean of 25.69 and a standard deviation of 13.287. Regarding the Subscapular variable, the measurements ranged from 8 to 48, with a mean of 25.24 and a standard deviation of 11.112.

The flexibility variable displayed measurements ranging from 12.0 to 42.0, a mean of 26.061 and a standard deviation of 7.8110. Similarly, the push Ups variable exhibited measurements ranging from 8 to 34, a mean of 19.98 and a standard deviation of 7.166. The Sit Ups variable had measurements spanning from 8 to 32, yielding a mean value of 17.49 and a standard deviation of 5.292. As for the Seat to Stand variable, the measurements ranged from 9 to 33, a mean of 19.94 and a standard deviation of 6.932. The Vertical Jump variable showcased measurements ranging from 0.60 to 4.00, with a mean of 1.6408 and a standard deviation of 0.79600. Lastly, the Speed variable had measurements that ranged from 12 to 36, with a mean value of 23.84 and a standard deviation of 6.179. The Beep_Test_20 variable had measurements ranging from 1.0 to 12.0, with a mean value of 5.357 and a standard deviation of 2.9663.

These descriptive statistics provide a summary of the distribution of data for each variable, including the range, mean, and standard deviation. The data shows that the responds are mainly above the standard measures as determined by CDC.

➢ *Correlation analysis between Composition and Fitness*

The correlation matrix shows the correlations between BMI and different skin fold variables

Table 9 Correlation Analysis between Composition and Fitness

Correlations						
		BMI	Tricep	Bicep	Abdominal	Subscapular
BMI	Pearson Correlation	1				
Tricep		.756**	1			
Bicep		.738**	.986**	1		
Abdominal		.743**	.982**	.987**	1	
Subscapular		.754**	.984**	.983**	.992**	1
**. Correlation is significant at the 0.01 level (2-tailed).						

The data presented above reveals significant correlations between BMI (Body Mass Index) and the variables Tricep ($r = 0.756$, $p < 0.01$), Bicep ($r = 0.738$, $p < 0.01$), Abdominal ($r = 0.743$, $p < 0.01$), and Subscapular ($r = 0.754$, $p < 0.01$). These correlations indicate a positive relationship, indicating that as BMI increases, so do measurements of Tricep, Bicep, Abdominal, and Subscapular.

Furthermore, Tricep exhibits significant correlations with Bicep ($r = 0.986$, $p < 0.01$), Abdominal ($r = 0.982$, $p < 0.01$), and Subscapular ($r = 0.984$, $p < 0.01$), suggesting a strong positive relationship between Tricep and the other variables. Similarly, Bicep demonstrates significant correlations with Abdominal ($r = 0.987$, $p < 0.01$) and Subscapular ($r = 0.983$, $p < 0.01$), indicating a strong positive relationship between Bicep and these variables. Moreover, Abdominal exhibits a significant correlation with Subscapular ($r = 0.992$, $p < 0.01$), suggesting a very strong positive relationship between the two variables.

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These findings highlight the interrelationships between BMI, Tricep, Bicep, Abdominal, and Subscapular measurements, providing valuable insights into the associations among these variables in the context of the study. The correlations suggest that there are significant relationships between BMI, Tricep, Bicep, Abdominal, and Subscapular measurements, with BMI being correlated with all other variables, and the other variables also exhibiting strong positive correlations among themselves.

➢ *Independent samples T-Tests Results*

The table below summarise the results on the independent t-test results.

Table 10 Independent samples T-Tests Results

Independent Samples Test										
		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Tricep	Equal variances assumed	16.931	.000	.452	47	.653	1.720	3.805	-5.935	9.375
	Equal variances not assumed			.819	41.925	.418	1.720	2.101	-2.521	5.961
Bicep	Equal variances assumed	18.583	.000	.076	47	.940	.294	3.892	-7.535	8.124
	Equal variances not assumed			.136	43.111	.893	.294	2.170	-4.082	4.670
Abdominal	Equal variances assumed	21.564	.000	-.042	47	.967	-.191	4.597	-9.440	9.057
	Equal variances not assumed			-.076	40.948	.940	-.191	2.520	-5.281	4.899
Subscapular	Equal variances assumed	16.968	.000	.131	47	.896	.505	3.844	-7.229	8.238
	Equal variances not assumed			.231	45.159	.819	.505	2.188	-3.902	4.912

The results of the t-test for Equality of Means show that there is a statistically significant difference between the means of the two groups for all four skinfold measurement. This means that the study can confidently reject the hypothesis that the means of the two groups are equal.

The results of the independent samples test indicate a statistically significant distinction between the mean skinfold measurements of the girls and boys groups for the triceps, biceps, abdominal, and subscapular regions. This implies that there are notable differences in the skinfold measurements between the two groups.

➢ *Anova Test on body composition*

The ANOVA table provides information about the analysis of variance for the variables Tricep, Bicep, Abdominal, and Subscapular.

Table 11 ANOVA Test on Body Composition

ANOVA						
		Sum of Squares	df	Mean Square	F	Sig.
Tricep	Between Groups	4724.153	3	1574.718	64.032	.000
	Within Groups	1106.664	45	24.593		
	Total	5830.816	48			
Bicep	Between Groups	5094.955	3	1698.318	78.073	.000
	Within Groups	978.882	45	21.753		

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	Total	6073.837	48			
Abdominal	Between Groups	7156.181	3	2385.394	81.430	.000
	Within Groups	1318.227	45	29.294		
	Total	8474.408	48			
Subscapular	Between Groups	4876.543	3	1625.514	69.631	.000
	Within Groups	1050.518	45	23.345		
	Total	5927.061	48			

The analysis reveals a substantial disparity between the groups for the Tricep variable. The between-groups sum of squares is 4724.153, with 3 degrees of freedom, resulting in a mean square of 1574.718. The F-value is 64.032, and the significance level is 0.000. This suggests that there is a significant variation between the groups in terms of the Tricep variable.

