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## Strengthening mentoring partnerships for African women scientists in the agricultural research and development system in sub-Saharan Africa

Dorothy Mukhebi<sup>1\*</sup>, Evelyne Otunga<sup>1</sup>, Melody Mentz<sup>2</sup>, and Anne Wangalachi<sup>1</sup>  
African Women in Agricultural Research and Development (AWARD)

MelodyM Consulting

\*Corresponding Author: [D.Mukhebi@cgiar.org](mailto:D.Mukhebi@cgiar.org)

### Abstract

The contribution of women to development is particularly important to the agricultural sector in Sub-Saharan Africa where women constitute a large proportion of smallholder farmers. Despite their important role, the participation of women in agricultural research, particularly at the leadership level, remains low. This paper explores the role of mentoring in increasing the pool of women in agricultural research using the case of the African Women in Agricultural Research and Development program. The paper elaborates on evidence collected over a three-year period to evaluate program effectiveness, benefits accrued and key success factors. Results show that the program's structured approach has direct career benefits for mentors and mentees. Furthermore, the program has proven effective in increasing gender responsiveness for mentors, particularly males, increasing their probability of serving as champions within institutions. Four discrete factors for successful mentoring were identified: commitment, shared research interests, proximity and personality. The paper concludes with recommendations for program design.

*Keywords:* Women, scientists, mentoring, partnership, empowerment, gender, sub-Saharan Africa

### Introduction

Gender equality is a global development priority, clearly articulated in the United Nations Sustainable Development Goals (SDGs). Women constitute half the world's population, and arguably half of its potential. In a "full potential" scenario where women play an identical role in labor markets as men, as much as \$28 trillion, could be added to global annual gross domestic product by 2025 (Woetzel *et al.*, 2016). The contribution of women to social and economic development is particularly important in sub-Saharan Africa's agricultural sector where women constitute between 40 and 50 percent of labor contributions among smallholder farmers and where the informal agricultural sector is one of the largest sources of livelihoods (Doss, 2014; SDG Fact Sheet, 2015b). Despite their important role in economic development and the agriculture sector, the participation of women in agricultural research and development remains low in Sub-Saharan Africa. Only one in four agricultural researchers are female and even fewer – one in seven – of the leadership positions in African agricultural research institutions are held by women (Beintema and Di Marcantonio, 2010).

This trend is not unique to Africa. Research findings show that although there has been an increase in the number of girls and women participating in science and technology, this number has been skewed toward the lower levels of science and technology systems (UNESCO, 2007;

Hoobler, Lemmon and Wayne, 2014; Willemsen, 2016) and women's participation decreased with career advancement in these systems – a phenomenon Huyer and Westholm (2007) termed the “leaking pipeline”. The phenomenon – where women disappear from careers in science at higher ranks – has been confirmed in various studies (Goh *et al.*, 2008). Appropriately, Meinzen-Dick *et al.* (2011) called for increasing the number of women employed in national, regional, and international research institutes.

As the ‘leaky pipeline’ phenomenon illustrates, achieving gender equality is not as simple as increasing absolute numbers. Women face various challenges in advancing their careers regardless of geographic location or employment sector, a problem which is pronounced in the field of science. Even in the most mature global science systems, women continue to produce fewer outcomes, be underrepresented in leadership or high level appointments, and continue to earn less than their male counterparts with equal qualifications and experience (Moss-Racusina *et al.*, 2012; Shen, 2013; Lariviere *et al.*, 2013). Recent studies have shown clearly how implicit biases continue to disadvantage women in science, directly hindering their opportunities for promotion (Moss-Racusina *et al.*, 2012).

The problem has proven to be persistent despite multiple interventions – the complexity of the root causes plays a distinct role in this perpetuation. Women in science across the globe face an accumulation of disadvantage – many seemingly insignificant challenges which, on their own, would not hinder career progress, but when taken together are particularly difficult to overcome (Valian, 2005). Some of the challenges which have been documented are illustrated in Box 1.

