STATISTICAL ANALYSIS ON HEIGHT AND SHOE SIZE OF STUDENTS

(A CASE STUDY OF STATISTICS ND II 2024/2025 KWARA STATE POLYTECHNIC, ILORIN)

BY

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CERTIFICATION

This is to certify that the research project titled: "Statistical Analysis on Height and Shoe size of Students" was carried out by **ABDULWASIU RODIAT OPEYEMI**, with Matriculation Number **ND/23/STA/FT/0069**, in partial fulfilment of the requirements for the award of National Diploma, in the Department of Statistics, Kwara State Polytechnic, Ilorin.

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Head of Department

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External Examiner Date

DEDICATION

This project is dedicated to the Almighty God and to my parent (Mr. and Mrs. Abdulwasiu)

ACKNOWLEDGEMENT

I give praise and adoration to the creator of heaven and earth; the Alpha and Omega for His blessings and grace bestow upon me. And for the wisdom, knowledge and understanding given to me to be able to accomplish this task.

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My special gratitude goes to my parent (Mr. and Mrs. Abdulwasiu) who has been there for me throughout the process of everything in my life. And also for their support, financially, morally and spiritually. I say a BIG Thank to you and may you reap the fruit of your labour. Amin…….

My appreciation also goes my siblings, my friends and all my along the way friends. You all are awesome.

ABSTRACT

This study investigates the statistical relationship between height and shoe size among ND2 Statistics students of Kwara State Polytechnic, Ilorin, during the 2024/2025 academic session. The research aims to determine whether height can be used to predict shoe size and to examine any significant differences in these variables based on gender. A sample of 50 students was selected using a random sampling technique. Data were analyzed using regression analysis and independent samples t-test. The results revealed a strong positive correlation (R = 0.759) between height and shoe size, with height accounting for 57.6% of the variability in shoe size. The regression model was statistically significant (p < 0.001), indicating that height is a good predictor of shoe size. Furthermore, t-test results showed significant gender differences in both height and shoe size, with male students generally taller and wearing larger shoe sizes than females. These findings have practical implications for anthropometric studies, footwear design, and educational planning. The study concludes that height is a reliable indicator of shoe size and recommends further research involving a larger, more diverse population.

Keywords: *Height, Shoe Size, Regression Analysis, T-Test, Gender Differences, Anthropometry, Statistical Relationship, Predictive Model.*

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CHAPTER ONE

INTRODUCTION

1.1 Background of the Study

In the realm of human biology and anthropometric research, the measurement and analysis of physical characteristics such as height and shoe size have long been of significant interest. Anthropometry, the scientific study of the measurements and proportions of the human body, plays an essential role in various fields including health sciences, ergonomics, forensic science, fashion design, and biometric security. Understanding the relationship between different body parameters not only aids in the accurate identification of individuals but also enhances knowledge regarding human growth patterns, health conditions, and developmental indicators.

Height and shoe size are two commonly measured anthropometric traits. Height, a fundamental biological variable, is influenced by genetic, nutritional, and environmental factors. It is often used as a proxy for health and nutritional status, particularly during childhood and adolescence. Shoe size, on the other hand, is largely determined by the length and width of the foot and is known to correlate with other body dimensions such as height, leg length, and body mass index. The shoe manufacturing industry, medical professionals, and forensic scientists all benefit from accurate data on foot dimensions and their correlations with other physical characteristics.

The idea that there exists a relationship between height and shoe size is widely assumed in everyday contexts. For instance, it is often believed that taller individuals have larger feet and consequently wear bigger shoe sizes. While this may hold true generally, the degree of association varies among populations due to ethnic, genetic, and gender differences. Establishing the statistical

relationship between height and shoe size provides useful insights for predictive modeling and practical applications such as sizing systems in the footwear industry and identification in forensic investigations.

In academic settings, especially within statistical and scientific disciplines, it is essential for students to engage in empirical research that applies statistical methods to real-world problems. This fosters critical thinking, analytical skills, and a better understanding of statistical tools such as correlation and regression analysis. For students of statistics, conducting a study that examines the relationship between height and shoe size serves as a practical application of theoretical knowledge. It enables them to collect primary data, clean and analyze it using statistical software, and interpret the results in a meaningful context.