Similarly, for the variables Bicep, Abdominal, and Subscapular, the analysis reveals significant differences between the groups. For Bicep, the between-groups sum of squares is 5094.955, with 3 degrees of freedom, resulting in a mean square of 1698.318. The F-value is 78.073, and the significance level is 0.000. For Abdominal, the between-groups sum of squares is 7156.181, with 3 degrees of freedom, resulting in a mean square of 2385.394. The F-value is 81.430, and the significance level is 0.000. Lastly, for Subscapular, the between-groups sum of squares is 4876.543, with 3 degrees of freedom, resulting in a mean square of 1625.514. The F-value is 69.631, and the significance level is 0.000.

- *Dietary Practices of Multi-Cultural Primary School Children*

The purpose of this section is to determine the dietary practices of multi-cultural primary school children

- *Meals Patterns*

The table below summarise the meal patterns of the participants

Table 12 Meals Patterns

Breakfast					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	29	59.2	59.2	59.2
	No	20	40.8	40.8	100.0
	Total	49	100.0	100.0	
		Lunch			
	Yes	32	65.3	65.3	65.3
	No	17	34.7	34.7	100.0
	Total	49	100.0	100.0	
		Supper			
	Yes	49	100.0	100.0	100.0

The table presents the frequencies and percentages of breakfast, lunch, and supper consumption among multi-cultural primary school children.

For breakfast, 29 children (59.2%) reported having breakfast, while 20 children (40.8%) did not. Regarding lunch, 32 children (65.3%) reported having lunch, while 17 children (34.7%) did not. For supper, all 49 children (100.0%) reported having supper. As there is no option for not having supper, the cumulative percent is also 100.0%.

The participants were further asked to respond on the effects of not eating breakfast, the table summarise the responses.

Table 13 Effects of not Eating Breakfast

What problems can children have if they don't eat before going to school?					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Children have short attention	13	26.5	26.5	26.5
	Have low concentration	14	28.6	28.6	55.1
	Cannot study well	13	26.5	26.5	81.6
	Do not do as well at school as they should	9	18.4	18.4	100.0
	Total	49	100.0	100.0	

The responses indicated that students believe missing breakfast lead to Short attention as in shown by 13 children (26.5%) reported experiencing short attention spans when they don't eat before going to school. Low concentration 14 children (28.6%) mentioned having difficulties maintaining concentration when they skip breakfast. Inability to study well, 13 children (26.5%) reported that not eating before school hinders their ability to study effectively. Underperformance at school was mentioned by 9 children (18.4%) expressed that they do not perform as well at school as they should when they don't have breakfast.

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The valid per cent represents the proportion of children who provided valid responses within each category, while the cumulative per cent shows the running total of children who reported each problem.

In essence the study found that there are potential negative consequences of children skipping breakfast before going to school. It suggests that not eating before school may contribute to issues such as reduced attention, poor concentration, difficulty in studying, and lower academic performance.

While a majority of the respondents (63.3%) perceive having breakfast before going to school as a beneficial practice, the study findings indicate that a significant portion of the students find it difficult to have breakfast before going to school. The majority (51.0%) reported facing difficulties in having breakfast, while a smaller percentage (20.4%) mentioned it was not difficult for them. The major reasons for difficulty mentioned were time, busy schedules and parents rushing to work in the morning.

The students further indicated that they have difficulties in having three meals a day as indicated in the figure below.

