

Gender and Research Attainment in Nigerian Agricultural Universities

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Abstract

The study uses data on the research outputs of 219 academics in three Nigerian universities of agriculture to compare gender with research attainment. The findings show that research attainment is slightly higher for male academics than for female. Academic qualifications and rank are significantly associated with gender and, although there was no significant association between promotion time and gender, male academics have higher publishing rates in journals and proceedings of repute. A high correlation also exists between gender and age, length of service and representation in management. More male faculty members are employed at top management positions, while the majority of female faculty members occupy middle management and entry levels. A policy of gender mainstreaming that would ensure gender balance in recruitment, training and research opportunities could provide a passage through which females gain greater access to positions hitherto dominated by their male counterparts.

Résumé

L'étude exploite les résultats de recherche de 219 universitaires provenant de trois universités agricoles nigérianes, afin de comparer le genre et la réussite au niveau de la recherche. Les résultats montrent que le niveau de réussite en termes de recherche est légèrement plus élevé pour les chercheurs de sexe masculin que pour ceux de sexe féminin. Les qualifications et le grade académiques sont considérablement associés au genre et bien qu'il n'y ait pas d'association significative entre le temps de promotion et le genre, il a été constaté que les universitaires de sexe masculin bénéficient d'un plus haut taux de publication dans les revues et écrits de renommée. Il existerait également une forte corrélation entre le genre et

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l'âge, la durée de service et la représentation au niveau des instances dirigeantes. Il existe davantage de membres des facultés de sexe masculin à des postes élevés de direction, tandis que les femmes membres des facultés occupent les positions intermédiaires ou inférieures. Une politique de rationalisation de la répartition de genre permettant d'assurer un certain équilibre de genre au niveau du recrutement, de la formation et des opportunités de recherche pourrait permettre aux femmes d'avoir un plus grand accès aux postes jusque-là réservés à leurs collègues de sexe masculin.

Introduction

Over the past three decades, the Nigerian tertiary education sector has expanded enormously. During this period, the proportion of faculty members eligible for tenure has gone up, but by far the most significant increase has been in male faculty. Recent studies have indicated how important the continued under-representation of women in education, particularly at tertiary level, is for agricultural development (Acker et al. 2000). Such gender differences clearly have consequences for the universities' tripartite mandate. However faculty performance, according to Ladebo (2003), is usually assessed and rewarded based on scholarly output and publication counts, with less priority given to teaching and service roles. Hence the organisational culture of academic journals, seminars and conference proceedings has become a factor in the assessment and promotion of faculty (Wilson 1993). Less advantaged positions persist even among professional women (Gunderson 1989). In support of this assertion Fameso (1992) and Oloruntoba (2001) found that male scientists still largely dominate agricultural research institutes in Nigeria. In terms of gender productivity, however, contradictory views were expressed. Rahji (2001) established that a large difference exists in labour productivity between the sexes. Bailey (1992) reported a higher level of research productivity by male faculty members. Kotrlik et al. (2002) have also noted that female faculty members are lagging behind more experienced male faculty members.

Of the universities in Nigeria twenty-four are federal institutions, and three of these are specialised universities of agriculture. Two of the universities of agriculture were established in 1988 in the southwest (in Abeokuta, Ogun State) and north (in Makurdi, Benue State), and the third was established in 1992 in the southeast (at Umudike, Abia State). Adopting the American collegiate system, and using experimental stations and model outreach villages, these institutions represent a new concept for promoting agricultural education and agricultural development services and the attainment of self-sufficiency in agricultural production in Nigeria. The distinguishing feature of these univer-

sities of agriculture is their tripodal mandate of teaching, research and community service focusing on agriculture.

