

**PROSPECTS AND PROBLEMS OF NIGERIAN WOMEN IN SCIENCE
AND TECHNOLOGY FOR NATIONAL DEVELOPMENT**

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ABSTRACT

Science and technology are human activities that have had profound influence on creation of wealth and sustainable development, but are the areas that have been recording the lowest women participation worldwide. It is a necessity that Nigerian women should be part and parcel of her science and technology development. Nigerian's effort to promote female entry into S&T took varied dimensions and the efforts seemed to yield the deserved fruits as evidenced by the increasing trends of female enrolment into S&T programme in tertiary institutions across the country. Nigerian women still encounter some conflicting experiences and obstacles that have prevented many of them from entering, staying and excelling in their S&T careers. Some coping strategies are suggested, but the up-and-coming women in S&T are advised to look up to and draw inspirations from successful females in S&T careers.

KEY WORDS: Women, Science and Technology, Accessibility, Enrolment, Obstacle and Conflicts, Coping Strategies.

INTRODUCTION

In recent time, Science and technology (S&T) are human enterprises and have fallen within the interest and capabilities of all humans regardless of race, gender, nationality or ethnicity (Byant & Swinton, 2001). As human activities S&T have engaged the attention of humans for centuries and have had profound influence on people's economic, social and cultural life. They are powerful tools for understanding, interpreting and controlling the natural and artificial environment and are instruments for har-

nessing resources for the benefits of the people. Acquisition of S&T skills has formed the basis for creation of wealth and sustainable development. As a result of these benefits, every nation endeavours to make science and technology education accessible to all her populace in order to equip them for the technology age and also to appreciate the worth and limitations of S&T. Nigeria is not left out of this effort of inclusive science education by taking women/ girls along the road to S&T education.

With the slogan "science for all", the differences in theory and practice of science and technology among men and women that are taken for granted have changed. The marginalization of women in education which hindered their access to science education is removed by making education accessible to all. The impression that science is a masculine subject, not meant for women/girls is been replaced by providing the same and equal environment for both boys and girls to learn science, exposing them equally to the same curriculum. In Nigeria, the efforts to promote women/girls entry into S&T profession have taken varied dimensions. Realising the need for women education and the importance of women involvement in science and technology, many state governments including federal governments established special science secondary schools for girls. Some states offer scholarship to girls who gained admission into tertiary institution to read science. These opportunities brought many girls in touch with science and have resulted in having a large number of female enrollment in S&T schools. Njoku (1997) and Ejiofor (1999) observed that the government efforts in women education is yielding the desired fruits as laudable number of girls are in all levels of education in Nigeria today. This was confirmed by Ezeliora (2006) who ascertained an increasing trend of female enrolment in science, technology and engineering courses in tertiary institutions in the country (Ezeliora, 2006 & Njoku, 1997). Thus Ejiofor (1999) said that there was a large number of girls in all levels of education in Nigeria today.

Table 1: Distribution of Students in Nigerian Secondary Schools in 1959,1963, 1970 and Percentage Female

Year	Male	Female	Total	% Female
1959	92,480	23,106	115,586	19.99
1963	151,807	60,072	211,879	28.55
1970	205,959	104,095	310,054	33.57

Source: Alele-Williams on Nigerian Women and Development,1985.

The table above showed the total number of Nigerian girls in secondary school at the time. The number in each year represents the total number of girls in all the secondary schools in Nigeria. Their number was not up to half the number of boys in schools as of the time.

Table 2: Enrolment of Female in Science and Technology Based Disciplines in Nigerian Universities Relative to Total Enrolments in 1980/81 and 1981/82

FACULTY	1980/81			1981/82		
	F	MF	% FEMALE	F	MF	% FEMALE
Agriculture	246	2024	12.2	277	2521	11
Engr.Tech	64	2405	2.7	156	3736	4.2
Env. Science	79	1079	7.3	241	1991	12.1
Medicine	904	4530	20	1143	5070	22.5
Pharmacy	80	263	30.4	132	678	19.5
Nat. Science	1061	5667	18.7	1350	7368	18.3
Vet.Medicine	27	455	5.9	115	1114	10.1

Source: Okeke (1992) STAN Position Paper NO. 4

Table 2 showed the total number of Nigerian girls that were enrolled in science and technology based courses in all the universities in Nigeria. The number of women/girls is not up to half the total population in each of the faculties and is too small to represent women in a country where women/girls form up to 60% of the population. Tables 1 and 2 showed the low enrolment of women/girls in education in the early sixties. Comparing it with what we have in schools today showed a great improvement in the involvement of women/girls in education and S&T in particular.

