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SCIENCE, TECHNOLOGY AND POVERTY ERADICATION: ANY CONNECTION WITH DEMOGRAPHY?

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ABSTRACT

The position paper presents the interconnection between demographic and gender gap dimension in university admission, and the suspected limitations to the success of STEM curricula in Nigeria. The thoughts presented were supported by archival-review of existing literature and empirical descriptive analysis of university enrolment with respect to STEM subjects (science, technology, engineering and mathematics). The paper was a post-departmental seminar adjusted paper following audience comments. The presentation emphasised the systematic biases in support for higher institution with potential to constrain and weaken the humanities, social sciences and consequently discourage universities (especially the private) from advertising for humanities and social sciences courses. The result of analysis shows that the 4-year cumulative admission (2005-2008) for courses like agriculture, medical science, sciences and engineering was higher than the preceding 4-year (2001-2004) cumulative admission. The opposite was recorded in administration, arts, education and law, that range from 14.7% in 2006 to 18.5% in 2008. The social sciences witnessed 20% and 8.0% admission cut down in 2005 and 2008 respectively. Male/female enrolment gap range from 13.6% to 21.1%. The position is that STEM could be a dependable programme for technological advancement but the persistence gender gap in university enrolment could sustain the existing low economic status of women with possible potential for more socio-economic vices such as high fertility rate, infant and maternal morbidity and mortality, unemployment and poor family wellbeing. The authors recommend intervention programme that could boost women university enrolment in STEM subjects in Nigeria without relegating the humanities and social sciences.

Keywords: STEM, demography, poverty, population studies, university education, humanities, social sciences, enrolment

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1. INTRODUCTION

The advancement in the global and national economies with increasing transition to knowledge economy are being propelled by rapid technological innovation and associated with emphasis on higher education (Thelen, 2019). This has been keenly supported by stakeholders especially government through STEM policy that emphasises science, technology, engineering and mathematics in academic curricula especially at higher colleges (Adikwu, 2012; Aguele & Agwagah, 2007; Gonzalez & Kuenzi, 2012; John et al., 2018; Okpala & Li, 2018; Onanuga & Saka, 2018). While STEM could be delivering maximally in most advanced economies, the hope of its urgent reality seems blink in Nigeria considering the unending wider gender gap in education, ICT and the current challenge of self-reliance in the face of overwhelming proportion of population in abject poverty. Self-reliance is the expected bigger hope of higher education in most developing countries, at least, as a plausible means for both gender empowerment and poverty alleviation. That STEM is an innovative academic curricula and, a significant contributor to improvement in development is not new in the literature (Adikwu, 2012; Amoo et al., 2019; Imam, 2012; Lee-Roy, 2013; Nwangwu, 2007; Okoroma, 2006; Onanuga & Saka, 2018; Solaipriya & Suresh, 2019). However, whether this program could achieve a practical reality for a gender-balanced economic development is a debatable subject especially in Nigeria. There are numerous limitations to the extent to which STEM education could serve as engine for technological and gender-balanced economic development.

Ideally, STEM education is meant to pursue consilience with other disciplines including humanities, arts and social sciences that are more closer to the social world. While the development and economic growth has been linked to science and technological advancement, (Adikwu, 2012; Badejo et al., 2018; Onanuga & Saka, 2018; Popoola et al., 2018), there are rarity of empirical information or data supporting the relevance of humanities or its interaction with science, especially as it relates to Nigeria economic growth. Nevertheless, there is no such fact that a discipline exits independently. Every accomplishment through a discipline is often a product of conglomerate of principles, ideas, models and methods from several disciplines. Education curriculum in African context permits student to have a feel of several other disciplines before specialising on any core field. Every engineer must have been a student or learner of mathematics, economics and perhaps religious studies (Amoo et al., 2019). For example, engineering by designed is considered as a field of endeavour built with the aid of mathematical and natural sciences to build or utilize the materials and forces of nature (economically) for the benefit of mankind (Okpala & Li, 2018). This implies that, it on its own cannot but archive nothing.

Suffices to say that by training, Nigerian engineers would require basic education that are not primarily taught by engineers. They would need civil education taught by humanities. Cultures and useful citizenship are taught in humanities. The field of humanities in their different forms provide insightful understanding into moral, ethical, both traditional and

modern ideological forces, including art. Humanities would offer window of opportunities for theories, the basis of all sciences (Dalbert, 2011). Subjects in humanity strengthen the ability to communicate and internalise works, ideas/concepts (Dalbert, 2011). Humanities could enhance the understanding of the impact of science, technology, engineering, mathematics on, not only on human being, but on the society as a whole (Dalbert, 2011). Basic knowledge in humanities could provide balanced education that is crucial for achieving balanced sustainable economic growth and development (Klasen, 2000). This position paper is therefore to state and re-iterate to certain degree, the interconnectedness of STEM subjects (science, technology, engineering and mathematics) and humanities, and explore why demography and population studies are indispensable to the world of science and technology. It is also meant to analyse and suggest how demographic tools could be used to bridge gender gap in STEM for effective and sustainable gender-balanced economic and sustainable development.