Topical issues at the forefront of research in the universities of agriculture were in the core areas of agriculture, science, engineering and technology, which underpinned the vision for their establishment. For instance the Abeokuta University of Agriculture was judged the best in research and won the overall first prize of N1 million in the first Nigerian Universities Research and Development Fair (NURESDEF) organised by the National Universities Commission (NUC) in Abuja in November 2004. At the fair forty-three federal, state and private universities, as well as three inter-university centres, exhibited a total of 592 research projects (*This Day* 2004). Prior to this, in 2002, Abeokuta blazed the trail in quality of teaching, research and community service as rated again by NUC, making her the *primus inter pares*.

Generally research is a public domain in Nigeria and has had a powerful impact in several areas including agriculture, commerce and industry. The impact of agricultural research has been particularly remarkable, given that there were eighteen agricultural research institutes with specific mandates and linkages with the International Institute for Tropical Agriculture (IITA) in Ibadan, which is also a member of the Consultative Group in International Agricultural Research (CGIAR). The finding that public research is inadequate led to assistance by the World Bank under the aegis of the National Agricultural Research Project (NARP) in 1994. Anecdotal evidence, however, reveals that little attention has been paid to gender differences of faculty in relation to research attainment in agricultural universities in Nigeria, despite the fact that increased research activities in tertiary education in developing countries and transition economies could fuel economic development.

Literature Review

The literature cited provides ample information on gender disparities but not particularly on women in science and technology. However literature on gender is critical in shaping policy directions. Early gender and development literature focused on economic development (Boserup 1970; Beneria and Sen 1981; Beneria 1995), gender and justice in economic development (Jacquette 1990), gender equality (Elson and McGee 1995), gender awareness (Elson 1993, 1995), gender and agricultural science (Buttel and Goldberger 2002), gender in development (Jobes 1997), gender in agriculture (Fortmann 1979, 1984; Olawoye 1989, 1994, 1995). Nowadays the key policy issue is that of gender “mainstreaming”, a systematic strategy to promote equal opportunities for women and men and to break down traditional role patterns which perpetuate the marginalisation of women (Schayan 2002).

Inequality in the employment of men and women is a reflection of more general gender differences in the social and economic structure (Bose and Acosta-Belen 1994). The Women in Development Network (1990) put the percentage of women among university teachers in Nigeria at only 10 per cent, while the FAO (1984) reported that only 3.4 per cent of the agriculturally trained personnel from forty-six countries in Africa were women. Similar findings were recorded in the Caribbean, where men far outnumber women in senior academic and administrative positions in the Faculty of Agriculture at the University of the West Indies. Karl (1998) found that only 14.7 per cent of the staff of the Faculty of Agriculture at the Obafemi Awolowo University, Ile-Ife, were women, the majority in the Home Economics Department. The same is true of the affiliated Federal College of Agriculture, Akure, where women overwhelmingly hold lower-level positions.

Radha Krishna et al. (2001) posit that journals provide an avenue of recognition for many researchers, since a published journal article is the first formal presentation to the scientific community of an innovation or discovery. Thus journals (and conference proceedings) may be the best source for the most current state-of-the-art literature in any discipline. It is also interesting to note that one of the criteria for promotion of researchers and academics is the number of such published articles. For example evidence of scholarly publication is presented on a three-yearly basis as a criterion for promotion in the Nigerian agricultural universities.

Approach

The objectives of this study were to:

- ascertain the gender distribution of senior academic and management positions in Nigerian agricultural universities
- identify gender differences with regard to promotion, publication rates and training opportunities
- determine the relationship between personal characteristics of faculty members and their research attainments.

The intended sampling frame was 540, but the actual sample consisted of 219 full-time academic staff members ranging from professorial rank to graduate assistants in the three Nigerian universities of agriculture. To guide the selection of the sample, secondary data reflecting the profiles of faculty members was collected from the personnel units of the universities and analysed.