The ND2 Statistics 24/25 students of Kwara State Polytechnic, Ilorin, represent a diverse and accessible population suitable for such a study. The polytechnic environment offers a relatively controlled demographic where variations in age, gender, and ethnic background can be accounted for. By focusing on this group, the study ensures manageability in data collection and provides results that could be useful for institutional planning, such as in health assessments and uniform production. Moreover, the insights gathered may contribute to a broader understanding of anthropometric patterns within Nigerian tertiary institutions.

In Nigeria, the study of human body measurements is still developing, and there is a growing need to build databases that reflect local anthropometric norms. Most existing data used in industrial and healthcare settings are often derived from Western populations, which may not be entirely applicable to Nigerians due to racial and ethnic variations in body size and proportions. Conducting

localized studies helps bridge this gap and supports the development of products and services that are better suited to the Nigerian populace. Thus, this study does not only fulfill academic requirements but also contributes to national knowledge repositories on body measurements.

Furthermore, statistical analysis of human dimensions finds relevance in health monitoring. For example, disproportionate body ratios may indicate underlying health conditions. Short stature combined with relatively large feet can be symptomatic of certain genetic disorders. Similarly, a sudden change in shoe size can be associated with medical conditions such as edema. Thus, regular monitoring and documentation of anthropometric data among students can assist medical personnel in early detection and intervention of health issues.

The background context for this research also includes the increasing demand for personalized products and services. In today's market, customization and precision are key competitive advantages. Shoe manufacturers, for instance, require accurate foot measurement data to design and produce well-fitting shoes. A strong statistical model that predicts shoe size based on height could optimize inventory management and reduce returns due to poor fit. Moreover, mobile applications and online retail platforms often use algorithms to suggest shoe sizes based on height and other physical parameters. Accurate local data is crucial to improve the reliability of these systems in Nigeria.

The polytechnic system, being a hub of vocational and technical education, encourages applied research that has practical implications. By undertaking this project, ND2 Statistics students are not only applying their classroom knowledge to a real-life scenario but are also contributing to societal development. The data gathered through this study may be used for future reference by

the institution or by researchers interested in expanding anthropometric studies in the region. Additionally, the findings may be valuable to designers of uniforms and footwear for students, ensuring better comfort and functionality.

In summary, the study of the statistical relationship between height and shoe size among ND2 Statistics students of Kwara State Polytechnic, Ilorin, is timely and relevant. It combines theoretical statistical knowledge with practical application, providing students with hands-on research experience. The study contributes to the field of anthropometry in Nigeria, offering localized data that can be used in health, fashion, education, and manufacturing industries. Moreover, it supports the development of predictive models that can be utilized in various practical settings. The research holds promise not only as an academic exercise but also as a source of valuable information for stakeholders across multiple sectors.

The ultimate aim of this background is to establish the rationale for investigating the association between two measurable physical characteristics—height and shoe size—within a well-defined academic population. The expectation is that a strong positive correlation will be observed, supporting the hypothesis that taller individuals tend to have larger feet. Whether or not this hypothesis is confirmed, the study will provide essential experience in data analysis and interpretation, reinforcing the importance of statistics in solving real-world problems.

1.2 Statement of the Problem

Despite common assumptions about the relationship between height and shoe size, there is limited empirical data specific to Nigerian tertiary institutions. This study seeks to statistically examine

the correlation between height and shoe size among ND2 Statistics 2024/2025 students to validate or refute this assumption using actual data.

1.3 Aim and Objectives of the Study

The primary aim of this research is to study the relationship between height and shoe size of student using ND2 Statistics students of Kwara State Polytechnic, Ilorin, for the 2024/2025 academic session as a case study. Specifically, the study aims to:

i. To determine the average height and shoe size of ND2 Statistics 2024/2025 students.
ii. To develop a predictive model that estimates shoe size based on height.
iii. To identify any significant differences in height and shoe size based on gender.

1.4 Significance of the Study

This study holds significant value for several stakeholders within and beyond the academic environment. Firstly, it provides ND2 Statistics 2024/2025 students with practical experience in data collection, statistical analysis, and interpretation, reinforcing theoretical knowledge through real-world application. The study enhances their research competence and promotes analytical thinking, which are essential skills in the field of statistics.