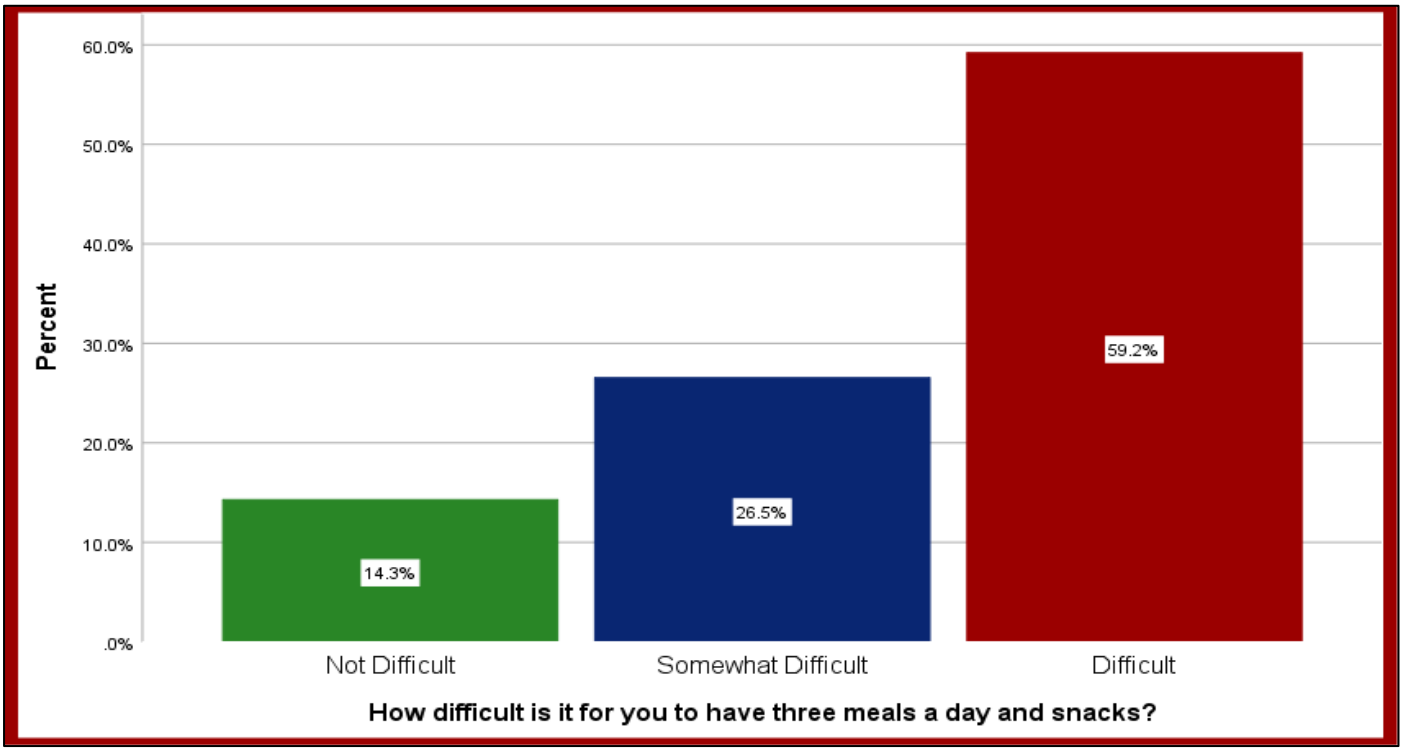

Fig 4 Difficulties in having Three Meals a Day

The data shows that 7 respondents (14.3%) indicated that it is not difficult for them to have three meals a day and snacks while 13 respondents (26.5%) reported that it is somewhat difficult for them to have three meals a day and snacks and 29 respondents (59.2%) expressed the view that it is difficult for them to have three meals a day and snacks.

These findings suggest that a significant majority of the respondents (59.2%) find it difficult to have three meals a day and snacks. These results highlight the challenges faced by some individuals in maintaining regular and balanced meals throughout the day, including the incorporation of snacks. Factors such as time constraints, lack of access to nutritious food, personal preferences, and lifestyle factors can contribute to the perceived difficulty. This has an impact on the body composition and dietary patterns of the children.

➢ *Meals Patterns and Regions*

The ANOVA table shows the results of the analysis of variance for the variables Breakfast and Lunch.

Table 14 Meal Patterns and Regions

ANOVA						
		Sum of Squares	df	Mean Square	F	Sig.
Breakfast	Between Groups	3.682	3	1.227	6.773	.001
	Within Groups	8.155	45	.181		
	Total	11.837	48			
Lunch	Between Groups	.766	3	.255	1.111	.355
	Within Groups	10.336	45	.230		
	Total	11.102	48			

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The data provided above reveals a statistically significant distinction between the groups when considering the Breakfast variable. The between-groups sum of squares is 3.682, with 3 degrees of freedom, resulting in a mean square of 1.227. The F-value is 6.773, and the significance level is 0.001. These findings indicate a substantial variation between the groups concerning the Breakfast variable.

Conversely, for the Lunch variable, the analysis does not reveal a statistically significant variability between the groups. The between-groups sum of squares is 0.766, with 3 degrees of freedom, resulting in a mean square of 0.255. The F-value is 1.111, and the significance level is 0.355. These results suggest that the observed variation between the groups in terms of the Lunch variable is not statistically significant.

The results of the ANOVA indicate significant variations among the groups concerning the Breakfast variable, whereas no significant differences were found between the groups for the Lunch variable. The study found that children from Europe and America were very consistent on having breakfast while those from Africa and Asia were not very consistent. This indicates the varying cultural backgrounds on dietary practices.

➢ *Snack and Dietary Patterns*

The study found that the dietary practices of multi-cultural primary school children were heavily affected by snacks. The table below summarise the snacks preferences among student. The study used the multiple response analysis of the selected snacks.

Table 15 Snacks and Dietary Patterns

Snacks Frequencies				
		Responses		
		N	Percent	Percent of Cases
Snacks[a]	Fruits	18	6.5%	36.7%
	Drinks_Fizzy	45	16.3%	91.8%
	Popcorn	36	13.0%	73.5%
	Cereal_Nuts	15	5.4%	30.6%
	Juice	20	7.2%	40.8%
	Chips_Crisps	42	15.2%	85.7%
	Cookies_Biscuits	43	15.6%	87.8%
	Yogurts_Cheese	13	4.7%	26.5%
	Sweets_Candy	44	15.9%	89.8%
Total		276	100.0%	563.3%
a. Dichotomy group tabulated at value 1.				

The table presents the multi-level response frequencies and percentages of responses for different snack items. The variables include Fruits, Drinks Fizzy, Popcorn, Cereal_Nuts, Juice, Chips Crisps, Cookies Biscuits, Yogurts Cheese, and Sweets Candy. For example, for the snack item "Fruits," there were 18 responses, which correspond to 6.5% of the total cases. The cumulative percentage of cases who selected "Fruits" or any preceding item (i.e., "Fruits" and any item before it) is 36.7%. Similarly, the table provides information on the frequency and percentage of responses for each snack item. For instance, "Drinks Fizzy" received 45 responses, accounting for 16.3% of the cases. The cumulative percentage of cases who selected "Drinks Fizzy" or any preceding item is 91.8%.

The snack items listed in the table pose dangers to dietary practices due to factors such as high sugar content, unhealthy fats, excessive calories, and additives.

➢ *Effects of Snacks on Dietary Patterns*

The respondents indicated that there are negative effects of snacks consumption. The table summarise.

Table 16 Effects of Snacks on Dietary Patterns

Why is it so bad to eat too many sweets and candies?					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Because they can cause tooth decay	4	8.2	8.2	8.2
	Because they are not nutritious	19	38.8	38.8	46.9
	Because they interfere with appetite	26	53.1	53.1	100.0
	Total	49	100.0	100.0	

The table provides information on the reasons why eating too many sweets and candies is considered bad, based on the responses of the participants.

The study found that 4 respondents (8.2%) mentioned that consuming too many sweets and candies can lead to tooth decay, which is a dental health concern while 19 respondents (38.8%) indicated that sweets and candies lack nutritional value. These treats often contain high amounts of added sugars, artificial ingredients, and limited beneficial nutrients. The majority of respondents, 26 (53.1%), highlighted that consuming excessive amounts of sweets and candies can interfere with appetite regulation. These sugary treats can contribute to overconsumption of calories without

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providing a feeling of fullness or satisfying hunger, potentially leading to imbalanced diets and weight gain.

These findings highlight some of the negative effects associated with consuming too many sweets and candies. It reinforces the understanding that excessive intake of these sugary treats can have detrimental impacts on dental health, provide limited nutritional value, and disrupt healthy appetite regulation.