In selecting the sample frame, two types of sampling techniques were used. Proportionate stratified random sampling was used to randomly select faculty members from each department/unit of each university and to represent a stra-

tum. The purposive sampling technique was then used to select all female members of staff in all male-dominated departments/units. This translated to 180 samples per university, which were designated for anonymity as A, B and C. Therefore a total response rate of 41 per cent was achieved, and the total sample size for the study was 219. The low response rate, particularly in university C, was attributable to refusal or unavailability of respondents as well as other factors prevailing at the time data was collected. Nevertheless the sample revealed important dimensions in the study and was representative enough to draw valid inferences. The questionnaire was face and content validated by experts, pre-tested and had an estimated internal consistency reliability measure (Cronbach's alpha) of 0.78. Primary data was collected from academic staff through the use of a structured questionnaire administered in personal visits and follow-ups. The data was analysed using descriptive statistics, Chi square and PPMC to test four alternate hypotheses. The alpha levels were set *a priori* at 0.05 and 0.01. A summary of population, sample size and questionnaire response rates are presented in Table 1 below.

Table 1: Summary of population, sample size and questionnaire response rates

University	Population (N)	Intended sample	Sample size	Questionnaire return response (%)
A	280	180	103	57
B	283	180	99	55
C	250	180	17	9.4
Total	813	540	219	41

Findings

The findings are presented based on four alternate hypotheses posed for the study as follows:

- H_{A1} : There is gender equity in publishing rates, promotion waiting periods and training opportunities in the three universities of agriculture.
- H_{A2} : Women academics are less likely than men to attain senior scientific and administrative positions in the three universities.
- H_{A3} : A significant relationship exists between the personal characteristics of academics and their research attainment.
- H_{A4} : A significant relationship exists between time spent on teaching, research and extension of academics and research attainment.

Gender Equity in Publishing Rates, Promotion Waiting Periods and Training Opportunities

Like most universities the world over, research attainment in the three Nigerian agricultural universities is determined by the number of published articles in refereed journals and conference proceedings of repute. Indeed refereed journal papers and proceedings, books or chapters in books, monographs and non-refereed conference papers are usually channels for the dissemination of research and development activities among researchers. Hence publishing a paper in higher-impact journals is an indication of success in advancing the frontiers of knowledge.

Table 2 presents gender and promotion waiting periods in the Nigerian universities of agriculture and reveals that the majority of academic members of staff (69.1 per cent) reported 3-year modal waiting periods for promotion. However, in terms of gender, there are more male academics reporting the same 3-year waiting periods. Those that missed the 3-year promotion policy have a chance in the fourth year to be promoted, provided they have enough publications. Reports above 4 years are unusual responses. The data indicates that there is no statistically significant association between promotion time and gender. This implies that being a male or female academic has no bearing on promotion waiting periods. Hence eligibility for promotion is not based on gender but on other criteria.

The publication sets of male and female academics are summarised in Table 2. Chi-square analysis showed that a significant relationship exists between publishing rates and gender. Most male academics have higher publishing rates than their female colleagues, despite there being no significant differences in their promotion waiting periods (Table 3). This may be as a result of the close working relationships that appear to be common between people of the same sex. Although men and women can learn to work together as peers, changes in attitudes and behaviours are more difficult to bring about in supervisory relationships (Brush et al. 1995). Cole and Fiorentine (1991) found no evidence linking biological differences with differences in the achievements of men and women in science.

Peer reviews are not without problems. For example a gender-bias study by Wenneras and Wold (1997) proved that female applicants for Swedish MRC post-doctoral fellowships had to be 2.5 times more productive than their male colleagues to get the same peer-review rating for scientific competence. Certain safeguards built into the peer review process may therefore be needed to eliminate or reduce 'halo' effects. Consequently women academics are more likely on the one hand to suffer peer-review biases than men and on the other

hand to interrupt their research agenda to take care of children, sick or elderly parents or in-laws. As a result women's participation in research output throughout their professional careers appears to be lower in some cases than men's.