2. LITERATURE REVIEW

The thoughts and information gathered from the literature indicated there are intrinsic connections between population growth, poverty level and university enrolment rate. Demographic factors are the driving forces behind development and are often the basic sources of most socioeconomic issues including poverty and employment (Cohen & Ladaique, 2018; Zhao & Zhang, 2018). High population exerts pressure on resources, engender inadequacies, lacks and poverty. The eventual poverty limits school enrolment, culminating in poor or low supply of skilled human capital and low technological development. Notwithstanding, a large population if well managed with adequate education policy could boost economic advancement. While high population could cause poverty (with plausible opposite) (Agarwal, Satyavada, Kaushik, & Kumar, 2018; Cleland, 2018; Meadows, 1986), the intermediating with gender-balanced education policy could break the circle and enhance adequate human capital required for development. The proportion of population in poverty has been on the rise in Nigeria (fig. 1), notwithstanding the growth in the Gross Domestic Product (GDP) (Tsuruga, 2015; Zuhumnan, 2018). The increasing gap in education enrolment as well as the proportional rise in poverty head count could be dangerous towards the future achievement of sustainable economic development.

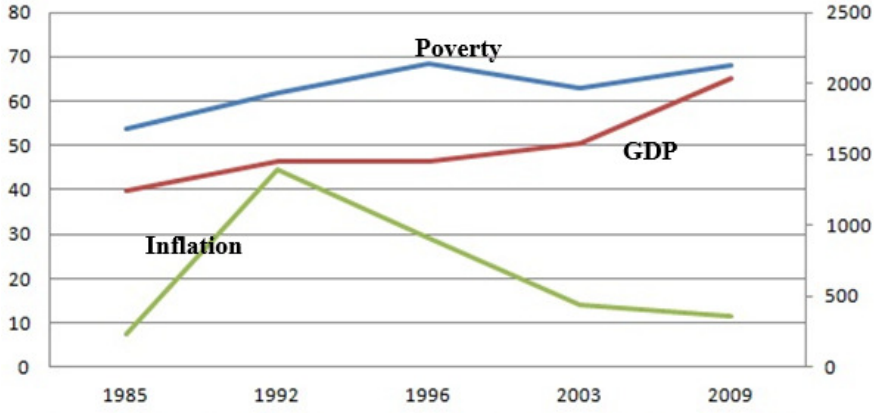

Figure 1. Poverty and Growth in Growth in GDP (1985-2009)

Source: Tsuruga (2015). https://www.povertist.com/is-growth-an-irony-for-the-poor-in-nigeria/.

Until the mid-19th century, the field of humanities (i.e., grammar, rhetoric, history, literature, languages, and moral philosophy) were the popular disciplines in higher institutions even in such places as Oxford, Cambridge Universities. Thereafter, the School of Applied sciences began to emerge (Dalbert, 2011) and the need for science majors to take courses in

the humanities became contentious issue (Dalbert, 2011). In Nigeria, during early and pre-independent years (1960s), there were only five universities namely: University of Ibadan, University of Ife, University of Nigeria, Ahmadu Bello University, and University of Lagos (Iruonagbe, Imhonopi, & Egharevba, 2015; World Education News and Review [WENR], 2017). However, between 1980 and 2017, it has grown to 152 universities (World Education News and Review [WENR], 2017). The emergence of engineering courses (such as Chemical Engineering, Electrical Engineering departments) has root with the then university of Ife (Now Obafemi Awolowo University) in 1961 (Nigerianfinder.com, 2018; Scott-Emuakpor, 2010) and the university also birthed the first Pharmacy school in West Africa (Nigerianfinder.com, 2018; Scott-Emuakpor, 2010). Medical sciences emerged with university of Ibadan (1948). Hitherto, the first health facility was just dispensary in Obosi in 1880, followed by similar ones in Ibadan, Onitsha and the first hospital (Sacred Health Hospital) in Abeokuta in 1885 and the operators were mainly explorers adventuring in purely agrarian economy (Scott-Emuakpor, 2010). However, as the population is expanding, the demand for higher education is increasing (World Education News and Review [WENR], 2017). Thus, the revolutions that have taken place in technology from agrarian stage, through the industrial revolution, and the current of high technology (high techs) were ascribed to growth of population (Crowder, 1983).

Generally, education is a process of imparting knowledge, skills and information and represents an integral of personal upbringing. It is force of acquiring understanding and re-designing human environment with the view of achieving and sustaining a better quality of life. It is therefore like an infrastructure provided for citizenry in order to enable them to acquire, sharpens their skills and earn better living conditions. However, as important as this ingredient is, it mostly impact on the society through technological innovation, advancement and entrepreneurship. This is more relevant especially in developing countries where micro-entrepreneurs generate almost more than half of their gross domestic product (Lee-Roy, 2013). Thus, technological innovation particularly through information communication Technologies (ICTs) are considered as the potent ways to foster economic development (Lee-Roy, 2013; Solaipriya & Suresh, 2019) and also in turn aid education and training (Lee-Roy, 2013; Solaipriya & Suresh, 2019). Technological innovation produces new products, and a paradigm shift or expansion in the use of existing ones such as computers, radio, television, telephone, and so on, for the prosperity of the citizenry and for economic advancement (Metcalfe, 2018). Notwithstanding, these innovations according to Crowder (1983) have tremendous implications to the society. First of all, it would require preparations of workers to adapt to the new wave of technology with likely tendency to render humanity courses less valuable. On the other hand, it could also arouse the feeling that mechanical/technological world would engender loss of job with adverse effects on family welfare and wellbeing. There are also possibility of drafting the whole world of students to technical occupations with no guarantee for marketability. This could eventually result into low or no profit, gravitates to redundancy, laying-off of workers and other economic crisis and total technical advancement without wellbeing.