#### **Box 1: Career challenges for women scientists**

Women wishing to advance in careers in science experience these challenges in common:

- Lack of role models
- Underdeveloped leadership skills and low self-confidence
- Assertiveness being seen as culturally inappropriate
- Reduced geographical and career mobility due to family responsibilities
- Poor access to social networks at work
- Men's lack of acceptance of women leaders
- Limited support networks
- Lower access to resources
- Slower promotion rates and fewer opportunities
- Receive less pay for equal work, compared to equally-qualified male peers

Sources: UNESCO, 2007; Hoobler *et al.*, 2014; Willemsen, 2016

Due to the complexity of factors contributing to the situation, it is important to provide women with the diverse and varied incentives and structures they need to succeed, in other words, creating enabling environments (Meinzen-Dick *et al.*, 2011). A component of this includes mentoring, which is a proven and powerful driver for career development and, particularly, for retaining women in science (Meinzen-Dick *et al.*, 2011; Hoobler, Lemmon and Wayne, 2014; Willemsen, 2016).

However, very little literature focuses on documenting and describing the components of successful mentoring programs, particularly in the African agricultural research and development context. This paper contributes to the field of knowledge by documenting the impact of a

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structured mentoring program for female scientists in Africa, and identifying key success factors for the design of other similar initiatives.

### **Literature review**

Formal mentoring has become increasingly recognized as an important tool in capacity development over the last 15 years (Webb, 2008), particularly for minority groups, including women (Goh *et al.*, 2008). Both formal and informal mentoring has been found to be beneficial in providing access to information and resources that are effective in promoting career advancement, especially for women (Hymowitz, 2007; Willemsen, 2016).

#### ***The role and benefits of mentors***

Mentors play several types of roles, including providing psychosocial support, career support, and serving as role models (Carter and Silva, 2010; Crisp and Cruz, 2009; Ely, Ibarra and Kolb, 2011; Ragins and Kram, 2007; Rathgeber, 2002; Webb, 2008; Willemsen, 2016).

- *Psychosocial support* includes providing acceptance, moral support, a sounding board, motivation to reach beyond the mentees perceived boundaries, communication skills, and help to solve problems.
- *Career support* includes sponsorship, exposure and visibility, coaching, protection, challenging assignments, assistance or guidance with academic decisions and choices, access to new job opportunities, and networking opportunities. For women scientists, career support offers the opportunity to learn the 'tricks of the trade' and receive constructive feedback on their work. Carter and Silva (2010) propose that women need sponsorship to advance to the top in organizations. They define sponsorship as a specific kind of career support that goes beyond simply providing feedback and advice to advocating for their mentee's promotion. Essentially, sponsorship serves a networking and championing role. Willemsen (2016) notes that a sponsor helps a mentee make contacts, access opportunities and introduces her to other professionals in the mentor's own professional networks.
- As a *role model*, mentors provide mentees with exemplars of appropriate attitudes, values, and behaviors.

Mentoring can serve a developmental or instrumental purpose, or a combination of both. Developmental mentoring encompasses primarily the psychosocial component of mentoring and is focused on creating supportive relationships (Karcher, 2005). Instrumental mentoring focuses on the learning of skills or the achievement of specific goals, and is typical of mentoring in the workplace (Hamilton and Hamilton, 2005).

Although the benefits of mentoring are typically thought of in terms of what the mentee gains from the engagement, studies have found that the benefits of mentoring accrue to mentees, mentors, and institutions. These benefits include increased career satisfaction, promotion, retention, publications, research grant income, confidence, self-esteem, networking, job involvement, and reduced stress (Blake-Beard, 2001; Gardiner, 2005; Ragins and Scandura, 1999; Ragins and Cotton, 1999) (see Table 1).