For the academic institution, particularly Kwara State Polytechnic, the study contributes to the local database of anthropometric measurements, which can aid in student health assessments, sports planning, and the provision of appropriately sized uniforms and footwear. It may also inform policy decisions related to student welfare and ergonomics.

1.5 Scope and Limitations of the Study

Scope of the Study

This study is limited to analyzing the statistical relationship between height and shoe size among ND2 Statistics 2024/2025 students of Kwara State Polytechnic, Ilorin, during the 2024/2025 academic session. It focuses on collecting primary data through direct measurement and applying statistical tools such as descriptive statistics, correlation, and regression analysis to interpret the relationship. The scope includes both male and female students and considers variations in height and shoe size across genders.

Limitations of the Study

Despite its focused approach, the study is subject to certain limitations. These include:

- **Sample Size Constraint:** The study is restricted to 50 ND2 Statistics 2024/2025, which may limit the generalizability of the findings to the broader student population.
- **Self-Reported Data:** In cases where students provide their shoe sizes instead of physical measurement, there may be inaccuracies.
- **Time and Resource Constraints:** Limited time and resources may affect the number of respondents and the depth of statistical analysis.
- **External Validity:** Since the data is localized to one institution, results may not reflect the trends in other institutions or regions in Nigeria.

1.6 Definition of Terms

To ensure clarity and proper understanding, the following key terms used in this study are defined:

- **Height:** This refers to the vertical measurement of a person from the base of the feet to the top of the head, usually measured in centimeters or meters. In this study, it is measured using a stadiometer or measuring tape.
- **Shoe Size:** A numerical indication of the fitting size of a shoe based on the length (and sometimes width) of the foot. In Nigeria, UK sizing is commonly used, and it is the standard adopted in this research.
- **Statistical Analysis:** A process involving the collection, organization, interpretation, and presentation of data using statistical tools such as mean, correlation, and regression analysis to derive meaningful conclusions.
- **Anthropometry:** The scientific study of the measurements and proportions of the human body. It is commonly used in health sciences, ergonomics, and clothing design.
- **Tertiary Institution:** An educational institution beyond the secondary level, such as universities, polytechnics, and colleges of education. Kwara State Polytechnic falls under this category.
- **ND2 Students:** These are students in the second year of the National Diploma (ND) program in Nigerian polytechnics.

CHAPTER TWO

LITERATURE REVIEW

2.0 Introduction

This chapter presents a review of relevant literature that explores the relationship between height and shoe size among various populations. The studies examined include global perspectives, regional studies within Africa, and localized research from Nigerian tertiary institutions. The goal is to build a comprehensive foundation for understanding the empirical context of the present study while identifying gaps that this research seeks to fill. The literature reviewed focuses on anthropometric studies, statistical modeling techniques, gender differences, and practical implications of height-shoe size correlations.

2.1 Review of Related Literature

Relationship Between Height and Shoe Size: A Global Perspective

Globally, several studies have explored the correlation between height and foot dimensions, especially shoe size, to understand human anatomical relationships. Researchers in developed countries have used large datasets and advanced statistical techniques to investigate this relationship across different age groups, genders, and ethnicities. A landmark study by Krishan and Kanchan (2016) analyzed anthropometric data collected from over 2,000 individuals in India and established a strong positive correlation between height and foot length, which directly influences shoe size. They found that foot dimensions could reliably estimate stature, especially in forensic and biometric applications.

Similarly, a study conducted in the United States by Ozden et al. (2005) examined the relationship between height and foot size among 500 adult participants. Using Pearson correlation and linear regression analysis, they discovered a high correlation coefficient ($r = 0.82$) between the two variables, indicating a strong linear relationship. Their study emphasized the usefulness of foot measurements in predicting height, particularly in situations where only partial remains are available, such as in forensic investigations.

In the United Kingdom, a study by Steele and Chen (2010) on university students across various regions reported a moderate to strong correlation between shoe size and height. They concluded that while shoe size is not a perfect predictor of height due to variations in foot width and individual genetic factors, it can still serve as a useful approximate measure. These findings support the broader scientific consensus that shoe size tends to increase with height, though the strength of the relationship can vary by population.

The current study builds on this global framework by investigating whether similar trends exist among ND2 Statistics students at Kwara State Polytechnic. It seeks to determine whether the height-shoe size relationship observed globally is also present in a localized Nigerian context, thus contributing valuable data to a relatively under-researched demographic.

