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INTERNATIONAL RESEARCH JOURNAL OF MULTIDISCIPLINARY-PRACTICES, PUBLIC AND COMMUNITY HEALTH (IRJMPCH)

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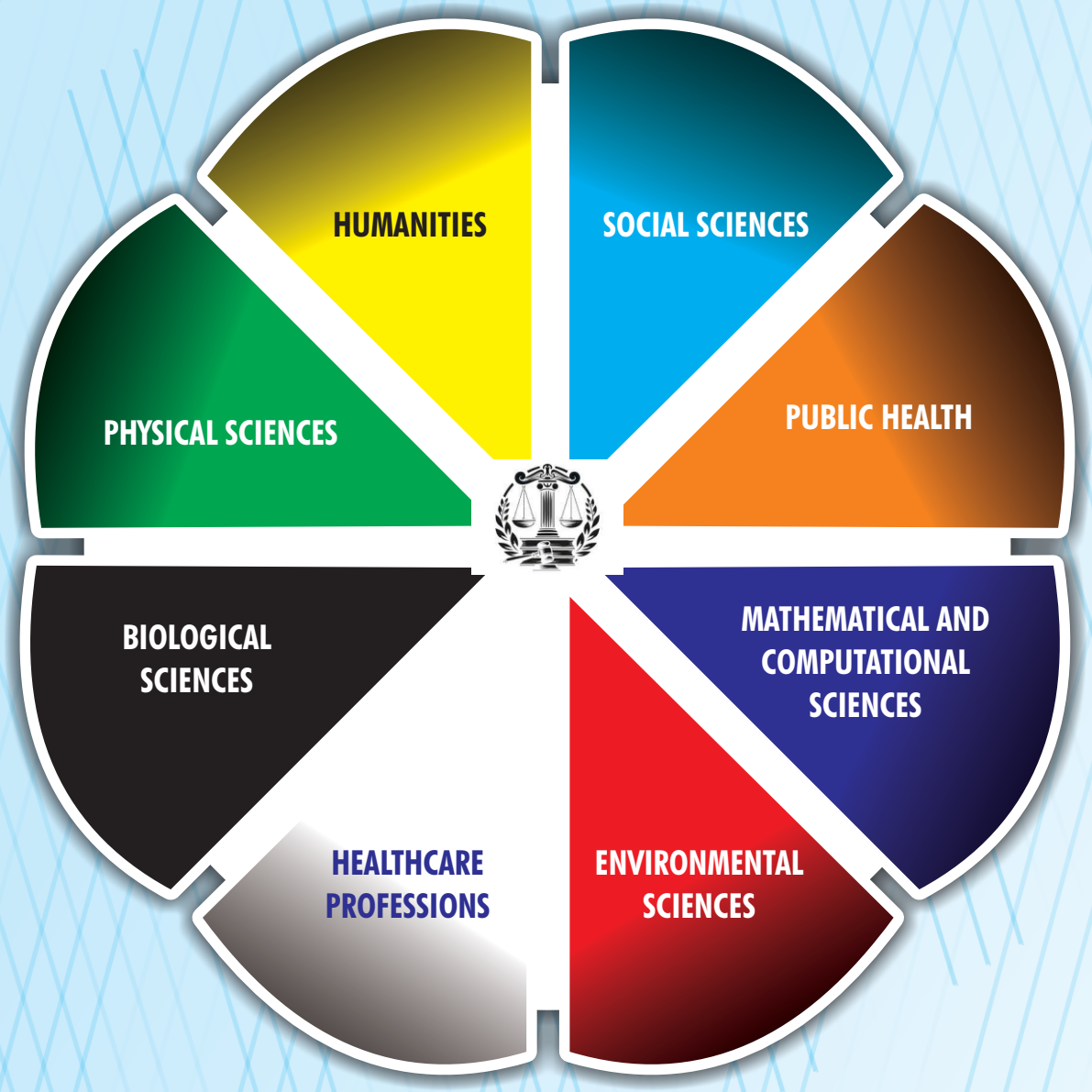
JULY, 2024



A PUBLICATION OF

NIC MAURICE COLLEGE OF HEALTH, MANAGEMENT, SCIENCE AND TECHNOLOGY

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Broadcast

Ladies and gentlemen, esteemed guests, and global audience,

It is my honor to welcome you to the official launch of the International Research Journal of Multidisciplinary Practices, Public and Community Health. Today, June 1st, 2024, marks a significant milestone in our journey to advance knowledge, promote collaboration, and improve health outcomes worldwide.

As we gather here today, we acknowledge the complexity of health challenges that transcend borders, cultures, and disciplines. We recognize the urgent need for innovative solutions, evidence-based practices, and collective action. Our journal is born out of this conviction, with a vision to bridge the gaps between research, practice, and policy.

We aim to create a platform where diverse voices and perspectives converge, where interdisciplinary approaches are fostered, and where knowledge is shared to address the most pressing health issues of our time. Our scope is broad, encompassing healthcare professions, social sciences, environmental sciences, biological sciences, physical sciences, mathematical and computational sciences, and humanities.

Expected key features of our journal include:

- High-quality, peer-reviewed research articles, reviews, and case studies
- Interdisciplinary approaches to public and community health
- Global perspectives and experiences
- Innovative methodologies and frameworks
- Best practices in healthcare delivery, education, and community engagement
- Critical perspectives and analyses
- Open access and online publication
- Rapid publication process
- Rigorous peer-review process
- Indexing in major databases
- Wide dissemination and visibility

Our editorial board, reviewers, and authors come from diverse backgrounds and disciplines, united by a shared passion for improving public and community health. We are committed to maintaining the highest ethical standards, transparency, and inclusivity in our publication process.

We believe that health is a fundamental right, not a privilege. We recognize that health is influenced by social determinants, environmental factors, and economic conditions. We acknowledge the disproportionate burden of health challenges on marginalized communities and vulnerable populations.

Our journal is dedicated to addressing these challenges through a multidisciplinary approach. We will publish research that explores the intersections of health with social sciences, environmental sciences, and humanities. We will showcase innovative practices that bridge the gaps between healthcare, education, and community engagement.

We invite you to join us on this journey. Share your research, your stories, and your ideas. Engage with us through social media, webinars, and conferences. Let us work together to create a world where health is a fundamental right, not a privilege.

Thank you for your attention, and let us embark on this exciting journey together!

- Nic Maurice

FROM THE Publishers

Dear esteemed Editorial Board Members, Reviewers, and Authors,

Representing diverse disciplines and expertise, you are the pillars of our journal's success. As we embark on this new venture, we acknowledge the vast scope of multidisciplinary practices in public and community health, encompassing:

- Healthcare professions (medicine, nursing, allied health)
- Social sciences (sociology, psychology, anthropology)
- Public health (epidemiology, health policy, health education)
- Environmental sciences (environmental health, ecology, conservation)
- Biological sciences (biology, microbiology, genetics)
- Physical sciences (physics, chemistry, engineering)
- Mathematical and computational sciences (biostatistics, data science)
- Humanities (ethics, philosophy, history)

Our mission is to create a platform where researchers, practitioners, and policymakers can converge, share ideas, and learn from each other's perspectives, fostering:

- Interdisciplinary collaboration and knowledge sharing
- Innovative research and methodologies
- Best practices in healthcare delivery, education, and community engagement
- Global collaboration and knowledge exchange

As Editorial Board Members, your guidance and expertise will help us:

- Shape the journal's direction and scope
- Ensure the quality and relevance of published articles
- Identify emerging trends and topics in multidisciplinary practices
- Develop strategic partnerships and collaborations

As Reviewers, your input is crucial in:

- Evaluating manuscripts through a rigorous and constructive peer-review process
- Providing feedback that enhances the quality and impact of published research
- Ensuring that our journal maintains the highest standards of scientific integrity and excellence

As Authors, your contributions are vital in:

- Sharing innovative research and ideas
- Showcasing best practices and case studies
- Exploring new methodologies and frameworks
- Addressing complex health issues and challenges
- Presenting theoretical and conceptual frameworks
- Sharing empirical research and data-driven findings
- Offering critical perspectives and analyses

Together, we can create a journal that:

- Breaks down disciplinary silos and fosters interdisciplinary collaboration
- Showcases cutting-edge research and innovation in public and community health
- Provides a platform for underrepresented voices and perspectives
- Informs policy and practice with evidence-based research
- Contributes to improving health equity, access, and outcomes globally
- Fosters a culture of inclusivity, diversity, and equity

We are committed to maintaining the highest ethical standards, transparency, and inclusiveness in our publication process. We will work tirelessly to ensure that our journal is:

- Indexed in major databases
- Widely disseminated and accessible to diverse audiences
- Compliant with international publication ethics and standards

Thank you for your dedication, expertise, and time. Let us work together to create a journal that makes a meaningful impact in the field of public and community health.

Please feel free to contact us with any questions, suggestions, or ideas. We look forward to collaborating with you and producing a journal that we can all be proud of.

Best regards,

Publishers
International Research Journal of Multidisciplinary Practices, Public and Community Health

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About IRJMPCH

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Managing Editor:	*Dr.Akaninyene Mark*
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EDITORIAL Comments

FROM THE DESK OF
EDITOR-IN-CHIEF

It is with gratitude and excitement that I welcome everyone to this maiden edition of International Research Journal of Multidisciplinary Practices, public and Community health IRJMPCH. The Research Journal is a first of its kind and a single largest gathering of intellect, great minds, experts and specialists in various aspects of Public/Community Health, Sciences, Management, Humanities, Computer, Social and Environment health.

In this maiden edition of IRJMPCH, we are afforded the luxury of hardworking and cerebral minds working in academia, ministries, Non-Governmental Organization, allied bodies and international community providing various services to the public. This journal is currently enjoying affiliations with various Ministries Departments and Agencies including tertiary institutions in and outside Nigeria like Federal University Otuoke, Bayelsa State, Nigeria , Adoka University Benue State, Nigeria , Global Community Health Foundation, Cashville Development Foundation, International center of Inter-professional Team Building, Professionals for Humanity International, Caprecon Development Foundation international in USA, UK, Europe ,Asia just to mention but a few.

The Journal has a public health terrain with numerous opportunities to Young researchers, publication services, writing assistance, research/business proposal Writing, co-authorship, article modification and formatting, Data analysis and training on SPSS, STATA etc, Grantsmanship and manuscripts writing to mention but a few.

I want to assure you, we have selected, tested, trusted and renounced experts to review your Manuscripts (papers and book/book chapter) with shortest period of time and get them published immediately! Our season experts in various Fields are working round the clock to deliver, assist, mentor with their vast years of experience and mentorship.

I will like to recommend this epoch making up-to-date research journal worldwide and I will like to pay public tribute and express our deepest gratitude to founder, administrator of IRJMPCH, Mr. Anso NicMaurice, Editorial team members, Managing Editors and all staff, whose useful contributions have made this maiden edition of IRJMPCH possible and a reality.

Finally, may I state, unequivocally that, we have put everything in place to help our scholars benefits maximally from this Internationally recognized journal.

Thank you .

Dr. Efegbere Henry Akpojubaro
Associate Professor and Consultant Physician in Community Medicine and Public Health and Multi-Disciplinary Specialist and Serial Entrepreneur
Editor in Chief
IRJMPCH.

From The
MANAGING EDITOR'S DESK

It is indeed an honor and a privilege to welcome you all to this Maiden edition of International Research Journal of Multidisciplinary Practices, public and Community health IRJMPCH. The IRJMPCH is a unique Journal, first ever, put together by highly recognized national and international developers, innovators, experts and specialists of various field of human endeavor.

We feel highly honored as Managing Editors of IRJMPCH to have enjoyed tremendous cooperation and support for scholars

On behalf of myself, l express profound gratitude to the Administrator of IRJMPCH and his team who are working round the clock to deliver.

The IRJMPCH is affiliated with Federal University Otuoke, Bayelsa State, Nigeria and Adoke University, Benue State, Nigeria , a giant step and great achievements of this top tier internationally recognized Journal.

In this maiden edition of IRJMPCH, we are poised with luxury of hardworking and cerebral minds working in academia, business and international community to provides various services to the public.

Our services are not limited to the following: publication services within 7-14 days, journal acceptance, peer reviewed process, research proposal) Dissertation assistance, Co- authorship, Grantsmanship, article modification) formatting among others.

We are top notch in accepting research/ review papers and short communication journals for our Q3 and Q4 Journal indexed.

This journal is highly recommended to our scholars including international community to publish, build and strengthen networks with the view to working collectively to collaborate much more effectively and efficiently to advancing their careers.

I wish you a fruitful, rewarding and exciting experience!
Bravo!!

Dr. Akaninyene Mark
Consultant physician Community Medicine and Public Health
Managing Editor, IRJMPCH

Contents

VOL.2 NO.1 JULY, 2024

Call FOR Papers

International Research Journal of Multidisciplinary Practices, Public and Community health (IRJMPCH) Affiliated with1. Federal University Otuoke, Bayelsa State, Nigeria 2. Adoka University Benue State, Nigeria. Other Universities affiliations in progress!

- Acceptance: 1-3 days
- Publication: 7-14 days
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Our services include:

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We are accepting research/review papers and short communications for our Q3, and Q4 journal indexed. We guarantee publication and fast acceptance in our top-tier journal (International Research Journal of Multidisciplinary Practice, public and Community Health)

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Dr. Efegbere Henry Akpojubaro
Associate Professor and Consultant physician in Community Medicine and Public Health
Editor-in-Chief,
IRJMPCPH.

Article Guideline
FOR AUTHORS

Guideline on Short Communication

Short Communications- Manuscript Preparation

- Short Communication presents a brief observation that does not warrant a full-length paper.
- Short Communications should be limited to a total of 3000 words.
- The manuscript should be formatted without section headings in the body of the text and contain no more than 3 figures or tables, combined.