**Table 1: Mentorship benefits to mentees and organizations**

Mentees' Gains	Mentors' Gains	Organizations' Gains
New skills and work knowledge	Renewed commitment and enthusiasm	Lower staff turnover
Self-confidence	New leadership and communications skills	More satisfied and committed employees
Information on career options	Professional development	Quicker integration of new employees
Higher salaries	Ability to encourage others	Better transfer of organizational culture
Greater career commitment	Personal satisfaction	
More job satisfaction	Peer recognition	
Lower work-family stress	Professional relationships	
More upward mobility		

Source: UNESCO, 2007; McKinsey, 2008; Ragins and Kram, 2007; Willemsen, 2016

### ***What contributes to the success of mentoring initiatives?***

Researchers have attempted to document what contributes to effective mentoring initiatives. A useful framework for reviewing mentoring relationships is provided by Broder-Singer (2012) who identifies six key ingredients of successful mentorship initiatives:

- *Clear delineation of program goals and expectations for mentors and mentees.* This allows the mentor and mentee to develop the appropriate psychosocial bond.
- *Careful selection and pairing of mentors and mentees* ensures the mentors and mentees are well-matched and able to establish the necessary relationships.
- *Accountability of both the mentor and mentee* for the relationship's success, including frequent check-ins which allow appropriate trust to develop.
- *Recognition of mentors* who make a difference.
- *Timeline with a beginning, middle, and end,* so participants can end the relationship gracefully if it is not working.
- *Mechanism for organizational follow-up* to benchmark the success of individual pairings and the development of best practices.

For successful implementation, mentoring programs need the appropriate infrastructure, practices related to the screening, matching, training, and ongoing support of mentors (Sipe and Roder, 1999). According to DuBois *et al.* (2002), the degree of infrastructure is reflective of the number and nature of mentoring practices provided to support the match, particularly those that would be expected to enhance program effectiveness. This is a key consideration in mentoring program development, evaluation, and research.

An important part of determining the right mentor-mentee match for female scientists is considering the sex of the mentor. In the case of mentor-mentee pairs involving women scientists, Willemsen (2016) notes that there are advantages of women scientists being paired with female mentors. Women mentors better understand the barriers women scientists encounter

in their careers, and the relationship is often more relaxed because the risk of inappropriate intimacy is low. Willemsen (2016) also acknowledges the benefits of having a male mentor. Men typically have more power and influence than women, making them more effective for the career advancement of mentees. There are wider benefits too. Through mentoring, male scientists learn about the barriers women encounter. This increased empathy allows men to identify where specific interventions are necessary to improve parity within the organization.

Mentoring partnerships are not always successful, for a variety of personal and institutional reasons. Common barriers identified by De Vries and Webb (2005) include time and workload pressures, reluctance by mentees to engage their mentor, unclear expectations and goals for the process, and lack of confidence on the part of mentees. Furthermore, Jacobi (1991) identifies a potential weakness of formal mentoring programs as the lack of choice in relationships that can undermine mutual interest in the relationship. Thus, mentoring program development, evaluation, and research should be cognizant towards these potential challenges and implement the necessary mechanisms to identify concerns and respond timeously and appropriately.

### **AWARD's approach to mentorship**

In 2006, the Consultative Group on International Agricultural Research (CGIAR), Gender and Diversity Program (G&D), ran pilot capacity building programs in various CGIAR centers around the world, with one focused on crop science researchers in East Africa. From the East African pilot, G & D gleaned that African women scientists are empowered through mentoring, leadership development, and sound science skills, as well as increased visibility (CGIAR, 2006). The value of the approach used in the pilot project has been recognized by Goh *et al.* (2008) in their working paper, *Successful Women, Successful Science*, which identified the pilot as one of the exemplars of excellence in the agricultural research and development system.

This pilot informed the design of AWARD's comprehensive two-year long career development program that comprises three complementary components, namely mentoring, science, and leadership. The mentoring component of AWARD is tailored for the African agricultural research and development sector, but incorporates the design principles identified in literature (Broder-Singer, 2012). Since 2008, approximately 70 fellows have been accepted on an annual basis. Each cohort includes fellows at the post-Bachelors (pB), post-Master's (pM), and post-Doctoral (pD) level. More than 1000 African women scientists (465 fellows, 398 mentors, and 297 mentees) from over 300 institutions have participated in the program since its inception.

