

# Gender Difference in Research Productivity and its Associated factors in Addis Ababa University: a Cross-Sectional study

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## Abstract

**Background:** Gender equity movements have increased the number of women going to higher institutions. However, the number of women participating in research is limited in creating a critical mass.

**Objective:** To assess the gender gap in research and its associated factors determinants among faculty at Addis Ababa University.

**Method:** We conducted a cross-sectional study from October 2018 to March 2019 using a structured self-administered questionnaire. University faculty who was lecturers and above level who served the University for more than a year were invited to participate in the study. Faculty were approached by data collection facilitators with graduate degrees and the secretary of the respective departments. We used descriptive and multivariate statistical methods to analyse the data.

**Result:** Of the 888 study participants, 161 (18.1%) females faculty participated in the study. It was found that three hundred ninety-seven male academics (54.6%) and 50 female academics (31.1%) had ever published articles in peer-reviewed journals ( $p < 0.001$ ). Male faculty were more likely to publish in peer-reviewed journals than their female counterparts [AOR and (95% CI) 2.55 (1.68, 3.86)]. Faculty with a rank of assistant professors and above [AOR (95% CI) 3.47(2.31, 5.21)], those who have a Ph.D. as highest degree [AOR (95% CI) 2.98 (2.11, 4.19) and those who have affiliation with other institutions [AOR (95% CI) 2.59 (1.98, 3.56)], were more likely to publish in peer-reviewed journals than their counterparts.

**Conclusion:** Female faculty were less likely to be involved in research than men counterparts. The University needs to narrow the gender gap in research by designing and implementing an appropriate intervention strategy. [*Ethiop. J. Health Dev.* 2021; 35(SI-2):15-21]

**Keywords:** Addis Ababa University, female faculty, gender difference, publication, research

## Introduction

Higher education has become highly competitive in the 20<sup>th</sup> century, where universities and colleges adopt a market-oriented strategy. The research outputs are the basis for institutions' stance and ranking (1, 2). Besides, the publication is one of the main criteria for academic promotion and securing research funds. In spite of that, studies have shown that female researchers produce less publication than their male counterparts (3, 4).

Despite gender equity movements globally, women's scientific research engagement remains limited across disciplines (3, 5, 6). As reported in a recent study by United Nations Educational, Scientific, and Cultural Organization (UNESCO), women are reported to account for only one-third of researchers worldwide (4). Accordingly, males published their research work almost five times more than females (7, 8). The difference in scientific patency was also documented (9). Furthermore, women's research participation is not visible as first authors but is limited to reviewing and related activities even in developed countries(10).

Although the number of female faculty at Addis Ababa University increases, their research involvement is not well documented. Therefore, this study examined the gender difference in research productivity and its associated factors among faculty at Addis Ababa University.

## Methods

**Setting:** Addis Ababa University is the oldest University in Ethiopia, and it was founded in 1950. The University consists of 10 colleges, 12 institutions, and 365 graduate programs, of which 96 are Ph.D. programs as of June 2020 (11). Of the 2,987 academic staff working for the University, 478 of them (16%) are female faculty (12).

**Study design and period:** The study employed a cross-sectional design. The study was conducted from October 2018 to March 2019.

**Study population:** The study population includes all academic staff at Addis Ababa University.

## Study participants

An academic staff who has served the University for more than one year, available on campus during the study period, and gave informed consent participated in the study. Faculty who were on sabbatical, study, or maternity leave and those who went for fieldwork were excluded from the study. Convenient sampling techniques were used to select participants based on their random availability at their office during the time of data collection.

## Sample size

To determine our sample size of 682 participants, we used a simple population proportion formula using 95%

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confidence limits, 50 percent population, and a design effect of 2. Adding 30% of the sample size to compensate for nonresponse gave us 887 potential participants.