The findings are also in line with the findings from the respondents' comments. Fizzy drinks can lead to weight gain, obesity, diabetes, and dental issues. Flavoured popcorn varieties can contribute to increased calorie and sodium intake, affecting cardiovascular health. Chips and crisps are high in unhealthy fats, sodium, and calories, which can lead to weight gain and chronic diseases. Packaged cookies and biscuits contain added sugars, unhealthy fats, and refined grains, contributing to weight gain, tooth decay, and chronic diseases. Sweets and candy with added sugars, artificial colours, and flavours can lead to weight gain, dental problems, and increased risk of chronic conditions. Moderation and balance are crucial, while promoting nutritious snacks like fruits, vegetables, whole grains, and low-fat dairy products for healthier dietary habits and overall well-being.

- *Establishing the Relationship between Body Composition and Physical Fitness*

The purpose of this section is to analyse and understand the correlation between body composition and physical fitness in both boys and girls.

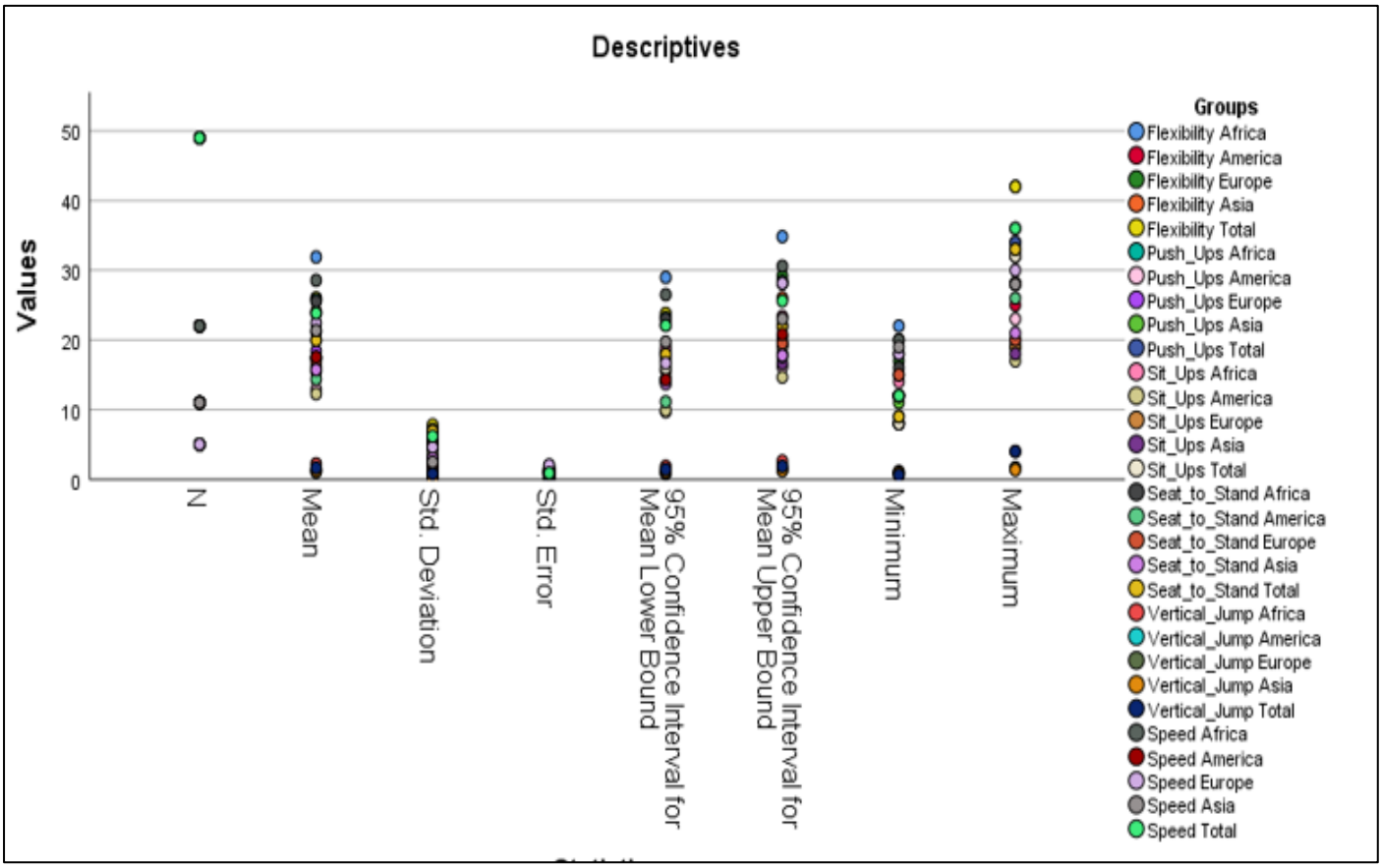

Fig 5 Descriptive Statistics for Fitness Variables

The figure above presents descriptive statistics for several variables: Flexibility, Push_ups, Sit_ups, Seat_to_Stand, Vertical jump, and Speed. The statistics include the number of observations (N), the mean, standard deviation, standard error, and the 95% confidence interval for the mean. Additionally, the minimum and maximum values are provided for each variable. For Flexibility, there are data available for four regions: Africa, America, Europe, and Asia. The mean flexibility scores vary across the regions, with the highest mean in Africa (31.900), followed by Europe (23.800), Asia (24.109), and the lowest mean in America (17.364). The standard deviation indicates the spread of the scores within each group, with Africa having the highest variability (6.5995) and America having the lowest (4.5227). The same pattern can be observed for the other variables. Push_ups, Sit-up, Seat_to_Stand, and Speed all show higher mean scores in Africa compared to the other regions. Vertical Jump, on the other hand, does not follow the same pattern, with the highest mean score in Africa (2.2432) and the lowest in America (1.0455).