Today, that government funding is tilting towards science and technology than humanities might not be unfounded (Dalbert, 2011). Emerging policies like STEM is evidently supporting science and technology compared to humanities. Specifically, government support for STEM include tuition free, universal, and compulsory education with emphasis in STEM subjects, the initiatives of Young Science Clubs (Junior Engineers, Technicians, and Scientists), several moves by government to partner with national and multinational organizations towards provision of scholarship with respect to sciences, technology, engineering subjects (Onanuga & Saka, 2018). According to Mouton (2011), evidences abound that there are systematic biases in the higher institution support with potential to constrain, weaken and disadvantage the

humanities and social sciences. Thus, in emerging technological market like Nigeria, the adventure by universities (especially the private sector) to advertise for humanities and social sciences courses could be (as described by Mouton) unaffordable luxury (Mouton, 2011; Scott-Emuakpor, 2010)

However, it has also been noticed that higher education generally are not contributing adequate graduates to drive the required innovation for rapid productivity in industries and economic advancement (Clarke, 2019; Okonkwo, Ubani, & Ubachukwu, 2013) and the reasons cannot be farfetched. Considering the fact that there is not such truth that a discipline is entirely independent, it is necessary to state that students pursuing career in sciences are to augment such training with strong foundation in humanities and social sciences. No wonder Okonkwo et a (2013) suggested that most curricula should be reviewed to meet the yearning demand of industries and at least for professional practical relevance within the social world (Okonkwo et al., 2013). While education in engineering, mathematics, technology or science offer pool of knowledge-based modern economy that is ICT driven, population structure offers the requisite market for continuous production and use of technology, and therefore sustaining the relevance of STEM in contemporary world.

3. METHODS, REVIEW STRATEGY AND INCLUSION/EXCLUSION CRITERIA

The study adopted archival review of existing literature to support personal perspectives on the interactions between STEM subjects, demography, gender gap in education and poverty. It also conducted empirical analysis of the trends in poverty, population distribution and university enrolment that relates to STEM subjects. The search included published, unpublished reports and seminal papers. Over 95% of the articles reviewed excluded those articles that were published prior to 2004 when STEM agenda began to emerged in Nigeria (Imam, 2012; Nwangwu, 2007; Okoroma, 2006), notwithstanding that the first known National Policy on Education in Nigeria came into being in 1977 (Imam, 2012; Nwangwu, 2007; Okoroma, 2006). Data were adapted from Kanyip (2013) and Agboola and Ofoegbu (2010) on admission statistics in Nigerian universities (Agboola & Ofoegbu, 2010; Kanyip, 2013). Data were analysed using only basic descriptive statistics, frequencies distribution and graph/charts where applicable. The statements and facts presented are however not chronologically arranged but intermingled to buttress certain point at a time.

4. RESULTS

Table 1 presents information from existing literature on the trends in enrolment into Nigerian universities across selected courses. These courses are agricultural Science, medical science, sciences and engineering and environmental sciences. They are hereinafter interchangeably refers to as sciences. Others are administration, arts, education, law and social sciences, which are further refers to as humanities and social sciences in this presentation. These subjects were based on the available data. Table 2 is a percentage distributions of raw figures contain in Table 1. Generally, the data in Table 1 revealed a general steady improvement in students' enrolment in sciences but mixed results in engineering/environmental sciences. In Table 3, the percentage change in annual enrolment is presented. The year preceding 2004 shows annual declining trend for engineering/environmental sciences from a reduction of 7.3% to 12.3% between 2000 and 2004 (Table 3). However, there was a change with increase in admission volume into these courses except in year 2006 (Table 3).

Table 1. Students enrollment into Nigerian universities by selected courses of study (2000-2008)

Admin Year	Agric. Science	Medical Science	Sciences	Engr. / Env'tal	Admin	Arts	Education	Law	Social Sc	Total Admission
2000	1,391	3,862	8,027	8,061	6,790	4,562	2,840	2,431	7,690	45,654
2001	3,609	5,105	16,099	14,836	13,526	9,301	9,711	3,623	13,957	89,767
2002	1,880	3,844	8,468	8,311	7,687	5,376	5,826	2,199	8,264	51,855
2003	4,789	7,206	17,059	15,352	14,193	10,836	14,988	3,455	16,924	104,802
2004	5,356	7,171	20,495	15,936	13,637	13,197	21,195	3,607	22,050	122,644
2005	4,452	4,649	14,172	10,098	7,858	6,815	13,855	3,010	11,496	76,405
2006	4,864	6,066	16,181	11,861	13,861	9,224	12,655	3,149	15,386	93,247
2007	6,404	7,138	23,387	14,047	10,422	10,111	13,594	3,463	18,775	107,341
2008	6,834	8,075	26,038	15,371	9,903	10,947	14,551	3,028	18,353	113,100

Source: (1) Kanyip, B. P. (2013). Admission crisis in Nigerian universities: the challenges youth and parents face in seeking admission. (2) Agboola, B. M., & Ofoegbu, F. I. (2010). Access to University Education in Nigeria: A Review. Online Submission. https://files.eric.ed.gov/fulltext/ED511051.pdf