Required Sections in Short Communication

Authors, affiliations and correspondence should be provided as in full research write up.

1. **Title**
2. **Abstract**

   The abstract should be limited to 100 words or fewer.

   Abbreviations, diagrams and references are not allowed here.
3. **Keywords**

   Five keywords or less should be given below the abstract.
4. **Main body or Literature** -All required parts (Introduction, Materials & Methods, Results and Discussion) should be given in this single section titled "Literature", no section headings.
5. **References**

Preparation of original research manuscripts

Writing Style

All submitted manuscripts should be written in British English with correct syntax, grammar and punctuations. Authors are to use Times New Romans & font size 11

The Manuscripts Structure

Original manuscripts should follow this order where applicable:

Title
Name(s) of Author(s)
Address of Author(s)
Abstract
Introduction
Materials & Methods
Results
Tables, figures, etc
Discussion
Conclusion
Recommendation(s)
Limitation(s)
Acknowledgment
Reference
Conflict of interests

The authors should please comply strictly with this format for original manuscripts.

Maximum length

Text of original research articles should not exceed 4,550 words (including abstract, references, legends, tables and figures).

Unit of Measurement

The authors are to express all measurements & quantities in SI Units.

Title

The title should be concise and reflect the nature of the research and findings. The title should not be more than 155 characters.

Authors

The author(s) should provide their email addresses, full names and institutional affiliations. The corresponding author's contact details especially e-mail address and telephone number, should also be provided. (Email addresses of other Co-Authors should be provided in the cover letter).

Abstract

The abstract should have a maximum word count of 250. There should be no paragraphing of the abstract (unstructured abstract).

Keywords

A maximum of relevant 7 keywords, in alphabetical order, should be provided for indexing and coding.

The main body of article text
This should consist of a maximum of 4,250 words and sectioned into the introduction or background, materials and methods, results, discussions, conclusion, recommendation and limitation.

Introduction
This section should contain concise background information to the research, justification, hypotheses and objectives with citation of the relevant references.

Materials and Methods
The authors should provide details of the research design, materials and equipment used, and any other details which will permit reproduction of similar results by other researchers. An explicit description of interventions (or treatments) should be given. Subjects, inclusion and exclusion criteria must be stated. Statistical tests or tools for the analysis of data including the version of software employed must be provided. There must be a clear demonstration that ethical clearance was obtained before commencement of the study and all relevant regulations were followed for both human and animal studies. The anonymity of patients or diagnostic materials must be preserved.

Results
This section must be explicit, concise and free from any form of ambiguity or unnecessary repetition. Tables and figures should be placed as much as possible, in proximity to the part of the text referring to them. Pictures must be of very good quality. All illustrative items must have an in-text reference, annotated and should contain clear descriptive legends.

Discussion
The results of the research should be discussed with particular attention to interpretation. A well-structured discussion will state the main findings, the strength and weakness of the study in comparison with similar studies, unanswered questions and future directions.

Conclusion
A brief summary of key findings, implications and future research

Acknowledgement
Significant contributors, if any, to the research who does not qualify as authors may be acknowledged.

Conflict of interest
The author(s) must issue a statement concerning conflict of interest in performing or reporting the research.

Check here for Guideline on how to prepare Short Communication

Referencing Style
The journal adopts the Vancouver referencing style recommended at the International Committee of Medical Journal Editors conference in Vancouver, 1978.

Text Citations
References numbers within the text should be in superscript at the end of a sentence, placed after the full stop. it should also be placed after a comma as the case may be. All et al should be in italics followed by either a full stop or a coma, as the case may be. The actual authors can also be referred to, but the reference number must always be given.

Reference List:
-General Guide
The reference list comes at the end of your document. Number the references in the list in the order in which they appeared in the text. List the authors' names, starting with surnames, followed by a maximum of two initials. The initials should NOT be separated with a full stop or a comma. The authors' names should be separated with a comma and Full stop should follow the final name.
Where there are more than six (6) authors the first 6 should be listed followed by 'et al. and a full stop.
Specific Reference Examples

Print journal article reference
7. Denning PJ, Campbell RT, John HT. Computational thinking in science. Am Sci 2017;105(2):13-17.

Online journal article reference
8. Kistner S, Vollmer R, Burns BD, Kortenkamp U. Model development in scientific discovery learning with a computer-based physics task. Comput Human Behav [Internet]. 2016 Feb 20 [cited

2017 ,.Feb 13]; 59: 446-455. Available from http://www.sciencedirect.com/science/article/pii/S0747563216300930

Referencing a Print Book
3. Susskind L, Hrabovsky G. The theoretical minimum: what you need to know to start doing physics. London: Allen Lane; 2013. 256p.

Referencing an e-book:
4. Bonitz M, Lopez J, Becker K, Thomsen H, editors. Complex plasmas: scientific challenges and technological opportunities [Internet]. New York: Springer; 2014. 491 p. Available from: http://link.springer.com/book/10.1007%2F978-3-319-05437-7

Referencing a chapter in an edited book
5. Kelsey S. Aristotle on interpreting nature. In: Leunissen M, editor. Aristotle's physics: a critical guide. Cambridge: Cambridge University Press; 2015. 31-45 p.

Referencing a chapter in an E-book
6. Watermann T, Scherrer A, Sebastiani D. Linear response methods in quantum chemistry. In: Bach V, Delle Site L, editors. Many-electron approaches in physics, chemistry and mathematics: a multidisciplinary approach [Internet]. New York: Springer; 2014. 97-110 p. Available from http://link.springer.com/chapter/10.1007/978-3-319-06379-9_5

Citation from unpublished work
5. Eke B. Evaluation of frequency of abdominal surgeries at Benue State University Teaching Hospital Makurdi Nigeria. Ph.D. Thesis, 2017, Benue State University Makurdi Nigeria. 253pp.

Cover Letter
Each submission should be accompanied by a cover letter in a Microsoft Word file. The content of the letter should include, a statement that:

1. The research is original and has not been submitted or accepted for publication elsewhere;
2. Potential conflict(s) of interest(s) do or do not exist;
3. The manuscript has been read and approved by all the authors.
4. E-mail addresses of all Co-Authors should be included.

Article submitted to the journal should not have been submitted for peer-review in another journal simultaneously, nor previously published.

A research report submitted simultaneously to two journals or submitted twice for publication will attract appropriate sanctions.

The manuscript should be formatted without section headings in the body of the text and contain no more than 3 figures or tables, combined.

Required Sections in Short Communication
Authors, affiliations and correspondence should be provided as in full research write up.

1. **Title**
2. **Abstract**
   The abstract should be limited to 100 words or fewer.
   Abbreviations, diagrams and references are not allowed here.
3. **Keywords**
   Five keywords or less should be given below the abstract.
4. **Main body or literature** -All required parts (Introduction, Materials & Methods, Results and Discussion) should be given in this single section titled "Literature", no section headings.
5. **References,**
   Preparation of original research manuscripts

Online journal article reference
8. Kistner S, Vollmer R, Burns BD, Kortenkamp U. Model development in scientific discovery learning with a computer-based physics task. Comput Human Behav [Internet]. 2016 Feb 20 [cited 2017Feb 13]; 59: 446-455. Available from http://www.sciencedirect.com/science/article/pii/S0747563216300930

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4. Bonitz M, Lopez J, Becker K, Thomsen H,

editors. Complex plasmas: scientific challenges and technological opportunities [Internet]. New York: Springer; 2014. 491 p. Available from: http://link.springer.com/book/10.1007%2F978-3-319-05437-7

Referencing a chapter in an edited book

5. Kelsey S. Aristotle on interpreting nature. In: Leunissen M, editor. Aristotle's physics: a critical guide. Cambridge: Cambridge University Press; 2015. 31-45 p.

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Cover Letter

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1. The research is original and has not been submitted or accepted for publication elsewhere;
2. Potential conflict(s) of interest(s) do or do not exist;
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4. E-mail addresses of all Co-Authors should be included.

Article submission

Articles may be submitted online here **http://Info@nicmauricecolleges.org ,** www.info@nicmauricecolleges.org whatsapp 234 8151144603, 234 7069094904 or the Editor-in-Chief or as an email attachment to submit

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The journal requires authors to pay a publication fee of fourty thousand Nigerian naira (40,000), or one hundred and fifteen (115.00) USD only for international Authors. Authors may be requested to pay cash, by bank draft, or by transfer into the journal account after the manuscript has been accepted for publication.

Editorial Team

The above mentioned Editorial team of IRJMPCH is vested with the responsibility as contained in the terms of reference to be served them. Please accept assurances of the Administrator highest regards.

Global Invitation

A. Global invitation for nomination recommendation of self /others to the prestigious position of:
1. *Editorial board of the journal and*
2. *Reviewer of disciplinary specialties/courses membership (specify your interest...1 or 2)*

B. Invitation to submit your endearing manuscripts in any/all specializations of the global sectors for possible publication in volume 1 (edition 1) of our journal.
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RELATIONSHIP BETWEEN BODY MASS INDEX, WAIST-HIP RATIO, AND CARRYING ANGLE AMONG HEALTHY FEMALE POPULATION IN A TERTIARY INSTITUTION IN SOUTH-EAST NIGERIA.

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Nnamdi Azikiwe University,
Nnewi Campus

Edeh Rita Uchenna
Department of Anatomy,
Nnamdi Azikiwe University,
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ABSTRACT:

Background: Overweight among female adolescent is a pressing issue globally. Previous research investigated BMI's impact on carrying angle in healthy individuals, creating a linkage between BMI and lean body mass. While WHR and waist circumference are indicators of central obesity, carrying angle is crucial for walking and object carrying and may indicate ulnar neuropathy risk. Objective: This study seeks to assess the impact of BMI and waist-hip circumferences on the carrying angle of healthy female students. It determine their average angles, variations, and their statistical significance. Methods: This descriptive study sampled 400 healthy female undergraduates aged 18-30 from Nnamdi Azikiwe University's College of Health Sciences, Nnewi Campus. Results: The study involved 400 healthy female undergraduates aged between 18 and 30 years, revealing a mean BMI of 22.43 ± 3.74kg/m². Remarkably, the analysis provided an objective understanding of carrying angles, the mean right angle and mean left angle were recorded at 14.74 ± 1.510 and 14.04 ± 1.560 respectively. A holistic investigation gave numerical values of the significant effect of BMI on carrying angles, which signifies its influence in delineating anthropometric variations ($p < 0.001$). Conclusion: This study provided insight into the BMI, WHR, and carrying angle correlation among 18-28-year-old women. Significant differences in carrying angles were noted across the observed BMI groups, with obese and overweight individuals showing increased angles. A positive correlation between BMI and carrying angles offer valuable anatomical insights.

Keywords: Body Mass Index, Obesity, Waist-Hip Ratio, Waist Circumference.

Introduction:

Overweight is a serious health problem among female adolescents in Nigeria. Few previous studies analyzed the effect of body mass index (BMI) on carrying angle in a healthy population. BMI is an estimate of body composition that correlates an individual's weight and height to lean body mass (LBM). The BMI is thus an index for weight adjusted for stature.[1]

BMI also known as "Quetelet index" of an individual is a measure of weight for height. It is a value derived from the mass (weight) and height of an individual. It is calculated as weight in kilograms divided by the square of height in meters^2 and universally expressed in units of kg/m^2. It may also be determined using a table or chart which displays BMI as a function of mass and height using contour lines or colors for different BMI categories, and which may use other units of measurements (converted to metric units for calculation).

The BMI is an attempt to quantify the amount of tissue mass (muscle, fat and bone) in an individual and then categorize the person as underweight, normal weight, overweight or obese based on the value (Kendrick, 2015). Although BMI clearly is not an ideal measure of actual adiposity, it has been a widely available and much used maker.[3]

According to world health organization (WHO), the commonly accepted BMI ranges are underweight: below18.5kg/m^2, normal weight: 18.5 to 25kg/m^2, overweight: 25 to 30kg/m^2, obese: above 30kg/m^2. BMI is used as an indicator of an individual's health, that is, it can determine whether a person has a healthy or unhealthy weight. It provides a simple numeric measure of a person's thickness or thinness allowing health professionals discuss weight problems more objectively with their patients. BMI was designed as a simple means of classifying average sedentary (physically inactive) population with an average body composition.[4]

Waist-hip circumference and waist-hip ratio (WHR) are measure of body composition commonly used in health research. Waist circumference alone is used as a measure of central obesity. For example, the American Heart Association defines abdominal obesity in men as a waist circumference greater than 40 inches (102cm) and in women as a waist circumference greater than 35 inches (88cm). Waist circumference is a measure of the waistline at the level of the navel, while hip circumference is measured at the widest part of the hips. The waist-hip ratio is then calculated as the waist circumference divided by the hip circumference. The World Health Organization (WHO) defines abdominal obesity as a WHR greater than or equal to 0.90 for males and greater than or equal to 0.85 for females.

The carrying angle of the elbow is defined as the angle formed by the long axis of the arm and the long axis of the forearm in the frontal plane when the elbow is fully extended and the forearm is supinated.[5] According to parmar (2015), when our arms are held out at our sides with palms facing forward, your forearm and hands should normally be 5 to 15 degrees away from your body. This is the normal "carrying angle" of the elbow. The angle allows the forearm to clear your hips when you swing your arms during walking or carrying objects.