#### **Data collection instruments and procedure**

Data were collected using a structured self-administered questionnaire. The tool had six parts: socio-demography, research activities, research-related courses and training, involvement in a grant application, and research output. Research output was assessed by asking the respondents any publication they have produced throughout their lifetime as of the day of the interview. The same is also for their academic rank.

Data collection was facilitated by ten individuals who had a graduate degree and a supervisor who were trained on the research objectives, the contents of the data collection tools, and approaches to be used to collect the data for a day. We assigned one data collector to each of the ten colleges. After contacting the department head, the data collectors approached the staff in person at their offices or in the university compound. The data collectors explained the purpose of the study and gave the information sheet individually for each staff and in subsequent follow-up for those who were absent on the day the data collectors visited their offices. After the informed consent was signed by the participants, the data collection tool was provided. The data collectors explained any unclear questions on the questionnaire. The data collectors collected the completed questionnaires on the same day or within two days after it was checked for completeness. In situations where the data collectors could not reach the faculty, department secretaries were asked to facilitate the data collection by reaching the staff when they come to the office. On top of that, the study team supervised the data collection process to assure the data quality, including its completeness and accuracy.

#### **Data Analysis**

The data were entered, cleaned, and analyzed using the SPSS version 24 software package. Results were summarized in tables, and graphs were used to present the study results. Following that, univariate and multivariate logistic regression models were fitted to identify independent factors associated with the outcome variable (peer-reviewed publication). A significant level was determined using a 95% confidence interval and P-value <0.05.

#### **Ethical consideration**

The Institutional Review Board (IRB) of the College of Health Science, Addis Ababa University approved the study. Only participants who gave informed consent participated in the study. Information about personal identification was not collected. All data were kept in a password-protected computer, and hard copies were locked in a safe place inaccessible to anybody other than the researchers.

#### **Results**

##### **Socio-demographic characteristics**

Out of the total 888 academicians included in this study, most of them, i.e. 727 (81.9%) were males and more than half (505, 56.9%) were less than 40 years of age. The majority of the participants (409, 46.1%) had first degree in their the educational level and 334 (37.6%) of them had third degree. A little over three-fourth of participants, i.e. 670 (76.6%), were ever married. Four hundred fifty-eight (72.3%) partners of the respondents had an educational status of degree and above, and 93(15%) of their spouses worked in academic or research institutions. About two-thirds of the respondents, i.e. 594 (67.1%), had children. Three hundred and ninety-seven (70.1%) faculty who reported having children had one or two children, and a third of them 157(32.2%) had their last-born child in the last 15 years. Slightly over half of the respondents, i.e. 436 (51.5%) were living in rented houses, while 270 of them (31.9%) lived in their personally owned houses (**Table 1**).

Table 1. Socio-demographic characteristics of study participants, Addis Ababa, Ethiopia, 2019

| Variables                          |                      | n   | (%)  |
|------------------------------------|----------------------|-----|------|
| <b>Sex</b>                         | Male                 | 727 | 81.9 |
|                                    | Female               | 161 | 18.1 |
| <b>Age</b>                         | 20-40 yrs            | 505 | 56.9 |
|                                    | >40 yrs              | 383 | 43.1 |
| <b>Marital status</b>              | Ever married         | 670 | 76.6 |
|                                    | Not married          | 216 | 24.4 |
| <b>Education</b>                   | First degree         | 409 | 46.1 |
|                                    | Second degree        | 145 | 16.3 |
|                                    | Third degree         | 334 | 37.6 |
| <b>Partner's education (n=633)</b> | Primary <sup>a</sup> | 9   | 1.6  |
|                                    | Secondary            | 51  | 8.1  |
|                                    | Diploma              | 115 | 18.2 |
|                                    | Degree               | 247 | 39.0 |
|                                    | Masters and above    | 211 | 33.3 |
| <b>Partner's occupation(n=630)</b> | Unemployed           | 111 | 17.6 |
|                                    | Government employed  | 289 | 45.9 |
|                                    | Private/NGO employed | 211 | 33.5 |
|                                    | Others <sup>b</sup>  | 19  | 3.0  |
| <b>Have children</b>               | Yes                  | 594 | 67.1 |
|                                    | No                   | 291 | 32.9 |
| <b>No of children (n=566)</b>      | 1-2                  | 397 | 70.1 |
|                                    | 3-6                  | 169 | 29.9 |
| <b>Age of last child (n=566)</b>   | 0-15yrs              | 442 | 79.5 |
|                                    | >15 yrs              | 114 | 20.5 |
| <b>Residential housing (n=846)</b> | Own house            | 270 | 31.9 |
|                                    | Rented house         | 576 | 68.1 |