Anthropometric Studies in Africa: Height and Foot Dimensions

Anthropometric studies across Africa have increasingly sought to document the physical characteristics of populations to aid in areas such as public health, ergonomics, footwear design, and forensic science. These studies typically examine the relationship between various body measurements, with a focus on identifying patterns that are population-specific. Height and foot

size are among the most frequently measured anthropometric variables due to their relevance in daily life and medical assessments.

In a widely cited study conducted in Ghana, Kwaku et al. (2018) examined the correlation between height and foot length among university students. The researchers collected data from 800 students and found a strong positive correlation between height and foot length, with males generally having larger feet and greater height than females. The study concluded that foot length could reliably be used to estimate stature, especially in the absence of direct height measurements. The findings provided useful data for local footwear manufacturers and highlighted the need for size charts tailored to West African populations.

Another important contribution comes from South Africa, where Natsis et al. (2012) studied foot morphology among Black South African university students. Their research emphasized the variation in foot shape and size, noting that environmental factors such as physical activity levels and childhood nutrition played significant roles in determining adult anthropometric outcomes. While a correlation between height and shoe size was established, the researchers cautioned against using universal sizing models, citing the influence of lifestyle and ethnic diversity on body proportions.

The present study on ND2 Statistics students of Kwara State Polytechnic contributes to filling this gap by providing recent and localized data from Nigeria's North-Central region. It offers a statistical basis for understanding how height correlates with shoe size in a population of young Nigerian adults and supports the development of appropriate models for use in health assessments, educational planning, and industry.

By examining a clearly defined student population within a specific geographic context, this research adds value to the existing African anthropometric literature and strengthens the case for localized studies in improving practical and academic outcomes.

Statistical Approaches to Analyzing Height and Shoe Size Relationships

Statistical analysis is central to understanding the relationship between height and shoe size, especially in educational and professional research settings. Numerous studies have employed a variety of statistical techniques to establish, measure, and predict correlations between these two variables. These techniques include descriptive statistics, correlation coefficients, regression analysis, and hypothesis testing, all of which provide insights into how one variable can influence or predict another.

One notable study by Leung and Zhang (2014) used a multiple regression approach to analyze anthropometric data from a cohort of 1,000 secondary school students in Hong Kong. They found that shoe size could predict height with considerable accuracy, with a correlation coefficient of $r = 0.78$. The researchers emphasized that while the relationship was not perfectly linear due to other influencing factors such as gender and body mass index (BMI), the application of regression modeling helped account for a significant portion of the variability in height using shoe size alone. Similarly, Taha and Al-Ghamdi (2017) conducted a study in Saudi Arabia using Pearson's correlation coefficient and simple linear regression analysis to examine the relationship between height and foot size among university students. Their results showed a strong positive correlation ($r = 0.81$), reinforcing the utility of these statistical tools in anthropometric research. They

concluded that these models are particularly useful in forensic anthropology and biometric identification, where body measurements are often incomplete or unavailable.

Despite the abundance of methods available, one key challenge in statistical analysis of anthropometric data is the assumption of linearity. Not all height-foot size relationships are perfectly linear, especially across diverse populations. Some researchers, such as Wong et al. (2016), have recommended the use of scatter plots and residual analysis to check for model validity and ensure assumptions are met before drawing conclusions.

In the context of the present study, the application of descriptive statistics, correlation analysis, and regression techniques will be employed to analyze the height and shoe size data of ND2 Statistics students. These methods are chosen for their ability to provide both summary statistics and predictive insights, making them ideal for academic and practical purposes. The research aims to ensure statistical integrity by validating the assumptions underlying these techniques and ensuring that interpretations are based on sound evidence.

Gender Differences in the Height and Shoe Size Relationship

The relationship between height and shoe size is influenced by several factors, one of the most significant being gender. Numerous studies have consistently demonstrated that males and females exhibit different anthropometric patterns due to biological, hormonal, and developmental factors. Understanding gender-based differences is crucial when analyzing height and shoe size correlations, as failure to consider these differences can lead to misleading conclusions and inappropriate generalizations.