Since females have narrower shoulders and wider hip to bear pregnancy (compared to the male counterparts) their forearm and hand should be normally about 15 degrees away from their body, that is, the carrying angle is more to allow effortless hip clearing while walking or carrying objects. This angle gives that outward "twisted" appearance to females when compared to males.[6] The carrying angle disappears on full flexion of the elbow joint reason being that the tilting of the humeral and ulnar articular surfaces is approximately equal, the two bones therefore reach the same plane.[7]

The angling away of the forearm from the body to a greater degree than normal when fully extended results in an increased carrying angle. This medical deformity is termed, "cubitus valgus". It was observed from the studies made by that increased carrying angle is a risk factor for non-traumatic ulnar neuropathy at the elbow.[8] Cubitus valgus could occur as a result of various factors including abnormalities in development of children, trauma, repeatedly applied stress on the forearm, genetics, malnutrition and considered as a main cause is the Turner's syndrome. Cubitus varus however is a common deformity in which part of the limb is deviated towards the midline of the body. It is often referred to as 'gunstock deformity' due to the nature of healing.[9]

The common cause of cubitus varus is the supracondylar fracture of the humerus. It may result in the subluxation of the ulna nerve over the medial epicondyle with active flexion and extension of the elbow. The knowledge of carrying angle is important in anthropology for differentiation of sex in fragmentary remains and also to understand sexual dimorphism which is more common in bones.[10]

Methods:

Study Site and Participants:
College of Health Sciences, Nnamdi Azikiwe University in Okofia Nnewi is a tertiary institution that offers specialist training in the health sciences. The study received ethical approval from the Ethical Committee of the Faculty of Basic Medical Sciences. Informed consent was also obtained from all participants.

Study design and Cognitive test task description:
Since this was a descriptive study, the simple random sampling was employed. The data was collected from 400 healthy female undergraduates aged between 18-30 years who are students of College of Health Sciences, Nnamdi Azikiwe University in Okofia, Nnewi. The BMI classes studied were categorised into; Underweight, Normal weight, Overweight, and Obesity.

Inclusion Criteria:
Female students aged between 18 and 30 years from the College of Health Sciences. Specifically, the participants must be students of the College of Health Sciences at Nnamdi Azikiwe University, Nnewi Campus, throughout the study period. Participants should have no history of trauma or fracture in the upper limb and no prior upper limb surgeries.

Exclusion Criteria:
The exclusion criteria for this study encompassed a diverse range of conditions and characteristics: Non-students and male individuals were excluded from participation, participants who had lost one or both upper or lower limbs were excluded, individuals with a history of fractures around the elbow or shoulder joint were not included, participants with any congenital condition affecting the elbow or shoulder were excluded from the study, pregnant individuals, those confined to a wheelchair, and individuals deemed unstable were not included in the study. Additionally, individuals who were upper limb amputees, blind, deaf, or mute were also excluded from participation.

Data analysis:
All data collected was analysed using two software packages: the statistical package for social sciences (SPSS) version 25.0 and the Microsoft office excel. Descriptive statistics was used to describe the demography of the population. Student t-test was used to check for the significant difference between the left and right carrying angle. Correlative analysis was used to check for the relationship between the carrying angle and other anthropometric parameters. Regression analysis was carried out to attempt developing a formula or an equation for estimating carrying angle from other parameters.

Results
The data used for this study was obtained from four hundred young women within the age range of 18-28 years and with a mean age of 21.31±1.99 years and a mean BMI of 22.43±3.73kg/m^2. The results from the study are arranged in the tables below.

Table 1: Descriptive analysis of socio-demographic variables

Variable	Frequency (n=400)	Percentage (%)
Age category (years)		
18-21	232	58.00
22-25	158	39.50
26-28	10	2.50
BMI Status		
Normal weight	279	69.75
Obesity	20	5.00
Overweight	63	15.75
Underweight	38	9.50
Tribe of origin		
Igbo	357	89.25
South-South (Delta)	24	6.00
North (Hausa)	13	3.25
South-West (Yoruba)	3	0.75
Middle Belt (Benue)	3	0.75
Total	**400**	**100.0**

Table 2: Summary statistics of quantitative variables measured in the study.

Variable	Summary statistics	
	Mean±SD	**Range**
Age (years)	21.31±1.99	18-28
Height (cm)	165.69 ± 6.28	149-185.1
Height (m)	1.65 ± 0.06	1.49-1.85
BMI (kg/m^2)	22.43 ± 3.74	13.32-38.30
Waist circumference (cm)	78.03 ± 9.48	59-113
Hip circumference (cm)	99.17 ± 9	81-138
Waist-Hip Ratio	0.79 ± 0.52	0.63-0.93
Right Carrying Angle (^{0})	14.74 ± 1.51	10-18
Left Carrying angle (^{0})	14.04 ± 1.56	9-18

The mean age of the population studied was 21.31±1.99 years with mean BMI of 22.43 ± 3.74kg/m^2. The mean right and left carrying angles in females studied were 14.74 ± 1.51^0 and 14.04 ± 1.56^0 respectively. The range of variation of the rest of the parameters are as shown in table 2 above.

Table 3: Comparison of the group 1-IV based on haemoglobin levels, age, parity, ultrasound estimated gestational age (USS EGA) and ultrasound estimated fetal weight (USS EFW) using an ANOVA test.

Variables	BMI Categories (Mean ± SD)				f-value	p-value
	Normal weight (n=279)	**Obesity (n=20)**	**Overweight (n=63)**	**Underweight (n=38)**		
Age (years)	21.15±1.92	21.5±2.13	22.07±2.17	21.07±1.90	3.96	0.008*
Waist circumference (cm)	77.40±9.06	86.19±11.05	78.10±8.42	78.22±11.45	5.53	0.001*
Hip circumference (cm)	98.37±8.64	108.92±12.59	99.99±7.98	98.54±11.53	8.65	<0.001*
Waist-Hip Ratio	0.79±0.05	0.79±0.04	0.78±0.06	0.79±0.06	0.48	0.699
Right Carrying Angle (^{0})	14.49±1.47	15.90±1.25	15.61±1.33	14.50±1.35	15.38	<0.001*
Left Carrying angle (^{0})	13.81±1.53	15.30±1.30	14.90±1.34	13.65±1.43	14.99	<0.001*

**(significant p-values<0.05)*

Table 4: Correlation between BMI, waist-hip circumferences and carrying angle of healthy female students in the study.

Variables	Correlation coefficient	p-value
BMI (kg/m^2) vs Right Carrying Angle (^{0})	0.383	<0.001*
BMI (kg/m^2) vs Left Carrying Angle (^{0})	0.385	<0.001*
Waist-Hip Ratio vs Right Carrying Angle (^{0})	0.080	0.107
Waist-Hip Ratio vs left Carrying Angle (^{0})	0.109	0.029*

/ statistically significant, P<0.05/*

Table 5: Multiple linear regression model showing the prediction of left carrying angle using BMI and waist-hip ratio while controlling for age among the study participants.

Variables	coefficient	p-value	95% Confidence Interval	
			Lower	Upper
BMI	0.158	0.001*	0.120	0.196
Waist-hip ratio	3.560	0.011*	0.837	6.282
Age (years)	0.040	0.264	-0.030	0.111
Model equation	**Left carrying angle = 0.158 (BMI) + 3.56 (WHR) + 0.04 (Age)**			

Adjusted R^2squared value = 0.158 = 15.8%
Dependent Variable: left carrying angle.
Predictors: (Constant), BMI, waist-hip ratio circumference, and age.

The dependent variable (left carrying angle) was regressed on predicting variables of BMI, waist-hip circumference, and age. The independent variables significantly predicted left carrying angle, F (3,396) = 26.10, p-value <0.001, which indicates that the factors under study had a significant impact on left carrying angle. Moreover, the R^2 =0.158 depicts that the model was able to explain 15.8% of the variance in left carrying angle.

Additionally, coefficients were further assessed to ascertain the influence of each of the parameters on the dependent variable. The result revealed that BMI had a significant and positive impact on left carrying angle (B=0.158, t=8.19, p=0.001). Also, Waist-hip ratio had a significant and positive impact on left carrying angle (B=3.56, t=2.57, p=0.011). Age had no significant impact on left carrying angle (p=0.264)

Table 6: Multiple linear regression model showing the prediction of right carrying angle using BMI and waist-hip ratio while controlling for age among the study participants.

Variables	coefficient	p-value	95% Confidence Interval	
			Lower	Upper
BMI	0.150	0.001*	0.113	0.187
Waist-hip ratio	2.601	0.053	-0.032	5.235
Age (years)	0.062	0.074	-0.006	0.131
Model equation	**Right carrying angle = 0.150 (BMI) + 2.601 (WHR) + 0.062 (Age)**			

Adjusted R^2squared value = 0.155 = 15.5%
Dependent Variable: right carrying angle.
Predictors: (Constant), BMI, waist-hip ratio circumference, and age.

The dependent variable (right carrying angle) was regressed on predicting variables of BMI, waist-hip circumference, and age. The independent variables significantly predicted right carrying angle, F (3,396) = 25.54, p-value <0.001, which indicates that the factors under study had a significant impact on right carrying angle. Moreover, the R^2 =0.155 depicted that the model was able to explain 15.5% of the variance in right carrying angle. Additionally, coefficients were further assessed to ascertain the influence of each of the parameters on the dependent variable. The result revealed that BMI had a significant and positive impact on right carrying angle (B=0.150, t=8.03, p=0.001). However, Waist-hip ratio had non-significant positive impact on right carrying angle (B=2.601, t=1.94, p=0.053). Age had no significant impact on right carrying angle (p=0.074)

Discussion

This study measured the relationship between body mass index (BMI), waist-hip ratio (WHR), and carrying angle among four hundred young women within the age range of 18-28 years at the College of Health Sciences, Nnamdi Azikiwe University, Nnewi, Anambra State Nigeria. The results showed significant differences in carrying angles across the different BMI categories, with obese and overweight individuals having higher carrying angles compared to normal-weight and underweight individuals.

Anthropometric measurements from this study reveal details about the physical characteristics of the participants. From the mean age of 21.31 years, it could be seen that the participants are primarily young adults. This is consistent with the age distribution of demography within the locality of the study. The mean BMI (22.43 kg/m²) also corresponds with the normal range for healthy young adults. The mean height of 165.69 cm, waist circumference of 78.03 cm, and hip circumference of 99.17 cm are indicative of average body proportions within the sample. Although there is a slight variation with the waist-hip ratio of 0.79 it is consistent and generally aligns with the global average for body composition and distribution.

The positive correlation observed between BMI and both the left and right carrying angles suggests that an increase in BMI is associated with an increase in carrying angle. The studies shows that the normal weight category (279) 69% of the sampled population is more common among females of the age range. The study used multivariable regression to describe the combined effect of multiple factors (BMI and WHR) correlated with carrying angle and aligns with previous studies that have linked higher BMI and obesity with increased carrying angle. potentially due to the increased stress on the lower limbs and altered biomechanics associated with excess weight.

The result also revealed significant differences in age among the various BMI categories ($F = 3.96$, $p = 0.008$*). In line with the finding of Brown et al., 1992 which reported that on an average, women gained 11.05 kg, or 0.35 kg per year between the ages of 18 and 50 years and reported body weight and body mass index (BMI) as variables that increased with age, the individuals categorized as overweight were of the highest mean age (22.07 ± 2.17 years), whereas those classified as underweight had the lowest mean age (21.07 ± 1.90 years) which is agrees with body weight and body mass index (BMI) increase with age. Brown et. al (1992) also posited that on average, women gained 11.05 kg, or 0.35 kg per year between the ages of 18 and 50 years.

In addition, the variations in waist circumference observed across BMI categories had a significant f-value of 5.53 ($p = 0.001$*). The individuals classified as obese had considerably higher mean waist circumference (86.19 ± 11.05 cm) as compared to those observed in other BMI categories. Like Oladipo et. al (2012) noted that BMI increases with advancing age, the significant differences found in hip circumference among the BMI groups ($F = 8.65$, $p < 0.001$*) is consistent as the obese group displayed the largest mean hip circumference (108.92 ± 12.59 cm), while those in the normal weight category exhibited the smallest mean hip circumference (98.37 ± 8.64 cm). In addition, no significant differences were observed in waist-hip ratio across the BMI categories ($F = 0.48$, $p = 0.699$). This indicates a consistent proportion among the age groups.

As part of the suggestive potential of BMI, there is a tendency for the carrying angle to increase as the BMI increases. This shows a direct relationship between body weight and elbow joint alignment. The result also shows a moderate positive correlation between BMI and both the right and left carrying angles, with correlation coefficients of 0.383 and 0.385, respectively (both $p < 0.001$) which isn't far off the finding of Golden et. al (2012). That BMI had a positive correlation with right elbow extension but did not correlate with left elbow extension or right or left carrying angle.

BMI is also a significant predictor of left carrying angle, with a coefficient of 0.158 ($p = 0.001$). From the result, for every one-unit increase in BMI, there is a corresponding increase of approximately 0.158 units in left carrying angle, this is with respect to the effects of WHR and age. The WHR demonstrated a remarkable association with left carrying angle, with a coefficient of 3.560 ($p = 0.011$). In essence, for every one-unit increase in WHR, there is a corresponding increase of approximately 3.560 units in left carrying angle, with respect to

BMI and age.

However, age did not show a significant association with left carrying angle, as evidenced by a non-significant coefficient (0.040, p = 0.264). Unlike Oladipo et al (2012) inferred, there is a heavy suggestion that age may not significantly predict the left carrying angle in this population, after accounting for BMI and WHR. Similarly, with a coefficient of 0.150 (p = 0.001), for every one-unit increase in BMI, the right carrying angle is expected to increase by 0.150 units, with respect to other variables in the model.

This study was conducted on a specific population of young female students, although this may limit the applicability of the findings to other age groups (populations). In addition, the cross-sectional structure of the study prevents the establishment of causal relationships between the researched variables.