<sup>a</sup>includes illiterates and those who can only read and write. Others<sup>b</sup> includes retired,

#### Research involvement

Most of the research activities in universities are student thesis followed by individual research [483 (76.8%) male and 83 (68.6%) females]. Their involvement in

thematic research and multicounty collaborative researches was limited to about 20% and 15% of the male and female faculty (**Figure 1**).

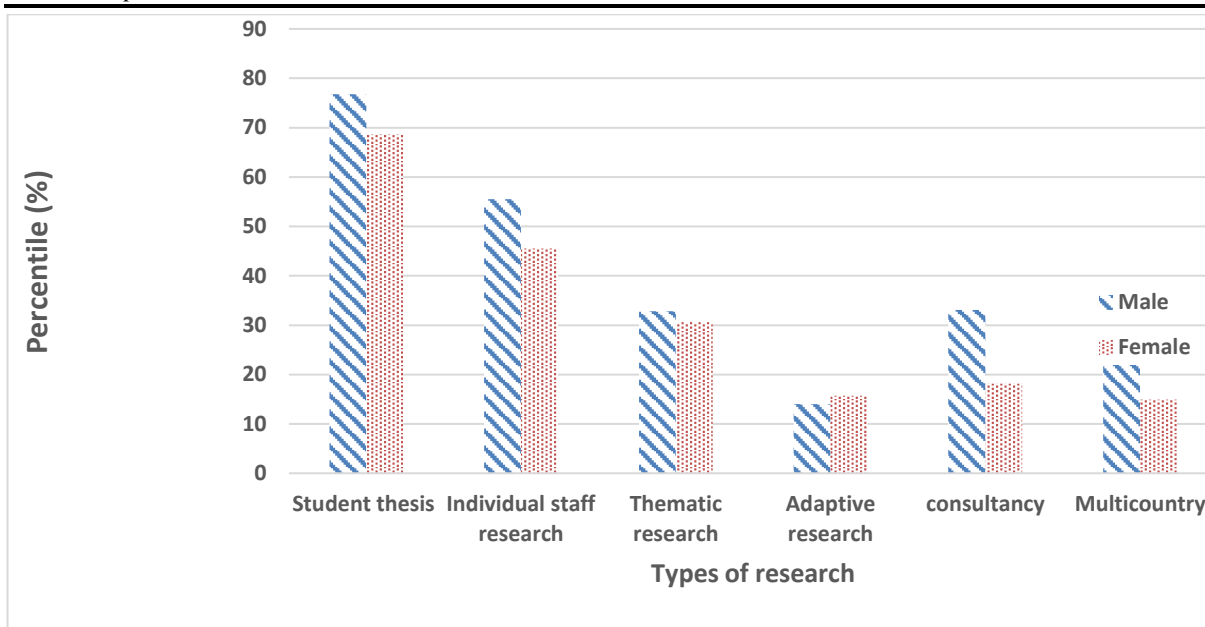


Figure 1. Types of researches conducted by study participants, Addis Ababa, Ethiopia, 2019

### Peer-reviewed publication

In comparison with their female counterparts, a much larger proportion of male academics (54.6% of the males vs 31.1% females) had ever published an article in peer-reviewed journals ( $P < 0.001$ ). Faculty who

reported having published articles, with a majority of 180 males (62.5%) and 20 females (74.1%) had published one to five articles ever as a primary author. A similar trend was observed with respect to research done in collaboration with other institutions (Table 2).