Table 2: Percentage Distribution of Academic Publishing Rates, Promotion Waiting Period and Training Opportunities by Gender: Nigerian Universities of Agriculture, 2003

Variable	Gender	
	Female	Male
Publications (Journals & Proceedings)		
(Number)	n=31	n=96
• 0-4	16.1	13.5
• 5-9	35.5	20.8
• 10-14	29.0	14.6
• 15-19	6.5	18.8
• 20+	12.9	32.3
Total	100.0	100.0
Chi-square	10.319*	
Promotion Waiting Period (years)		
	n=42	n=120
• 0-3	71.4	68.3
• 4-6	26.2	22.5
• 7-9	0.0	4.2
• 10+	2.4	5.0
Total	100.0	100.0
Chi-square	2.765 (NS)	
Training Opportunities		
University-sponsored		
	n=54	n=162
• Yes	63.0	56.2
• No	37.0	43.8
Total	100.0	100.0
Chi square	0.766 (NS)	
Type of Course sponsored		
	n=35	n=91
• University degree	60.0	62.6
• Short course locally	14.3	13.2
• Short course abroad	11.4	17.6
• Long course locally	2.9	1.1
• Long course abroad	11.4	5.5
Total	100.0	100.0
Chi-square	2.393 (NS)	

Table 2: Percentage Distribution of Academic Publishing Rates, Promotion Waiting Period and Training Opportunities by Gender (contd.)

Variable	Gender	
	Female	Male
Advanced degree	n=30	n=110
• Nigerian University	76.7	68.2
• Foreign University	23.3	31.8
Total	100.0	100.0
Chi-square	0.808 (NS)	
Limitations to career advancement	n=36	n=103
• Family Responsibilities	27.8	6.8
• Personal Choice	16.7	11.7
• By the Dept. / Unit	11.1	15.5
• By Finance	33.3	50.5
• Others	11.1	15.5
Total	100.0	100.0
Chi-square	12.550*	

* $p \leq .05$ (2-tailed), NS = Not Significant

However, there is no linking evidence to suggest that male researchers are more likely to present their findings in higher-impact journals. On journal quality there is also no indication by gender of the expected number of citations of papers received in the five years, based on the journal in which the papers were published.

Table 3: *t*-test of Difference Between Male and Female Academics Promotion Waiting Period

	N	Mean	SD	STD of Mean	<i>t</i> -value	p
Female Academics	44	3.557	1.386	0.2090	0.502	0.616
Male Academics	120	3.710	1.836	0.1678	0.572	0.569

Mean difference = 0.1522 NS

Attaining Senior Scientific and Administrative Positions in Universities

A recent *World Development Report* (World Bank 2004) highlighted as key third millennium development goals the promotion of gender equality and empowerment of women, especially the elimination of gender disparity at all levels of education. Table 4 shows that gender inequality does manifest itself in structural assignment to positions in the universities of agriculture. Although an almost equal proportion of male (95 per cent) and female (96 per cent) academic staff are employed on full-time basis, there is a difference in educational level. Half of the males but only about a third of females have PhDs, while 57.1 per cent of females and 40.7 per cent of males have MA/MSc degrees. Only a few (14.3 per cent of females and 9.3 per cent of males) have only a bachelor's degree, thus confirming the relatively low education level of female faculty. Indeed possession of a PhD. is mandatory for all faculties in Nigerian universities. The majority of female academics (70.9 per cent) are of junior rank (lecturers) and are actively involved in research as well as teaching and extension activities like their seniors, while very few (only 7.3 per cent) are senior lecturers. This implies an influx of a broad spectrum of female academics into universities of agriculture lately.