NB: Agric. = Agricultural Med = medical, Engr. = Engineering, Env. = Environmental Sciences Admin = Administration

Table 2. Students enrollment into universities (in %) by selected courses of study (2000-2008)

Year of Admin	Agric. Science	Med. Science	Sciences	Engr. / Env'tal	Admin	Arts	Education	Law	Soc. Sciences	Total (%)
2000	3.0	8.5	17.6	17.7	14.9	10.0	6.2	5.3	16.8	100.0
2001	4.0	5.7	17.9	16.5	15.1	10.4	10.8	4.0	15.5	100.0
2002	3.6	7.4	16.3	16.0	14.8	10.4	11.2	4.2	15.9	100.0
2003	4.6	6.9	16.3	14.6	13.5	10.3	14.3	3.3	16.1	100.0
2004	4.4	5.8	16.7	13.0	11.1	10.8	17.3	2.9	18.0	100.0
2005	5.8	6.1	18.5	13.2	10.3	8.9	18.1	3.9	15.0	100.0
2006	5.2	6.5	17.4	12.7	14.9	9.9	13.6	3.4	16.5	100.0
2007	6.0	6.6	21.8	13.1	9.7	9.4	12.7	3.2	17.5	100.0
2008	6.0	7.1	23.0	13.6	8.8	9.7	12.9	2.7	16.2	100.0

Source: Computed for this study from dataset presented by Kanyip (2013) and Agboola & Ofoegbu (2010)

NB: Agric. = Agricultural Med = medical, Engr. = Engineering, Env. = Environmental Sciences Admin = Administration

Between 2005 and 2008, student admission into engineering and environmental sciences increased from 1.5% to 3.7%. The Sciences increased gradually from 2.4% (2004), 20.2% (2007) to 23.0% in 2008, respectively. Clear evidence of positive change in admission in the field of medical science could also be seen from 2005 where there was a 4.9% increase in enrolment rate, 6.2% (in 2006), up to 7.1% in 2008 (Table 3).

The result from the social sciences indicated that apart from year 2001 when the programme recorded 8.4% decrease in admission, it really enjoyed positive change in admission in 2002 (2.5%), 2003 (1.2%) and 2004 (10.6%) as shown in Table 3. However, enrolment into the programmes in Social Sciences witnessed a drastic decline (20.0%) the year preceding STEM policy (i.e. 2004) (Table 3).

Table 3. Percentage change with yearly admission by selected courses of study (2000-2008)

Year of Admin	Agric. Science	Med. Science	Sciences	Engr. / Env'tal	Admin	Arts	Education	Law	Soc. Sciences
2000									
2001	25.0	-49.1	1.7	-7.3	1.3	3.8	42.6	-32.5	-8.4
2002	-11.1	23.0	-9.8	-3.1	-2.0	0.0	3.6	4.8	2.5
2003	21.7	-7.2	0.0	-9.6	-9.6	-1.0	21.7	-27.3	1.2
2004	-4.5	-19.0	2.4	-12.3	-21.6	4.6	17.3	-13.8	10.6
2005	24.1	4.9	9.7	1.5	-7.8	-21.3	4.4	25.6	-20.0
2006	-11.5	6.2	-6.3	-3.9	30.9	10.1	-33.1	-14.7	9.1

2007	13.3	1.5	20.2	3.1	-53.6	-5.3	-7.1	-6.2	5.7
2008	0.0	7.1	23	3.7	-10.2	3.1	1.6	-18.5	-8.0
Source: Computed for this study from dataset presented by Kanyip (2013) and Agboola & Ofoegbu (2010)									

In addition, the reduction in social science admission rates has been declining though positively between 2006 and 2007 (9.1% to 5.7%) before entering a drastic decline in 2008, specifically, a percentage reduction of 8.0% (Table 3). Enrolment into Law was consistently high until a Year after STEM emergence in Nigeria. The proportional reduction into law programme/course range from 14.7% (2006) to 18.5% (2008) as shown in Table 2. The field of Arts experienced a drastic reduction in enrolment immediately after STEM introduction in 2004. The enrolment into the programme in 2005 was 25% lesser than the preceding 2004 admission (Table 2). The admission into the course again reduced by 5.3% between 2006 and 2007. Generally, the programme of administration, arts, education, law and social Sciences, ended up with negative percentage change in enrolment by the year 2008 compared with preceding years. Overall, the 4-year cumulative admission (2005-2008) for each of the science courses examined (i.e. agriculture, medical science, sciences and engineering) was higher than the preceding 4-year cumulative admission (2001-2004). The result was the opposite humanities such as administration, arts, education & law.

4.1. Gender analysis in university enrolment (2000-2008)

The gender analysis revealed bi-annual increases in male and female admission rate into universities in Nigeria. While there was a general upward increase from year 2000 and 2001 across gender, there was also a general increase between 2003 and 2004. After this period, the number of admission reduced drastically. Gender gap analysis indicated that admission into universities between male and female has never been equal. With respect to available data, the relative gap between male and female admission range from 13.6% to 21.1%. However, the trend of this gap became only consistently increasing from 2005. While the gaps were relatively wider in 2000 (16.5%), 21.1% and 23.2 % in 2001 and 2002 respectively, it narrowed in 2003 (13.6%) and 2004 (13.8%). The gap became steadily increasing in 2005 (17.6%), 18.4% (2006) and later became stabilized in 2007 and 2008.