Table 2. Articles published and abstract presentations among faculty at Addis Ababa University, Addis Ababa, Ethiopia, 2019

| Variables   | Male<br>n(%) | Female<br>n(%) |
|---|--------------|----------------|
| <b>Peer-reviewed articles ever published</b>                            | 397 (88.6)   | 50 (11.2)      |
| <b>Peer-reviewed articles published as a primary author (n=315)</b>     | 180 (62.5)   | 20 (74.1)      |
| <b>Solo authors</b>   | 108(37.5)    | 7 (25.9)       |
| 1-5   |              |                |
| >5  |              |                |
| <b>Peer-reviewed articles published with *AAU collaborators (n=173)</b> | 93 (61.2)    | 16 (76.2)      |
| 1-5   | 59 (38.8)    | 5 (23.8)       |
| >5  |              |                |
| <b>Peer-reviewed articles published with other collaborators</b>        | 85 (68.0)    | 8 (80.0)       |
| 1-5   | 40(40.9)     | 2(20)          |
| >5  |              |                |
| <b>Presentation in a conference as a primary author (AAU)</b>           | 139 (74.7)   | 17 (81.0)      |
| 1-5   | 47 (25.3)    | 4 (19.0)       |
| >5  |              |                |
| <b>Published at least one book as a primary author AAU</b>              | 62 (89.1)    | 7 (10.1)       |
| <b>Books published other than AAU</b>                                   | 26 (96.3)    | 1(3.7)         |
| <b>Published book chapter in AAU</b>                                    | 13 (81.3)    | 3 (18.7)       |

\*AAU represents research activities after the faculty joined Addis Ababa University

### Research related courses and training

Five hundred eleven male faculty (71.1%) and 118 female faculty (73.8%) said they had taken research methodology courses while they were undergraduate students. Similarly, 532 male respondents (74.0%) and 113 female respondents (70.2%) took research methodology courses during their graduate training. Only 257 males (35.9%) and 63 females (39.6%)

reported that they knew about research-related training provided by AAU. A third of the study participants of males and females (which is an equal proportion) had a chance to be involved in the in-service training provided by the Addis Ababa University. There was no statistically significant difference between male and female faculty in receiving research training (Table 3).

Table 3. Research methodology course and training received among faculty at Addis Ababa University, Addis Ababa, Ethiopia, 2019

| Variable   | Male<br>n (%) | Female<br>n (%) | P-value |
|--|---------------|-----------------|---------|
| <b>Received research methodology course in the undergraduate Program</b> |               |                 |         |
| Yes  | 511 (71.1)    | 118 (73.8)      | 0.497   |
| No   | 208 (28.9)    | 42 (26.2)       |         |
| <b>Received research methodology course in the graduate program</b>      |               |                 |         |
| Yes  | 532 (74.0)    | 113 (70.2)      | 0.603   |
| No   | 187 (25.7)    | 44 (26.0)       |         |
| <b>Knowledge about research related short courses training at AAU</b>    |               |                 |         |
| Yes  |               |                 | 0.54    |
| No   | 257 (35.9)    | 63 (39.6)       |         |
| <b>Received research related training at AAU</b>                         |               |                 |         |
| Yes  | 458 (64.1)    | 96 (60.4)       | 0.58    |
| No   | 230 (32.3)    | 55 (34.8)       |         |
| <b>Type of training * (n=285)</b>  | 483 (66.4)    | 103 (65.2)      |         |
| <b>Grant writing</b>   |               |                 |         |
| Manuscript writing   | 68 (29.6)     | 14 (25.5)       | 0.78    |
| Proposal writing   | 71 (30.9)     | 11 (20.0)       | 0.24    |
| Data analysis  | (42.6)        | 19 (34.5)       | 0.56    |
| Software application   | 97 (42.2)     | 24 (43.6)       | 0.61    |
| Mentorship   | 93 (40.4)     | 20 (36.4)       | 0.88    |
|  | 29 (12.6)     | 7 (12.7)        | 0.84    |

\*Multiple responses

**Involvement in a grant application**

The majority of respondents had information about university research calls. There was no difference between male and female faculty. Three hundred fifty-two male participants (56.1%) and 69 female

participants (57.0%) were involved in grant applications either for international, national, or university calls. However, taking the principal investigator's role was more seen in males than females counteract ( $P < 0.05$ ) (Table 4).