- *Correlation Analysis between Body Composition and Physical Fitness*

The study carried out a Pearson's Correlation analysis in order to determine the relationship between body composition and physical fitness among respondents of the study. Table below summarise the results.

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Table 17 Correlation Analysis between Body Composition and Physical Fitness

Correlations								
	BMI	Flexibility	Push_Ups	Sit_Ups	Seat_to_Stand	Vertical_Jump	Speed	Beep_Test_20
BMI	1							
Flexibility	-.792**	1						
Push_Ups	-.779**	.871**	1					
Sit_Ups	-.678**	.874**	.870**	1				
Seat_to_Stand	-.832**	.816**	.832**	.752**	1			
Vertical_Jump	-.654**	.803**	.757**	.804**	.728**	1		
Speed	-.796**	.791**	.850**	.729**	.838**	.701**	1	
Beep_Test_20	-.757**	.865**	.874**	.800**	.830**	.797**	.849**	1
**. Correlation is significant at the 0.01 level (2-tailed).								

The correlation table shows the Pearson correlation coefficients between different variables: BMI, Flexibility, Push_Ups, Sit-ups, Seat_to_Stand, Vertical_Jump, Speed, and Beep_Test_20. The result indicates that BMI is negatively correlated with Flexibility, Push_ups, Sit-ups, Seat_to_Stand, vertical jump, and Speed. The correlations are all statistically significant ($p < .01$), indicating that higher BMI values are associated with lower scores in these physical fitness measures.

Flexibility, Push_ups, Sit-ups, Seat_to_Stand, vertical jump, Speed, and Beep_Test_20 are all positively correlated with each other. The correlations are all highly significant ($p < .01$), suggesting that higher scores in one variable are associated with higher scores in the others. The correlations provide insights into the relationships among the variables and suggest that physical fitness measures are interrelated. Higher flexibility, strength (Push_ups, sit-ups), lower body strength (Seat_to_Stand), explosive power (vertical jump), and speed are generally associated with each other and with better performance on the Beep_Test_20.

These findings suggest that higher BMI values among children in the Northern Central District of Harare are associated with lower scores in measures of flexibility, strength (Push_ups, Sit-up), lower body strength (Seat_to_Stand), explosive power (vertical Jump), and speed. This highlights the importance of considering body composition, particularly BMI, when evaluating and addressing the physical fitness levels of children.

➢ *ANOVA Test on body composition and physical Fitness.*

The study carried out the Analysis of Variance (ANOVA) test to analyse the differences in means among children from different regions (Natives) and in relation to their physical fitness in performance using flexibility variables.

➢ *The Levene Homogeneity of Variance Test*

The "Test of Homogeneity of Variances" was conducted to assess whether the variances of different variables across groups are equal. The results showed variations in the variances across groups for the Flexibility variable. The Levene statistic for Flexibility was 9.851 with 3 and 45 degrees of freedom, and the p-value was less than .001, indicating significant differences in variances. Additionally, using the trimmed mean method also yielded significant results (Levene statistic = 9.684, $p < .001$). For other variables such as Push_Ups, Sit_Ups, Seat_to_Stand, Vertical_Jump, and Speed, the results varied across the different methods of calculation (mean, median, median with adjusted df, and trimmed mean). Some methods showed significant differences in variances ($p < .05$ or $p < .01$), while others did not reach significance.

➢ *ANOVA Results*

The ANOVA Test results are presented in the Table below.

Table 18 ANOVA Test on Body Composition and Physical Fitness.

ANOVA						
		Sum of Squares	df	Mean Square	F	Sig.
Flexibility	Between Groups	1649.622	3	549.874	19.347	.000
	Within Groups	1278.975	45	28.422		
	Total	2928.596	48			
Push_Ups	Between Groups	1459.371	3	486.457	21.768	.000
	Within Groups	1005.609	45	22.347		
	Total	2464.980	48			
Sit_Ups	Between Groups	637.545	3	212.515	13.532	.000
	Within Groups	706.700	45	15.704		
	Total	1344.245	48			
Seat_to_Stand	Between Groups	1277.835	3	425.945	18.628	.000
	Within Groups	1028.982	45	22.866		
	Total	2306.816	48			
Vertical_Jump	Between Groups	14.760	3	4.920	14.144	.000

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	Within Groups	15.654	45	.348		
	Total	30.413	48			
Speed	Between Groups	1000.767	3	333.589	18.044	.000
	Within Groups	831.927	45	18.487		
	Total	1832.694	48			

The ANOVA results above indicate that there are significant differences in mean scores across the groups (Native) for each variable: Flexibility, Push_Ups, Sit_Ups, Seat_to_Stand, Vertical_Jump, and Speed. The p-values are all less than .001, suggesting strong evidence against the null hypothesis of equal means.

These findings suggest that body composition, such as body mass index (BMI) or other relevant measures, may have a significant impact on physical fitness in children. It implies that factors such as muscle strength, endurance, and flexibility may vary based on the body composition of the individuals.

The significant differences in mean scores highlight the importance of considering both body composition and physical fitness levels when assessing the overall health and well-being of children. These findings can help inform interventions and programs aimed at promoting healthy body composition and improving physical fitness among children in the Northern Central District of Harare.It is worth noting that the study focused on both boys and girls, allowing for a comprehensive understanding of the relationship between body composition and physical fitness across genders. This information can be valuable for designing targeted interventions to address any disparities or specific needs identified within each group.

- *Compare Body Composition, Dietary Practices and Health-related Physical Fitness*

This section focuses on inferential analysis in the comparison of body composition, dietary practices and health-related physical fitness between boys and girls in northern central district.

- *ANOVA Test on Gender and Dietary Practises*

The table below summarise the ANOVA results on gender and dietary practises among girls and boys.