Table 4. Gender distribution of universities admission by selected courses of study (2000-2008)

Year of Admin	Y2000	Y2001	Y2002	Y2003	Y2004	Y2005	Y2006	Y2007	Y2008
Male	26,600	54,365	31,948	59,540	69,802	44,916	55,209	64,689	68,159*
Female	19,054	35,402	19,907	45,262	52,842	31,489	38,038	42,652	44,941*
Total	45,654	89,767	51,855	104,802	122,644	76,405	93,247	107,341	113,100

Sources: Computed for this study from dataset presented by Kanyip (2013) and Agboola & Ofoegbu (2010).
NB: * = estimates

Table 5. Gender distribution of universities admission by selected courses (2000-2008)									
Year of Admin	Y2000	Y2001	Y2002	Y2003	Y2004	Y2005	Y2006	Y2007	Y2008
Male (%)	58.3	60.6	61.6	56.8	56.9	58.8	59.2	60.3	60.3
Female (%)	41.7	39.4	38.4	43.2	43.1	41.2	40.8	39.7	39.7
Total (%)	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Gap (%)	-16.5	-21.1	-23.2	-13.6	-13.8	-17.6	-18.4	-20.5	-20.5
Sources: Computed for this study from dataset presented by Kanyip (2013) and Agboola & Ofoegbu (2010). NB: * = estimates									

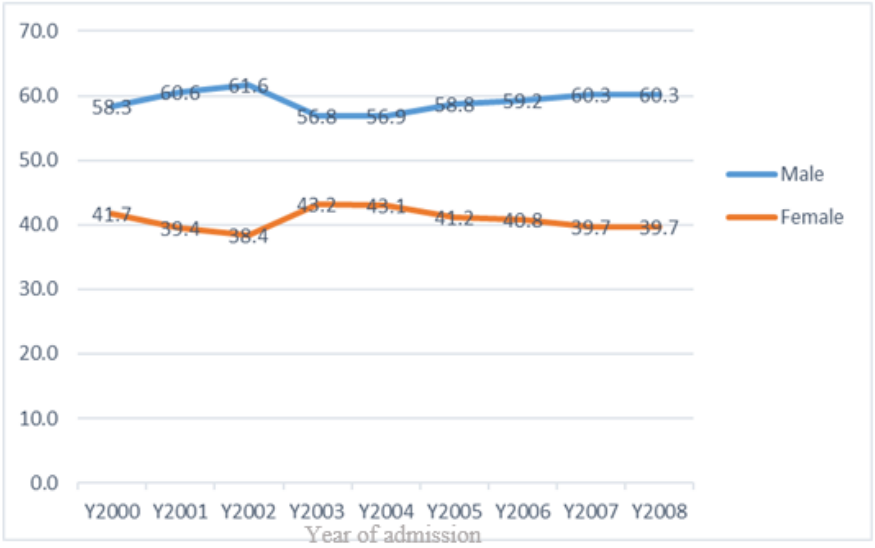

Figure 2. Gender distribution of university admission (%) 2000-2008

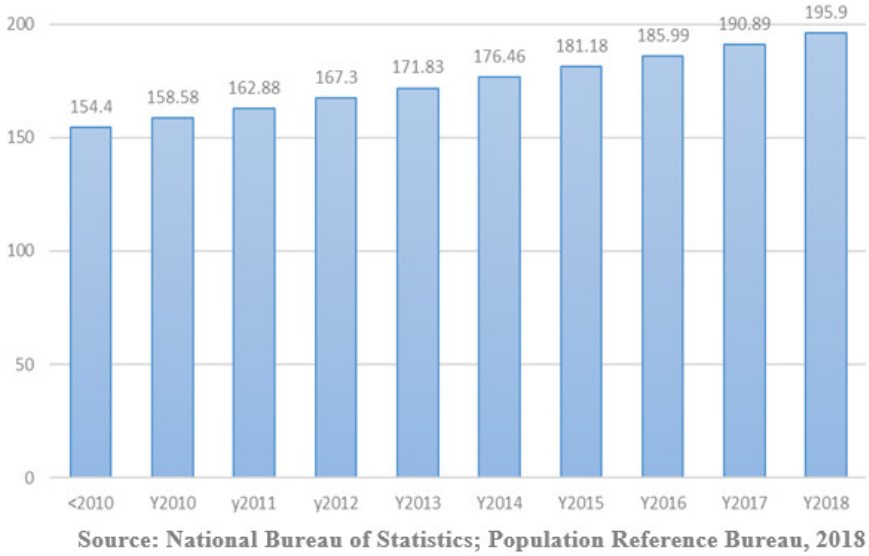

Figure 3. Trends in population growth in Nigeria

5. DISCUSSION

This position paper emphasised the systematic biases in support for higher institution with potential to constrain and weaken the humanities, social sciences. The continue pursuance of the policy unadjusted in its present form could discourage universities especially the privately

own ones from advertising for humanities and social sciences courses for obvious profit matter. The revelation of increase the 4-year cumulative admission (2005-2008) for courses STEM courses such as agriculture, medical science, sciences and engineering over the past preceding four year admission (2001-2004) with a decline in humanities and social science could suggest influx of engineers and scientist into Nigeria labour market compared to social scientists with potential danger for balanced economic growth. The study highlighted that population growth is the driver of development (Cohen & Ladaique, 2018; Zhao & Zhang, 2018) including for high demand in the university education and increase in admission rate. However, the gender gap highlighted could hinder gender-balanced development with negative socioeconomic issues such as poverty and employment (Agarwal et al., 2018; Cleland, 2018; Meadows, 1986) and further low school enrolment particularly where majority of women fail to access higher education.