Conclusion:
This study explored the correlation between body mass index (BMI), waist-hip ratio (WHR), and carrying angle among young women aged 18-28 years. The results revealed significant differences in carrying angles across the various BMI groups. Participants within the obese and overweight groups displayed elevated carrying angles in contrast to those in the normal-weight and underweight categories. In the study, there was an observed positive correlation between BMI and carrying angles, this suggests that BMI is directly associated with carrying angle. The variation in waist circumference across BMI categories also supports the link between BMI and body composition. In spite of the limitations peculiar to the study population and cross-sectional structure, the results provide insightful contributions into understanding the biomechanical ramifications of BMI and WHR on carrying angles among young women.

Conflict of Interest: The authors declare that they have no conflict of interest.

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IMPACT OF CRANIAL CAPACITY ON ACADEMIC PERFORMANCE OF SECONDARY SCHOOL STUDENTS IN NNEWI.

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Abstract

Background: Cranial capacity is the volume of the interior of the cranium of vertebrates that possess a cranium and a brain. Cranial volume is used to approximate the size of the brain, which is also suggestive of the intelligence of the organism.[1] Cranial capacity is a measure of the volume of the interior of the cranium which is sometimes used as a rough indicator of the size of the brain and are affected by environmental ecological biological geographical racial gender and age factors.[2] Medically various methods of measuring cranial capacity have been known for some time.[3] This study was put- fore to assess the impact of cranial capacity on academic performance of secondary school students in Nnewi. Materials and Methods= The following materials were employed in this study namely Digital vernier caliper, Inelastic measuring Tape, Pen, Weighting scale, Data collection sheets. Nnewi is a local government in Anambra state, it is made of many towns which includes; Otolo, Uruagu, Umudim and Nnewi-ichi. Otolo Nnewi was picked for this study by a simple sampling technique (multistage sampling). Furthermore, Otolo Nnewi is divided into different villages including: Okpuno, Indiakwu, Indingbu, Amiliba, Umuanuka, Umuenem, Okofia, Mbanagu, Ekwuru, Umuzu, Ezekwuagbo, Umuzumbana, Umuzungo and Okofia was picked for the study. First a letter was collect from the supervisor to the principal of the secondary schools. Simple random sampling technique was used to recruit participants into this study. The academic record of each student was also collected. Simple random sampling (balloting without replacement) were used, From these two schools were selected. Ethical approval for this study was obtained from the ethical committee of the Faculty of Basic Medical Sciences, college of Health sciences Nnamdi Azikiwe. The subjects that participated in this study were randomly selected healthy secondary school students from Okofia Nnewi North, Anambra State with ages ranging from 10-19 years. The sample size was calculated using the formula of Yamene (2016). n=>N/[1+N(e)²] Where n=sample size to be estimated , 1=constant. e=level of significance or limit of tolerable error which is set at 0.05. N=Total population in Okofia. n=193,987/[1+193,987(0.05)²] = 399.18 which is approximately 400. Results: First a letter was collected from the supervisor to the principal of the secondary schools. Subject bio data was first obtained including their: Name or initial, age, sex, class, CH, CL, CB, H, W. Measurement of weight The body weight of the subjects used were taken twice with the aid of a weighing scale with an accuracy of 1kg and documented in kg after calculating the average, the participant was measured bare Footed and with minimal clothing as they stand on the center of the scale with their weight evenly distributed across both feet, the scale was placed on a hard floor and not a floor covered with soft materials. Measurement of height: The height of the students where measured with manual stadiometer and recorded in centimeters. The participants were barefooted standing in an erect position looking horizontally and the measurement being read from the vertex of the scalp, for taller students I climbed on a stool to avoid error: After the height and weight was has been measured, body max index (BMI) was derived as mass in Kg/height in meters squared.BMI=body Mass (Kg)/height (m2). Measurement of cranial dimensions: Maximum anterior-posterior cranial length

(CL) in centimeters: measured between glabella and inion. (2) Maximum cranial breadth (CB) in centimeter measured between the two parietal eminences. (3) Maximum cranial height (CH) in centimeters: measured between the vertex and the external acoustic meatus. (4) Using the following formulae derived by Lee-pearson, the cranial capacity (cc) (mm3) was computed as follows: Males: 0.000337 (L-11) (B-11) (H-11) +406.01cc, Female: 0.000400 (L-11) (B-11) (H-11) +206.60cc. (5) Brain weight in grams and cerebral index (CI) were determined by the following formulae: Brain weight= cranial capacity 1.035, Where 1.035 is the mass density of the brain cerebral index= brain weight/ body weight. Conclusion: The study showed that there was sexual dimorphism in craniometric parameters such as cranial breadth, cranial height, cranial length, cranial capacity and also body weight and height. There was therefore no sexual dimorphism in academic performance. Cranial capacity had a positive significant relationship with academic performance in both males and females and there also exist strong positive correlations between cranial capacity and cranial length, cranial breadth, and cranial height.

Keyword; Cranium capacity impact, academic performance, secondary school students

Introduction

Cranial capacity is the volume of the interior of the cranium of vertebrates that possess a cranium and a brain. Cranial volume is used to approximate the size of the brain, which is also suggestive of the intelligence of the organism.[1] Craniometrics study is an important part of anthropometry that is used to determine the cranial capacity of an individual. Cranial capacity is a measure of the volume of the interior of the cranium which is sometimes used as a rough indicator of the size of the brain and are affected by environmental ecological biological geographical racial gender and age factors.[2] The capacity of the cranium has in many studies been used to indirectly reflect the volume of the brain and predict mental ability[3]medically various methods of measuring cranial capacity have been known for some time.[4] Some investigators have estimated the cranial capacity in the past and indirectly reflects the brain volume.[5] Most of these available studies have been made on discuss using linear dimensions, that are the valuable stories.

Medically various methods of measuring cranial capacity have been known for some time.[6] Man has always prided himself on his intellectual capabilities and has often pondered to explain the reason why he alone is able, unlike the rest of the animals Kingdom, to contemplate and communicate with others. Since man's brain is larger than other animals [6,7] it is natural for man to conclude that the brain is the hallmark of the man and the measurement of it must be the key to the understanding of his unique intellectual capacity.[8] Since research on academic achievement began to emerge as a field in the 1960s, it has guided educational policies on admissions and dropout prevention.[9] The capacity of the cranium has been shown in many studies to directly or indirectly reflect the volume of the brain and to predict academic performance.[10] In other words, this has been a major problem especially among teens and growing up children due what has been fed them by either parents or guardian, so this approach is designed to explore the optimum relationship between cranial capacity and academic performance. Some investigators have investigated cranial capacity in the past which indirectly reflects the brain volume.[11] Most of those available studies have been made on dry skulls using linear dimensions, packing methods or occasionally radiological methods. It is also an indirect approach to evaluate the size of the brain.[12] cranial capacity which is in close relation with brain volume, reflects racial characteristics and thus has been thought to be one of the commonest items in physical Anthropological studies.[13]

The study aimed to assess the impact of craniometric variables on academic performance of secondary school students in Nnewi.

Materials and Methods

Material employed were Digital Vernier caliper, Inelastic measuring Tape, Pen, Weighting scale, Data collection sheets. The subjects that participated in this study were

randomly selected healthy secondary school students from Okofia Nnewi North, Anambra State with ages ranging from 10-19 years.

Study Location

The study was conducted in Okofia Nnewi Anabara State. In each of the schools, terminal results of the students were collected from their form masters/mistress and also their cranial length, breadth and height was taken.

Fig 3.1: Map of Nigeria showing Anambra State (GIS, 2022)

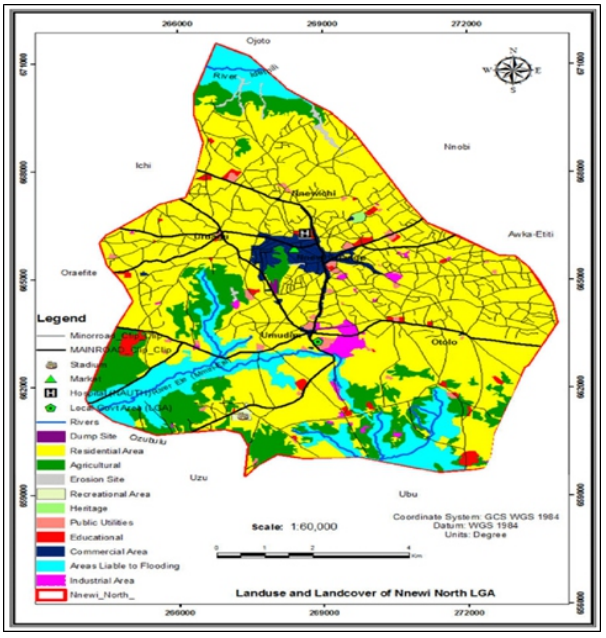


Fig 3.2; Map of Anambra showing Nnewi North.

Sampling Technique

Nnewi is a local government in Anambra state, it is made of many towns which includes; Otolo, Uruagu, Umudim and Nnewi-ichi. Otolo Nnewi was picked for this study by a simple sampling technique (multistage sampling). Furthermore, Otolo Nnewi is divided into different villages including: Okpuno, Indiakwu, Indingbu, Amiliba, Umuanuka, Umuenem, Okofia, Mbanagu, Ekwuru, Umuzu, Ezekwuagbo, Umuzumbana, Umuzungo and Okofia was picked for the study.

First a letter was collect from the supervisor to the principal of the secondary schools. Simple random sampling technique was used to recruit participants into this study. The student cranial length, breadth and height included with their standing height and weight was taken using a venier caliper and weighing scale and inelastic measuring tape respectively. The academic record of each student was also collected. Therefore, Simple random sampling (balloting without replacement), were used. From these two schools were selected.

Sampling Size Determination

The sample size was calculated using the formula of Yamene (2016). $n=>N/[1+N(e)^2]$ Where n=sample size to be estimated, 1=constant, e=level of significance or limit of tolerable error which is set at 0.05, N=Total population in Okofia. $n=193,987/[1+193,987(0.05)^2] = 399.18$ which is approximately 400.

Inclusion Criteria

Strictly students from PROF. SAM secondary school, Chukwujekwu memorial grammar school Otolo Nnewi, and Saint Joseph Catholic school Otolo Nnewi. All subjects should be mentally and physically fit, between 10 and 19 years and must have full academic records with the school management

Exclusion Criteria

Any subject with cranial deformity or history of trauma or in the body areas targeted for anthropological assessment that could hinder accurate measurement. Females with obstructive hair styles, Subjects with incomplete academic records.

Ethical clearance

Ethical clearance was obtained from the ethical committee of the Faculty of Basic Medical Sciences, college of Health sciences Nnamdi Azikiwe.

Limitations
Inability to trace academic records of some students who had already participated in the study, Lack of complete academic records of some students, Lack of co-operation by some school authority, Different subject's combinations of some students, as some students who participated in the studies do not offer some of the general subjects under the consideration.

Measurement of Variables
First a letter was collected from the supervisor to the principal of the secondary schools. Subject bio data was first obtained including their: Name or initial, age, sex, class, CH, CL, CB, H, W.

a. Measurement of weight
The body weight of the subjects used were taken twice with the aid of a weighing scale with an accuracy of 1kg and documented in kg after calculating the average, the participant was measured bare Footed and with minimal clothing as they stand on the center of the scale with their weight evenly distributed across both feet, the scale was placed on a hard floor and not a floor covered with soft materials.

b. Measurement of height
The height of the students where measured with manual audiometer and recorded in centimeters. The participants were barefooted standing in an erect position looking horizontally and the measurement being read from the vertex of the scalp, for taller students I climbed on a stool to avoid error. After the height and weight was has been measured, body max index (BMI) was derived as mass in Kg/height in meters squared. BMI=body Mass (Kg)/height (m2).

c. Measurement of cranial dimensions
(1) Maximum anterior-posterior cranial length (CL) in centimeters: measured between glabella and inion. (2) Maximum cranial breadth (CB) in centimeter measured between the two parietal eminences. (3) Maximum cranial height (CH) in centimeters: measured between the vertex and the external acoustic meatus. (4) Using the following formulae derived by Lee-Pearson, the cranial capacity (cc) (mm3) was computed as follows:

Males: 0.000337 (L-11) (B-11) (H-11) +406.01cc,

Female: 0.000400 (L-11) (B-11) (H-11) +206.60cc.

(5) Brain weight in grams and cerebral index (CI) were determined by the following formulae:

Brain weight= cranial capacity 1.035,
Where 1.035 is the mass density of the brain
cerebral index = brain weight/ body weight.

Grading of Student's Academic Performance

Score	Grade	Score	Remark
75 & above	A	91-100	Excellent
		85-90	Excellent
		80-84	Excellent
		75-79	Very good
65-74	B	70-74	Good
		65-69	Fairly good
60-64	C	60-64	Above average
50-59	D	55-59	Average
		50-54	Pass
40-49	E	0-49	Fail
39 & below	F		

Results

Table 4.1 shows the summary statistics of all the evaluated parameters.

Descriptive Statistics					
	N	**Minimum**	**Maximum**	**Mean**	**Std. Deviation**
Age	800	10	19	15.49	1.793
Weight	800	30	72	51.05	10.420
Height	800	64	186	160.43	9.801
Cranial length	800	11.88	17.65	15.1471	1.10200
Cranial Height	800	4.00	12.56	9.2558	1.49163
Cranial Breadth	800	10.10	17.75	13.9969	1.46617
First term result	800	33.8	89.5	57.670	11.9191
Second term result	800	35.8	88.5	59.446	22.9794
Cranial capacity	800	561.53	1588.13	1050.2707	180.90355

N= Sample size

Table 4.2 compares the parameters between male and female participants. Result shows that male participants have significantly higher weight, height, cranial length, and cranial capacity than their female counterpart. Result also showed that the average age of the male participants (16.19) was significantly higher than that of the female participants (15.21). There was no significant difference in the first and second term performance of both male and female students.

