

# *African Journal of Reproductive Health*

*Friday Okonofua, Editor*

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# African Journal of Reproductive Health

Editor: Friday Okonofua

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## ABOUT AJRH

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*African Journal of Reproductive Health (AJRH)* is published by the Women's Health and Action Research Centre (WHARC). It is a multidisciplinary and international journal that publishes original research, comprehensive review articles, short reports and commentaries on reproductive health in Africa. The journal strives to provide a forum for African authors, as well as others working in Africa, to share findings on all aspects of reproductive health, and to disseminate innovative, relevant and useful information on reproductive health throughout the continent.

*AJRH* is indexed and included in Index Medicus/MEDLINE. The abstracts and tables of contents are published online by INASP at <http://www.ajol.info/ajol/> while full text is published at <http://www.ajrh.info> and by Bioline International at <http://www.bioline.org.br/>. It is also abstracted in *Ulrich's Periodical, Feminist Periodicals African Books Publishing Records*.

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The Women's Health and Action Research Centre (WHARC) is a registered non-profit organization, committed to the promotion of women's reproductive health in sub-Saharan Africa. Founded in 1995, the centre's primary mission is to conduct multidisciplinary and collaborative research, advocacy and training on issues relating to the reproductive health of women. The centre pursues its work principally through multidisciplinary groups of national and international medical and social science researchers and advocates in reproductive health.

WHARC receives core funding and support from the Ford Foundation and technical cooperation and mentorship from International Perspectives on Sexual and Reproductive Health and Studies in Family Planning. Principal funding for the journal comes from the Consortium on Unsafe Abortion in Africa. The goal of the centre is to improve the knowledge of women's reproductive health in Nigeria and other parts of Africa through collaborative research, advocacy, workshops and seminars and through its series of publications – the *African journal of Reproductive Health, the Women's Health Forum* and occasional working papers.

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# Revue Africaine de Santé de la Reproduction

Editor: Friday Okonofua

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## **APROPOS AJRH**

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La Revue Africaine de santé de la Reproduction (RASR) est publiée par le Women's Health and Action Research Centre (WHARC). C'est une revue à la fois pluridisciplinaire et internationale qui publie des articles de recherche originaux, des articles de revue détaillés, de brefs rapports et des commentaires sur la santé de la reproduction en Afrique. La Revue s'efforce de fournir un forum aussi bien à des auteurs africains qu'à des professionnels qui travaillent en Afrique, afin qu'ils puissent partager leurs découvertes dans tous les aspects de la santé de reproduction et diffuser à travers le continent, des informations innovatrices, pertinentes et utiles dans ce domaine de santé de la reproduction.

La RASR est indexée et figure sur l'Index Medicus/MEDLINE. Les résumés et les tables des matières sont publiés en ligne par INASP sur le site web <http://www.ajol.info/ajol> tandis que le texte est publié à <http://www.ajrh.info> par Bioline International sur le site web <http://www.bioline.org.br/>. Il est également résumé dans *Ulrich Periodical, feminist Periodical et African Books Publishing Records*

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Le WHARC est une organisation non gouvernementale à but non-lucratif s'engageant dans la promotion de santé de la reproduction chez la femme en Afrique sub-saharienne. Fondé en 1995, le Centre a pour objectif principal de mener des recherches pluridisciplinaires et en collaboration, de promouvoir et de former des cadres en matières relatives à la santé de la reproduction chez la femme. Le Centre travaille surtout à travers des groupes multidisciplinaires de chercheurs aussi bien nationaux qu'internationaux en sciences médicales et en sciences économiques dans le domaine de santé de la reproduction.

Le WHARC reçoit une aide financière principale de la Fondation Ford et bénéficie de la coopération technique de l'*International Perspectives on Sexual and Reproductive Health* et de *Studies in Family Planning*. Le financement principale pour la revue vient de la part du Consortium on Unsafe Abortion in Africa. L'objectif du Centre est d'améliorer la connaissance en matière de santé de la reproduction chez la femme au Nigeria et dans d'autres régions d'Afrique à travers la recherche en collaboration, le padoyer, des ateliers et des séminaires à travers des séries de publication - *La Revue africaine de santé de la reproduction, Le Women's Health Forum* et des rapports des recherches de circonstance.

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## EDITORIAL

# Assessing the Impact of Sexuality and HIV/AIDS Education in Africa

*Friday Okonofua*

Editor, African Journal of Reproductive Health

Since the dawn of the HIV/AIDS epidemic, the centrality of sexuality education and HIV/AIDS education as critical in efforts to curtail the disease has come to the fore. Before HIV/AIDS, sexuality education was a difficult paradigm to propose in Africa, with many stakeholders believing that sexuality education would promote sexuality and increase promiscuity among youth. With a continent rankled by religious and cultural fundamentalism, this belief rapidly gained support, and till date has not completely gone away. With the onset of HIV/AIDS and its predilection to affect un-educated and ignorant African population, policymakers have begun to accept the concept of sexuality education as key to eradicating the disease<sup>1</sup>.

Educating young people and other vulnerable persons reduces the risk of HIV infection by encouraging them to assert their sexual and reproductive health and rights in a responsible manner. Education also enables all sexually active youth and adults to undergo HIV testing, and empowers them to respond to testing results in the most appropriate and sensible manner. In particular, for the large number of HIV positive persons in the continent, sexuality education enables them to seek appropriate medications, to respond to disease or treatment complications in an evidence-based manner, and to comply with prevention and treatment methods in ways to reduce the chances that they would transmit the disease to others.

In many parts of Africa, HIV/AIDS prevalence and mortality burden appear to be falling or are stabilizing. Much of this fall or curtailment can be attributed to sexuality education, which has been the main focus of the HIV/AIDS control measures in the continent. HIV/AIDS education remains the number one intervention that has been implemented by many African countries for the control of HIV/AIDS,

and remains part of all HIV/AIDS interventions in the continent. However, despite the key role of sexuality and HIV/AIDS education, there has been limited research that evaluates the impact of sexuality education, or even the practice of sexuality education in the continent. Measuring its impact would be important to challenge some continuing opposition to its practice and to determine how best to implement its tenets to achieve higher level of effectiveness and impact for HIV/AIDS prevention.

It is within this context that the editorial board of the *African Journal of Reproductive Health* is pleased to publish two articles in this edition<sup>2,3</sup> that report the results of a national assessment of the implementation of sexuality and HIV/AIDS education in Nigeria. Nigeria has the second highest burden of HIV/AIDS (in terms of absolute numbers) in the continent, with sexuality education being the main intervention being applied by governments and non-governmental organizations at national and sub-national levels for the curtailment of the disease. Right from the early 1990s till date, sexuality and HIV/AIDS education focusing on youth has been implemented throughout the country. The two papers published in this edition<sup>3,4</sup> report the results of a national research and evaluation survey conducted by the University of Ibadan multi-disciplinary research and evaluation group (INSERT) in 2014. To our knowledge, this is the first effort to document an assessment of the extent and depth of implementation of the nationally approved sexuality and HIV/AIDS education curriculum in Nigeria. The report shows several gaps in implementation, including poor quality teaching methods and the exclusion of adolescents who are not in school. However, the nature of these gaps needs to be further understood in order to strengthen and improve current strategies for constraining the disease.