Women also did not hold a fair proportion of executive positions but mostly occupied middle management and entry levels. Empirically there appears to be a statistically significant gender relationship between nature of appointment, rank, length of service and representation in senior scientific and administrative positions. This implies that there is no gender inequality in terms of these selected variables. However possession of the highest educational qualification is significantly associated with gender, which probably explains the disparity in the appointment of more senior male academics (32.8 per cent) than female (14.6 per cent). Men were much more likely than women to move directly from receiving a PhD to taking a faculty position in universities. These findings contrast with those of Buttell and Golderger (2002), where gender inequality manifests itself in significant differences between female and male scientists' level of academic appointment among US Land Grant Scientists. Punch (2003) observed that women academics were not adequately represented at the highest levels of organisations to successfully influence policy and cultural and social norms, and to increase the pace of change and statistics. This may appear to be true when generalised because male dominance in senior administrative and scientific positions has been acknowledged in many organisations. This is in line with the findings by Zulu (2003) on gender representation patterns in higher education in South Africa.

Table 4: Percentage Distribution of Academic Background and Appointment Indicators by Gender: Nigerian Universities of Agriculture, 2003

Variable	Gender	
	Female	Male
Age	n=58	n=160
• >25	1.7	0.6
• 26–35	48.6	26.3
• 36–45	32.8	43.0
• 46–55	17.2	26.3
• 56–65	0.0	3.8
Total	100.0	100.0
Chi-square	31.41 (NS)	
Nature of Appointment	n=56	n=163
• Part time	1.8	0.0
• Temporary	1.8	5.0
• Full time	96.0	95.0
Total	100.0	100.0
Chi-square	3.907 (NS)	
Highest Educational Qualification	n=56	n=162
• BSc/BA	14.3	9.3
• MSc/MA	57.1	40.7
• PhD	28.6	50.0
Total	100.0	100.0
Chi-square	7.782*	
Status (Rank)	n=55	n=162
• Professor	5.5	6.8
• Reader/Associate Professor	1.8	5.6
• Senior Lecturer	7.3	20.4
• Lecturers	70.9	55.6
• Graduate Assistants	14.5	11.7
Total	100.0	100.0
Chi square	9.108 (NS)	
Length of Service (years)	n=54	n=158
• 0–4	27.8	24.0
• 5–10	14.8	19.6
• 10–14	11.1	20.3
• 15–19	18.5	16.5
• 20+	100.0	100.0
Total	100.0	100.0
Chi-square	6.767 (NS)	

Table 4: Percentage Distribution of Academic Background and Appointment Indicators by Gender (contd.)

Variable	Gender	
	Female	Male
Representations in Management	n=11	n=53
• Head of Department	63.6	54.7
• Dean	36.4	30.2
• Director of Units	0.0	13.2
• Deputy Vice Chancellor	0.0	1.9
Total	100.0	100.0
Chi-square	1.900 (NS)	

* $p \leq .05$ (2-tailed), NS = Not Significant

Relationship Between Personal Characteristics of Academics and Research Attainment

Using the Pearson Product Moment correlation analysis, the relationship between different personal characteristics was determined. Most correlations were significant but at different levels. For instance highly significant relationships were obtained ($p < 0.001$) with correlation values ranging from 0.175 (highest education qualification and gender) to 0.768 (rank and highest education qualification), as shown in Table 5. It is apparent that there is an agreement between highest educational qualification, gender and rank. Furthermore significant relationships were also obtained ($p < 0.05$) with correlation values ranging from 0.138 for gender and age and 0.288 for length of service and representations in management. These results further indicate that there is an agreement between gender and age, length of service and representation in management. Studies have shown overwhelming evidence of a correlation between age and research output among academics. Gordon and Scruggs (1984) reported that age was related to research productivity. Bland and Berquist (1997) observed that the average productivity of faculty seems to drop with age, although many senior academics remain quite active in research activities and their outputs are comparable to those of younger academics. Furthermore there is no empirical evidence to suggest that differences exist due to gender and age. The findings in this study however show a positive correlation between gender and age at 0.05 level of probability.