The study also emphasised impact of rapid population. Nigeria population is estimated to be over 195.9 million out of 7.6 billion world population. While the country is acclaimed to be rich in mineral resources such as oil, the country is also characterized with high level of poverty and ranked among the countries with high fertility rate (Population Reference Bureau [PRB], 2018). As at 2017, over 49.1% of the population are in abject poverty and women are hardest hit than their male counterparts. This rate was a little different from the 2009 report of 53.5% poverty rate (Knoema, 2018). Women population is almost 50% of the total population and consists of young women and girls (Population Reference Bureau [PRB], 2018). The incidence of poverty in Nigeria is rated to be on the increase since 1980s. While several attempts have been made and on-going towards the economic development and wellbeing of the citizenry, a major obstacle to human development has been gender inequality especially as it affect women and girls in education, employment and health/wellbeing (United Nations Development Programme [UNDP], 2018). However, education is seen as potent means of tackling most of the developmental challenges especially as it affect health wellbeing and employment but the gender gap challenge has posed serious obstacle as well. Specifically, Poverty-education nexus impacts promotion of women development both at the family and societal levels (Coley & Baker, 2013; United States Agency for International Development [USAID], 2012; World Economic Forum, 2005, 2013).

While science education is therefore enjoying good support through various programmes, especially STEM in this case (Onanuga & Saka, 2018), the observed gender gap in university enrolment could pose a serious threat to the expected gains form the programme in Nigeria. A relative gap of 20.5% between male and female enrolment into university annually cannot be regarded as insignificant. An intervention programme that could enhance increase in women university enrolment could be expedient. Gender inequality especially in education reduce the prospect in growth and development (Klasen, 2000). It has considerable direct impact on economic growth through reduction in available women for employment, low quality women-human capital. This could culminate in low earnings, low economic status among women generally (Klasen, 2000). This gender gap could also serve as impediment to reduction in women fertility rate ($\geq$ 5.5) (Population Reference Bureau [PRB], 2018), fuels infant and maternal mortality, hinders women and family wellbeing as well as low economic progress (Klasen, 2000).

Every education especially tertiary training is organized or conducted to make the participants relevant to the contemporary economy. However, the rate of graduate absorption into the labour market in Nigeria was relatively 22% as at 2001 (Dabalen, Oni, & Adekola, 2001) has not improved considerably considering the high unemployment rate in the country (Amoo, 2018; United Nations Development Programme [UNDP], 2016; United Nations

Economic Commission for Africa [ECA], 2017). A report indicated that university graduates have been found wanting in requisite applied technical skills for the modern day development or are being perceived as unproductive on the job (Dabalen et al., 2001). Most employers expected proactive and short-term productive graduates and are not prepared to compensate for insufficient academic preparation or extra training cost (Dabalen et al., 2001). Thus, holistic training that can make student to be abreast with social situation and versatile could be appropriate but achievable if social context through relevant subjects are integrated into STEM training. Specifically, while STEM is adjudged to have potential to play significant role in virtually all facets of life such as economic, technological, political and environmental development, the holistic, interdisciplinary and multidisciplinary teaching of the subject would however be required (Adikwu, 2012; Amoo et al., 2019; Onanuga & Saka, 2018), so that the outcome can adequately meet and satisfy the demand of modern industries and dynamic population structure.

6. CONCLUSION AND RECOMMENDATIONS

The study confirmed that there exists gender gap in male and female enrolment into university in Nigeria, that the gap is relatively high but becoming stablised especially towards the end of the data period used. It highlighted the reality of STEM gaining support from stakeholders especially the government. While re-iterating the potential of STEM education in advancing the economy of Nigeria, it however, emphasised that its integration with humanities and social science disciplines could make the programme holistic, interdisciplinary and multidisciplinary towards effective and rapid delivery of economic development. The study observed that the persistence gender gap in education would engender low economic status of women and all its associated social and economic vices such as unemployment, high fertility rate, including infant and maternal morbidity and mortality and low family wellbeing. The authors however recommend programme of plausible measures to boost women enrolment into the university and across all towards achieving sustainable national development.

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REFERENCES

[1] Adikwu, M. U. (2012). Curriculum Development in Science, Technology and Mathematics (STM) Education. A Keynote Address presented at the. Presented at the The 49th Annual Conference of Science Teachers Association of Nigeria, Yenagoa: The 49th Annual Conference of Science Teachers Association of Nigeria.

[2] Agarwal, S., Satyavada, A., Kaushik, S., & Kumar, R. (2018). Urbanization, urban poverty and health of the urban poor: status, challenges and the way forward. Demography India, 36(1), 14.

[3] Agboola, B., & Ofoegbu, F. (2010). Access to University Education in Nigeria: A Review. Online Submission, (ED511051). Retrieved from https://eric.ed.gov/?id=ED511051

[4] Aguele, L. I., & Agwagah, U. N. (2007). Female participation in science, technology and mathematics (STM) education in Nigeria and national development. Journal of Social Sciences, 15(2), 121–126.