The editorial board of the journal strongly believes that there is a need to go beyond assessment of the implementation to research that evaluates the impact of sexuality and HIV education on various sexual and reproductive health indicators in the continent. Nigeria recently witnessed a decline in the prevalence of HIV/AIDS from over 5% in the 1990s to 3.4% in 2013<sup>5</sup>, although marked differences still exist between different States and geo-political zones in the country. The extent to which sexuality and HIV/AIDS education has contributed to this decline is not known. Also, not known is the extent to which sexuality education ameliorates other sexual and reproductive health indicators for sexually active persons, which serve as the precursors and risk factors for acquiring and spreading the virus. A review of 80 studies that measure the impact of sexuality and HIV/AIDS education for young people throughout the world<sup>5</sup> showed the programs to be effective in reducing sexual risk behaviours, and increasing the use of condoms during unsafe sexual encounters. However, in low income countries characterized by poor access to sexual and reproductive health information and services, HIV discrimination and stigma, cultural and religious dogmas and low status of women, the magnitude of the benefits of sexuality education may not be as profound as those witnessed in high income countries. Also, socio-economic disadvantages - high rates of poverty and unemployment - which prevail in Africa, may place youth and other vulnerable persons in positions where they may not be able to act appropriately on the tenet of sexuality and reproductive health education.

Clearly, there is a critical unmet need for intervention and evaluatory research that tests the effectiveness and relative effectiveness of

sexuality and HIV/AIDS education curricular or training programs in the African continent. Such research would identify what works or do not work in implementing sexuality and HIV/AIDS education, and would help to develop strategies for scaling the sustained prevention of HIV/AIDS throughout the continent. Also within the context of the present “fence-seating” by policymakers on issues relating to sexuality education, the provision of accurate and compelling data that proves its effectiveness will be crucial for attaining the much needed political will for implementing sexuality education and addressing HIV/AIDS and other sexual and reproductive health challenges in the continent.

**Conflict of Interest**      None

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## **Evaluer l'impact de l'éducation sexuelle et du VIH/SIDA en Afrique**

*Friday Okonofua*

Rédacteur en Chef, Revue africaine de santé de la reproduction

Depuis la parution de l'épidémie du VIH/SIDA, la centralité de l'éducation sexuelle et l'éducation sur le VIH/SIDA comme approche critique dans les efforts pour réduire la maladie, se fait remarquer. Avant l'arrivée du VIH/SIDA, l'éducation sexuelle était un paradigme difficile à proposer en Afrique car beaucoup de gens intéressés croyaient que l'éducation sexuelle allait promouvoir la sexualité et augmenter la promiscuité chez la jeunesse. Etant donné un continent perturbé par l'intégrisme religieux et culturel, cette croyance a rapidement attiré des soutiens et jusqu'aujourd'hui, ce soutien n'a pas encore disparu. Avec l'arrivée du VIH/SIDA avec sa prédilection à atteindre la population africaine illettrée et ignorante, les décideurs ont commencé à accepter le concept de l'éducation sexuelle comme un moyen d'éradiquer la maladie<sup>1</sup>.

Le fait de sensibiliser les jeunes gens et toutes les personnes vulnérables réduit le risque de l'infection du VIH en leur encourageant à affirmer leur santé sexuelle et leurs droits de la reproduction de manière responsable. La sensibilisation permet aussi à tous les jeunes et à tous les adultes de subir des analyses pour détecter le VIH et leur donne la capacité de pouvoir réagir aux résultats des analyses de manière la plus responsable et appropriée. En particulier, en ce qui concerne le grand nombre de personnes séropositives dans le continent, l'éducation sexuelle leur permet de rechercher les médicaments d'une manière fondée sur l'évidence et pour respecter les méthodes de prévention et de traitement de façons à réduire la possibilité de transmettre la maladie aux autres personnes.

Dans plusieurs régions d'Afrique, le fardeau de la prévalence et de la mortalité causé par le VIH/SIDA, semble être à la baisse ou bien se stabilise. Une grande partie de cette baisse ou réduction peut être attribuée à l'éducation sexuelle qui demeure le point important de concentration des mesures de contrôle prises dans le continent.

L'éducation sur le VIH/SIDA reste la toute première intervention qui a été mise en œuvre par nombreux pays africains pour le contrôle du VIH/SIDA et fait toujours partie des interventions pour le contrôle du VIH/SIDA dans le continent. Cependant, malgré le rôle clé que joue l'éducation sexuelle et du VIH/SIDA, il y a eu peu de recherche qui évalue l'impact de l'éducation sexuelle ou même la pratique de l'éducation sexuelle dans le continent. Mesurer son impact serait important pour défier l'opposition continue contre sa pratique et pour déterminer la meilleure façon de mettre en œuvre ses principes afin d'atteindre un plus haut niveau d'efficacité et d'impact pour la prévention du VIH/SIDA. C'est dans ce contexte que le comité de rédaction de la *Revue africaine de santé de la reproduction* a le plaisir de faire publier deux articles dans ce numéro<sup>2,3</sup> qui font des rapports sur des résultats d'une évaluation nationale de la mise en œuvre de l'éducation sexuelle et du VIH/SIDA au Nigeria. Le Nigeria vient au deuxième rang quand au fardeau du VIH/SIDA (en termes des nombres absolus) dans le continent, ayant l'éducation sexuelle comme étant l'intervention principale appliquée par les gouvernements et les organisations non gouvernementales aux niveaux national et sous-national pour la réduction de la maladie. Depuis les années 1990 jusqu'à l'heure actuelle, l'éducation sexuelle et du VIH/SIDA qui est concentrée sur la jeunesse a été mise en œuvre partout dans le pays<sup>3,4</sup>. Les deux articles publiés dans ce numéro font des rapports sur une recherche nationale et une enquête d'évaluation qui ont été menées par le groupe d'évaluation et de recherche multidisciplinaire de l'Université d'Ibadan (INSERT) en 2014. A notre connaissance, il s'agit de la première tentative de documenter une évaluation de l'ampleur et de la profondeur du programme de l'éducation sexuelle et du VIH/SIDA qui a été approuvée sur le plan national pour s'occuper de la maladie au Nigeria.

Le rapport révèle plusieurs lacunes dans la mise en œuvre y compris la qualité médiocre des méthodes et l'absence des adolescents qui ne fréquentent pas l'école. Néanmoins, on devrait comprendre davantage la nature de ces insuffisances à fin de renforcer et d'améliorer les stratégies actuelles pour limiter la maladie.

Le comité de rédaction de la revue est persuadé qu'il est nécessaire d'aller au-delà de l'évaluation de la mise en œuvre pour aboutir à la recherche qui évalue l'impact de l'éducation sexuelle et du VIH à travers des indices différents sexuels et de santé de la reproduction dans le continent. Le Nigeria a connu très récemment une baisse dans la prévalence de plus de 5% dans les années 1990 jusqu'à 3.4% en 2013<sup>5</sup>, quoiqu'il existe des différences remarquables parmi les Etats différents et les zones géopolitiques dans le pays. On ne sait pas non plus jusqu'à quel point l'éducation sexuelle et du VIH améliore les autres indices pour les personnes sexuellement actives qui servent des précurseurs et des facteurs de risque dans l'acquis et la dissémination du virus. Un compte rendu des 80 études qui mesurent l'impact de l'éducation sexuelle et du VIH pour les jeunes gens partout dans le monde<sup>5</sup> a révélé que les programmes sont efficaces en ce qui concerne la réduction des comportements à risque sexuel et dans l'augmentation de l'emploi des préservatifs pendant des rapports sexuels dangereux. Cependant, dans les pays à faible revenu qui sont caractérisés par un faible accès à des services et des informations sur la santé de la reproduction, la discrimination et la stigmatisation à cause du VIH, les doctrines culturelles et religieuses et la mauvaise condition sociale des femmes, l'ampleur et les apports de l'éducation sexuelle peuvent ne pas être aussi profondes que celles des pays à haut revenu. En plus, les désavantages socio-économiques – les hauts niveaux de la pauvreté et du chômage – qui existent en Afrique, mettront les jeunes et autres personnes vulnérables dans des situations dans lesquelles ils ne pourraient pas agir de manière appropriée sur les principes de l'éducation

sexuelle et de santé de la reproduction.