Table 5: Correlations Between Selected Socio-Demographic Variables

Variables	Age	Rank	Lengserv	Gender	Higheduc	Repmgt
Age	1.00					
Status/rank	.651**	1.00				
Lengserv	.702**	.722**	1.00			
Gender	.138*	.156*	.066	1.00		
Higheduc	.449**	.768**	.498**	.175**	1.00	
Repmgt	.272*	.318**	.288*	.131	.151	1.00

**p ≤ .001 (2-tailed), NS = Not Significant

Legend

Lengserv = length of service

Higheduc = highest education qualification

Repmgt = representations in management

Relationship Between Time Spent on Teaching, Research and Extension and Research Attainment

Table 6 presents the percentages of academic staff time spent in various work activities such as teaching, research extension and management tasks. Most of the work activity was spent on teaching (63.8 per cent). Women spent a slightly greater percentage of their time teaching (76.6 per cent) than men (67.6 per cent). In terms of gender male faculty spent 15.8 per cent of their time on research and female faculty 22.5 per cent. On management tasks males spent 19.5 per cent of their time while females spent 20 per cent of their time. The gender differences in extension were significant at 0.05 per cent. It is not surprising that, when research activities were controlled by length of service, the older, more experience males spent less time on research (56 per cent) and more time on management tasks. However, female faculty with less than 10 years experience spent more of their time on research than teaching. Therefore, there is empirical evidence to suggest that a gender disparity exists with regard to research attainment in universities. Research attainment is consistently slightly higher for males than for females.

Table 6: Percentage Distribution of Faculty Time Spent on Teaching, Research and Extension by Gender: Nigerian Universities of Agriculture, 2003

Variable	Gender	
	Female	Male
Teaching (%)		
• 0–20	8.5	6.9
• 21–40	14.9	25.5
• 41–60	48.9	40.7
• 60+	27.7	26.9
Total	100.0	100.0
Chi-square	2.448 (NS)	
Research (%)		
• 0–20	36.7	29.6
• 21–40	40.8	54.8
• 41–60	14.3	9.6
• 60+	8.2	6.2
Total	100.0	100.0
Chi-square	2.991 (NS)	
Extension (%)		
• 0–20	89.3	85.4
• 21–40	3.6	14.6
• 41–60	0.0	0.0
• 60+	7.1	0.0
Total	100.0	100.0
Chi square	8.562*	
Management Task (%)		
• 0–20	64.0	57.8
• 21–40	16.0	22.7
• 41–60	8.0	11.3
• 60+	12.0	8.2
Total	100.0	100.0
Chi-square	1.067 (NS)	

* $p \leq .05$ (2-tailed), NS = Not Significant

Conclusion and Policy Implications

In sum it can be concluded that the research attainment of female academics is lower than that of males. Gender differences in publishing rates implying gender bias could be premised on closer working relationships, better communication and stronger informal networks among male faculty. There are also few experienced female academics in top scientific and senior management positions, and the educational levels of female faculty are lower than those of males. However the most serious limitations on research attainment by female academics were family responsibilities and lack of financial resources.

This study has further exposed and reaffirmed the need to reduce the negative impact due to structured imbalance created in the social structures of institutions of the labour market. Female faculty mostly occupy junior ranks and continue to be more seriously under-represented in science and technology disciplines. Since eligibility for promotion is on a three-yearly basis, no evidence links gender with promotion waiting periods.

The gender differences should be explored by policy makers to ensure that faculty in tenure track are treated equitably in recruitment, training and research opportunities for professional growth. House and Baety (1990) contend that women will bring new perspectives and methods of administration as they ascend to higher positions. Hence there should be a concerted effort to increase the number of women in top management and research positions to a reasonable proportion of 10–30 per cent within the next five years. Through gender policy female faculty could gain greater access to positions hitherto dominated by men. Further studies should investigate important changes in the structure and composition of tenure faculty in Nigerian universities for 10 years or more. This will show if women have made a significant increase in their representation in senior management and research positions.

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