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Superwomen and the streetlight effect in research on family-related career challenges among scientists in Africa ¹

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Background and purpose

Over the last 21 years, a significant increase and interest in the field of women’s participation in science has been observed (Dehdarirad, Villarroya & Barrios, 2015). One focus area of this field has been the way in which family responsibilities may cause women scientists to be less productive than their male colleagues. The evidence collected since the late 1960s in this regard, generally disconfirms such a hypothesis (Prozesky, 2006), leading some to caution against an “over-reliance on an explanatory framework that positions family-related variables as central to the research productivity gender gap” (Aisten & Jung, 2015:205).

In this paper, I argue that such a conclusion is premature with regard to the African context, which has been largely absent from literature on the topic. A recent, continent-wide study of African scientists, the first of its kind, shows that that women’s scientific production is indeed negatively impacted by these family responsibilities (Beaudry & Prozesky, 2018). It is therefore important to consider norms dictating the role and status of women in a society, and therefore the extent to which domestic labour is assigned to women, as these differ quite extensively across socio-cultural contexts. The results of a further analysis of the survey data on African scientists are presented here, showing that women scientists carry a heavier domestic and childcare burden than their male counterparts, and are more likely to perceive balancing work and family demands as a career challenge.

However, the women scientists’ likelihood to report having children and/or other dependents, and the number they report, are lower than for men scientists. A sociological interpretation of these results leads to a critical reflection on the past 50 years of research on the issue of women in science in terms of its tendency to be systematically biased in favour of “surviving superwomen”. It is argued that, if such research were to contribute to policy aimed at a more gender-diversified scientific workforce, it needs to address the gaps left by a “streetlight” of easily accessible data sources.

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Method

A web-based survey was conducted between 2016 and 2017, which collected data on more than 5,000 scientists born and currently working in an African country. For the purpose of this survey, scientists are defined as members of a scientific community who communicate, through peer-reviewed journal articles, their results and findings to their peers. Thus, to identify and contact African scientists, we extracted corresponding authors’ emails from the Web of Science (WoS) and Scopus databases for each article published from 2005 to 2015 with an institutional address in Africa.

Data were collected via a self-administered, structured questionnaire, distributed through two online survey platforms to a total of 120,888 email addresses that we had extracted, of which 98,973 proved to be valid. A total of 7,513 completed questionnaires were received, which constitutes a response rate of approximately 8%. Excluding non-African nationals and those who did not provide their nationality resulted in a final dataset of 5,700 cases. Presented in this paper are the results of a gender comparison of responses to questionnaire items relevant to balancing work and family demands, as analysed with IBM SPSS Statistics 24.

Results

Of the ten career challenges presented to the respondents in the questionnaire (Figure 1), balancing work and family demands is the only one which women are significantly more likely than men to have experienced, even when controlling for whether respondents have children or dependents (results not shown here).

Figure 1: A comparison between women and men scientists in terms of their experience of career challenges

These perceptions of career challenges are supported by evidence that the care of children (and general housework) is not men scientists’ main responsibility. As Figure 2 shows, on average, men scientists undertake a much lower percentage of such work themselves than is
the case among women, while their partners contribute a much higher percentage than women scientists’ partners do.

**Figure 2**: Gender differences in terms of the average (mean) percentage of care-work and general housework by respondent, partner and other

![Bar chart showing gender differences in care-work and general housework percentages.](image)

Interestingly, however, women respondents are much more likely than their male counterparts to have no children or dependents (Figure 3).

**Figure 3**: Gender differences in terms of having no children/dependents, by age of children/dependents

![Bar chart showing gender differences in having no children or dependents.](image)

And, if only those respondents with children/dependents are taken into account, women report, on average, having a lower number of children/dependents, again regardless of the age of those children/dependents (Figure 4), and when controlling for women respondents’ slightly younger age (results not shown here).
As a whole, the results presented here show that women scientists are more likely than men scientists to perceive balancing of work and family demands as a career challenge. This perception is supported by the result that, in their households, African women scientists still take main responsibility for the care of children and general housework, and that Beaudry and Prozesky’s (2018) finding that women’s scientific production is negatively impacted by these responsibilities.

However, the survey also shows that women scientists in Africa are less likely than their male counterparts to have children or dependents, and if they do, they report a smaller number. Academic women elsewhere have also been found to have fewer children in comparison with their male counterparts, but also in comparison with women in the general population of similar ages (see Prozesky, 2006, for a review). This requires further interpretation, especially considering the predominance of “pro-natalist cultures” in Africa (Bongaarts & Casterline, 2013; Tsikata, 2007), which prescribe the highest ideal family sizes for women globally.