### ***Mentor selection and pairing***

AWARD pairs each fellow with a mentor (a respected male or female senior science professional) who is chosen to match the fellow's area of expertise and career goals but also her personality and style. Fellows are also afforded the opportunity to identify and propose potential mentors. The mentor-mentee matching is comprehensive in line with the recommendations by Broder-Singer (2012) and the experiences of successful mentorship programs (De Vries and Webb, 2005).

Each fellow is mentored for the first year of her fellowship and, in the second year, "shares forward" by taking on a junior scientist who she herself mentors. This approach allows fellows to

receive the benefits of mentoring, but also to practice the skill of mentoring, with the goal that after their participation in the program they will continue to mentor scientists in their professional contexts. Matching a fellow with her best mentor is an art, requiring personal commitment in addition to well-defined criteria. To ensure high chances of success in the mentoring relationship and process, AWARD invests in carefully matching the mentors and fellows (see Box 2).

### **Box 2: Profile of an AWARD mentor**

AWARD Fellows have characterized a good mentor as having strong professional qualities, such as being experienced, intellectual, visionary, a respectable and recognized role model, technically sound and skilled.

They also report that good mentors are leaders who understand the value and importance of mentoring and actively coaching their mentees. They are good communicators and receptive listeners who support the aims of female scientists, encouraging them and helping to grow their independence.

The fellows also listed essential personal qualities for building rapport and a solid mentoring relationship, such as compassion, respect, honesty, maturity, willingness, credibility, tolerance, selflessness and wisdom.

Source: AWARD

The set of selection criteria that AWARD uses to identify outstanding mentors calls for a good reputation and recognition in their field of expertise, in-depth knowledge of or interest in a fellow's area of work, and interpersonal coaching and leadership skills. In addition, mentors ideally live or work close to their fellows and show a commitment to mentoring as well as empathy. Each fellow works in consultation with the AWARD Mentoring and Partnership Coordinator to make the final selection. Karcher (2005) refer to this as the infrastructure component of mentoring initiatives, and point out that the greater the quality of infrastructure, the better the mentoring outcomes.

### **Mentoring structures, processes and tools**

The mentoring component of AWARD goes well beyond merely identifying potential mentors and pairing them with appropriate fellows. The structure of AWARD's mentoring relationship involves one-on-one mentoring, with typical sessions being conducted either at the fellow's workplace (site-based) in cases where the mentor and fellow work in the same organization; while some fellow-mentor pairs meet more informally (field-based). The AWARD mentoring relationship is both developmental and instrumental, whereby fellows benefited from the mentors' counsel, guidance, and psychosocial support, as well as technical knowledge on how to conduct research and advance their careers. These interactions in turn increase the fellows' motivation, focus, and scientific capability. The mentorship process is supported significantly to set it up for success.

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### ***Mentoring Orientation Workshop***

The first fellowship activity is a four-day Mentoring Orientation Workshop (MOW). The MOW introduces fellows to what to expect during their two-year fellowship, explaining the opportunities and resources the package includes, and clarifies the roles of the mentors and the fellows. It also provides an opportunity to initiate a supportive and collaborative network among fellows, mentors, and the AWARD team; introduces fellows to learning, monitoring and evaluation processes which are integral to AWARD; and raises their awareness of how personalities, culture, gender, values, communications, and problem-solving patterns can influence personal and working relationships.

During the workshop's four days, the fellows and mentors are guided to work with a set of planning tools, all of which are specifically designed to facilitate a successful and focused working relationship. This process of expectation setting is in line with what has been shown to work in other mentoring frameworks presented in literature (De Vries and Webb, 2005; Karcher, 2005; Broder-Singer, 2012).

### ***Mentoring contract***

The mentor and fellow create their mentoring contract together, specifying the three goals they agree to work on as well as how they will deal with potential conflict and how they will address issues of intellectual property rights. It is a private agreement between the mentoring partners.

### ***Career timeline***

Fellows develop timelines that delineate key events in their lives. This helps them understand their present situation and actively plan their futures.