	Group	**Mean±SEM**	**t-value**	**p-value**
Weight	Female	49.78±0.415		
	Male	54.32±0.728	-5.420	0.000*
Height	Female	159.97±0.402		
	Male	161.60±0.675	-2.115	0.035*
Cranial length	Female	14.98±0.045		
	Male	15.57±0.066	-6.975	0.000*
Cranial Height	Female	9.25±0.060		
	Male	9.26±0.107	-0.065	0.948
Cranial Breadth	Female	13.97±0.057		
	Male	14.05±0.111	-0.755	0.450
Age	Female	15.21±0.072		
	Male	16.19±0.117	-7.107	0.000*
First term result	Female	57.59±0.490		
	Male	57.87±0.823	-.298	0.765
Second term results	Female	60.16±1.099		
	Male	57.59±0.640	1.423	0.155
Cranial capacity	Female	1027.22±6.949		
	Male	1109.53±13.466	-5.899	0.000*

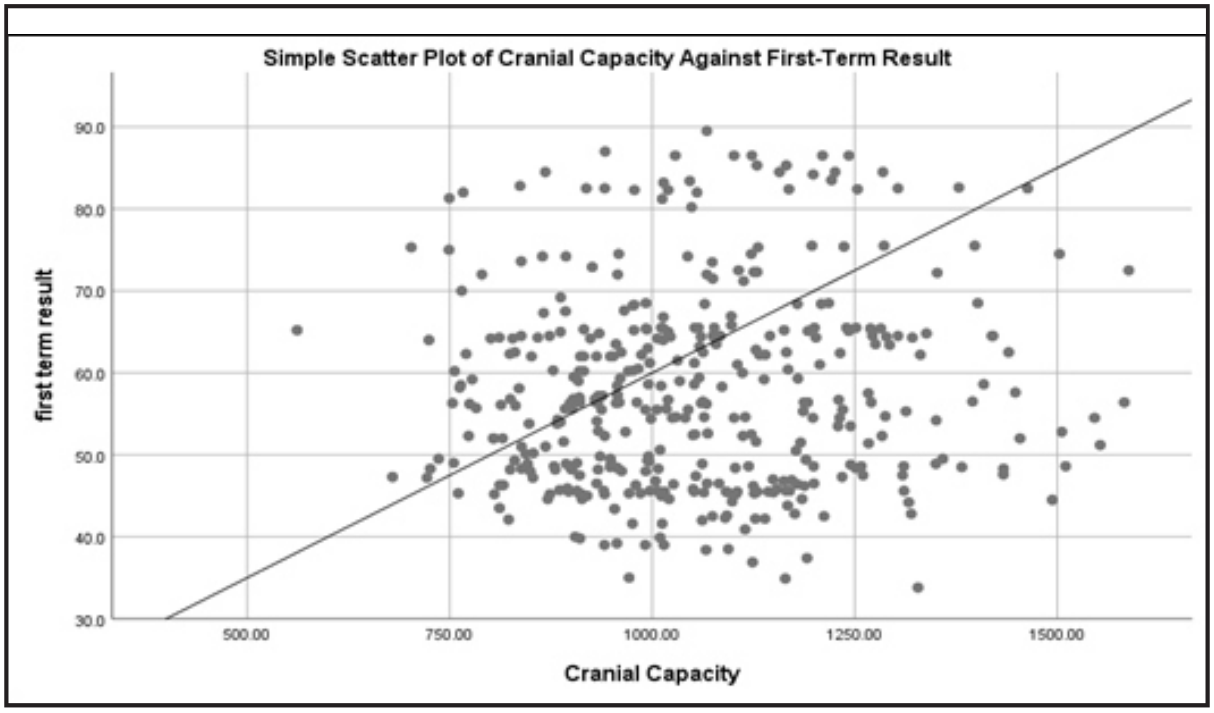
Data was analyzed using student's T-test and result was considered significant at $p<0.05$*

Table 4.3 shows the relationship between cranial capacity and performance in both first and second term. There was a positive significant correlation between the cranial capacity and student's performance in both the first and second term. Meaning that students with higher cranial performance appear to have higher result in both first and second term.

		First term result	**Second term result**
Cranial capacity	Pearson Correlation	0.079	0.070
	P value	0.026*	0.047*
	N	800	800

Data was analyzed using Pearson correlation and result was considered significant at P<0.05. N = sample size*

Figure 1 & 2 shows the scatter plot of the correlation between cranial capacity and first and second term performance. As seen in the graph, there is a positive correlation between the cranial capacity of students and their performance in both first and second term.



Discussion

Craniometry is a branch of anthropometry through which cranial dimensions can be estimated. [14] Cranial capacity is a measure of the volume of the interior of the cranium (skull) of vertebrates.[15] The capacity of the cranium has been shown in many studies to indirectly reflect the volume of the brain and to predict academic performance.[16] These authors stated that increase in brain size is associated with more sophisticated cognitive functions and that larger cranial capacity can be an indicator of larger brain and higher intelligence. Hence, the aim of this study is to find out the correlation between cranial capacity and academic performance among secondary schools in Nnewi.

Cranial capacity is one of the most important characters for determining the racial difference.[17] It is a measure of cranial volume and an indirect approach to evaluate the size of the brain, thus human populations differ in brain size. In this study it is observed that cranial capacity has a positive correlation with academic performance, this disagrees with the research carried out by [18] who stated that it is predictable that correlation between academic performance and brain size will be modest, because the brain is not involved in what we call academic performance and thus variations in mass/size of that tissue will lower the magnitude of correlation. The cranial capacity of the students in this study was $1109.53 \pm 13.466 cm^3$ in males and $1027.22 \pm 6.949 cm^3$ in females, which indicates that the males had a higher value than the females. Generally, males and females differ from each other genotypically and phenotypically and these differences are more pronounced during puberty.[19] This result from the present study is in line with Swamy *et al*. who reported that males had significantly larger cranial capacity than females.

There was a positive significant correlation between the cranial capacity and student's performance in both the first and second term. Meaning that students with higher cranial performance appear to have higher result in both first and second term. This is contrary to a study done by Augustine *et al.* who reported no significant correlation between the cranial capacity of his participants and their academic performances. Also, according to [20] individual brain size is affected by nutrition, and

could also be attributed to genetic and environmental influences and food habits as reported by [21] It has been suggested that size would not be expected to increase cognitive competence more than modestly because larger brains have larger neurons and more myelinated axons connecting them as reported by Deacon (1990). It is because of this reason that people with larger than normal brains are not necessarily brighter.[22]

It has been argued that there is important aspect of human intelligence that academic performance fails to measure, such as creativity, practical intelligence, social intelligence and emotional intelligence which are involved in cognitive development. Some of these constructs are more securely grounded than others and not all of them are wholly dependent on academic performance.[23] This is because psychometrically measured academic performance leave out much cognitive reliance to academically performed behaviors.

This study also revealed that academic performance has no relationship with gender but shows a sexual dimorphism in craniometric parameters between the male and female participants. This disagrees with the study reported [25] which stated that academic performance shows a statistical significance between males and females, with females scoring higher than males and according to their study, it might be because of differences in eye-hand motor coordination. Kimura et al., (2000) also reported that women excelled higher than men in eye-hand coordination. Also, accordingly to [26] individual brain size is affected by nutrition and early experience, this can be due to males are more subjected to physical activities than the females and attention is given more to females. However, in the view of Fagboungbe (2016) concluded that performance level of a student depends on the quality of the brain cells and not about the sex of the individual. He noted females tends to be better than males in certain areas while males tend to be better than women in certain areas. He documented that academic performance is determined by the quality of the brain cells in the individuals. So, it is the function of the quality of those cells of the individuals that is why young ones are not meant to lack nutritious food so that it can lead to qualitative brain cells and when the brain cells are of high quality, the processor is bound to be intelligent and have high academic scores.

Result shows that male participants have significantly higher weight, height, than their female counterpart. This observation is in agreement with previous works by [27-31]This could be because of the bigger body frame of growing-up males than the females Xu also mentioned in his research that the brain plays a very high role in the body weight of adolescence causing differences in their sex chromosomes, he found out that female POMC neurons express higher levels of TAP63 which make the female neurons fire faster than the male and causing much expenditure of energy, this will in turn cause highly reduced or less appetite, therefore the females are more protected in gaining weight than the male. Moreover, the male cranial capacity was also higher than that of the female, which has been shown that the gender differences in brain weight could be attributed to activities in which the specific sex excelled [32] Another possible reasons for this difference could be differences in the number of cortical neurons. Pakkenberg and Gunderson (1997) reported that men had about 4 billion more for cortical neurons than women. Also, study in Hawaii (Nakashima, 1986) suggested that environmental and ecological conditions could cause changes in head dimensions such as cranial capacity and head shape. There is also a significant factor that enables man adapt to life adverse environmental factor which is the fact that environmental pressures produce noticeable difference between people with respect to their Cranial capacity [33] Also, Rushton (1994) indicated that genetic factors are accounted for phenotypic variance in cranial capacity. Result also showed that the average age of the male participants (16.19) was significantly higher than that of the female participants (15.21) These differences mean that girls more readily 'engage' with school and show intrinsic motivation for academic tasks, factors strongly associated with readiness early school activities. Boys, however, are more likely to find schoolwork unfamiliar and difficult also girls show a serious and high quest for knowledge and enthusiasm in exploring new knowledge than the males because of this reason parents will force be forced to enroll the female students to school earlier before the expected age for school.

Brain size and cranial capacity are receiving attention because of technologies available to scan the brain and' because a significant relationship has been established between academic performance and brain size.[34] They reported that the correlation between academic performance and brain size estimated from magnetic and resonance imaging (MRI) ranges from 0.35 to 0.47 with an average of about 0.40 [35] Other studies have corroborated that there is a positive correlation between brain size, cranial capacity and one's intelligence and most general mental ability [36-38]. Rushton and Ankney (1996) reported that Galton (1888) was the first one to quantify the relationship between brain-size and cognitive ability in humans. His subjects were Cambridge undergraduate males who were divided into two: those who achieved first-class honors degree and those who did not. He computed head volume by multiplying head length by breadth and height and plotted the results against age (15 to 19 years) and class of degree (A, B, C). He reported that cranial capacity continued to grow massively after the age of 8 and those who obtained high honors degree had a brain size of 2 to 5% greater than those who did not. Rushton and Ankney (1996) also reported that Pearson (1906) re-examined Galton's data using his correlation coefficient and noted a weak positive relationship between head size and academic performance. They noted that cognitive abilities and academic performance were correlated with brain size, age, sex, social class and race but Passingham reported a correlation of r = .14 between brain weight and academic performance in his study. However, Passingham also reported that when height was partialled out, the correlation coefficient became r = .03 (ns). In discussing his findings, Passingham commented that other studies had not partialed out factors like height, weight and age when relating academic performance and brain size. In addition, socio-economic class, which enters the equation both in terms of nutrition and environmental influences, had not been taken into consideration. Like others, Passingham was also concerned with the problem of being able to measure either academic performance or brain weight directly, but not both in the same sample. For instance, in his living sample, academic performance of the students was measured directly and brain weight was estimated through external cranial measurements. In Passingham's sample, brain weight was measured directly, and academic performance was estimated on the basis of the socio-economic status of the individuals.

Conclusion

Findings from this study showed that there was sexual dimorphism in craniometric parameters such as cranial breadth, cranial height, cranial length, cranial capacity and also body weight and height. There was therefore no sexual dimorphism in academic performance. Cranial capacity had a positive significant relationship with academic performance in both males and females and there also exist strong positive correlations between cranial capacity and cranial length, cranial br
eadth, and cranial height.

Recommendations

1. More detailed examination with better assessments of brain size such as magnetic resonance imaging should be used to improve on accuracy.
2. More work should be done to provide more data on craniometric variables.
3. Other methods of testing academic performance should be in related study.