[5] Amoo. (2018). Introduction to Special Edition on Covenant University's Perspectives on Nigeria Demography and Achievement of SDGs-2030. African Population Studies, 32(1). https://doi.org/10.11564/32-1-1170

[6] Amoo, E. O., Adekola, P. ., Olawole-Isaac, A., Samuel, G. W., Akanbi, M. ., Ajayi, M. ., & Agboola, O. . (2019). Science, technology, engineering and mathematics: Where is the place of Demography? A Position Paper on Demography and STEM. International Journal of Mechanical Engineering and Technology (IJMET), 9(13), in print.

[7] Badejo, J. A., John, T. M., Omole, D. O., Ucheaga, E. G., Popoola, S. I., Odukoya, J. A., & Ajayi, P. (2018). Data sets linking ethnic perceptions to undergraduate students learning outcomes in a Nigerian Tertiary Institution. Data in Brief, 18, 760–764.

[8] Clarke, M. (2019). STEM to STEAM: Policy and Practice. In STEM to STEAM: Policy and Practice. In: de la Garza A and Travis C. (eds). The STEAM Revolution (https://doi.org/10.1007/978-3-319-89818-6_15, pp. 223–236). Springer, Cham. Retrieved from https://link.springer.com/chapter/10.1007/978-3-319-89818-6_15

[9] Cleland, J. (2018). Family Planning and Fertility Control in Development. The International Encyclopedia of Anthropology, 1–7. https://doi.org/10.1002/9781118924396.wbiea1515

[10] Cohen, G., & Ladaique, M. (2018). Drivers of Growing Income Inequalities in OECD and European Countries. In: Carmo R., Rio C., Medgyesi M. (eds) Reducing Inequalities. In Reducing Inequalities (https://doi.org/10.1007/978-3-319-65006-7_3, pp. 31–43). Springer, Palgrave Macmillan, Cham.

[11] Coley, R. J., & Baker, B. (2013). Poverty and education: Finding the way forward. Educational Testing Service Center for Research on Human Capital and Education.

[12] Crowder, D. B. (1983, October 21). The Importance of the Humanities in the Age of High Technology. ERIC. Paper presented at a Meeting of the Mid-South Association of Community and Junior Colleges, Dyersburg, TN,. Retrieved May 1, 2019, from https://eric.ed.gov/?id=ED258623

[13] Dabalen, A., Oni, B., & Adekola, O. A. (2001). Labor market prospects for university graduates in Nigeria. Higher Education Policy, Palgrave Macmillan UK, 14(2), 141–159. https://doi.org/10.1016/S0952-8733(01)00010-1

[14] Dalbert. (2011, May 12). Ten Important Reasons to Include the Humanities in Your Preparation for a Scientific Career. Retrieved from https://blogs.sciencemag.org/sciencecareers/2011/05/ten-important-r.html

[15] Gonzalez, H. B., & Kuenzi, J. J. (2012). Science, technology, engineering, and mathematics (STEM) education: A primer. Congressional Research Service, Library of Congress. Retrieved from http://www.stemedcoalition.org/wp-content/uploads/2010/05/STEM-Education-Primer.pdf

[16] Imam, H. (2012). Educational policy in Nigeria from the colonial era to the post-independence period. Italian Journal of Sociology of Education, 4(1). Retrieved from http://ijse.padovauniversitypress.it/system/files/papers/2012_1_8.pdf

[17] Iruonagbe, C., Imhonopi, D., & Egharevba, M. (2015). Higher education in Nigeria and the emergence of private universities. International Journal of Education and Research, 3(2), 49–64.

[18] John, T. M., Badejo, J. A., Popoola, S. I., Omole, D. O., Odukoya, J. A., Ajayi, P. O., … Atayero, A. A. (2018). The role of gender on academic performance in STEM-related disciplines: Data from a tertiary institution. Data in Brief, 18, 360–374.

[19] Kanyip, B. P. (2013). Admission crisis in Nigerian universities: the challenges youth and parents face in seeking admission. Submitted in partial fulfillment of the requirements for the degree of Doctor of Education. Seton Hall University Dissertations and Theses (ETDs), 217. https://scholarship.shu.edu/dissertations/1908/

[20] Klasen, S. (2000). Does gender inequality reduce growth and development? Evidence from cross-country regressions. LUDWIG Maximillians Universatat Muchen. https://doi.org/10.5282/ubm/epub.1602

[21] Knoema. (2018). Nigeria, Total Population. (No. World Data Atlas). Knoema Corporation, US. Retrieved from https://knoema.com/atlas/Nigeria/Population

[22] Lee-Roy, C. (2013, May 11). The Importance of Technology in Economic and Social Development. Retrieved from https://www.fairobserver.com/region/africa/importance-technology-economic-and-social-development/

[23] Meadows, D. (1986). Poverty causes population growth causes poverty. Sustainability Institute, The Donella Meadows Archive. Retrieved November, 17, 2006.

[24] Metcalfe, S. (2018). Evolutionary theories of economic and technological change: present status and future prospects (Vol. 44). Routledge. Retrieved from https://www.taylorfrancis.com/books/e/9781351127691/chapters/10.4324%2F9781351127707-8

[25] Mouton, J. (2011). The Humanities and Social Sciences in SA: Crisis or cause for concern? South African Journal of Sciences, 107(11/12), 961. http:// dx.doi.org/10.4102/sajs. v107i11/12.961

[26] Nigerianfinder.com. (2018). First Universities in Nigeria: The Oldest 10. Retrieved from https://nigerianfinder.com/first-universities-in-nigeria-oldest

[27] Nwangwu, I. O. (2007). Higher education for self-reliance: An imperative for the Nigerian economy. NEAP Publication, 1–8.