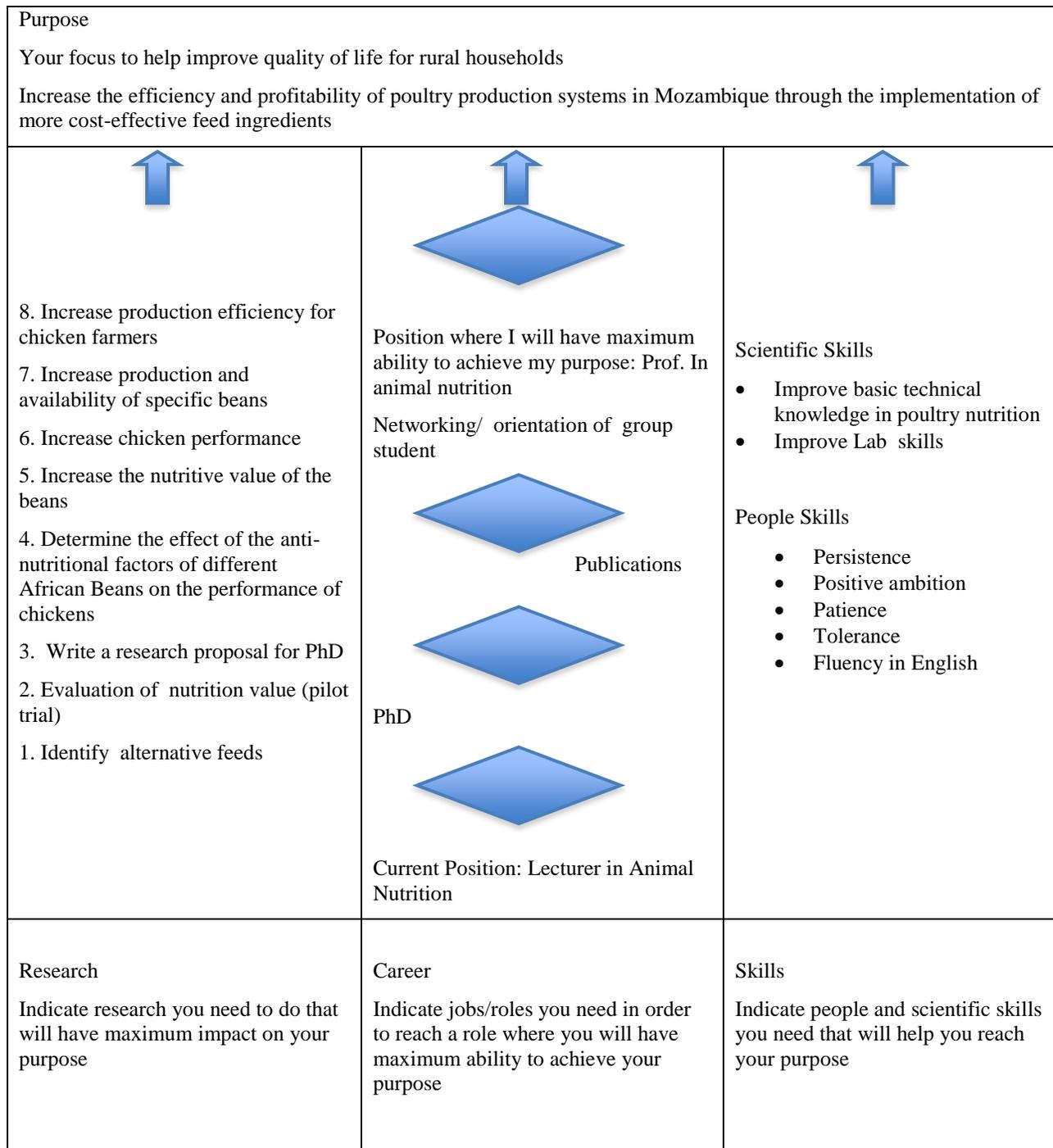
### ***Purpose road map***

The purpose road map (see Figure 1) details the changes the fellow wants to make in her career to attain her career goals. In creating her road map, the fellow defines the milestones for her fellowship and beyond. This includes the research she wants to focus on and which positions she will have to attain to make the changes she is aiming towards. This conforms to AWARD's theory of change, premised on the expansion of agency for the fellows.