Table 3: Nominal Roll of Male and Female Students in Science Based Course in University of Nigeria Nsukka Alone, 2002/2003

Faculty	Male	Female	Total	% Female
Agriculture	92	169	261	64.8
Biological Sc.	242	175	417	42
Engineering	408	56	464	12.1
Pharmaceutical	152	144	296	48.6
Physical Sc.	463	311	774	40.2
Vet. Medicine	126	65	191	34.03
Env. Studies	143	80	223	35.9
Health Science	119	148	267	55.4
Science Edu.	27	67	94	71.3
Med. Dentistry	297	150	447	33.6
Total	2069	1365	3434	39.8

Source: University of Nigeria, Nsukka Planning Unit, 2006

The data in Table 3 showed the nominal roll of male and female students in science based courses in University of Nigeria alone in 2000/2003 session. University of

Nigeria is one of the first generation university in Nigeria. The table above showed a lot of improvement of girls/women enrolment into science based courses. Some departments recorded more girls than boys.

Table 4: Nominal Roll of Postgraduate Students by Sex in Science Based Courses in University of Nigeria, Nsukka, 2002/2003 Session

Faculty	Male	Female	Total	% Female
Agriculture	235	112	347	32.3
Biological Sc.	212	130	342	38
Science Edu	74	42	116	36.2
Engineering	195	12	207	5.8
Pharmaceutical	13	8	21	38.1
Physical Sc.	177	68	245	27.8
Vet. Medicine	25	3	28	10.7
Env. Studies	87	12	99	12.1
Health Science	67	26	93	28
Med. Dentistry	-	-	-	-
Total	1085	413	1498	27.6

Source: Planning Unit, University of Nigeria, Nsukka,2006.

Table 4 showed postgraduate enrolment in science based courses sex by sex. There is a sharp reduction in female students' enrolment in science based courses in the post-graduate level. The number of female enrollment reduced drastically; it was not up to 50% of the total number of postgraduate students in each faculty.

Table 3 showed a remarkable increase in the enrolment of girls into science based courses in tertiary institutions in the country when compared with what was obtained in the previous years. This trend of enrolment in the above tables cut across most universities in Nigeria but for want of time and space only University of Nigeria Nsukka is used. As was indicated in the tables some science departments have more girls than boys in enrolment. In Table 4, the number of women enrolment in post-graduate dropped though some women/girls doggedly continued. This seems to undermine the efforts to empower women through science and technology. Okeke (1999) pointed out that a good number of women doctors, pharmacists, engineers, geologists, architects and many others abandon their career and set up some business that are unrelated to their training. This attitude is worrisome especially now that the world is moving towards high technology adoption.

Table 5: Academic Staff Strength By Sex and Faculties in Natural Science Department in Nnamdi Azikiwe University, Awka

Department	Male	Female	Total	% Female
Parasitology	10	13	23	56.5
Statistics	12	9	21	42.9
Botany	10	6	16	37.5
Microbiology	14	13	27	48.2
Biochemistry	11	12	23	52.2
Ind. Chemistry	14	18	32	56.3
Computer Sc.	12	11	23	47.8
Geology	17	6	23	26.1
Mathematics	9	7	16	43.8
Zoology	7	10	17	58.8
Physics	17	7	24	29.2

Source: Faculty of Natural Sciences, Nnamdi Azikiwe University, Awka, 2007

Table 5 showed the number of female lecturers in the Department of Natural Sciences in the university. The above record is almost the same in all the universities in the country. There are women scientists in other areas. While some of the female lecturers are professors, others are professors in the making; still others are already professor emeriti. The number of surviving women in scientific careers as recorded in Table 5 is encouraging, almost covering up with their male counterpart in the departments though the number may be considered small when compared to the large number of girls in universities. The fact remains that women/girls are in science now than before and science is no longer seen as a masculine career.

Prospects of Nigerian Women in Science

One of the major set backs of the third world countries is poor human development. Thus the level of development of any nation is shown through the extent her populace are educated especially her women. The awaking interest to have women/girls participation in science and technology come as a result of the need to get everybody involved in national development. Women/girls are talented beings and some are talented genius in science. These talents need to be developed and utilized for the benefit of the society. Secondly, science and technology are perceived as powerful model for understanding and interpreting the natural world and provides power for extending human capacities to control environment as well as living creatures (Harding, 1987). It is necessary that women should be part and parcel of it. Excluding women from S&T will mean excluding them from power and from contributing to national development. Furthermore, the sustainable development which is the ma-

major goal of S&T education cannot be feasible in Nigeria without having her women in science and technology. Nigerian women play vital role in the essential sectors of development such as the use of land, economic management of water, protection of forests, preservation of biodiversity and technological information. According to Okeke (2001) development in these essential sectors is a mirage in Nigeria if her women lacks sufficient schooling and scientific information to understand what is at risk and adapt their behaviour to new situations. For instance, today Agriculture which was Nigeria's main source of economy has collapsed. Women provide up to 70% of agricultural labour force. If women were trained in agriculture with men, with their science and technology education the women would have kept up and sustained agricultural sector when men abandoned it to the urban cities.