Evidemment, il y a un besoin non satisfait critique de l'intervention et de la recherche évaluatrice qui mesure l'efficacité des programmes ou les programmes de formation de l'éducation sexuelle et du VIH dans le continent africain. Une telle recherche identifiera ce qui marche et ce qui ne marche pas par rapport à la mise en œuvre de l'éducation sexuelle et du VIH en Afrique et aidera à élaborer les stratégies qui permettront de promouvoir les meilleurs modèles et approches partout dans le continent. De plus, dans le contexte de l'attitude de s'abstenir de prendre position qu'ont adoptée les décideurs à l'égard des problèmes concernant l'éducation sexuelle, l'assurance des données précises et très importantes qui démontrent leur efficacité, seront cruciales pour atteindre la volonté politique tant désirée pour mettre en œuvre l'éducation sexuelle et pour s'occuper du VIH/SIDA et d'autres débâcles de santé de la reproduction dans le continent.

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## COMMENTARY

# Managing Endometriosis in Sub-Saharan Africa: Emerging Concepts and New Techniques

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**Keywords:** Endometriosis, Ultrasound, Minimal access surgery

Endometriosis is a gynaecological disorder that is characterized by the growth of endometrial tissue outside the uterine cavity<sup>1</sup>. In developed countries, it occurs in up to 20% of women of reproductive age and is a common cause of pelvic pain and infertility<sup>1,2</sup>. In sub-Saharan Africa, epidemiological data on the prevalence of endometriosis among African indigenous women are meagre<sup>3</sup>. In some of the few published studies, endometriosis constituted the third most common finding at laparoscopies and was reported in 15.7% of laparoscopies performed for infertility assessment<sup>4</sup>. In South Africa, Wiswedel et al (1989) reported a prevalence of 2% among African indigenous women presenting to an infertility clinic compared to a prevalence of 4-6% among South Africans of mixed and white race<sup>5</sup>. In Nigeria, a prevalence of 4-8% has been reported among women also presenting for assisted reproductive programmes<sup>4,6,7</sup>.

The low prevalence of endometriosis reported among indigenous African women has been attributed to a different culture and life styles in particular, early age at first pregnancy, short inter pregnancy intervals with large size families, taboos around menstruation and pain, increased risk of pelvic inflammatory disease and blocked fallopian tube<sup>8-10</sup>. These factors contribute to delays in expression of symptoms and limit the cumulative number of menstrual cycles with

retrograde menstruation that is positively associated with risk of developing endometriosis<sup>8-10</sup>. Others have attributed the lower prevalence of endometriosis among indigenous African women to the low awareness of the disease in sub-Saharan Africa, the poor access to diagnostic and therapeutic facilities and the limited training available for the management of endometriosis in the region<sup>11,12</sup>.

In Nigeria, recent efforts by nongovernmental organizations (NGOs)<sup>13</sup> to collaborate with global movements that seek to improve awareness of endometriosis on a designated World Endometriosis Day represents a significant paradigm shift in Nigeria's approach to this debilitating disease. The involvement of NGOs in partnership with global movements for endometriosis provides an opportunity for Nigeria to encourage research interests in endometriosis and develop enduring evidence based strategies for managing women suffering from endometriosis. The foundations for these strategies should be based on the emerging new concepts and diagnostic modalities currently available for diagnosing and treating endometriosis in developed countries.

For example, transvaginal ultrasound (TVS) is now considered a first line diagnostic tool of choice for imaging the pelvis in the preoperative assessment of women planning laparoscopy for surgical treatment of

endometriosis<sup>14,15</sup>. Compared to other imaging modalities, the general availability of ultrasound, its low cost, the absence of harmful radiation and patient acceptability are significant added advantages for its potential role in the management of endometriosis in sub-Saharan Africa<sup>15</sup>. Indeed, knowledge around the performance of TVS in the preoperative diagnosis of ovarian and extra ovarian phenotypes of endometriosis and their markers of local invasiveness (i. e Pouch of Douglas obliteration and ovarian immobility) has evolved in the last decade with evidence now supporting a role for TVS in the diagnosis of various phenotypes of endometriosis<sup>16-23</sup>.

More recently, Menakaya et al described a systematic approach to the evaluation of the pelvis in women with suspected endometriosis using a five domain TVS based approach<sup>24</sup>. The five domain TVS based approach provides a consistent, reproducible and systematic way to evaluate the pelvis in women with suspected endometriosis and has the ability to objectively stratify competency in the expertise required for performing a tertiary level imaging of the pelvis in women with suspected endometriosis. In addition, its role as a tool for triaging women with higher stage endometriosis to the most appropriate expertise for optimal surgical treatment has been described<sup>16</sup>. In Nigeria, the five - domain TVS based approach can be used to develop and adapt training modules for the next generation of sonographers to improve the assessment of women with suspected endometriosis using a readily available cost effective imaging modality.

But developing ultrasound programs that improve the diagnosis and triage of women with suspected endometriosis is not enough. Efforts should also be directed towards establishing regional centers of excellence for managing higher stage endometriosis in line with recent recommendations of the World Endometriosis Society<sup>25</sup>. Such centers of excellence should have proficiencies in minimal invasive surgery especially as laparoscopy is the preferred method for the treatment of endometriosis compared to

laparotomy<sup>26,27</sup>. However, expertise in laparoscopy demands specific training and acquisition of particular surgical skill sets<sup>28,29</sup>. Fortunately, many public hospitals in Nigeria are slowly rising to the challenge of minimal access surgery as an increasing number of hospitals modernize their facilities<sup>30</sup>. There is also a growing interest among the surgical communities and academic institutions in Nigeria to develop laparoscopic programs for fellows and trainees<sup>31</sup>. Indeed, various models of collaboration in capacity building programs between public and private institutions in developing countries and laparoscopic surgeons/laparoscopic surgical units in developed countries have been developed to address this interest<sup>32</sup>.

With this introduction of minimal access surgery into the health care systems, an opportunity also presents for Nigeria to develop and streamline cost effective and sustainable strategies that will build the capacity of local gynecologists for the laparoscopic treatment of endometriosis. Among other things, such strategies must include an enabling environment for partnerships between the public and private health sectors to thrive, establishing regional centers of excellence with comprehensive training curricular for endometriosis ultrasound and laparoscopy and encouraging the involvement and integration of highly skilled laparoscopic gynecologists of Nigerian descent working in developed countries. Indeed, lessons from the growth of the Indian subcontinent as a medical tourist destination must be learnt and adapted to the Nigeria environment to encourage research on endometriosis and improve service delivery that will ultimately result in an improved quality of life for women with endometriosis.

The first ever Sub Saharan African scientific conference on endometriosis in Kampala Uganda in 2006 highlighted the need to develop integrative and multidisciplinary endometriosis programs in Sub Saharan African that will raise awareness of the disease, improve patient education and initiate research that will address the gaps in the

knowledge of endometriosis in the region<sup>9</sup>. Establishing such programmes is especially important because with the current wave of globalization, Indigenous African women are experiencing significant changes in lifestyle, socio economic wellbeing and career prospects; marrying later and having fewer children. Such lifestyle changes expose them to long durations of uninterrupted menstrual flow with retrograde menstruation<sup>33</sup>. These factors are considered to be major risk factors for endometriosis<sup>34</sup>.