Table 19 Anova test on gender and dietary practises

ANOVA						
		Sum of Squares	df	Mean Square	F	Sig.
Knowledge	Between Groups	2914.676	42	69.397	29.913	.000
	Within Groups	13.920	6	2.320		
	Total	2928.596	48			
Attitude	Between Groups	1797.194	42	42.790	7.232	.010
	Within Groups	35.500	6	5.917		
	Total	1832.694	48			

The data shows that the variable "Knowledge", the sum of squares between groups is 2914.676, with 42 degrees of freedom. The mean square is 69.397. The F-value is 29.913, and the significance value (Sig.) is 0.000. This indicates that there is a significant difference in knowledge scores between the groups. Within Groups: The sum of squares within groups is 13.920, with 6 degrees of freedom. The mean square is 2.320. This represents the variability within each group.

For the variable "Attitude", the sum of squares between groups is 1797.194, with 42 degrees of freedom. The mean square is 42.790. The F-value is 7.232, and the significance value (Sig.) is 0.010. This indicates that there is a significant difference in attitude scores between the groups.

The study revealed that there are distinct dietary practices between boys and girls. Furthermore, within each gender group, individuals exhibit diverse dietary habits, which are influenced by their regional background and unique family dietary practices.

- *Regression Analysis*

The study will adopt the multivariate regression model to compare body composition, dietary practices and health-related physical fitness between boys and girls in northern central district.

- *Model Summary*

The model summary provides an overview of the regression model examining the relationship between flexibility (dependent variable) and BMI (predictor variable) among girls in the selected sample where Gender = Female.

The model summary provides an overview of the regression model examining the relationship between flexibility (dependent variable) and BMI (predictor variable) among girls in the selected sample where Gender = Female.

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Table 20 Regression Model Summary

Model Summary[b,c]										
	R					Change Statistics				
Model	Gender = Female (Selected)	Gender ~= Female (Unselected)	R Square	Adjusted R Square	Std. Error of the Estimate	R Square Change	F Change	df1	df2	Sig. F Change
1	.680[a]	.871	.662	.643	4.1112	.462	24.034	1	28	.000
a. Predictors: (Constant), BMI										
b. Unless noted otherwise, statistics are based only on cases for which Gender = Female.										
c. Dependent Variable: Flexibility										

The coefficient of determination (R-squared) value indicates that approximately 66.2% of the variability in flexibility can be explained by the variability in BMI. This means that BMI is a moderately strong predictor of flexibility in this sample of girls.

The adjusted R-squared takes into account the number of predictor variables in the model and adjusts the R-squared value accordingly. In this case, the adjusted R-squared is 0.643, indicating that about 64.3% of the variability in flexibility is accounted for by the predictors in the model, considering the degrees of freedom.

➢ *Regression Coefficients Results.*

The coefficients table presents the results of a regression model examining the relationship between the flexibility (dependent variable) and BMI (predictor variable) among girls in the selected sample where Gender = Female.

Table 21 Regression Coefficients Results

Coefficients[a,b]						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	39.786	3.379		11.774	.000
	BMI	-.660	.135	-.680	-4.902	.000
a. Dependent Variable: Flexibility						
b. Selecting only cases for which Gender = Female						

The standardized coefficient (beta) for BMI is -0.680, which suggests that for each one-unit increase in BMI, there is an average decrease of 0.680 units in flexibility. This coefficient is statistically significant ($p < 0.001$), indicating that BMI is a significant predictor of flexibility among girls in the selected sample. The results suggest that BMI has a significant negative association with flexibility among girls in the selected sample where Gender = Female. Higher BMI values are associated with lower flexibility scores.

IV. RESULTS

The study aimed to gain a deeper understanding of the health profiles of primary school children in the district by exploring their body composition, dietary practices, and health-related fitness levels. Through the collection of data using surveys, physical assessments, and interviews, a diverse sample of children from different multicultural groups was included, ensuring the representation of the district's population. The analysis of the collected data involved the application of both descriptive and inferential statistics. Descriptive statistics provided an overview of the sample characteristics and allowed for a better understanding of the distribution and central tendencies of the variables under investigation. On the other hand, inferential statistics, including t-tests, ANOVA, and regression analysis, enabled the examination of relationships, differences, and potential predictors within the data.

The study found that females in the sample had higher average BMI values compared to males, indicating a potential difference in body composition or fat distribution between the genders. Factors such as genetics, lifestyle, and cultural norms may contribute to these gender disparities. Notably, the America region was found to exhibit the highest mean BMI of 28.927, significantly surpassing the mean values of other regions. This region also showed moderate variation in BMI with a standard deviation of 4.4596. In contrast, the Africa region had a mean BMI of 17.582 and a smaller standard deviation of 3.1935, indicating less variability in BMI. The range of BMI values in America ranged from 18.9 to 33.7, while in Africa, it ranged from 13.6 to 25.1. The ANOVA results confirmed significant differences in mean BMI values between the regions, with the variation in BMI between regions being considerably larger than the variation within each region. These findings underscore the need to consider regional and gender-specific differences in body composition among primary school children.

In terms of the health-related fitness levels of primary school children in the Northern Central District of Harare, the descriptive statistics found that the children's measurements for skinfold variables and flexibility tend to exceed the standard measures set by the CDC, suggesting potential health concerns within the population. In addition correlation analysis highlights significant relationships between BMI, Triceps, Bicep, Abdominal, and Subscapular measurements. BMI demonstrates correlations with all other variables, while the remaining variables also exhibit strong

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positive correlations among themselves, indicating interdependencies among these body composition factors. The independent samples test shows statistically significant differences in the mean skinfold measurement between boys and girls, suggesting variations in body composition between the two genders. Additionally, the ANOVA test results indicate significant differences between groups for the variables Triceps, Bicep, Abdominal, and Subscapular. This suggests substantial variations in these body composition measures across different groups.