Table 4. Involvement in grant application among faculty at Addis Ababa University, Addis Ababa, Ethiopia, 2019

| Variable   | Male<br>n (%) | Female<br>n (%) | P-value |
|--|---------------|-----------------|---------|
| <b>Involvement in grant application in the past five years</b>     |               |                 |         |
| Yes  | 352 (56.1)    | 69 (57.0)       | 0.84    |
| No   | 276 (43.9)    | 52 (43.0)       |         |
| <b>Role in grant application* (n= 421)</b>                         |               |                 |         |
| PI   | 207 (58.8)    | 30 (43.5)       | 0.02    |
| Co-PI  | 173 (49.0)    | 27 (39.1)       | 0.13    |
| Research team member   | 186 (52.7)    | 34 (49.3)       | 0.60    |
| Director / Co-director   | 16 (4.5)      | 1 (1.4)         | 0.24    |
| <b>Status of grant application in the past five years (n= 375)</b> |               |                 |         |
| Unsuccessful   | 88 (26.9)     | 9 (18.8)        | 0.65    |
| Succeed  | 196 (59.9)    | 30 (62.5)       | 0.94    |
| Pending  | 43 (13.2)     | 9 (18.7)        | 0.14    |
| <b>Information about AAU research call</b>                         |               |                 |         |
| Yes  | 507 (81.0)    | 91 (75.2)       | 0.15    |
| No   | 119 (19.0)    | 30 (24.8)       |         |

\*Multiple responses

**Factors affecting publication**

Results of the multivariate analysis regression model showed that male faculty were more likely to publish than their female counterparts in the University [AOR (95% CI) 2.55 (1.68, 3.86)]. Faculty who have children were also more likely to publish than those who had no children [AOR(95% CI) 1.67 (1.02, 2.75)]. Lecturers

were less likely to publish articles compared to assistant professors and above [AOR(95% CI) 3.47(2.31, 5.21)]. Faculties with a Ph.D. are more likely to publish than academic faculty who had a master's degree and specialization in the medical field. [AOR (95% CI) 2.98 (2.11, 4.19)]. Faculty that has affiliation with other

institutions are two times more likely to have publication [AOR (95% CI) 2.59 (1.98, 3.56)] as compared to those faculty who had no affiliation with other institutions (**Table 5**).

**Table 5. Factors affecting publication of peer-reviewed articles among academic faculties at AAU, Addis Ababa, Ethiopia, 2019**