Although significant steps have been taken towards actualizing the goals highlighted at the Kampala scientific conference; more needs to be done. In particular, research should be aimed at understanding the prevalence of endometriosis among African indigenous women<sup>3</sup>. This is central to appropriate planning and management of endometriosis in Sub Saharan Africa<sup>3</sup>. In addition, integrating the emerging concepts and new techniques for the diagnosis and management of endometriosis into programs developed and adapted to the sub Saharan African environment with involvement of patient groups and supported by African developmental partners will contribute to the evolution of a high quality evidence based approach to endometriosis management in sub Saharan Africa.

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## ORIGINAL RESEARCH ARTICLE

# Explaining the Rapid Increase in Nigeria's Sex Ratio at Birth: Factors and Implications

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### Abstract

This paper examines the rapid increase in Nigeria's sex ratio at birth from 1.03 boys born for every 1 girl born in each year from 1996-2008 to 1.06 in each year from 2009-2014, second only to Tunisia in Africa at 1.07. The average sex ratio at birth in the world in 2014 was 1.07. In most Black African nations or Black majority nations, it is 1.03 or less. Among the factors presented for this development are: historical fluctuations of sex ratio at birth; geography and ethnicity; male preference/chasing a son; Age of parents; high death rates of male infants and males in general; and wealth/socioeconomic status. Among the potential implications are: young and poor men in Nigeria may not be able to find brides and form families due to a potential shortage of females; emigration of young and poor Nigerian men to West (Africa) and elsewhere to seek brides and form families; immigration of marriage age women from West (Africa) and around the world to Nigeria to seek husbands; and low contraceptive use and high fertility rates in Nigeria. (*Afr J Reprod Health 2015; 19[2]: 17-33*).

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**Keywords:** age; ethnicity; historical fluctuations; infant mortality; male preference; region; socioeconomic status.

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### Résumé

Cet article examine l'augmentation rapide de les proportions des sexes à la naissance au Nigeria à partir de 1,03 garçons nés pour chaque fille née e chaque année de 1996 à 2008 à 1,06 chaque année de la période 2009-2014, en second lieu seulement à la Tunisie en Afrique à 1,07. La proportion des sexes à la naissance dans le monde en 2014 était de 1,07. Dans la plupart des pays d'Afrique noire ou des nations dont la majorité de la population est noire, il est de 1,03 ou moins. Parmi les facteurs présentés pour ce développement sont les suivants: les fluctuations historiques des proportions des sexes à la naissance; la géographie et l'origine ethnique; la préférence pour les garçons / la recherche d'un fils; l'âge des parents; le taux de mortalité élevé de bébés de sexe masculin et les hommes en général; et de la richesse / la condition socio-économique. Parmi les implications potentielles sont: les hommes jeunes et pauvres au Nigeria peuvent ne pas être en mesure de trouver des épouses et de former des familles en raison d'un risque de pénurie de femelles; l'émigration des jeunes et des pauvres hommes nigériens en Afrique de l'Ouest et d'ailleurs à rechercher les épouses et de commencer les familles ; l'immigration des femmes en âge de mariage de l'Afrique de l'Ouest et dans le monde au Nigeria pour chercher des maris; et une faible utilisation de la contraception et des taux de fécondité élevés au Nigeria.. (*Afr J Reprod Health 2015; 19[2]: 17-33*).

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**Mots clé :** âge, ethnicité, fluctuations historiques, mortalité infantile, préférence pour les garçons région, état socio-économique.

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### Introduction

One of the most important phenomenons pertaining to human creation is the fact that regardless of race or ethnicity, the sex ratio at birth data shows more males born than females. As of 2014, the average sex ratio at birth in the world was 1.07 boys born for every 1 girl born. In 2014, the sex ratio at birth in China was 1.11; 1.12 in India; 1.06 in the European Union; and 1.05 in the United States<sup>1-5</sup>.

Another important phenomenon pertaining to this topic is that regardless of geographic location, the sex ratio at birth data show that Black females give birth to fewer boys than non-Black females. For example, in 2008, while the average sex ratio at birth in the world was 1.06, it was 1.03 in Black African nations, Black America (in 2003), and in 2006 it was 1.03 or lower for Black nations or Black majority nations of the Caribbean such as Anguilla (1.03), Bahamas (1.02), Barbados (1.01),

Cayman Islands (1.02), Grenada (1), and Haiti (1.03). This was the case for the most populous and the least populous Black majority nations in the world<sup>6,7,2,8-12</sup>. Citro et al. present a list of the 13 nations with sex ratio at birth above the standard range, from 1.08 to 1.26 as of April 2014, and no Black African nation or a Caribbean nation with a Black majority is among them. They also present another list of nations with the lowest sex ratio at birth below the standard range, from 0.94 to 1.02 as of April 2014, and 4 of them are in sub-Saharan Africa (Kenya, Malawi, Mozambique, and South Africa, all at 1.02); 4 nations are Black majority countries in the Caribbean (Barbados and Haiti at 1.01; Cayman Islands and Saint Kitts and Nevis, at 1.02). There is also one Caribbean nation, Puerto Rico, with a substantial Black population, with sex ratio at birth data of 1.02<sup>2</sup>. Egwuatu points out that the sex ratio at birth was 1.03 "...reported for Zaire and for the black populations of the US and the Caribbean..." (p.399)<sup>9</sup>.

There is a new development, however, whereby Nigeria, the most populous Black nation in the world has experienced a rapid increase in its sex ratio at birth data from 1996-2008 to 2009-2014. For example, in each year from 1996-2008, the sex ratio at birth in Nigeria was 1.03 boys born for every 1 girl born. However, in each year from 2009-2014 that figure increased to 1.06 boys born for every 1 girl born<sup>69</sup>. This new development is not the case for most other Black nations or Black majority nations, large or small.

Most nations in Africa, especially in sub-Saharan Africa tend to possess many similar characteristics. Indeed, it is those similar characteristics that these nations share that caused the need for this study because Nigeria has suddenly deviated from the norm of having a sex ratio at birth of 1.03 to 1.06. What has changed in Nigeria in the period from 2009-2014 that has caused such a rapid increase in its sex ratio at birth data? It is likely that the various factors presented below in this paper may contribute to answering that question. One such factor presented below is geography and ethnicity. Nigeria's massive population and geographic size are not like most African nations. Therefore, the hundreds of relatively large ethnic groups, in addition to the geographic vastness of the country could result in

changes in sex ratio not observed in other sub-Saharan African nations. Another factor presented is the age of parents at birth. Nigeria is relatively younger than most countries in Africa, with over four out of every ten people (41.2%) below the age of 15, but 40.8% average in Africa. This is connected to another factor presented that could have been a level of change not experienced in other African nations in the past several years – Nigeria's relatively high total fertility rate (5.3 children born per woman), compared with an average of 4.1 children born per woman in Africa. Nigeria's total fertility rate is not declining as fast as other African nations.

This paper examines the rapid increase in the sex ratio at birth data of Nigeria from 1.03 in each year from 1996-2008 to 1.06 in each year from 2009-2014. The paper begins by presenting sex ratio at birth data for African nations for 2008 and 2014 and illustrates that while the rates have remained the same or even declined for a number of Black African nations, the rate for Nigeria shows a sharp increase. Next, the paper presents some factors that may be contributing to this new development. Finally, the paper presents some potential implications as a result of this development.