Both fellows and mentors use the road map to monitor progress to make any needed adjustments to the goals, activities, and milestones originally identified. The purpose road map is a useful tool for reviewing the potential value of emerging opportunities and how they fit in with the fellow's overall career goals. In other words, the road map gives fellows the insight to know when to say "yes" and when to say "no" to opportunities.

### ***Development journal***

Each fellow uses her development journal to turn her purpose road map into an achievable plan with defined actions and milestones. To start a focused mentoring relationship, the fellow defines three main mentoring goals based on her purpose road map. A "goal" in this case signifies a key milestone on her career path that can be achieved within two years.



**Figure 1: Sample purpose roadmap**

***Mentoring diaries***

Fellows and mentors keep diaries to reflect on meetings and to prepare for the next meeting. These documents are not shared with anyone else.

### ***Mentoring session tracker***

Fellows use the tracker to record the dates of the monthly mentoring meetings and how the meeting was conducted (e.g. face-to-face session, telephone, or Skype). Such records are useful for both the mentoring pair and AWARD in understanding the dynamics of mentoring relationships.

### **Monitoring and evaluating mentorship**

In addition to the tools fellows and mentors use to track progress, AWARD makes use of timely monitoring and evaluation to benchmark the success of individual pairings during the fellowship period and over time to contribute to the body of knowledge on what contributes towards a successful mentorship approach for African women scientists working in agricultural research and development.

## **Methodology**

### ***Organizing questions***

Through the program's ongoing monitoring and evaluation efforts, AWARD can determine the effectiveness of its mentoring program for each individual cohort of fellows and over time, distil lessons relevant to similar initiatives.

The four overarching questions covered in the monitoring and evaluation are:

- How effective is the implementation of the mentoring components by the AWARD team?
- Is AWARD contributing to the development of mentoring capacity in the African agricultural research and development system?
- What are the benefits of the mentoring engagement for fellows and mentors?
- What are the factors that contribute to success?

### ***Data sources***

The data discussed in this paper was obtained from the three cohorts of AWARD's fellows and mentors. At the end of the first year of the fellowship, at the time when the formal mentoring period concludes, both fellows and mentors were asked to reflect on their experiences in the mentoring component of the fellowship.

The feedback was gathered electronically through the distribution of evaluation forms through JotForm, which allows editable PDF documents to submit data directly to a central server. Participants were thus able to complete the evaluation form offline and on their own time, and then submit their responses electronically.

Quantitative questions were included in order to allow the program to monitor patterns across each cohort of fellows and to have systematic data which is similar in format for all fellows and mentors. The tool included qualitative questions that allowed the program to understand the nuances and complexities of how fellows and mentors experience the relationship and provide insights into how the mentoring relationship is contributing either positively or negatively to

both fellows and mentors.

A high response rate was noted for both fellows and mentors in all three cohorts of mentoring (see table 2). A total of 196 fellows (out of a population of 209) and 166 mentors (out of a total of 209) completed the feedback form.

**Table 2: Response rates of fellows and mentors for three cohorts of the fellowship mentoring evaluation**

	2013 Cohort				2014 Cohort				2015 Cohort			
	Fellows		Mentors		Fellows		Mentors		Fellows		Mentors	
	n	%	n	%	n	%	n	%	N	%	n	%
Respondents	66	94	51	73	64	93	54	78	66	93	61	86

### *Data analysis*

Quantitative data were analyzed using the Statistical Package for the Social Sciences (SPSS). Descriptive statistics in the form of frequency tables were run on all the quantitative questions in the dataset. In order to identify any possible trends/ differences between groups of interest, the quantitative data was disaggregated by cohort of fellowship and level of qualification in the case of the fellows, and by gender in the case of the mentors.