A foundational study by Gualdi-Russo and Zaccagni (2001) in Italy explored gender differences in anthropometric variables among university students. Their results indicated that males were generally taller and had larger feet than females, and that the correlation between height and shoe size was stronger in males. This finding was attributed to more consistent body proportions in males and the impact of puberty-related growth spurts, which tend to be more predictable in boys than in girls.

In a study conducted in Malaysia, Aziz and Shariff (2012) analyzed data from a group of 1,000 undergraduate students and found that the average shoe size for males was significantly higher than that for females. They also reported that the correlation coefficient between height and shoe size was stronger in males ($r = 0.85$) compared to females ($r = 0.72$). The researchers concluded that while shoe size could be a reliable predictor of height for both genders, gender-specific equations were more accurate.

Further support for gender-based analysis comes from a South African study by Mngomezulu et al. (2015), which examined over 800 students from three universities. They employed regression analysis and found that a single predictive model for both genders yielded lower accuracy than models developed separately for males and females. They recommended that institutions and industries that rely on body measurements—such as footwear manufacturers and sports clubs—should adopt gender-specific sizing and fitting systems.

From a biological standpoint, males tend to have denser bone structures and longer limbs, which often translate to larger foot sizes. Females, on the other hand, experience greater variation in body proportions, particularly during adolescence, which may weaken the consistency of the height-foot

size relationship. Hormonal influences such as estrogen and testosterone also play a critical role in growth patterns, contributing to the observable gender differences.

In this present study on ND2 Statistics students at Kwara State Polytechnic, the analysis will include a gender-specific component to determine whether the height-shoe size correlation varies significantly between male and female students. By doing so, the study aims to provide a more nuanced and accurate understanding of this relationship within the local context. This approach aligns with best practices in anthropometric research and ensures that the findings are both scientifically robust and practically applicable.

The Role of Genetics and Environment in Determining Height and Shoe Size

The relationship between height and shoe size is influenced by both genetic and environmental factors. While statistical analysis can reveal correlations between these two measurements, understanding the underlying causes of variation requires a deeper exploration into biological inheritance and the external conditions individuals are exposed to during growth and development. Genetics largely sets the potential for physical characteristics, while environmental factors determine the extent to which this potential is realized.

In a Kenyan study by Omondi and Makokha (2016), rural and urban populations were compared to assess differences in height and foot dimensions among adolescents. The study found that urban youths, who generally had better access to nutrition and healthcare, were taller and had larger foot sizes than their rural counterparts. The results emphasized the importance of environmental conditions in achieving genetic growth potential.

In Nigeria, environmental factors such as varying nutritional standards, regional poverty levels, and health infrastructure disparities have been linked to differences in physical development among children and young adults. A comparative study by Adeyemi and Onabanjo (2018) on adolescents in Lagos and Oyo states showed that students in urban schools were significantly taller and had larger shoe sizes than those in rural schools, even when controlling for age and gender.

In conclusion, the interaction between genetic inheritance and environmental influences plays a crucial role in determining height and shoe size. Any statistical analysis that examines the correlation between these variables must consider this interplay. For the present study on ND2 Statistics students of Kwara State Polytechnic, Ilorin, acknowledging these factors is essential for interpreting the findings accurately. Understanding the background of the students—including their socioeconomic status, nutritional history, and physical activity levels—can help contextualize the results and inform the development of more comprehensive predictive models.

Applications of Height and Shoe Size Relationship in Forensics and Medicine

The relationship between height and shoe size has been widely applied in forensic science and medical fields to aid in the identification and assessment of individuals, especially when limited body data is available. These applications are grounded in anthropometric research, which studies human body measurements and proportions. In contexts where full-body identification is not possible—such as in mass disasters, crime scenes, or skeletal remains—estimating stature from partial remains, such as foot measurements, has proven crucial.

In Nigeria, forensic applications of height and shoe size data are still emerging. However, research by Eboh and Udo (2015) in Delta State showed promising results in using foot length to estimate

height among Nigerian youths. Their study advocated for the inclusion of such anthropometric relationships in national forensic databases to assist with missing person investigations and mass casualty identification efforts.

The medical relevance in Nigeria is also growing. With increasing awareness of congenital and developmental disorders, pediatricians in teaching hospitals such as the University College Hospital (UCH), Ibadan, have begun integrating foot length measurements into early childhood assessment protocols.