#### ***Sex Ratio at Birth Data for African Nations: 2008 and 2014***

Tables 1 and 2 (in appendix) present sex ratio at birth data for African nations for 2008 and 2014. According to Table 1, five of six North African nations have 2008 sex ratio at birth data of 1.05 (Algeria, Egypt, Libya, Morocco, and Sudan), and the sixth, Tunisia at 1.07. For sub-Saharan African nations, Mauritius, Reunion, Angola, and Saint Helena each has sex ratio at birth of 1.05, and Chad has a figure of 1.04. All of the remaining nations of sub-Saharan Africa have a sex ratio at birth rate of 1.03 or lower, with Nigeria at 1.03 (Table 1).

Table 2 shows that in 2014, five of seven nations of North Africa have a sex ratio at birth rate of 1.05 (Algeria, Egypt, Libya, Morocco, and Sudan), the sixth, Tunisia at 1.07, and the seventh, Western Sahara at 1.04. For sub-Saharan African nations, Mauritius, Reunion, Angola, Benin, and

Saint Helena each has sex ratio at birth of 1.05. Chad has a figure of 1.04. Nigeria has the highest rate in sub-Saharan Africa and the second highest on the entire continent (1.06). All of the remaining nations of sub-Saharan Africa have a sex ratio at birth rate of 1.03 or lower (Table 2).

As Table 2 shows, Nigeria is Africa's most populous nation, with its 177.2 million people accounting for 15.9% of the 1.117 billion people in Africa in 2014. Nigeria is also the most populous Black nation in the world. This makes it a very important development that needs some examination. What are the factors responsible for the 0.03 points increase in Nigeria's sex ratio at birth rates in each year from 1996-2008 to each year from 2009-2014?

### ***Factors Contributing to the Rapid Increase in Nigeria's Sex Ratio at Birth (1996-2008 and 2009-2014)***

A number of possibly interrelated factors could be contributing to what appears to be Nigeria's unusually high current sex ratio at birth. The following are examined as potential factors contributing to the rapid increase in the sex ratio at birth in Nigeria: (1) historical fluctuations of sex ratio at birth; (2) geography and ethnicity; (3) male preference/chasing a son; (4) Age of parents (5) high death rates of male infants and males in general; and (6) wealth/socioeconomic status.

### ***Historical Fluctuations of Sex Ratio at Birth***

A careful examination of the sex ratio at birth data published over the past four decades reveals that regardless of race, ethnicity, nationality and geographic location, whether it is due to the environment at the time or nature, sex ratio at birth tends to go through periods of highs and lows. For example, the study by Davis et al. find that from 1970 to 1999 Japan's sex ratio at birth declined from 0.5172 to 0.5135. In the United States, the sex ratio at birth declined for non-Hispanic Whites from 0.5143 in 1970 to 0.5122 in 2002. For non-Hispanic Blacks, it increased from 0.5076 in 1970 to 0.5079 in 2002 (pp.942-943)<sup>8</sup>. Garenne claims that the sex ratio at birth in Korea between 1921

and 1929 was 1.13<sup>10</sup>. According to the 2014 CIA World Fact book, the sex ratio at birth in 2014 in South Korea was 1.07 and 1.05 in North Korea<sup>1</sup>.

Garenne continues by claiming that the sex ratio at birth in France from 1900 to 1913 was 1.041; 1.064 from 1918 to 1920; 1.051 in 1921; 1.038 in 1941; 1.059 from 1942 to 1948; 1.053 in 1949; 1.046 in 1963; 1.055 in 1972; and 1.051 in 1999 (pp.889-890)<sup>10</sup>. According to the 2014 CIA World Fact book, the sex ratio at birth in 2014 in France was 1.05<sup>1</sup>. Garenne also points to a 1967 study that claims that the sex ratio at birth in the Democratic Republic of Congo (former Zaire) was 0.978 (p.890)<sup>10</sup>. In a table entitled: "Sex Ratios at Birth in 56 Demographic Sample Survey" of African countries, Garenne shows that in 1982, the survey for Benin shows a sex ratio of 1.037; 0.981 in Botswana in 1988; 1.048 in Cameroon in 1978; 1.051 in Liberia in 1986; 1.059 in Burundi in 1987; 1.044 in Ghana in 1979; 1.053 in Guinea in 1999; 1.078 in Mali in 1987; 1.068 in Madagascar in 1997; 1.053 in Niger in 1992; 1.045 in Senegal in 1986; 0.992 in Rwanda in 1992; 0.994 in Uganda in 1988; and 0.993 in Zambia in 1992 (pp.892-893)<sup>10</sup>. Egwuatu notes that sex ratio at birth "...values of 1.12-1.14 [have been] observed among Africans of Uganda and Cameroon" (p.399)<sup>9</sup>. Garenne's study of the World Fertility Survey (WFS) and the Demographic and Health Surveys (DHS) conducted between 1977 and 2006, included 2,000,812 recorded births in 33 sub-Saharan African nations with 85% of their populations. "Two surveys were conducted in Ethiopia, both with high sex ratios (1.074, 1.092)" (pp.474-475)<sup>11</sup>.

Nigeria could be experiencing these historical fluctuations as the nations mentioned above. Tables 1 and 2 show that Nigeria's sex ratio at birth increased from 1.03 in 2008 to 1.06 in 2014. Garenne points to research that claims that "...in Nigeria the sex ratios were higher than elsewhere in Africa (>1.050)..." (p.474)<sup>11</sup>. The table in Garenne's study entitled: "Sex Ratios at Birth in 56 Demographic Sample Survey" of African countries, shows that the survey in Nigeria had a sex ratio at birth in 1982, 1990, and 1999 of 1.121, 1.070, and 1.104, respectively (p.892)<sup>10</sup>. Garenne's study shows that: "Four surveys were conducted in

Nigeria, all with high sex ratios (1.121, 1.070, 1.104, 1.068)” (pp.474-475)<sup>11</sup>.

### **Geography and Ethnicity**

The data presented above in this paper so far illustrate that geography in the context of different continents and countries, and race are contributing factors to the differences in sex ratio at birth data among the peoples of the world. In fact, in the case of geography, specifically pertaining to different countries or continents, studies have shown this to be the case<sup>13,2,7,14</sup>.

Within Africa, especially sub-Saharan Africa, the data presented above show that while most of the countries have similar sex ratio at birth data, there are still some visible differences<sup>10,11</sup> (Tables 1 and 2). Garenne points to a 2002 study that claims that, “...southern and eastern Africa had lower sex ratios than the average and that Ethiopia was also a typical in Africa, with higher values” (p.474)<sup>11</sup>. Garenne’s study finds that:

*“When the sex ratios at birth were computed for each of the 33 countries, they were significantly different from the average in 12 countries.... When grouped into three categories, no country had a sex ratio different from the average of its group (with the exception of Burundi, which had a small sample size), ... The first group includes countries on or south of the equator populated primarily by Bantu groups: Botswana, Burundi, Congo, Gabon, Kenya, Lesotho, Malawi, Mozambique, Namibia, Rwanda, South Africa, Uganda, Tanzania, Zambia, and Zimbabwe. The second group includes most countries in West Africa or in the Sahelian band: Benin, Burkina-Faso, Cameroon, Central African Republic, Chad, Cote d’Ivoire, Ghana, Guinea, Liberia, Mali, Niger, Senegal, Sudan, and Togo. It also includes two islands located in the Indian Ocean: the Comoros and Madagascar. The third group includes two atypical countries with high sex ratios: Nigeria and Ethiopia” (p.475)<sup>11</sup>.*