Getting women in science and technology is likely to give a different meaning to and new direction to scientific inventions. Women are very caring, careful, responsive, very much concerned with preservation and protection of life. Women coming into S&T with these feminine attributes will give S&T a feminine touch. Ezeliora (2007) noted that when women apply their mothering skills and feminine genius into S&T career, S&T will have a more human face that will meet the needs of all categories of **persons and groups** which in turn will influence positive decisions for political, social and economic development of the nation. However, two heads are better than one. When women and men scientists put their ideas together to plan for national development, better and useful outcomes will emerge than when only men are left to plan and execute. Thus Olateru-Olagbeju (2006) opined that women's full participation in the country's plans, policies and programmes are essential if meaningful development that will really benefit every Nigerian will take place. In addition, women bear and nurture the nation's work force through taking care of the health, nutritional needs of children and as well as adult members in the family. In other words, infant mortality, high fertility rate, and high maternal mortality in the country correlate with low level of scientific literacy of the women. Generally, most of the above mentioned incidences occur in the rural areas where illiterate women abound with no scientific knowledge. Since life in the family is primarily science based, it behooves to widen women's access to science and technology education in the interest of the nation. Most importantly, success of the Millennium Development Goals will be feasible only if women/girls are carried along through science education. That is what Anagbogu (2007) described as gender mainstreaming in science.

She posited that science for all involves full participation of men, girls, boys and women in all scientific activities to the extent that no gap should be left and nobody is left behind.

Barriers To Women's Full Participation in S&T Career.

One of the Millennium Development Goals (MDG) is to achieve science for all, nobody is left behind (NRC,1999). This aim according to Metz (2008) is to mitigate

academic achievement gaps associated with ethnicity, socio-economic status, gender, physical disability, limited English language ability. Any educational set up that will not bridge these gaps will be obnoxious to national development. Women/girls participation in science is to equip them for their contribution in national development and their involvement in planning and decision making. Many women have really made it in S&T based career but their capacity building is still very small when compared to great number that enroll into S&T in secondary school and undergraduate level. A good number of women doctors, pharmacists, engineers geologists and so many others abandon their career after first degree as seen in table 5 and set up some business that are not related to their training (Okeke,1999). Harding & McGregor (1996) observed that inside S&T community, women/girls encounter an array of barriers which create chilly climate that prevents some women/girls from participating fully in S&T professions. A lot of obstacles visible and invisible have discouraged girls/women from entering, staying and excelling in science and technology careers (Njoku,2001).

One major barrier is the conflicting impact of their career with their roles as mothers and home makers. Most S&T career involve field work or long period in office or laboratory which are not experienced in other professions. S&T career exposes one to a lot of hazards and dangers that constitute a risk for a nursing or pregnant mother. When the demand of career becomes unbearable, a good number of women doctors, geologists, architects and so on abandon their career and settle with less demanding profession. This was observed by Okeke (1999) when she noted that career-role-conflict situations compel some women in S&T to drop out of their S&T careers.

Furthermore, Njoku (2001) said that the most critical of these conflicts is the reproductive years overlapping with career productive years and role of mother and home-maker demand on S&T career. However, when the difficulty in managing the overlap of child bearing and rearing and S&T career demands become unbearable, women usually sacrifice their S&T career and consolidate family roles. Confirming the above point, Harding and McGregor (1996) noted that women who give priority to child bearing during the periods that are critical to career development and promotions suffer career consequences. Alternative for such women is to opt out of the S&T career to attend to their family responsibility.

Njoku (2001) further pointed out that inadequate remuneration is a serious obstacle experienced by Nigerian women in science and technology. In Nigeria, there is no clear gender based disparity in remuneration for equal work, but gender discrimination against women in the assignment of critical duties may give rise to gender discrimination in income for the same job. Research and field work in S&T are very strenuous and too demanding. Many a time no remuneration is attached to them. Men by carrying out important duties are likely to gain additional incomes as impress account, duty tour allowance while the women who suffer discrimination earn nothing extra than their stark salaries. When women weigh their loses in family responsi-

bility against the remuneration from job, the tendency is for them to opt out and set up lucrative business like restaurants, hairdressing.

Way Forward

That some women have doggedly persevered and excelled in S&T career should be sources of inspiration and encouragement to other women. Their coping strategies with the obstacles they experienced in S&T career should be a guide and a challenge to the young and upcoming females opting for S&T career. Njoku (2001) pointed out the following as possible strategies for coping namely: perseverance, seeking research grant and consultancy from external sources, assertiveness and self-confidence, mastery of one's profession, hard work, cooperation with colleagues, willingness to solve problems by self and resourcefulness. According to Njoku (2001) these strategies are capable of reducing or eliminating the obstacles experienced by women in S&T career. In other words, adopting these strategies is likely to reduce or stop the wasteful attrition of women in S&T career and thus more women will enter, stay and excel in S&T professions. Another strategy is the ability of the women to manage their time effectively at home and in the career. This means cutting off irrelevant engagements to save time and energy for family and career demands. Invariably, coping with the obstacles and conflicts encountered in the career depends on the women's professional skills and management of their family and work environment.

CONCLUSION

The efforts to promote female entry into S&T profession have yielded the desired fruits. Women/girls are no longer afraid of science nor regard it as masculine subject. Though women encounter a lot of obstacles in S&T career, coping strategies are demanded from them to stay and excel in S&T profession. The young and upcoming female scientists opting for S&T career should imitate and adopt the strategies used by those successful women in S&T career to manage their situation.

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