The study found that there is varying dietary practices of multi-cultural primary school children, in terms of their meal patterns and the impact of snacks on their diet. The data revealed varying dietary practices among the children in terms of breakfast, lunch, and supper. While all children reported having supper, 59.2% had breakfast, and 65.3% had lunch. Notably, a significant proportion of students did not have breakfast or lunch regularly. The study further highlighted potential negative consequences of skipping breakfast, including reduced attention, poor concentration, difficulty in studying, and lower academic performance. Despite a majority perceiving breakfast as beneficial, a significant portion of students found it challenging to have breakfast before school. These findings indicate difficulties in maintaining regular and balanced meals throughout the day, including snacks. Factors such as time constraints, limited access to nutritious food, personal preferences, and lifestyle factors contributed to the perceived difficulty in adhering to regular meal patterns. The ANOVA results indicated significant differences between groups concerning breakfast practices but no significant differences for lunch. Children from Europe and America were found to be more consistent in having breakfast compared to those from Africa and Asia, reflecting cultural variations in dietary practices. Additionally, the study highlighted the impact of snacks on children's dietary patterns. The excessive consumption of sweets and candies was found to interfere with appetite regulation, potentially leading to imbalanced diets and weight gain. Overconsumption of these sugary treats can contribute to calorie intake without providing a feeling of fullness or satisfaction.

The study found and inverse relationship between body composition and physical fitness among children in the Northern Central District of Harare. The results indicate that higher BMI values among children are linked to lower scores in measures of flexibility, strength (Push_Ups, Sit_Ups), lower body strength (Seat_to_Stand), explosive power (Vertical_Jump), and speed. This suggests that children with higher BMI values may have lower levels of flexibility, muscle strength, endurance, and overall physical fitness. These findings underscore the importance of considering body composition, particularly BMI, when evaluating and addressing the physical fitness levels of children. It highlights that factors such as muscle strength, endurance, and flexibility may vary based on individuals' body composition, specifically BMI or other relevant measures. Moreover, the ANOVA findings indicate that body composition, such as BMI or other relevant measures, significantly impact physical fitness in children. This implies that variations in body composition may contribute to differences in muscle strength, endurance, and flexibility among individuals.

The study also aimed to compare body composition, dietary practices, and health-related physical fitness among primary school children. The findings show distinct dietary practices between boys and girls, indicating gender differences in dietary habits. Additionally, within each gender group, individuals exhibited diverse dietary habits influenced by their regional backgrounds and family dietary practices. Regarding the relationship between body composition and physical fitness, the study found that approximately 66.2% of the variability in flexibility among girls can be explained by the variability in BMI. This suggests that BMI serves as a moderately strong predictor of flexibility in girls. The standardized coefficient (beta) for BMI was determined to be -0.680, indicating that for every one-unit increase in BMI, there is an average decrease of 0.680 units in flexibility. This coefficient was statistically significant ($p < 0.001$), underscoring the significant association between BMI and flexibility among girls in the sample. Furthermore, the results indicate that higher BMI values are associated with lower flexibility scores among girls. This negative association between BMI and flexibility highlights the impact of body composition on physical fitness, specifically in terms of flexibility.

V. CONCLUSION

It is the conclusion of this study that gender differences in body composition among primary school children, with females exhibiting higher average BMI values compared to males. Regional variations are also observed, with the America region having the highest mean BMI and greater variation compared to the Africa region. These findings emphasize the importance of considering regional and gender-specific differences in body composition among children.

The health-related fitness levels of primary school children in the Northern Central District of Harare show potential concerns, as their skinfold measurements and flexibility tend to exceed standard measures. Significant correlations between body composition variables highlight interdependencies among these factors. Variations in body composition between boys and girls are observed, indicating differences in body composition between genders.

Dietary practices among multi-cultural primary school children vary, particularly in terms of meal patterns and the impact of snacks on their diet. Skipping breakfast is associated with potential negative consequences on attention, concentration, studying, and academic performance. Challenges in maintaining regular and balanced meals throughout the day are identified, influenced by factors such as time constraints and limited access to nutritious food. Cultural variations in dietary practices are observed, with children from Europe and America exhibiting more consistent breakfast habits compared to

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those from Africa and Asia. Excessive consumption of sweets and candies negatively affects appetite regulation.

The study concluded that inverse relationship between body composition and physical fitness among children. Higher BMI values are associated with lower scores in measures of flexibility, strength, lower body strength, explosive power, and speed. BMI serves as a significant predictor of flexibility in girls, with higher BMI values correlating with lower flexibility scores.

The study concludes that in comparing body composition, dietary practices, and health-related physical fitness reveals gender differences in dietary habits, diverse dietary practices influenced by regional backgrounds and family practices, and the significant association between BMI and flexibility among girls.

RECOMMENDATIONS

➢ *Based on the Conclusions of the Study, the Following Recommendations can be made:*

- Promote awareness of gender-specific differences in body composition: Educate parents, teachers, and healthcare professionals about the gender disparities in body composition among primary school children. Emphasize the need to consider these differences when assessing and addressing children's health and well-being.
- Implement region-specific interventions: Develop targeted interventions that address the specific challenges and variations in body composition observed across different regions. For example, in regions with higher average BMI values, focus on promoting healthy eating habits and physical activity to address potential health concerns.
- Foster healthy dietary practices: Raise awareness among parents, educators, and children about the importance of regular and balanced meals, particularly breakfast. Provide resources and support to help families overcome barriers such as time constraints and limited access to nutritious food. Encourage the incorporation of healthy snacks and discourage excessive consumption of sweets and candies.
- Enhance physical fitness programs: Design physical fitness programs that target flexibility, strength, lower body strength, explosive power, and speed, especially for children with higher BMI values. Integrate these programs into school curricula and extracurricular activities to promote overall physical fitness among primary school children.
- Promote cultural sensitivity: Recognize and respect cultural variations in dietary practices while promoting healthy eating habits. Provide resources and educational materials that take into account diverse cultural backgrounds to ensure the recommendations are culturally relevant and acceptable.
- Encourage collaboration between stakeholders: Foster collaboration between parents, schools, healthcare professionals, and community organizations to create a supportive environment for children's health and well-being. Work together to implement and monitor interventions, share best practices, and provide on-going support and guidance to children and their families.