Within Nigeria, to determine whether geography is a contributing factor to the rapid

increase in its sex ratio at birth, it is important to link it with ethnicity because in African nations, ethnic groups tend to reside in particular geographic regions<sup>13,9,15</sup>. As Egwuatu points out “... the sex ratio at birth is influenced by geographic and genetic distribution” (p.399)<sup>9</sup>. Garenne points out that sex ratio at birth rates “... were higher in northern Nigeria than in southern Nigeria” (p.474)<sup>11</sup>. Ayeni’s study of sex ratio at birth records for seven years of the Yoruba ethnic group of Southwestern Nigeria shows that: “Among 548 558 hospital live births the male proportion was 51.37%, while vital registration records for one urban and one rural town showed a figure of 51.39% in 315 735 live births. Of the total 864 331 live births, the overall proportion was 51.4 ± 0.05%...” (pp.137-141)<sup>13</sup>. Rehan’s study of sex ratio at birth of infants of the Hausa ethnic group in Katsina province of Nigeria examined data from 1961 to 1980 and finds that for 1,113,313 live births, the sex ratio ranged from 1.05 to 1.11, and the mean was 1.07. Another data from the records of the Maternity Hospital for 5,780 live births from 1976 to 1980, showed sex ratio of 1.2. “The results are consistent with other reports based on hospital deliveries from other parts of Africa, including: a sex ratio of 1.06 for births in Lagos City, 1.05 in Igbo-ora, 1.06 in Ibadan...” (pp.163-167)<sup>15</sup>. In a study of sex ratio at birth of infants of the Igbo ethnic group of Southeast Nigeria, Egwuatu claims that:

*“Data were drawn from the 1973 record of registered live births from hospitals, health centers, and maternity homes among Igbos; records of live births in Anambra State in 1976-79; and live births at the University of Nigeria Teaching Hospital in 1976-82. Of the 31,685 Igbo infants born at the University of Nigeria Teaching Hospital in 1976-81, 16,389 were males and 15,296 were females, giving a sex ratio of 1.07. The sex ratio of the 5,905 live births recorded at the hospital from July 1981-June 1982 was 1.08.... Of the 70,662 births recorded at all medical institutions in 1973, 36,104 were males and 34,648 were females, for a sex ratio of 1.039 (1.07 for hospital deliveries, 1.037 for deliveries in maternity homes, and 1.02 for births in*

*community health centers). Finally, of the 184,352 live births registered in Anambra State in 1976-79, 93,916 were males and 90,436 were females, giving a sex... (ratio) of 1.038. These findings suggest a sex ratio at birth for Igbo infants of about 1.04. ... this figure is lower than ... the 1.06 and 1.07 ratios reported for the other 2 [largest] ethnic groups in Nigeria (the Yorubas and Hausa-Fulanis, respectively)...” (pp.399-402)<sup>9,6</sup>.*

The examples presented in this section of this paper substantiate the claim by many scholars that there are geographic differences in the sex ratio at birth data among continents, countries, regions within countries, racial groups, and ethnic groups. The sex ratio at birth data for the various regions, cities and ethnic groups of Nigeria help to explain why that nation's sex ratio at birth data has increased on average by 0.03 points from 1996-2008 to 2009-2014. This is understandable because Nigeria is not just a very populous nation, but also geographically relatively large. For example, according to the 2014 CIA World Fact book, the total area of Nigeria is 923,768 sq km (slightly more than twice the size of California): 910,768 sq km of land; and 13,000 sq km of water<sup>1</sup>. This means that although all Nigerians are under one flag and carry one passport, the geographic vastness of the country can make the various characteristics of the people in each region seem like they reside in different countries. Nigeria shares a land border with Cameroon, Benin, Chad and Niger. This means that Nigerians residing in the border towns or cities next to each of these countries might have different cultural and physiological characteristics from the others.

### ***Male Preference/Chasing a Son***

There appears to be an almost universal desire among parents and families all over the world who prefer to have a son or sons rather than a daughter or daughters. It has been claimed that this is especially the case among many cultures in Africa and Asia. Some of the explanations for parents

desiring sons are that a son can take the last name of the father or family and continue the line of descent by inheriting a household. In most cultures, sons are the ones most likely to inherit any family accumulated wealth or property. Mothers in many societies believe that their sons would provide for them or take care of them during old age. A daughter, the argument goes, will eventually get married and leave her parents' household for her husband's household and also take the last name of her husband. So some believe that parents can get their investments back from a son, but would get little or nothing back from their daughter because they would eventually lose her to her husband and his family<sup>16-19</sup>.

This male preference, it is claimed is so serious that parents or families in different parts of the world end up practicing sex selective abortion, with China and India the two countries commonly cited as examples of this phenomenon<sup>2,20,21,19,5</sup>. It has also been noted that this phenomenon is practiced in Africa. For example, Navara claims that, "...gender selection through preferential induced abortions of males or females ... has been reported in many Asian and African countries” (p.2)<sup>14,22</sup>.

However, a careful examination of this topic finds that while there is a significant number of scholarly publications substantiating the claim that expected mothers in Nigeria tend to prefer sons, there was no evidence found that they seek, or performed sex selective abortion, even as hundreds of thousands of abortions are performed annually in Nigeria<sup>23,16,24-27</sup>. In their study that surveyed 134 Nigerian health professionals in a health institution in 'South Western Nigeria', Adeyemi et al. find that 54 (40.3%) of them strongly agreed that sex selective abortion is violence against women; 34 (25.4%) agreed; 21 (15.7%) were uncertain; 14 (10.4%) disagreed; and 11 (8.2%) strongly disagreed (pp.719-722)<sup>24</sup>. According to Maaji et al., governments across the world have banned "prenatal fetal sex determination" as a result of their fear of sex selective abortion. However, "This certainly is not the experience in Nigeria for most of the reasons for seeking prenatal fetal gender are innocuous" (p.12)<sup>26</sup>. It is also noted that sex selective abortions are performed across countries in the world, "... to discriminate in

favour of boys. But not in Africa. Nigeria's sex ratio at birth is the natural one: 106 boys are born for every 100 girls..."<sup>28,18</sup>.

Awopetu and Fasanmi claim that: "In Nigeria about 760,000 abortions occur annually despite the country's restrictive abortion law" (p.4263)<sup>25,29,30</sup>. Moreover, if it were not policies supported by western countries, abortion rates in Africa would be a lot less<sup>31</sup>. In a study that surveyed 201 pregnant women in Nigeria who wanted to know their fetal sex, none said they intended to abort the child if the child was a male or a female<sup>26</sup>. The research study by Sedgh et al. surveyed 2,978 Nigerian women age 15-49 in eight states, and found that 28% of them had experienced unwanted pregnancy in their lives, and that of this group 51% (14% of the 2,978 total) had sought to terminate the pregnancy through an abortion. However, of the many reasons provided for termination of the pregnancy (such as being unmarried, birth spacing, economic issues, too young, still in school or problems with their partner), none was for the sex of the child as a female or a male (pp.178-179)<sup>27</sup>. In their study of contraceptive use, unwanted pregnancy, and induced abortions in Southwest Nigeria, Omideyi et al. find that: "Abortion is usually resorted to because pregnancy was unwanted due to incomplete educational attainment, economic hardship, immaturity, close pregnancy interval, and social stigma" (p.S52; also see Mitsunaga et al.)<sup>32</sup>.