Deductive qualitative coding was done using Dedoose ([www.dedoose.com](http://www.dedoose.com)), an online mixed-methods data analysis tool. The coding process was inductive and sought to serve the purpose of complementarity – in other words increasing the understanding of the quantitative data by providing explanations for quantitative response. Data were coded by a small team of researchers, all of whom have been engaged with the program for at least three to five years.

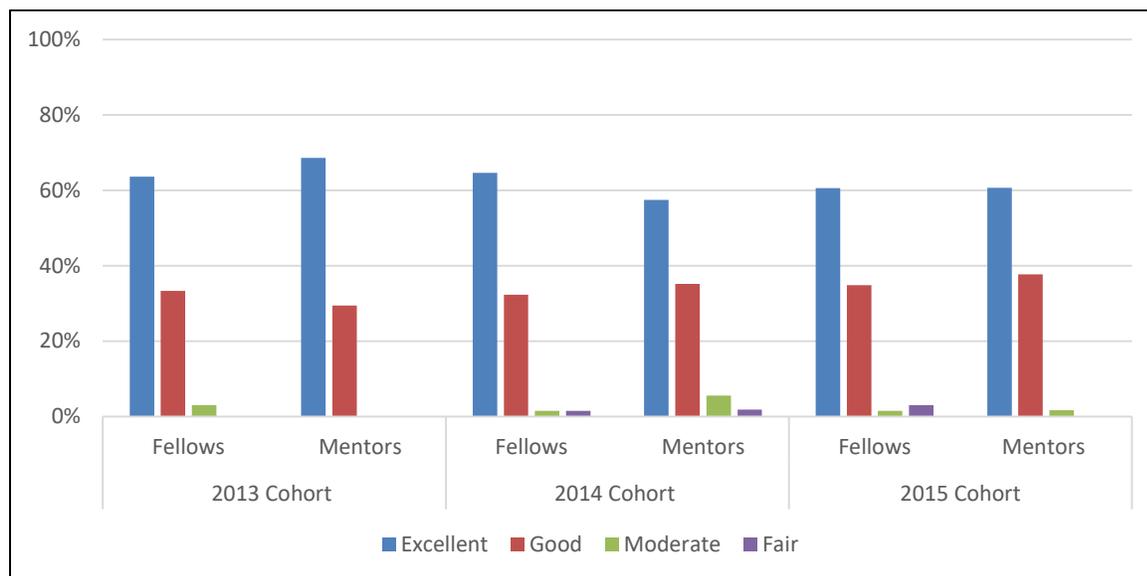
### **Key findings**

#### *Implementation success*

Two core elements are deemed critical to implementation success – the match between the fellow and mentor, and the quality of delivery of the mentoring program components. Although implementation success does not guarantee positive outcomes and ultimate impact, it is a necessary foundation and thus an important component to consider.

Fellows and mentors were asked to rate the match between themselves and their mentor (in the case of fellows) or mentee (in the case of mentors). As a result of the rigorous process for making the match and ongoing support by AWARD's Mentoring and Partnership Coordinator, the fellow-mentor match was rated as either good or excellent in the vast majority of cases (90%) by fellows and mentors (regardless of level of qualification or gender). Qualitative data informed understanding of the factors that led to less than optimal matching. The only factor identified as negatively influencing the match is the busy schedules mentors have to manage and the negative impact this has on their availability to invest in the fellow.

Fellows and mentors were asked to rate the delivery of the mentoring program, including all formal activities, such as the mentoring orientation and negotiation skills workshops. Fellows and mentors primarily rated the delivery as “excellent” or “good” in each for all three cohorts. Ratings in each cohort were very similar, indicating consistent delivery across different cohorts (Figure 2).