➢ *Areas of Further Study*

- Conduct a longitudinal study to investigate the long-term health implications of gender-specific differences in body composition among primary school children.
- Assess the potential risks associated with higher average BMI values in females and their impact on health outcomes such as cardiovascular health, metabolic disorders, and musculoskeletal issues.
- Assessing the Effectiveness of Region-Specific Interventions on Body Composition and Health-Related Fitness: Conduct a comparative study across different regions to evaluate the effectiveness of region-specific interventions targeting body composition and health-related fitness among primary school children.
- Explore how cultural norms, family dietary practices, socioeconomic factors, and access to nutritious food impact children's dietary habits and physical fitness levels. This research can provide insights into the barriers and facilitators of healthy behaviours and inform the development of culturally sensitive interventions.

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APPENDIX I: QUESTIONNAIRE

Nutritional Questionnaire

Knowledge Attitude and Practices to assess the 5 Healthier Habits

Child's Code …… **Today's Date ……**

Province …….. **District ……..**

Name of School …….. **School Location ……..**

Gender of Child …….. **Date of Birth ……..**

NOTE: Depending on the study context, questions from this module can be administered to different players involved in changing knowledge, attitudes and practices, some of whom may be the project's participant populations, such as parents and teachers of school-age children or mothers, caregivers (e.g. fathers, grandmothers).

➢ *Explain to the participant (child):*
I am going to ask you some questions about your nutrition and nutrition in general. Please let me know if you need me to clarify any of my questions. Feel free to ask any question you may have.

➢ *Season:*

- Low food season
- High food season

➢ *Practices*

- Question P.1: Having breakfast: time and place

Did you have breakfast before going to school?

Yes ..... *Go to question P.1.b.*

No ..... *Go to question P.2*

Don't know/no answer

If Yes:

At what time?

Between 6 a.m. and 9 a.m.

Between 9 a.m. and noon

Between noon and 3 p.m.

Where?

Home

School

Elsewhere (*specify*) _____

- *Question P.2: Having Lunch: Time and Place*

✓ If the interview is being conducted before lunchtime, ask: Did you have lunch yesterday?

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✓ *If the interview is being conducted after lunchtime, ask*: Did you have lunch today?

Yes ..... *Go to question P.2.b*

No ..... *Go to question P.3*

Don't know/no answer

If Yes:

At what time?

Between 9 a.m. and noon

Between noon and 3 p.m.

Between 3 p.m. and 6 p.m.

Who prepares your lunch?

Parents at home

School cafeteria

Lunch is bought with pocket money

Other (*specify*) _____

- *Question P.3: Dinner/Supper: Time and Place*

✓ Did you have dinner yesterday?

No ..... *Go to question P.4*

Don't know/no answer

If Yes:

At what time?

Between 3 p.m. and 6 p.m.

Between 6 p.m. and 9 p.m.

Between 9 p.m. and midnight

Where?

Home

School

Elsewhere (*specify*)

✓ Did you have dinner together as a family?

Yes ..... *Go to question P3.e.*

No ..... *Go to question P.4*

Don't know/no answer

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✓ Do you enjoy meals together as a famliy?

Yes

No

Don't know/no answer

- *Question P.4: Snacks*

✓ Yesterday during the day and night, did you eat anything between the meals?

Yes ..... *Go to question P4.b.*

No ..... *Go to question P.5*

Don't know/no answer

If Yes:

What did you eat?

[Include a list of locally available snacks or the responses most cited during pre-testing.]

Other (*specify*) _____

- Question P.5: Bought food

✓ Yesterday during the day and night, did you buy foods with your own money?

Yes ..... *Go to question P5.b.*

No ..... *Go to question K.1*

Don't know/no answer

If Yes:

What did you buy?

[Include a list of locally available snacks/foods or the responses most cited during pre-testing.]

Other

Where did you buy those foods?

At school/cafeteria

On the street (from street vendors)

Other (*specify*) _____

➢ *Knowledge*

- *Question K.1: Consequences of short-term hunger at school*

Some children do not have breakfast before going to school and are hungry in class. What is the consequence for children of not having breakfast and being hungry at school?

- *Probe if Necessary:*

What problems can children have if they don't eat before going to school?

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Children have short attention/have low concentration/cannot study well/do not do as well at school as they should
Other
Don't know

- *Preliminary Analysis*

✓ Knows
✓ Does not know

- *Question K.2: Discouraging sweets and candies*
  Why should parents discourage sticky and sugar-rich foods, such as sweets and candies?

- *Probe if Necessary:*
  Why is it so bad to eat too many sweets and candies?

Because they can cause tooth decay
Because they are not nutritious
Because they interfere with appetite
Other
Don't know

➢ *Preliminary Analysis*

- Knows
- Does not know
- Number of correct responses

➢ *Attitudes*
  Attitudes towards an ideal or desired nutrition-related practice

- ***Having breakfast*** *before going to school*

- *Perceived Benefits*
  How good do you think it is to have breakfast before going to school?

✓ Not good
✓ You're not sure
✓ Good

- *If Not good:*
  Can you tell me the reasons why it is not good?

➢ *Perceived Barriers*
  How difficult is it for you to have breakfast before going to school?

- Not difficult
- So-so
- Difficult

✓ *If Difficult:*
  Can you tell me the reasons why it is difficult?

✓ *Having three meals a day and snacks*

➢ *Perceived Benefits*
  How good do you think it is to have three meals a day and snacks?

- Not good
- You're not sure
- Good

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- *If Not good:*
  Can you tell me the reasons why it is not good?

➢ *Perceived Barriers*
How difficult is it for you to have three meals a day and snacks?

- Not difficult
- So-so
- Difficult

- *If Difficult:*
  Can you tell me the reasons why it is difficult?

✓ Having different types of foods at meal times

➢ *Perceived Benefits*
How good do you think it is to have different types of foods at meals?

- Not good
- You're not sure
- Good

- *If Not good:*
  Can you tell me the reasons why it is not good?

➢ *Perceived Barriers*
How difficult is it for you to have different types of foods at meals?

- Not difficult
- So-so
- Difficult

- *If Difficult:*
  Can you tell me the reasons why it is difficult?