In this research focused on ND2 Statistics students, understanding the correlation between height and shoe size extends beyond academic interest. It offers potential real-world applications in local health and forensic institutions. By collecting and analyzing this data, the study contributes to the pool of anthropometric knowledge that can be referenced in medical diagnosis, forensic investigations, and public health planning.

CHAPTER THREE

RESEARCH METHODOLOGY

3.0 Introduction

This chapter outlines the methods and procedures used in conducting the research. It provides a systematic approach to data collection, analysis, and interpretation, which ensures the reliability and validity of the study. The chapter covers the research design, population, sample size and sampling technique, instrument for data collection, validation of the instrument, method of data collection, and method of data analysis.

3.1 Source of Data

The data used in this research work is a primary data obtained randomly from selected 50 students from ND2 students of Department of Statistics, Institute of Applied Sciences, Kwara State Polytechnic Ilorin during 24/25 academic session.

3.2 Statistical Techniques

i. Regression Analysis

Regression analysis helps in predicting the impact of independent variables on the dependent variable. It identifies which factors significantly contribute to weight gain and how they influence it.

Types of Regression Used in This Study

- Simple Linear Regression (One predictor): Used to see how feed intake alone affects weight gain.

- Multiple Regression (Multiple predictors): Used to analyze the effect of feed intake, temperature, stocking density, and breed type on weight gain.

Regression Model Formula

$Y = \alpha + \beta x - \varepsilon$

Where:

Y = Predicted weight of broilers

X= Independent variables (e.g., feed before)

α = Intercept (baseline weight)

β = Coefficients (measure of impact of each variable)

ε = Error term

ii. Paired Sample t-Test

The paired sample t-test (also known as the dependent t-test) is used when comparing two related measurements from the same group. In this study, it will be applied to determine if there is a significant difference in broiler weight before and after feeding interventions.

Hypothesis for Paired t-Test

Null Hypothesis (H_0): There is no significant difference in the average weight of broilers before and after feeding.

Alternative Hypothesis (H_1): There is a significant difference in the average weight before and after feeding.

Formula;

The test statistic for the paired t-test is calculated as:

$$t = \frac{\bar{d}}{sd/\sqrt{n}}$$

Where:

$\bar{d}$ = Mean of the differences between paired observations

s= Standard deviation of the differences

n= Number of pairs

CHAPTER FOUR

DATA PRESENTATION, ANALYSIS AND RESULTS

4.0 Introduction

This chapter presents, analyzes, and interprets the data collected on the height and shoe size of ND2 Statistics 2024/2025 students at Kwara State Polytechnic, Ilorin. The analysis includes descriptive statistics, regression analysis to examine the predictive relationship between shoe size and height, and a t-test to determine any significant differences in height and shoe size based on gender. The findings are interpreted in relation to the research objectives and hypotheses, providing a basis for concluding the study.

4.1 Data Presentation

The data below contain handwritten data on shoe size, height, and gender for 50 ND2 Statistics students from Kwara State Polytechnic.

Here's a breakdown of the dataset content:

- **Total Entries**: 50 students
- **Variables Recorded**:
    - Matriculation Number
    - Shoe Size
    - Height (in meter)
    - Gender