There is evidence, however, that females or women in Nigeria tend to chase a son, meaning that they would continue to have children until they give birth to a boy<sup>28,18</sup>. According to a study focusing on son preference, fertility and family structure in Nigeria, Milazzo notes of the phenomenon in countries around the world of "...son-preferring fertility behavior (or son-preferring stopping rules) in which women with girls among earlier-born children are more likely to continue having children and to have shorter birth intervals" and finds in the study that: "...compared to women who had a first-born boy, women with a first-born girl exhibit a 2% increase in the number of children ever born" (p.3)<sup>18</sup>. Coney and Mackey conducted a study that surveyed 632 successful men in the United States

including U.S. presidents, listed in the 1975 Who is Who in the United States about the sex ratio of their children. They claimed that: "Conceptions of sons tended to occur more often when there was a greater interval between adjacent conceptions: a daughter-daughter tandem occurred in significantly shorter birth intervals" (p.174)<sup>3</sup>.

An observer might note that male preference or male chasing could actually lead to more girls born in Nigeria because females or women continue to have girls until they have a boy. This can be the case. On the other hand, since the average sex ratio at birth in Nigeria is 1.06 or even at the previous rate of 1.03, more boys are born than girls. It is among a sub-set of females or women who may be highly likely to give birth to girls that male chasing might be more prevalent. Also, one could observe that without this sub-set of females or women who chase a son, the proportion of births to girls could be smaller, because their experience leads to more births to girls.

### *Age of Parents*

Researchers have pointed out that age is a contributing factor to the sex ratio at birth data favoring males. They claim that the younger both the mother and father are, the more likely they would give birth to more boys, or the older they are, the more likely they would give birth to a girl<sup>11,7,33</sup>. Kaba quotes a 1997 work in which the author claims that: "Parental age has also been shown to affect the sex ratio. ... as paternal age increased, the sex ratio decreased" (p.146)<sup>11</sup>. Wadley and Martin point to a 1994 study that "...finds a strong, statistically significant tendency for sex ratios to decline with maternal age" and they also cite a 1987 study that finds "...sex ratios at birth declining with increasing paternal age" (pp.79-80)<sup>33</sup>.

Nigerians are among the youngest human beings in the world. For example, as of 2014, while 40.8% of Africa's 1.117 billion population was under the age of 15, it was 42.2% of the 177 million Nigerians under the age of 15<sup>1</sup>. In Nigeria, like in a high number of African nations, substantial proportions of females marry and start having children at an early age.

Ugoji points out that “It is presumed in general, that women in Africa get married at much earlier ages than women elsewhere leading to pregnancies at earlier age” (p.4126)<sup>34</sup>. Oyefara points to a 1998 government report in Nigeria which claims that among young Nigerians 10 to 14 years old, 7.5% of females and 4% of males had been married (p.3985)<sup>35,36</sup>. Ugoji claims that sub-Saharan Africa has the highest teen pregnancy rate in the world and cites a 2003 report that puts the figure at 143 per 1,000 girls aged 15-19 (p.4126)<sup>34</sup>. Ugoji cites a 2008 report that: “...showed that the teen pregnancy rate, globally, as surveyed in 2002, was 1.5% to 1.9% and that it has been increasing rapidly with the highest occurrence in Nigeria (87%)”, and a 1999 study claims that 40% of Nigerian secondary school teenage girls have been pregnant at least one time (p.4126)<sup>34</sup>. Oyefara cites a 1992 study which claims that by age 20, half of Nigerian women have become mothers; 10% to 12% have a child by age 15; and 21% to 28% have a child from 15 to 17 years old. Also, a 1999 survey shows that the fertility rate of Nigerian females/women aged 15 to 19 was 111 births per every 1,000 of their population (p.3985)<sup>35</sup>.

The study by Garenne substantiates the claim that the younger the parent, the higher the chances of giving birth to a boy, claiming that a mother’s age when she gives birth to a child has a significant effect on the sex of the baby, predicting a value of 1.048 when the mother is 15 years old and 0.998 when the mother is 49 years old. For females aged 12-19, with average births of 1.50, the sex ratio ranged from 1.091 at 12 years old to 1.039 at 19 years old. For women 20 to 39 years old, with average age of 26.5 years, their sex ratio “... varied from 1.033 for the second birth to 1.019 for the eighth birth. For women age 40–49 years, who on average had 8.5 births, the sex ratio varied from 1.014 at age 40 to 0.983 at age 49” (pp.475-477)<sup>11</sup>.

The age related examples presented in this section of this paper contribute to explaining why the sex ratio at birth in Nigeria has increased from 1.03 in each year from 1996-2008 to 1.06 in each year from 2009-2014. Nigerians, both males and females are among the youngest human beings in the world. The evidence shows that a substantial number of them tend to get married and have

children at an early age. Those who are not married also tend to have children at an early age. The research shows that the younger parents are, the more likely they would give birth to a son. In addition to the massive number of Nigerians, especially young Nigerians, the median age in Nigeria is 18.2 years; 20.8 years average in Africa; and world average of 29.7 years<sup>1</sup>. All of these age related factors could have contributed to the sharp increase in Nigeria’s sex ratio at birth.

One could claim that it is common for people to experience early marriage in all countries in Africa, and not just in Nigeria. What then is different in Nigeria in recent years? One potential answer to this question is that there might be a certain uniqueness to Nigeria’s demographics. Due to demographics, there could have been a sustained relatively substantial numbers of younger parents who tend to give birth to males. This is because even if the proportion of young Nigerian girls who marry early remains stagnant, the rapid increase in the country’s population means that in absolute numbers there are more such marriages. While females or women have children in Nigeria without being married, research shows that most of those who do are married or had once been married. This may not be the exact situation in other African nations because they are getting a little older on average than in Nigeria. Moreover, females with a first child at a younger age are more likely to have larger numbers of children. There is also an education component connected to demographics. Although the proportion of Nigerians with at least some formal education is increasing, the rapid and massive population increase means that a large number of people in that nation do not have formal education, which could be linked to early marriage and many births to children.

The study by Emelumadu et al. examining when parents in Nigeria start discussing sex with their adolescent children finds that, those parents’ average suggested age for their daughters to marry is 22.4 years (p.296)<sup>10</sup>. The study by Gayawan and Adebayo on age at first birth in Nigeria shows that less than 15 years old, a female would give birth to seven or more children, and they accounted for 31% of the study sample. As age increases, the total number of children decreases. For women

with first birth at age 25, only 8.3% of them had seven or more children (pp.1352-1353; also see Oyefara, 2015)<sup>71</sup>. The study by Ayotunde et al. on maternal age at first birth "... revealed 64.3% prevalence rate of early childbirth with 18.6 years as mean age at first birth" (p.12)<sup>63</sup>.

The study by Adebimpe examines marriage patterns and fertility among women in Southwest Nigeria ( a sample size of 1,024), and finds that their mean age was 19.6 years for those who resided in rural areas, and 22.6 years for those who resided in urban areas. Those aged 15 to 24 comprised the highest proportion of survey respondents: 40.2% in rural areas and 39.6% in urban areas; 21.5% of rural respondents had no formal education, compared to 7.4% of those in urban areas. Of the women from rural areas, 90.4% married between 20 and 29 years, while it was 72.4% for women in urban areas who married from 20 to 29 years. Ninety one percent of women in rural areas and 80.9% of those in urban areas were married. Almost 52% (51.8%) of women in rural areas married for the first time from 15 to 24 years (but 18 years average for entire sample), and the figure was 23% for women in urban areas (but 19.5 years for entire sample) (pp.143-148)<sup>72</sup>.