Discussion

This survey of African scientists, the first of its kind, shows that women’s greater likelihood to experience work–family role conflict is not necessarily a function of the number of children/dependents they have. In order to interpret this finding, a useful starting point is the results presented in Figure 2 above, and suggested elsewhere (e.g. Zulu, 2013; Mama, 2003), that African men scientists delegate domestic responsibilities to their (female) partners to a much greater extent than women scientists do. Arguably, the cultural norms that prescribe this gendered division of domestic labour make it difficult for women scientists to compete on equal terms with men, while the same norms allow men scientists to successfully pursue their research. It is this fundamental difference between men and women that their employing institutions often neglect, as they assume that women scientists also have access to partners and their unpaid work (Tsikata, 2007; Mama, 2003; De la Rey 1999).
A number of studies have highlighted the negative effects of a traditional gendered division of labour on African women scientists (e.g. Arthur & Arthur, 2016; Raburu, 2015; Hassine, 2014; Akinsanya, 2012; Tettey, 2010; Anagbogu & Ezeliora, 2008; Gaidzanwa, R., 2007; Muula, 2007; Tsikata, 2007). At the same time, most African research institutions lack gender-sensitive policies, especially those that encourage the re-integration of women academics back into the workplace after they bear children (Anagbogu & Ezeliora, 2008). As Bennett (2002) argues, such institutional practices in African universities, which segregate academic work from family, ensure the “masculinisation” of individuals within the academy. An extreme case is Nigeria, where in some cases women have not been allowed to get married or have children (Egunjobi, 2009, cited in Olaogun, Adebayo & Oluyemo, 2015).

Consequently, as Grant, Kenny and Ward (2000) suggest, women would be much more likely than men to believe that children are incompatible with their academic careers, and thus, as the results of our survey shows, are more likely than men to limit the number of children they have. An important though rarely considered point is that women scientists would therefore also be more likely than other women in their culture to limit their fertility. In traditional patriarchal societies (and especially with a rise in Islamism), exercising such a choice involves breaking existing social norms (Hassine, 2014; Tsikata, 2007). As such, these women scientists represent what Cole (1981:388) refers to as “quintessential cases of superwomen”.

In order to manage their family and professional roles simultaneously, these women need to apply a sociological lens. As Williams et al. (1974:401) explain,

in order to justify the rejection of the maternal role as a main commitment, the pressures on them to achieve are greater for other women. Otherwise they must constantly question themselves about whether it was worthwhile making the sacrifices that are required of them and their families; it is especially important to them that there should be some tangible return to their deviant decision […] If there were little or nothing to show for it, it would be even harder to assuage any guilt they might feel and there would be too little social recognition to balance the social criticism.

These women are also the “survivors”: a residual of the attrition from science careers of women more strongly committed to their family roles and/or more affected by the demands of those roles. This has important implications for both the external and internal validity of research on women in science. Studies in the field continue to depend primarily on bibliometric and other data that include only active scientists who have made a contribution to knowledge, usually by publishing articles. Such sample selectivity has the “streetlight effect” (Kaplan, 1964) of limiting the generalisability of findings to “surviving superwomen”, thereby understating the effect of family responsibilities on women’s academic careers.

The “surviving superwoman” bias has been recognised since the late 1970s by many scholars in the field, but its nature and effects remain a matter of conjecture, as only a very small number of studies focus specifically on women who have departed from scientific careers (Rabe & Rugunanan, 2012; Ecklund & Lincoln, 2011; Cheng 2010; Preston, 2006; Rosser, 2003; Rothblum, 1988). It is therefore not surprising that, globally, policy initiatives for women in science do not pay much attention to the turnaround of the female scientific
workforce (Ritter, 2012), even though the studies cited above show that balancing work with family responsibilities plays a major role in women “leaking out of the scientific pipeline” (Berryman, 1983), while among the smaller number of men who exit scientific careers, salary considerations predominate (Preston, 2004, cited in Kaminski & Geisler, 2012).

This bias is fundamentally methodological in origin: the women who “drop out” of active, scientific careers also drop out of bibliometric and other databases and sampling frames, thereby rendering them effectively invisible. As this study also has a bibliometric component, in the sense that WoS and Scopus were used as a source of email addresses, it is highly likely that this effect also affected the results of this study. Thus, in our search for solutions to create a more gender-diversified scientific workforce, our empirical evidence is constantly hampered by the streetlight effect, i.e. the observational bias that occurs when we only search for something where it is easiest to look. Beyond this “streetlight” lie the experiences of women who are highly likely to provide crucial insight on the effect of family responsibilities on women’s decisions, within particular socio-cultural contexts, to remain active scientists.

Conclusions

Research on the gendered aspects of family responsibilities of scientists is scarce in general (Prozesky, 2006), and particularly with regard to African scientists. The results presented here suggest to those who aim to optimise the performance of African women in science, that work–family role conflict is indeed a challenge those women face. The results further suggest, however, that these women scientists deviate from the dictates of their pro-natalist cultures, in order to adapt their reproductive responsibilities to workplaces that generally do not accommodate those who have children.

This finding leads to the conclusion that the field of women in science would, ironically, benefit much from studying “women out of science”, i.e. those who have exited active scientific careers and therefore have ceased to publish. Such women are probably most strongly committed to and/or seriously burdened by family responsibilities. Longitudinal bibliometric data provide a potential avenue for identifying such women, especially if they had already demonstrated some activity in terms of publishing. This potential requires further exploration, because to attain gender diversity of the scientific workforce in societies that are not gender-neutral, our selection of data sources cannot remain gender neutral either.
References


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1 Originally measured with three response options, “not at all”; “to some extent”; and “to a large extent”, but recoded into a binary variable (“No” and “Yes”, with the latter including at least to some extent) for ease of comparison.