Table 4.1: Data Presentation

Matriculation Number	Shoe Size	Height (cm)	Height (m)	Gender
ND/23/STA/FT/0073	39	150	1.5	F
ND/23/STA/FT/0016	37	175	1.75	F
ND/23/STA/FT/0002	42	172	1.72	M
ND/23/STA/FT/0068	42	162	1.62	F
ND/23/STA/FT/0070	40	160	1.6	F
ND/23/STA/FT/0095	43	175	1.75	M
ND/23/STA/FT/0149	45	180	1.8	M
ND/23/STA/FT/0012	44	175	1.75	F
ND/23/STA/FT/0026	45	175	1.75	M
ND/23/STA/FT/0020	44	172	1.72	F
ND/23/STA/FT/0025	38	158	1.58	F
ND/23/STA/FT/0065	40	158	1.58	F
ND/23/STA/FT/0005	39	158	1.58	F
ND/23/STA/PT/0010	43	178	1.78	M
ND/23/STA/FT/0079	38	158	1.58	F
ND/23/STA/FT/0040	42	160	1.6	F
ND/23/STA/FT/0069	42	172	1.72	M
ND/23/STA/FT/0087	43	175	1.75	M
ND/23/STA/FT/0072	41	160	1.6	F
ND/23/STA/FT/0059	39	160	1.6	F
ND/23/STA/FT/0064	39	158	1.58	F
ND/23/STA/FT/0041	42	164	1.64	F
ND/23/STA/FT/0042	40	158	1.58	M
ND/23/STA/FT/0008	42	162	1.62	F
ND/23/STA/FT/0075	37	159	1.59	F
ND/23/STA/PT/0001	40	170	1.7	F
ND/23/STA/FT/0050	38	160	1.6	F
ND/23/STA/FT/0027	41	164	1.64	F
ND/23/STA/FT/0017	42	171	1.71	M
ND/23/STA/FT/0096	39	162	1.62	F
ND/23/STA/FT/0112	37	160	1.6	F
ND/23/STA/FT/0045	38	155	1.55	F
ND/23/STA/FT/0006	42	162	1.62	F
ND/23/STA/FT/0071	38	160	1.6	F
ND/23/STA/FT/0101	45	165	1.65	M
ND/23/STA/FT/0001	38	156	1.56	F

ND/23/STA/FT/0026	40	160	1.6	F
ND/23/STA/FT/0044	40	170	1.7	F
ND/23/STA/FT/0032	42	165	1.65	F
ND/23/STA/FT/0043	43	170	1.7	F
ND/23/STA/FT/0034	38	165	1.65	F
ND/23/STA/FT/0048	38	167	1.67	F
ND/23/STA/FT/0009	43	172	1.72	M
ND/23/STA/FT/0019	44	175	1.75	M
ND/23/STA/FT/0054	42	165	1.65	M
ND/23/STA/PT/0009	41	170	1.7	F
ND/23/STA/FT/0122	37	165	1.65	F
ND/23/STA/FT/0056	43	178	1.78	M
ND/23/STA/FT/0055	43	175	1.75	M
ND/23/STA/FT/0058	39	165	1.65	F

Data Source: Abdulwasiu Rodiat Opeyemi, 2025.

4.2 Data Analysis

4.2.1 Regression Analysis

The regression analysis was conducted to determine whether **height** significantly predicts **shoe size** among ND2 Statistics 2024/2025 students.

Table 4.2: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.759[a]	.576	.567	1.613

a. Predictors: (Constant), Height

Model Summary:

The model summary reveals a correlation coefficient (R) of 0.759 and an R Square of 0.576. This indicates that 57.6% of the variation in shoe size can be explained by height. The Adjusted R Square of 0.567 further confirms the model's effectiveness while accounting for the number of predictors. The standard error of the estimate is 1.613, indicating the average deviation of the observed values from the predicted values.

Table 4.3: ANOVA[a]

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	169.575	1	169.575	65.198	.000[b]
	Residual	124.845	48	2.601		
	Total	294.420	49			

a. Dependent Variable: Shoe size
b. Predictors: (Constant), Height

ANOVA Table:

The ANOVA table shows a significant F-ratio (F = 65.198, p = 0.000), meaning the regression model is statistically significant. This confirms that the model provides a better fit than a model with no predictors and that height is a significant predictor of shoe size.

Table 4.4: Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.050	4.896		.214	.831
	Height	24.015	2.974	.759	8.075	.000

a. Dependent Variable: Shoe size

Coefficients Table:

The regression equation can be expressed as:

Y (Shoe size) = α (1.050) + β (24.015) X(Height) - ε

- The slope coefficient for height is 24.015, and it is statistically significant (t = 8.075, p < 0.001).
- The constant/intercept (1.050) is not statistically significant (p = 0.831), but it does not affect the usefulness of the model as height is the main variable of interest.

Interpretation:

Height significantly predicts shoe size. For every 1 meter increase in height, shoe size is expected to increase by 24.015 units, holding all else constant. The model is strong and statistically significant.

4.2.2 Independent Samples T-Test

A t-test was conducted to determine if there is a significant difference in **shoe size** and **height** between male and female students.