Gallery of photos

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RELATIONSHIP BETWEEN CRANIAL CAPACITY AND ACADEMIC PERFORMANCE OF SECONDARY SCHOOL STUDENTS IN NNEWI

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Abstract

Background: Cranial volume is used to approximate the size of the brain, which is also suggestive of the intelligence of the organism.[1] Cranial capacity is the volume of the interior of the cranium of vertebrates that possess a cranium and a brain. Cranial capacity is a measure of the volume of the interior of the cranium which is sometimes used as a rough indicator of the size of the brain and are affected by environmental ecological biological geographical racial gender and age factors.[2] Medically various methods of measuring cranial capacity have been known for some time.[3] This study was put- fore to assess the impact of cranial capacity on academic performance of secondary school students in Nnewi. Materials and Method: The following materials were employed in this study namely Digital vernier caliper, Inelastic measuring Tape, Pen, Weighting scale, Data collection sheets. Nnewi is a local government in Anambra state, it is made of many towns which includes; Otolo, Uruagu, Umudim and Nnewi-ichi. Otolo Nnewi was picked for this study by a simple sampling technique (multistage sampling). Furthermore, Otolo Nnewi is divided into different villages including: Okpuno, Indiakwu, Indingbu, Amiliba, Umuanuka, Umuenem, Okofia, Mbanagu, Ekwuru, Umuzu, Ezekwuagbo, Umuzumbana, Umuzungo and Okofia was picked for the study. First a letter was collect from the supervisor to the principal of the secondary schools. Simple random sampling technique was used to recruit participants into this study. The academic record of each student was also collected. Simple random sampling (balloting without replacement) were used, From these two schools were selected. Ethical approval for this study was obtained from the ethical committee of the Faculty of Basic Medical Sciences, college of Health sciences Nnamdi Azikiwe. The subjects that participated in this study were randomly selected healthy secondary school students from Okofia Nnewi North, Anambra State with ages ranging from 10-19 years. The sample size was calculated using the formula of Yamene (2016).n=>N/[1+N(e)²] Where n=sample size to be estimated 1=constant. e=level of significance or limit of tolerable error which is set at 0.05 N=Total population in Okofia. n=193,987/[1+193,987(0.05)²] = 399.18 which is approximately 400. Results: First a letter was collected from the supervisor to the principal of the secondary schools. Subject bio data was first obtained including their: Name or initial, age, sex, class, CH, CL, CB, H, W. Measurement of weight. The body weight of the subjects used were taken twice with the aid of a weighing scale with an accuracy of 1kg and documented in kg after calculating the average, the participant was measured bare Footed and with minimal clothing as they stand on the center of the scale with their weight evenly distributed across both feet, the scale was placed on a hard floor and not a floor covered with soft materials. Measurement of height. The height of the students where measured with manual audiometer and recorded in centimeters. The participants were barefooted standing in an erect position looking horizontally and the measurement being read from the vertex of the scalp, for taller students I climbed on a stool to avoid error. After the height and weight was has been measured, body max index (BMI) was

derived as mass in Kg/height in meters squared. BMI=body Mass (Kg)/height (m2). Measurement of cranial dimensions. (1) Maximum anterior-posterior cranial length (CL) in centimeters: measured between glabella and inion. (2) Maximum cranial breadth (CB) in centimeter measured between the two parietal eminences. (3) Maximum cranial height (CH) in centimeters: measured between the vertex and the external acoustic meatus. (4) Using the following formulae derived by Lee-Pearson, the cranial capacity (cc) (mm3) was computed as follows, Males: 0.000337 (L-11) (B-11) (H-11) +406.01cc. Female: 0.000400 (L-11) (B-11) (H-11) +206.60cc. (5) Brain weight in grams and cerebral index (CI) were determined by the following formulae: Brain weight= cranial capacity 1.035, Where 1.035 is the mass density of the brain cerebral index= brain weight/ body weight. Conclusion: Cranial capacity had a positive significant relationship with academic performance in both males and females and there also exist strong positive correlations between cranial capacity and cranial length, cranial breadth, and cranial height. The study showed that there was sexual dimorphism in craniometrics parameters such as cranial breadth, cranial height, cranial length, cranial capacity and also body weight and height. There was therefore no sexual dimorphism in academic performance.

Keyword; Cranium capacity impact, academic performance, secondary school's students

Introduction

Craniometric study is an important part of anthropometry that is used to determine the cranial capacity of an individual. Cranial capacity is a measure of the volume of the interior of the cranium which is sometimes used as a rough indicator of the size of the brain and are affected by environmental ecological biological geographical racial gender and age factors.[1] Cranial capacity is the volume of the interior of the cranium of vertebrates that possess a cranium and a brain. Some investigators have estimated the cranial capacity in the past and indirectly reflects the brain volume.[2] Cranial volume is used to approximate the size of the brain, which is also suggestive of the intelligence of the organism.[3] The capacity of the cranium has in many studies been used to indirectly reflect the volume of the brain and predict mental ability[4] medically various methods of measuring cranial capacity have been known for some time.[5] Most of these available studies have been made on discuss using linear dimensions, that are the valuable stories. Medically various methods of measuring cranial capacity have been known for some time.[6]

Man has always prided himself on his intellectual capabilities and has often pondered to explain the reason why he alone is able, unlike the rest of the animals Kingdom, to contemplate and communicate with others. Since man's brain is larger than other animals [6,7] it is natural for man to conclude that the brain is the hallmark of the man and the measurement of it must be the key to the understanding of his unique intellectual capacity.[8] Since research on academic achievement began to emerge as a field in the 1960s, it has guided educational policies on admissions and dropout prevention.[9] The capacity of the cranium has been shown in many studies to directly or indirectly reflect the volume of the brain and to predict academic performance.[10] In other words, this has been a major problem especially among teens and growing up children due what has been fed them by either parents or guardian, so this approach is designed to explore the optimum relationship between cranial capacity and academic performance. Some investigators have investigated cranial capacity in the past which indirectly reflects the brain volume.[11] Most of those available studies have been made on dry skulls using linear dimensions, packing methods or occasionally radiological methods. It is also an indirect approach to evaluate the size of the brain.[12] cranial capacities which is in close relation with brain volume, reflects racial characteristics and thus has been thought to be one of the commonest items in physical Anthropological studies.[13] The study aimed to assess the impact of craniometrics variables on academic performance of secondary school students in Nnewi.

Materials and Method

Material employed were Digital Vernier caliper, Inelastic measuring Tape, Pen, Weighting scale, Data collection sheets. The subjects that participated in this study were randomly selected healthy secondary school

students from Okofia Nnewi North, Anambra State with ages ranging from 10-19 years.

Study Location
The study was conducted in Okofia Nnewi Anabara State. In each of the schools, terminal results of the students were collected from their form masters/mistress and also their cranial length, breadth and height was taken.

Fig 3.1: Map of Nigeria showing Anambra State (GIS, 2022)

Sampling Technique
Nnewi is a local government in Anambra state, it is made of many towns which includes; Otolo, Uruagu, Umudim and Nnewi-ichi. Otolo Nnewi was picked for this study by a simple sampling technique (multistage sampling). Furthermore, Otolo Nnewi is divided into different villages including: Okpuno, Indiakwu, Indingbu, Amiliba, Umuanuka, Umuenem, Okofia, Mbanagu, Ekwuru, Umuzu, Ezekwuagbo, Umuzumbana, Umuzungo and Okofia was picked for the study. First a letter was collect from the supervisor to the principal of the secondary schools. Simple random sampling technique was used to recruit participants into this study.

The student cranial length, breadth and height included with their standing height and weight was taken using a venier caliper and weighing scale and inelastic measuring tape respectively. The academic record of each student was also collected. Therefore, Simple random sampling (balloting without replacement),were used. From these two schools were selected.

Sampling Size Determination
The sample size was calculated using the formula of Yamene (2016).
$n = >N/[1+N(e)^2]$

Where
- n = sample size to be estimated
- 1 = constant
- E = level of significance or limit of tolerable error which is set at 0.05
- N = Total population in Okofia.

$n = 193,987/[1+193,987(0.05)^2]$
$= 399.18$ which is approximately 400.

Inclusion Criteria
Strictly students from Prof. Sam secondary school, Chukwujekwu memorial grammar school Otolo Nnewi, and Saint Joseph Catholic school Otolo Nnewi. All subjects should be mentally and physically fit, between 10 and 19 years and must have full academic records with the school management

Exclusion Criteria
Any subject with cranial deformity or history of trauma or in the body areas targeted for anthropological assessment that could hinder accurate measurement. Females with obstructive hair styles, Subjects with incomplete academic records.

Ethical clearance
Ethical clearance was obtained from the ethical committee of the Faculty of Basic Medical Sciences, college of Health sciences Nnamdi Azikiwe Campus.

Limitations
Inability to trace academic records of some students who had already participated in the study, lack of complete academic records of some students, Lack of co-operation by some school authority, Different subject's combinations of some students, as some students who participated in the studies do not offer some of the general subjects under the consideration.

Measurement of Variables
First a letter was collected from the supervisor to the principal of the secondary schools. Subject bio data was first obtained including their: Name or initial, age, sex, class, CH, CL, CB, H, W.

a. Measurements of weight.

The body weight of the subjects used were taken twice with the aid of a weighing scale with an accuracy of 1kg and documented in kg after calculating the average, the participant was measured bare Footed and with minimal clothing as they stand on the center of the scale with their weight evenly distributed across both feet, the scale was placed on a hard floor and not a floor covered with soft materials.

b. Measurement of height

The height of the students where measured with manual audiometer and recorded in centimeters. The participants were barefooted standing in an erect position looking horizontally and the measurement being read from the vertex of the scalp, for taller students I climbed on a stool to avoid error. After the height and weight was has been measured, body max index (BMI) was derived as mass in Kg/height in meters squared. BMI=body Mass (Kg)/height (m2).

c. Measurement of cranial dimensions

(1) Maximum anterior-posterior cranial length (CL) in centimeters: measured between glabella and inion. (2) Maximum cranial breadth (CB) in centimeter measured between the two parietal eminences. (3) Maximum cranial height (CH) in centimeters: measured between the vertex and the external acoustic meatus. (4) Using the following formulae derived by Lee-Pearson, the cranial capacity (cc) (mm3) was computed as follows:

Males: 0.000337 (L-11) (B-11) (H-11) +406.01cc,

Female: 0.000400 (L-11) (B-11) (H-11) +206.60cc

(5) Brain weight in grams and cerebral index (CI) were determined by the following formulae: Brain weight= cranial capacity 1.035, Where 1.035 is the mass density of the brain cerebral index= brain weight/ body weight.

Grading of Student's Academic Performance

Score	Grade	Score	Remark
75 & above	A	91-100	Excellent
		85-90	Excellent
		80-84	Excellent
		75-79	Very good
65-74	B	70-74	Good
		65-69	Fairly good
60-64	C	60-64	Above average
50-59	D	55-59	Average
		50-54	Pass
40-49	E	0-49	Fail
39 & below	F		

Results

Table 4.1 shows the summary statistics of all the evaluated parameters.

Descriptive Statistics					
	N	Minimum	Maximum	Mean	Std. Deviation
Age	800	10	19	15.49	1.793
Weight	800	30	72	51.05	10.420
Height	800	64	186	160.43	9.801
Cranial length	800	11.88	17.65	15.1471	1.10200
Cranial Height	800	4.00	12.56	9.2558	1.49163
Cranial Breadth	800	10.10	17.75	13.9969	1.46617
First term result	800	33.8	89.5	57.670	11.9191
Second term result	800	35.8	88.5	59.446	22.9794
Cranial capacity	800	561.53	1588.13	1050.2707	180.90355

N= Sample size

Table 4.2 compares the parameters between male and female participants. Result shows that male participants have significantly higher weight, height, cranial length, and cranial capacity than their female counterpart. Result also showed that the average age of the male participants (16.19) was significantly higher than that of the female participants (15.21). There was no significant difference in the first and second term performance of both male and female students.

	Group	Mean±SEM	t-value	p-value
Weight	Female	49.78±0.415		
	Male	54.32±0.728	-5.420	0.000*
Height	Female	159.97±0.402		
	Male	161.60±0.675	-2.115	0.035*
Cranial length	Female	14.98±0.045		
	Male	15.57±0.066	-6.975	0.000*
Cranial Height	Female	9.25±0.060		
	Male	9.26±0.107	-0.065	0.948
Cranial Breadth	Female	13.97±0.057		
	Male	14.05±0.111	-0.755	0.450
Age	Female	15.21±0.072		
	Male	16.19±0.117	-7.107	0.000*
First term result	Female	57.59±0.490		
	Male	57.87±0.823	-.298	0.765
Second term results	Female	60.16±1.099		
	Male	57.59±0.640	1.423	0.155
Cranial capacity	Female	1027.22±6.949		
	Male	1109.53±13.466	-5.899	0.000*

Data was analyzed using student's T-test and result was considered significant at p<0.05*

Table 4.3 shows the relationship between cranial capacity and performance in both first and second term. There was a positive significant correlation between the cranial capacity and student's performance in both the first and second term. Meaning that students with higher cranial performance appear to have higher result in both first and second term.

		First term result	Second term result
Cranial capacity	Pearson Correlation	0.079	0.070
	P value	0.026*	0.047*
	N	800	800

Data was analyzed using Pearson correlation and result was considered significant at P<0.05. N = sample size*

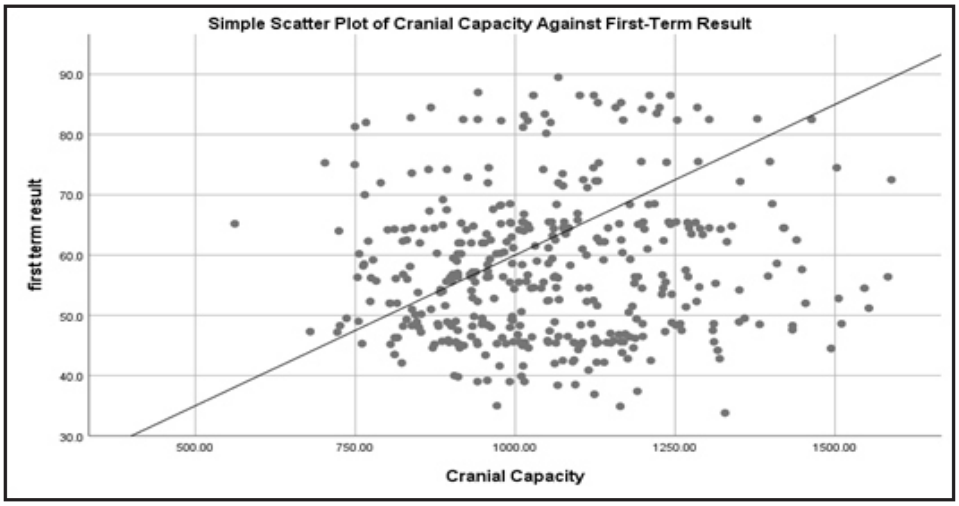

Figure 1 & 2 shows the scatter plot of the correlation between cranial capacity and first and second term performance. As seen in the graph, there is a positive correlation between the cranial capacity of students and their performance in both first and second term.

Discussion

Cranial capacity is one of the most important characters for determining the racial difference.[17] It is a measure of cranial volume and an indirect approach to evaluate the size of the brain, thus human populations differ in brain size. In this study it is observed that cranial capacity has a positive correlation with academic performance, this disagrees with the research carried out by [18] who stated that it is predictable that correlation between academic performance and brain size will be modest, because the brain is not involved in what we call academic performance and thus variations in mass/size of that tissue will lower the magnitude of correlation.