| Variable   | No (%)     | COR (95% CI)      | AOR (95% CI)             |
|--|------------|-------------------|--------------------------|
| <b>Sex</b>   |            |                   |                          |
| Male   | 727 (81.9) | 2.67 (1.86, 3.85) | 2.68 (1.78, 4.05)        |
| Female   | 161 (18.1) | 1                 | 1                        |
| <b>Age</b>   |            |                   |                          |
| 20-40  | 505 (56.9) | 1                 | 1                        |
| 41 & above   | 383 (43.1) | 2.94(2.23, 3.87)  | 1.12 (0.78, 1.62)        |
| <b>Marital status</b>                              |            |                   |                          |
| Ever Married                                       | 670 (75.6) | 2.21(1.61, 3.04)  | 0.78(0.45, 1.34)         |
| Not married  | 216 (24.4) | 1                 | 1                        |
| <b>Having children</b>                             |            |                   |                          |
| Yes  | 594 (67.1) | 2.40 (1.80, 3.21) | 1.65 (1.01, 2.71)        |
| No   | 291 (32.9) | 1                 | 1                        |
| <b>Academic rank</b>                               |            |                   |                          |
| Lecturer   | 398 (44.8) | 1                 | 1                        |
| Assistant Professor and above                      | 490 (55.3) | 5.77 (4.31, 7.72) | 4.38(3.11., 6.17)        |
| <b>Admin position involvement in the last 5yrs</b> |            |                   |                          |
| Yes  | 447 (50.5) | 0.54 (0.41, 0.70) | 1.03 (0.74, 1.43)        |
| No   | 439 (49.5) | 1                 | 1                        |
| <b>Affiliation with other institutions</b>         |            |                   |                          |
| Yes  | 462 (52.3) | (2.58, 4.48)      | <b>2.57 (1.86, 3.52)</b> |
| No   | 422 (47.7) | 1                 | 1                        |
| <b>Part-time engagement</b>                        |            |                   |                          |
| Yes  | 419 (47.4) | 1                 | 1                        |
| No   | 465 (52.6) | 1.08, 1.84)       | 1.01 (0.74, 1.39)        |

## Discussion

This study indicated that female faculty were less likely to publish in peer-reviewed journals than their male counterparts. Faculty who had lower academic rank were also less likely to publish. Compared to faculty who had no affiliation with other institutions, those with affiliation and those who have children had more research publications while both faculty were more involved in student thesis than other studies. Besides, the results of the study show that taking a role as a principal investigator (PI) for a research project was more apparent in males than in females.

A possible explanation for the less likelihood of publishing in a peer-reviewed journal could be related to their low participation in collaborative grant applications and multicountry studies.

This is also demonstrated in our findings where those who had an affiliation with other institutions published more. It is also worth recognizing that having international collaborations enable authors to publish in high-impact journals and acquire a more significant number of citations. The gender difference in research productivity might also be related to women's pregnancy, maternity leave, a disproportionate share of responsibilities at home, and a more significant role in supporting their family than male scientists. That a disproportionate share of parenting results in less research productivity by female faculty is also reported by several related studies (13-15). On the other hand, the number of associate professors and above is meager, which deters women from supervising Ph.D., who could

contribute to the new findings and publication. The is consistent with previous findings that indicated the low number of female faculty publications (14, 16-18).

It was found that faculty who have more children publish more implying that there is a positive relationship between having more children and publishing peer-reviewed articles. In real life, having children and maturing in the academic arena go in hand in hand. In other words, people tend to engage in research as they get mature. The hassle of settlement and livelihood at a younger age may limit participation in research (17).

Our analysis also revealed that taking a role as a principal investigator (PI) for research grants was more apparent in male faculty than in women faculty. Understandably, involvement as PI is likely to give a better opportunity for male researchers to publish in a peer-reviewed journal as a lead author. This finding is in agreement with the results of other studies conducted in developed countries which reported the invisibility of women's research participation as first authors; their participation was instead limited to reviewing and doing related activities(10, 19, 20).

In this study, it was found that lecturers and assistant professors were less likely to publish articles as compared to those with a rank of associate professor and above. And not surprisingly, research publication is one of the major criteria used by the University for promoting faculty as reported by other related studies. (14, 21-23).

**Limitation**

The study employed a self-administered questionnaire that only relied on participants' responses. We are aware that other important parameters such as impact factor of journals, citation of published articles, and variation in different disciplines were not examined in this study, and that be considered as a limitation of the study.

**Conclusion**

Our findings indicated that Addis Ababa University has to go to a great length to narrow the publication gap of peer-reviewed articles and the gap in grant writings for application between male and female faculty. Attention should also be put in place to rectify the University's ongoing gender imbalances by designing programs and policies that boost the active participation of female faculty in research.

**Funding**

Addis Ababa University (AAU) funded this study through thematic research.

**Acknowledgments**

The authors would also like to thank the data collectors and study participants for their time and contribution to the research.

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