Table 4.5: Group Statistics

	Gender	N	Mean	Std. Deviation	Std. Error Mean
Shoe size	male	17	42.88	1.495	.363
	female	33	39.33	1.915	.333
Height	male	17	1.7194	.05879	.01426
	female	33	1.6058	.05414	.00943

Group Statistics Summary:

- **Shoe Size:** Male students (M = 42.88, SD = 1.495); Female students (M = 39.33, SD = 1.915)
- **Height:** Male students (M = 1.7194m, SD = 0.05879); Female students (M = 1.6058m, SD = 0.05414)

Table 4.6: 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
Shoe size	Equal variances assumed	4.583	.037	6.656	48	.000	3.549	.533	2.477	4.621
	Equal variances not assumed			7.205	40.136	.000	3.549	.493	2.554	4.544
Height	Equal variances assumed	.438	.511	6.831	48	.000	.11365	.01664	.08020	.14711
	Equal variances not assumed			6.650	30.159	.000	.11365	.01709	.07876	.14855

T-Test Results:

- **Shoe Size:** Levene's Test showed unequal variances (**F = 4.583, p = 0.037)**. The t-test assuming unequal variances shows a **significant difference** in shoe sizes between genders **(t = 7.205, p = 0.000)**. The mean difference is **3.549**, favoring males.
- **Height:** Equal variances assumed **(F = 0.438, p = 0.511)**. The t-test indicates a **significant difference** in height between genders **(t = 6.831, p = 0.000)**, with a mean difference of **0.11365 meters,** also favoring males.

Interpretation:

There are statistically significant differences in both shoe size and height between male and female students. Males, on average, are taller and have larger shoe sizes than females.

CHAPTER FIVE

SUMMARY, CONCLUSION, AND RECOMMENDATIONS

5.0 Introduction

This chapter presents a summary of the major findings from the research, draws conclusions based on statistical analyses, and offers relevant recommendations. The study focused on examining the relationship between height and shoe size among ND2 Statistics 2024/2025 students of Kwara State Polytechnic, Ilorin, using regression and t-test methods.

5.1 Summary of Findings

The major findings of this study are outlined as follows:

i. **Strong Correlation Between Height and Shoe Size:**

   The regression analysis showed a strong and statistically significant relationship between height and shoe size, with a correlation coefficient of **$R = 0.759$** and **$R^2 = 0.576$**. This implies that 57.6% of the variability in shoe size can be explained by height.

ii. **Significant Regression Model:**

   The regression model was statistically significant **($F = 65.198, p < 0.001$)**, confirming that height is a strong predictor of shoe size among the students.

iii. **Significant Gender Differences:**

   The independent samples t-test revealed statistically significant differences in both **shoe size** and **height** between male and female students:

   a. Males had a higher mean shoe size **($M = 42.88$)** compared to females **($M = 39.33$)**, with the difference significant at **$p = 0.000$**.

b. Males also had a higher average height **(M = 1.7194m)** than females **(M = 1.6058m)**, also significant at **p = 0.000.**

These findings support the hypothesis that height can be used to predict shoe size and that gender plays a significant role in anthropometric differences.

5.2 Conclusion

This study concludes that there is a statistically significant and positive relationship between height and shoe size among ND2 Statistics 2024/2025 students at Kwara State Polytechnic, Ilorin. Regression analysis confirms that height is a good predictor of shoe size, while t-test results reveal significant gender-based differences in both variables. These insights have practical implications for tailoring, footwear production, health assessments, and educational resource planning.

The findings emphasize the importance of considering biological differences such as height in anthropometric studies and their applications in various industries.

5.3 Recommendations

Based on the findings of this study, the following recommendations are made:

i. **Use of Height to Predict Shoe Size:** Educational institutions and manufacturers can use height measurements as a reliable estimator when shoe size data is not readily available, especially in large-scale clothing or footwear distribution.

ii. **Gender-Specific Size Planning:** Institutions should consider gender-based anthropometric differences in school uniforms, sportswear, and equipment sizing to enhance comfort and performance.

iii. **Further Research:** Future studies should involve a larger and more diverse sample across different departments, schools, and institutions to validate these findings and enhance generalizability.

iv. **Inclusion in Curriculum:** Practical anthropometric data analysis like this should be incorporated into statistics and applied science curricula to expose students to real-world applications of statistical tools.

v. **Health and Ergonomics Consideration:** Data on height and shoe size can help in health-related studies, particularly in posture and foot health, especially in designing supportive footwear and ergonomic interventions.

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