Craniometrics is a branch of anthropometry through which cranial dimensions can be estimated. [14] Cranial capacities is a measure of the volume of the interior of the cranium (skull) of vertebrates.[15] The capacity of the cranium has been shown in many studies to indirectly reflect the volume of the brain and to predict academic performance.[16] These authors stated that increase in brain size is associated with more sophisticated cognitive functions and that larger cranial capacity can be an indicator of larger brain and higher intelligence. Hence, the aim of this study is to find out the correlation between cranial capacity and academic performance among secondary schools in Nnewi.

The cranial capacity of the students in this study was 1109.53±13.466cm^3 in males and 1027.22±6.949cm^3 in females, which indicates that the males had a higher value than the females. Generally, males and females differ from each other genotypically and phenotypically and these differences are more pronounced during puberty.[19] This result from the present study is in line with Swamy *et al*. who reported that males had significantly larger cranial capacity than females.

There was a positive significant correlation between the cranial capacity and student's performance in both the first and second term. Meaning that students with higher cranial performance appear to have higher result in both first and second term. This is contrary to a study done by Augustine *et al.* who reported no significant correlation between the cranial capacity of his participants and their academic performances. Also, according to [20] individual brain size is affected by nutrition, and could also be attributed to genetic and environmental influences and food habits as reported by [21] It has been suggested that size would not be expected to increase cognitive competence more than modestly because larger brains have larger neurons and more myelinated axons connecting them as reported by Deacon (1990). It is because of this reason that people with larger than normal brains are not necessarily brighter.[22]

It has been argued that there is important aspect of human intelligence that academic performance fails to measure, such as creativity, practical intelligence, social intelligence and emotional intelligence which are involved in cognitive development. Some of these constructs are more securely grounded than others and not all of them are wholly dependent on academic performance.[23] This is because psychometrically measured academic performance leave out much cognitive reliance to academically performed behaviors.

This study also revealed that academic performance has no relationship with gender but shows a sexual dimorphism in craniometrics parameters between the male and female participants. This disagrees with the study reported [25] which stated that academic performance shows a statistical significance between males and females, with females scoring higher than males and according to their study, it might be because of differences in eye-hand motor coordination. Kimura et al., (2000) also reported that women excelled higher than men in eye-hand coordination. Also, accordingly to [26] individual brain size is affected by nutrition and early experience, this can be due to males are more subjected to physical activities than the females and attention is given more to females.

However, in the view of Fagboungbe (2016) concluded that performance level of a student depends on the quality of the brain cells and not about the sex of the individual. He noted females tends to be better than males in certain areas while males tend to be better than women in certain areas. He documented that academic performance is determined by the quality of the brain cells in the individuals. So, it is the function of the quality of those cells of the individuals that is why young ones are not meant to lack nutritious food so that it can lead to qualitative brain cells and when the brain cells are of high quality, the processor is bound to be intelligent and have high academic scores.

Result shows that male participants have significantly higher weight, height, than their female counterpart. This observation is in agreement with previous works by [27-31]This could be because of the bigger body frame of growing-up males than the females Xu also mentioned in his research that the brain plays a very high role in the body weight of adolescence causing differences in their sex chromosomes, he found out that female POMC neurons express higher levels of TAP63 which make the female neurons fire faster than the male and causing much expenditure of energy, this will in turn cause highly reduced or less appetite, therefore the females are more protected in gaining weight than the male. Moreover, the male cranial capacity was also higher than that of the female, which has been shown that the gender differences in brain weight could be attributed to activities in which the specific sex excelled [32] Another possible reasons for this difference could be differences in the number of cortical neurons.

Pakkenberg and Gunderson (1997) reported that men had about 4 billion more for cortical neurons than women. Also, study in Hawaii (Nakashima, 1986) suggested that environmental and ecological conditions could cause changes in head dimensions such as cranial capacity and head shape. There is also a significant factor that enables man adapt to life adverse environmental factor which is the fact that environmental pressures produce noticeable difference between people with respect to their Cranial capacity [33] Also, Rushton (1994) indicated that genetic factors are accounted for phenotypic variance in cranial capacity. Result also showed that the average age of the male participants (16.19) was significantly higher than that of the female participants (15.21) These differences mean that girls more readily 'engage' with school and show intrinsic motivation for academic tasks, factors strongly associated with readiness early school activities. Boys, however, are more likely to find schoolwork unfamiliar and difficult also girls show a serious and high quest for knowledge and enthusiasm in exploring new knowledge than the males because of this reason parents will force be forced to enroll the female students to school earlier before the expected age for school.

Brain size and cranial capacity are receiving attention because of technologies available to scan the brain and' because a significant relationship has been established between academic performance and brain size.[34] They reported that the correlation between academic performance and brain size estimated from magnetic and resonance imaging (MRI) ranges from 0.35 to 0.47 with an average of about 0.40 [35] Other studies have corroborated that there is a positive correlation between brain size, cranial capacity and one's intelligence and most general mental ability [36-38]. Rushton and Ankney (1996) reported that Galton (1888) was the first one to quantify the relationship between brain-size and cognitive ability in humans.

His subjects were Cambridge undergraduate males who were divided into two: those who achieved first-class honors degree and those who did not. He computed head volume by multiplying head length by breadth and height and plotted the results against age (15 to 19 years) and class of degree (A, B, C). He reported that cranial capacity continued to grow massively after the age of 8 and those who obtained high honors degree had a brain size of 2 to 5% greater than those who did not. Rushton and Ankney (1996) also reported that Pearson (1906) re-examined Galton's data using his correlation coefficient and noted a weak positive relationship between head size and academic performance. They noted that cognitive abilities and academic performance were correlated with brain size, age, sex, social class and race but Passingham reported a correlation of r = .14 between brain weight and academic performance in his study. However, Passingham also reported that when height was partialled out, the correlation coefficient became r = .03 (ns). In discussing his findings, Passingham commented that other studies had not partialed out factors like height, weight and age when relating academic performance and brain size. In addition, socio-economic class, which enters the equation both in terms of nutrition and environmental influences, had not been taken into consideration.

Like others, Passingham was also concerned with the problem of being able to measure either academic performance or brain weight directly, but not both in the same sample. For instance, in his living sample, academic performance of the students was measured directly and brain weight was estimated through external cranial measurements. In Passingham's sample, brain weight was measured directly, and academic performance was estimated on the basis of the socio-economic status of the individuals.

Conclusion

Cranial capacity had a positive significant relationship with academic performance in both males and females and there also exist strong positive correlations between cranial capacity and cranial length, cranial breadth, and cranial height. Findings from this study showed that there was sexual dimorphism in craniometrics parameters such as cranial breadth, cranial height, cranial length, cranial capacity and also body weight and height. There was therefore no sexual dimorphism in academic performance.

Recommendations

1. More detailed examination with better assessments of brain size such as magnetic resonance imaging should be used to improve on accuracy.
2. More work should be done to provide more data on craniometrics variables.
3. Other methods of testing academic performance should be in related study.

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HEALTH EDUCATION ON THE CONTROL OF NON-COMMUNICABLE DISEASES IN PATIENTS ATTENDING PRIVATE CLINIC IN UYO SENATORIAL DISTRICT OF AKWA IBOM STATE, NIGERIA.

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Abstract

Background: Non communicable diseases (NCDs) also known as chronic diseases, are not passed from person to person. They are of long duration and generally slow progression (WHO 2019). Chronic condition that do not result from an (acute) infectious process and hence are "not communicable". NCDs are increasingly becoming an important contributor to the National diseases burden and therefore a major public health concern. This study was put-forth to X- ray the control measures associated with Non- Communicable Diseases, with the aim of educating the patients on how to cope with these diseases. Methods: The findings of this study was used to understand people's attitudes, emotions, concerns as regard the control of Non-communicable diseases. A focus group discussion with a purposive sampling technique was used to select twenty participants with prior experience in attending antenatal care. A single FGD which lasted for 30 minutes was conducted and information gathered from the recordings was manually transcribed. The Majority of the participants had good knowledge about the control measures of NCDs. Most of the participants recounted the negative impacts of alcohol intake and the poor implementation of Best buys strategies. While a minority of the group has however benefitted from health education on the topic. This enhances their care and preventive reliability and help allay their fears of having taken care of people that developed complications following the diseases. Conclusion: NCDs are gradually overtaking communicable diseases as the reason for the greatest burden of disease in developing countries. It occurs in pattern which can be predicted and therefore controlled. Control of NCDs should take place at the population and the most at-risk level to be effective. However, more effort should be focus on passing and enforcing effective control measures of NCDs through health education and other channel of communication where populace understand. This will include expanding activities to implement best buy-demand reduction measures at the highest level of achievement, reinforcing and sustaining current programmes to incorporate a range of measures to controlling NCDs.

Keywords non- communicable disease, private hospital control measure

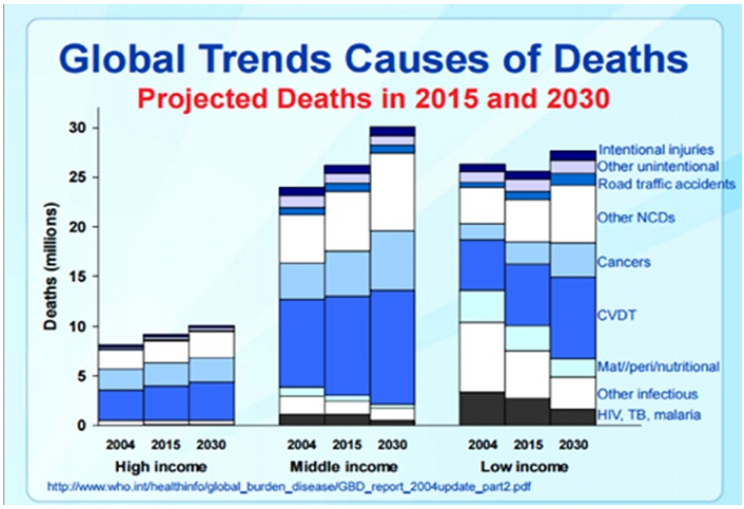
Introduction

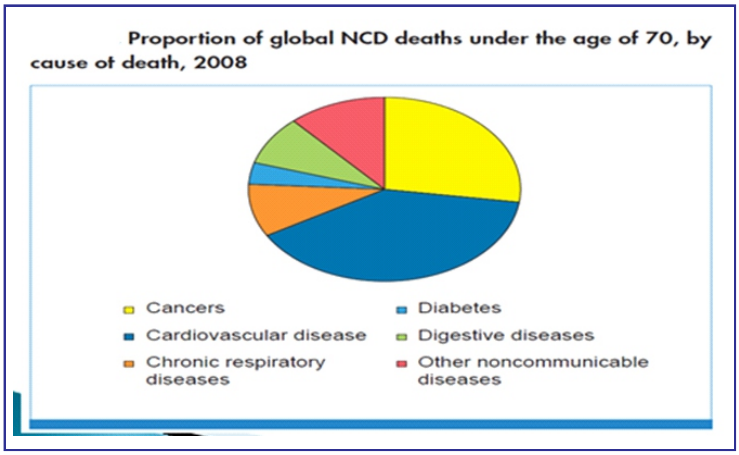
NCDs comprise all impairments or deviations from normal, which have one or more of the following characteristics: Are permanent, leave residual disability, caused by non-reversible pathological alterations, require special training of the patient for rehabilitation and may be expected to require a long period of supervision, observation or care. Chronic NCDs have become important determinants of current and future global health. They are projected to become the leading cause of death in all WHO regions except Africa by 2020 and in all regions by 2030. In 2008, around 80% of all death (29million) from NCDs occurred in low and middle income countries, and a higher proportion (48%) of death in the latter countries are premature (under the age of 70").

The propensity and the probability of dying from NCDs between the ages of 30 and 70 years are highest in Sub-Saharan Africa, Eastern Europe and part of Asia. NCDs are the leading cause of death globally, killing more people each year than all other causes combined. WHO estimates that death from NCDs are likely to increase globally by 17% over the next 10 years, and the region will experience a 27% increase, that is 28 million additional death from these condition which are projected to exceed death due to communicable, maternal, perinatal and nutritional diseases combined by 2030.

In Nigeria, 2008 NCDs were estimated to account for 27% of all death. The 2030 Agenda for sustainable development recognizes NCDs as a major challenge for sustainable development (CDC 2013). The epidemiological transition of diseases from predominance of infectious disease to chronic or degenerative disease is believed to be responsible for the emerging pandemic of NCDs, sequel to globalization, urbanization and changes in lifestyles.

Key characteristics of NCDs are Complex etiology(causes), Multiple risk factors, Long latent period, Non contagious origin(non-communicable), Prolonged course of illness, Functional impairment/ disability, Incurability, Insidious onset.





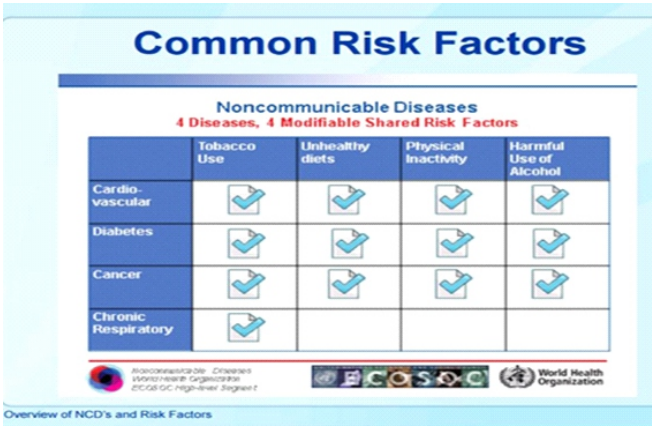
Types of NCDs.
The NCDs of major public health importance are:
1. Cardiovascular diseases (hypertension and coronary heart disease);
2. Diabetes mellitus
3. Cancers (breast, cervix, prostate),
4. Chronic respiratory diseases,
5. Sickle cell disease including other haemoglobinopathies,
6. Road traffic accident (RTA).