[28] Okonkwo, U. C., Ubani, N. O., & Ubachukwu, O. A. (2013). A Functional Curriculum for Engineering Education in Nigerian Universities. International Journal of Scientific & Engineering Research, 4(1), 1–5.

[29] Okoroma, N. (2006). Educational Policies and Problems of Implementation in Nigeria. Australian Journal of Adult Learning, 46(2), 243–263.

[30] Okpala, I., & Li, J. (2018). Geotechnical Engineering Education in Nigeria: Reflecting on University versus Industry Reality. Retrieved from https://docs.lib.purdue.edu/cgi/viewcontent.cgi?article=1029&context=aseeil-insectionconference

[31] Onanuga, P. A., & Saka, A. O. (2018). Trend Analysis of Students' Academic Performance in Selected Science, Technology, Engineering, and Mathematics Subjects in Ogun State Basic Education Certificate Examination (OG-BECE), Nigeria, from 2011 to 2015: A Projection for Five Years. Science Education International, 29(2), 110–116.

[32] Popoola, S. I., Atayero, A. A., Badejo, J. A., Odukoya, J. A., Omole, D. O., & Ajayi, P. (2018). Datasets on demographic trends in enrollment into undergraduate engineering programs at Covenant University, Nigeria. Data in Brief, 18, 47–59.

[33] Population Reference Bureau [PRB]. (2018). The 2018 World Population Data Sheet (with a Special Focus on Changing Age Structures. Population Reference Bureau [PRB], Washington DC. Retrieved from https://www.prb.org/wp-content/uploads/2018/08/2018_WPDS.pdf

[34] Scott-Emuakpor, A. (2010). The evolution of health care systems in Nigeria: Which way forward in the twenty-first century. Nigerian Medical Journal, 51(2), 53–65.

[35] Solaipriya, P., & Suresh, M. (2019). A Study on Information and Communication Technology Skills of LIS Professionals in Management Institutions of Tamil Nadu. In Literacy Skill Development for Library Science Professionals (DOI: 10.4018/978-1-5225-7125-4.ch005, pp. 106–127). IGI Global. Retrieved from https://www.igi-global.com/chapter/a-study-on-information-and-communication-technology-skills-of-lis-professionals-in-management-institutions-of-tamil-nadu/214355

[36] Thelen, K. (2019). Transitions to the Knowledge Economy in Germany, Sweden, and the Netherlands. Comparative Politics, City University of New York, 51(2), 295–315. https://doi.org/10.5129/001041519825256623

[37] Tsuruga, I. (2015). Is Growth an Irony for the Poor in Nigeria?January 28, 2015. Retrieved January 11, 2019, from https://www.povertist.com/is-growth-an-irony-for-the-poor-in-The Povertist

[38] United Nations Development Programme [UNDP]. (2016). Human Development Report 2016: Briefing note for countries on the 2016 Human Development Report Nigeria (Human Development for Everyone). United Nations Development Programme. Retrieved from http://hdr.undp.org/sites/all/themes/hdr_theme/country-notes/NGA.pdf

[39] United Nations Development Programme [UNDP]. (2018). Human Development Index (HDI). Human Development Index data. United Nations Development Programme. Retrieved from http://hdr.undp.org/en/data

[40] United Nations Economic Commission for Africa [ECA]. (2017). Country Profile 2016: Nigeria (p. 48). United Nations Economic Commission for Africa. United Nations Economic Commission for Africa. Retrieved from https://www.uneca.org/sites/default/files/uploaded-documents/CountryProfiles/2017/nigeria_cp_eng.pdf

[41] United States Agency for International Development [USAID]. (2012, March). Gender Equality and Female Empowerment Policy. United States Agency for International Development, Washington, DC.

[42] World Economic Forum. (2005). Women's Empowerment: Measuring the Global Gender Gap (eds.) Lopez-Claros Augusto and Zahidi Saadia. World Economic Forum, Geneva, Switzerland.

[43] World Economic Forum. (2013). The Global Gender Gap Report 2013. World Economic Forum, the Global Gender Gap Index 2013, Geneva, Switzerland. ISBN 978-92-95044-43-2. World Economic Forum, Geneva, Switzerland. Retrieved from http://www3.weforum.org/docs/WEF_GenderGap_Report_2013.

[44] World Education News and Review [WENR]. (2017, March 7). Education System Profiles: Education in Nigeria. Retrieved from https://wenr.wes.org/2017/03/education-in-nigeria

[45] Zhao, Z., & Zhang, G. (2018). Socioeconomic Factors Have Been the Major Driving Force of China's Fertility Changes since the Mid-1990s. Demography, 55(2), 733–742. https://doi.org/10.1007/s13524-017-0595-x

[46] Zuhumnan, D. (2018). Poverty in Nigeria: Understanding and Bridging the Divide between North and South. Commentary and Analysis. APRIL 6, 2018. Retrieved from https://www.cgdev.org/blog/poverty-nigeria-understanding-and-bridging-divide-between-north-and-south#disqus_thread