A study by Olatoregun et al. analyzed the differences in fertility in Ghana and Nigeria. The sample size for Nigeria is 33,385 females aged 15 to 49 and 4,916 females in Ghana aged 15 to 49: 72% of the females in Nigeria were married, compared to 60% in Ghana; females aged 15 to 24 accounted for 38% of Nigerians and 38.8% in Ghana; 68.6% of the females in Nigeria resided in rural areas, compared to 56% of those in Ghana; 35.8% of females in Nigeria had no formal education, compared to 25.3% in Ghana; 21% of the females in Nigeria were first married under 15 years old, compared to 6.2% of females in Ghana; 11% of females in Nigeria had their first intercourse under age 15, compared to 6.4% of females in Ghana; and 59.3% of females in Nigeria said their ideal number of children was more than 4 children, compared to 33.4% of females in Ghana (pp.39-40)<sup>73</sup>.

### ***High Death Rates of Male Infants and Males in General***

One must not omit the possibility that among the

factors that have led to a sharp increase in the sex ratio at birth in Nigeria is that parents in that nation are attempting to provide a sort of insurance of having at least one male child because male infants, regardless of race, ethnicity or geographic location tend to die at an early age than their female counterparts. Although there are more males born than females, by age 65 and over, however, there are more women than men in almost all nations<sup>28,7,18</sup>. Kaba points out that in countries all over the world, more males than females are born at birth. However, from the moment they are born, girls tend to outlive their male counterparts. In the under 15 years old population, there are more males than females in almost all countries (p.140)<sup>7</sup>. Kaba (2008) quotes a scholar who claims that: "Even when a boy manages to be born, he's still behind the survival eight ball: he is three to four times more likely than girls to have developmental disorders like autism and dyslexia; girls learn language earlier, develop richer vocabularies and even hear better than boys. Girls demonstrate insight and judgment earlier in adolescence than boys, who are more impulsive and take more risks than their sisters. Teenage boys are more likely to commit suicide than girls and are more likely to die violent deaths before adulthood" (p.140)<sup>7</sup>. It is also explained that since sex selective abortion is not responsible for Nigeria's relatively high sex ratio at birth of 1.06 favoring boys and, since "...boys are more vulnerable to infant diseases, so this ratio ensures that equal numbers of the sexes reach puberty..."<sup>28</sup>.

In 2014, of the 7.174 billion people in the world, 956.4 million (13.3%) were males aged 15 and younger and 893.6 million (12.5%) were females aged 15 and younger. In 2014, there were 265.5 million men and 331.2 million women in the world aged 65 and over. The infant mortality rate for males in the world in 2014 was 38.5 deaths per 1,000; and 34.5 deaths per 1,000 for females<sup>1</sup>.

Discussing this topic from the perspective of parents in Africa, Milazzo points out that: "... male children are biologically weaker than females and more likely to die at birth and in infancy... As mothers tend to replace a dead child by having more children, those with a first-born boy will thus have more children than they would have had if

there were no biological gender differences in infant mortality” (p.13)<sup>18</sup>. In 2014, the average infant mortality rate in Africa was 53 deaths per 1,000: 58 deaths per 1,000 for males and 48 deaths per 1,000 for females. In Nigeria in 2014, it was 74.1 deaths per 1,000 for both sexes: 79 deaths per 1000 for males and 69 deaths per 1,000 for females. The average life expectancy in Africa in 2014 was 61 years: 59.3 years for males and 62.6 years for females. For Nigeria, in 2014, the life expectancy was 52.6 years: 51.6 years for males and 53.7 years for females. In 2014, 3.5% of Africa’s 1.117 billion people were aged 65 and over: 17.74 million men were aged 65 and over; and 21.6 million women were aged 65 and over. For Nigeria, in 2014, 3% of its 177.2 million population was aged 65 and over: 2.6 million men; and 2.9 million women<sup>1</sup>.

### **Socioeconomic Status/Wealth**

Scholars have also noted that one’s wealth or socioeconomic status tends to impact sex ratio at birth favoring males or sons<sup>16,3,9</sup>. Egwuatu suggests “... a possible role for socioeconomic status” in the sex ratio at birth study of Igbo infants in Nigeria (p.399)<sup>9</sup>. In their study of the regional differences in the child’s gender preference (CGP) among women in Nigeria, Adebowale et al. point to research that: “... revealed that the women from richer homes have higher CGP particularly for males than those from poorer homes” (p.5881)<sup>16</sup>. In a study on sex ratio at birth and mortality, Dama claims that a country that has a higher gross domestic product is also in a position to: “...afford better education and medical services, leading to reduced mortality and extended life expectancy, which may indirectly lead to increased son births, by enhancing the parental investment ability” (p.4)<sup>4</sup>. The study of Coney and Mackey of the sex ratio at birth of successful men in the United States finds that the wives of U.S. presidents tend to give birth to sons, and that: “More affluent Mormon men had more wives and a higher proportion of sons” (p.174)<sup>3</sup>. The data tend to suggest that “... if a woman has, within her own referent social group, marginally increased levels of resources from her husband, she translate those incremental resources to a son”

(p.174)<sup>3</sup>. Oladeji and Ariyo find in their study examining the socioeconomic factors that influence mate selection among adolescents of reproductive age in Nigeria that: “The results further indicated the significant position between income level and mate selection ... and social factors and marriage partner... (p.6145)<sup>74</sup>.”

This brings us to an explanation that Nigeria’s recent economic achievements could be potentially contributing to the increase sex ratio at birth in that nation. In the period from 2008 to 2013, Nigeria and many African nations have experienced visible gains in their economies, including a steady increase in the number of known millionaires and billionaires in the country. Africa’s total Gross Domestic Products (GDP) in 2008 was \$2.652 trillion, with per capita GDP of \$2,660<sup>37</sup>. Africa’s total GDP in 2013 was estimated at \$3.5374 trillion. Its per capita GDP was \$3,167 (\$3.5374 trillion divided by 1.0998 billion people in Africa in 2013)<sup>1,38</sup>. In 2008, Nigeria’s GDP was \$338.1 billion, with per capital GDP of \$2,300<sup>37</sup>. In 2013, Nigeria’s GDP was \$478.5 billion, with per capital GDP of \$2,800<sup>1</sup>. It is useful to note that the per capita GDP of both Africa and Nigeria increased from 2008 to 2013 despite the very large population increase during that period. As Table 1 shows Nigeria’s population in 2008 was 138 million. By 2013 it had increased by almost 41 million (40.8 million) to 172.8 million<sup>38</sup>.

**Table 1:** Population and Sex Ratio at Birth of African Nations, 2008.

N=57		Sex Ratio at Birth
Country	Population	Male(s)/Females
Burundi	8,691,005	1.03
Comoros	731,775	1.03
Djibouti	506,221	1.03
Eritrea	5,028,475	1.03
Ethiopia	78,254,090	1.03
Kenya	37,953,834	1.02
Madagascar	20,042,551	1.03
Malawi	13,931,831	1.01
Mauritius	1,274,189	1.05
Mayotte	216,306	1.03
Mozambique	21,284,701	1.02
Reunion	743,981	1.05
Rwanda	10,186,063	1.03
Seychelles	82,247	1.03
Somalia	9,558,666	1.03
Tanzania	40,213,162	1.03
Uganda	31,367,972	1.03
Zambia	11,669,534	1.03