Emerging NCDs includes:
1. Oral health conditions like cancrum oris(Noma), dental caries,
2. Visual impairment and blindness
3. Osteoarthritis/osteoporosis,
4. Asthma,
5. Tobacco related diseases.
6. Mental health conditions like schizophrenia.
7. Gender based violence/ Domestic violence.

Risk Factors are
Risk factors are those conditions whose presence or relative lack is associated with an increase likelihood of developing the disease. Four main modifiable risk factors for NCDs, Physical inactivity, Tobacco use, Alcohol use, Unhealthy diets (high fat and sodium, low fruit and vegetable intake), They are the notorious five S's: Smoking, Spirit (alcohol), Sedentary lifestyle, Stress, Sugar (unhealthy dietary habit)

Modifiable risk factors are Lifestyle such as Cigarette smoking, Alcohol, Dietary patterns, Physical inactivity, Environmental and Occupational hazards such as exposure to radiation, pollutants, Failure or inability to get preventive health services such as: Screening, Early treatment, Stress factors, recently identified aetiological factors such as Viral carcinogenesis, HPV, Epstein Barr virus, HIV, HBsAg etc.

Non-modifiable factors are Genetic factor, Age, Sex, Ethnicity, However, the current surge of NCDs in developing countries is directly or indirectly associated with these lifestyles which are reversible, thus making lifestyle change an important factor in their prevention.



Overview of NCD's and Risk Factors

Metabolic Risk Factors Raised blood pressure, Overweight and obesity, Raised blood glucose, Hyperlipidemias

Methods: The health education was conducted in Private Health Facility of Akwa Ibom State. Akwa Ibom State is located in the South-South geopolitical zone of Nigeria, which lies between latitudes' 4o32'N and 5o 33'N and longitudes 7o25'E and 8o25'E. It has a projected population of 5.67 million in 2017 based on the National Population Commission census figures of 2006 with a nearly equal distribution of males and females of 50.8% and 49.2% respectively (National Population Commission, 2017). A qualitative study (focus group discussion) was used to interview the participants. Here participants are free to talk with other group members. The focus group discussion lasted about 60 to 90 minutes. Purposive sampling technique was used in selecting the participants for the health education and it was based on the experience of the participants attendance to care in the past. The group interview was conducted and recorded in a quiet, neutral location of the participants' choice, where the participants were comfortable and not in any form of discomfort. There was no intimidation or coercion in the process of the health education. Participants were allowed the freedom to talk and asked questions after the education. The participant's responses were recorded in a recording tape and were eventually transcribed and coded manually from the recordings to a handwritten report. The interview lasted about 90 minutes. Field notes were made on some of the participants after the focus group discussion.

Goal

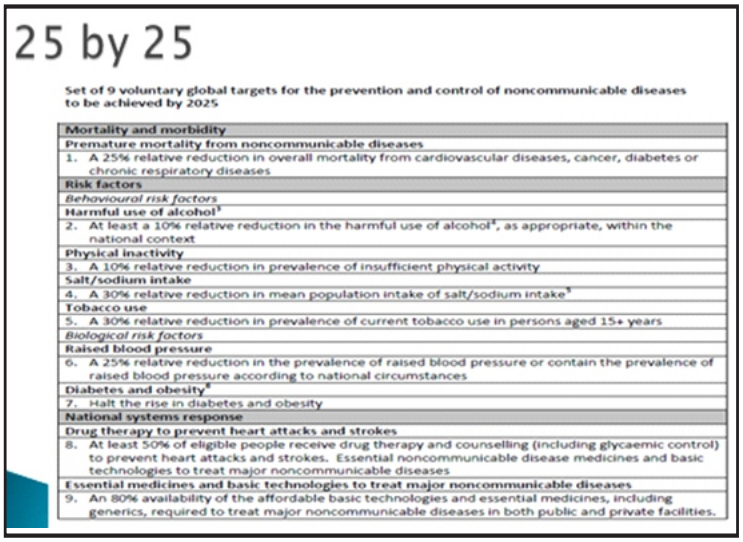
- To reduce the burden of preventable morbidity and disability and avoidable mortality due to non-communicable diseases.
- To provide a roadmap and a menu of policy options for all members' state and stakeholders to take coordinated and coherent actions at all levels to attain the 9 voluntary targets of NCDs.

Objectives

1. Strengthen international cooperation to control NCDs
2. To strengthen national capacity for prevention and control of non-communicable diseases
3. To reduce exposure to modifiable risk factors for non-communicable diseases through creation of health promoting environments
4. To strengthen and re-orient health systems to address prevention and control of non-communicable diseases through people-centered primary care and universal health coverage.
5. To promote and support national capacity for quality research and development for prevention and control of non-communicable diseases
6. To monitor trends and determinants of non-communicable diseases and evaluate progress in their prevention and control.

MPOWER for tobacco.

M - monitor tobacco use and prevention
P - protect people and second hands smokers
O - offer help to quit tobacco use
W - warn about dangers of tobacco use
E - enforce ban on advertising on tobacco use
R - raise taxes



Framework Elements

1. A 25% relative reduction in overall mortality from cardiovascular diseases, cancer, diabetes or chronic respiratory diseases
2. At least a 10% relative reduction in the harmful use of alcohol, as appropriate, within the national context
3. A 10% relative reduction in prevalence of insufficient physical activity
4. A 30% relative reduction in mean population intake of salt/sodium intake
5. A 30% relative reduction in prevalence of current tobacco use in persons aged 15+ years
6. A 25% relative reduction in the prevalence of raised blood pressure or contain the prevalence of raised blood pressure
7. Halt the rise in diabetes and obesity
8. At least 50% of eligible people receive drug therapy and counseling (including glycemic control) to prevent heart attacks and strokes.
9. An 80% availability of the affordable basic technologies and essential medicines, including generics, required to treat major non-communicable diseases in both public and private facilities.

Set of Control Measures-Best Buys In NCDS

A set of evidence based cost effective individual and population level interventions which have been proven to deliver huge health gains. Based on Economic analysis by the World Economic Forum and the Harvard School of Public. Cost effectiveness analysis studies by WHO.

SAFER for alcohol

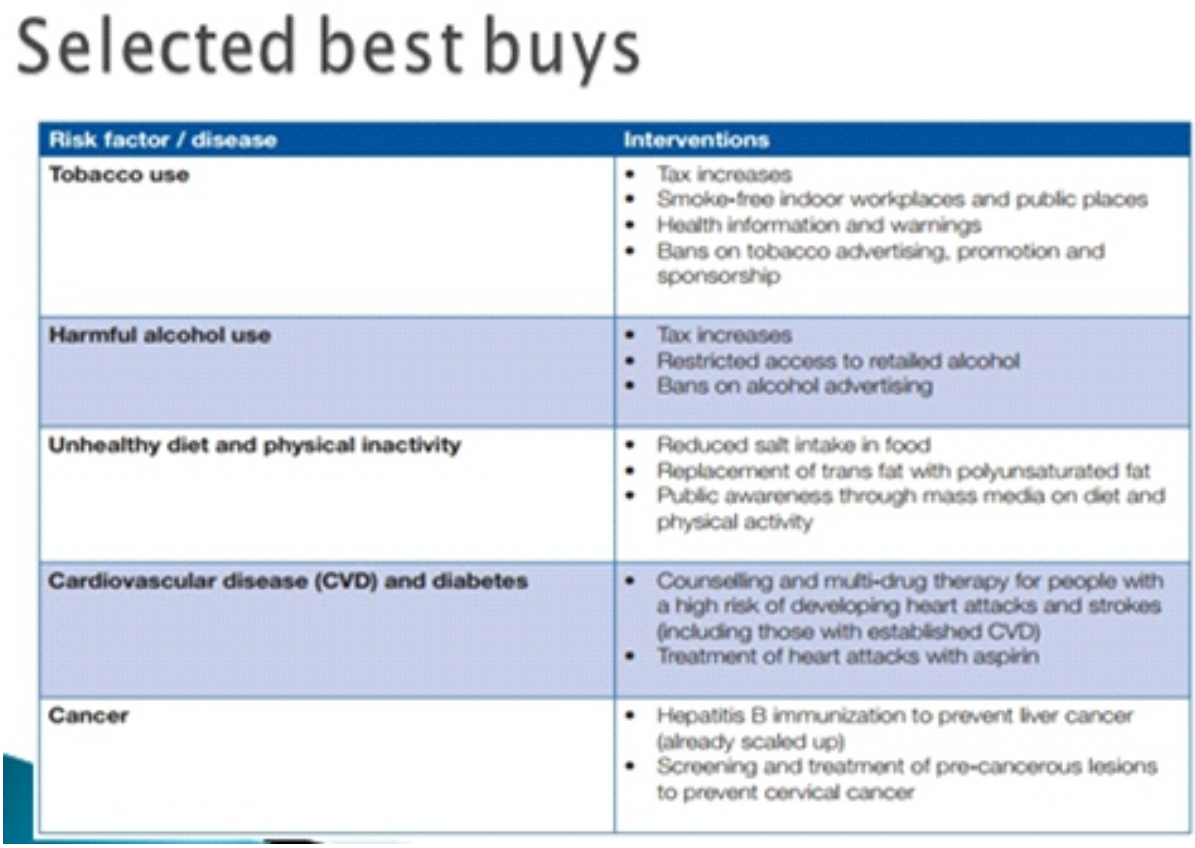
S - strengthening restriction on alcohol availability
A - advancing and enforcing drink driving counter measures
F - facilitate access to screening
E - enforce ban on comprehensive restriction on alcohol advertising
R - raise taxes on alcohol purchase

SHAKE technique package for salt reduction

S - surveillance to monitor salt intake
H - harness industry to promote foods of less salt
A - adapt standard for labeling and marketing
K - knowledge on the danger of excessive salt intake
E - environmentally sound programs/awareness on salt reduction

Hearts for cardiovascular health

H - healthy lifestyle counseling
E - evidence based treatment procedure
A - access to essential medicine and technology
R - risk based chart
T - team based care
S - system for effective monitoring



In 2005, global initiative framework of WHO put up some strategies for the control of NCDs.

Strategies for the control of NCDs in Nigeria

- Advocacy and sensitization
- Legislation/ legal consideration
- Health promotion: information, education and communication
- Capacity building and development
- Risk factors reduction
- Prevention and management of complications
- National surveys of NCDs and risk factors
- Surveillance relevant to NCDs
- Resource mobilization
- Monitoring and evaluation
- Genetic counseling
- Expansion of vaccination programmes
- Establishment and reinforcement of screening services
- Establishment of addiction maintenance clinics
- Research

Prevention of NCDs

Prevention of NCDs is by:

- Primary,
- Secondary and
- Tertiary prevention.

Primary prevention: This involves preventing the risk factors of the disease to stop development of the disease. Population strategy-nutrition, weight reduction, encourage physical activities. High risk strategy-awareness raising in family clusters.

A novel approach to primary prevention of NCDs is primordial prevention. It involves preventing the emergence and spread of NCDs risk factors and lifestyles that have not yet appeared or become endemic. This applies to developing countries in particular; they are expected to preserve their traditional eating patterns and lifestyles associated with low levels of NCDs risk factors. Dietary modification is a very important component of NCDs preventive strategy. Dietary changes/approach recommended by the WHO Expert Committee for high incidence populations include:

1. reduction of fat intake to 20-30 percent of total energy intake,
2. reduction of dietary cholesterol to below 100mg per 1000 kcal per day
3. an increase in complex carbohydrate consumption.

4. reduction of salt intake to 5g daily or less.
5. avoidance of excessive alcohol consumption.
6. consumption of saturated fats must be limited to less than 10 percent of total energy intake. Some of the reduction in saturated fat may be made up by mono-unsaturated and poly- unsaturated fats.

7.Regular moderate physical activities example brisk walking for at least 30 minutes daily for 3 times a week.
8. Avoidance of stress by indulging in periodic relaxation activities and avoiding undue stressful situation and confrontations
9.Eat fruits rich in potassium like bananas, oranges and vegetables
10. Maintain normal weight of (BMI 18.5-24.9kg/m2)

Secondary prevention
Consists of: Early detection/diagnosis through screening and Treatment, proper management and patient compliance

Examples of **screening methods include:**
Visual inspection with acetic acid (VIA) for cervical cancer, Pap smear test for cervical cancer, Mammography screening for breast cancer, Rectal examination and serum PSA estimation for prostate cancer, Treatment options include one or a combination of surgery, radiotherapy and chemotherapy. The goal is to control the disease or considerably prolong life while improving the patient's quality of life. Palliative care to relieve symptoms rather than cure the disease is offered if presentation is late.
Tertiary prevention Consists of Limitation of disability and Rehabilitation (physical, occupational and psychological).

Conclusion
There has been great progress in global control of NCDs in recent years. NCDs are gradually overtaking communicable diseases as the reason for the greatest burden of disease in developing countries. It occurs in pattern which can be predicted and therefore controlled. Control of NCDs should take place at the population and the most at-risk level to be effective. However, more effort should be focus on passing and enforcing effective control measures of NCDs. This will include expanding activities to implement best buy-demand reduction measures at the highest level of achievement, reinforcing and sustaining current programmes to incorporate a range of measures to controlling NCDs.

Funding: none

Competing interest: None

Ethical approval: Health Research and Ethics Committee (HREC), AKS and permission gotten from the head of private hospital. Individual informed consent: A written informed consent was obtained from the participant after full explanation of the health education including the benefits. Participation was voluntary and that their confidentialities was guaranteed.

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