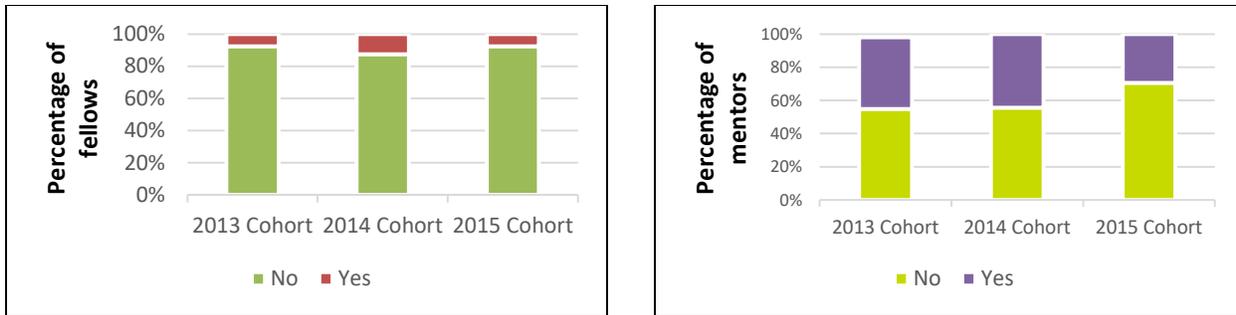
**Figure 2: Fellow and mentor ratings of the implementation of the mentoring program**

The implementation success of the mentoring program was further confirmed by acknowledging that several agricultural research and development institutions have adopted and adapted the mentoring model. AWARD has additionally received requests to conduct mentoring orientation workshops in several agricultural research and development institutions as a first step towards institutionalizing professional mentorship for women scientists.

### *Increasing mentoring capacity in the agricultural research and development sector*

Fellows and mentors were asked to report on whether they had previously been part of a mentoring program, and in what capacity. Figure 3 illustrates the responses from the fellows and mentors respectively for the cohorts entering in 2013-2015.

For all but one of the fellows in this sample, this experience as a mentee was their first. Mentors had more experience with mentorship programs (45 percent had previously been engaged in mentoring). A noticeable gender divide exists in mentor feedback; wherein male mentors have exclusively served as mentors while female mentors had been both mentees and mentors.

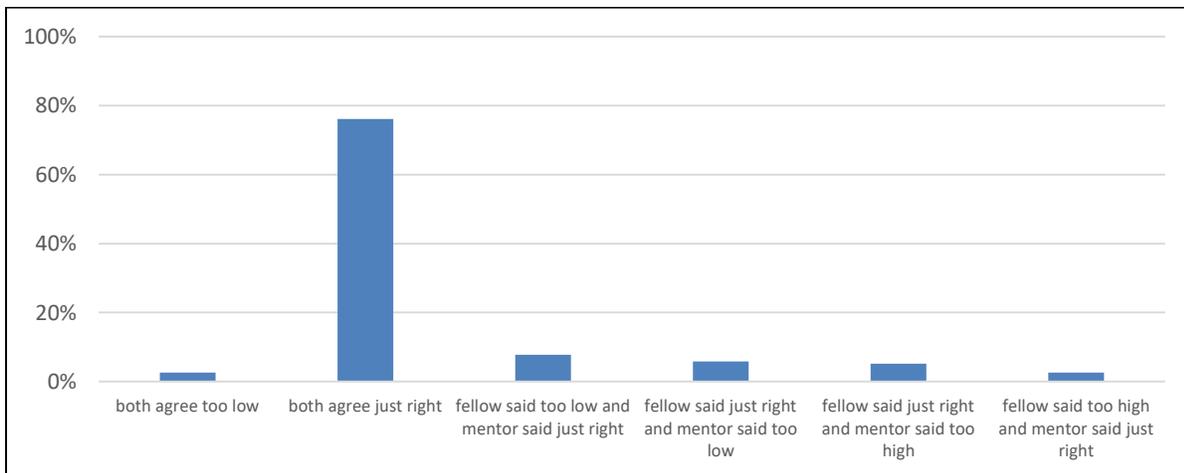


**Figure 3: Previous experience with formal mentoring**

The program thus plays an important role in exposing fellows and mentors to the value of formal mentorship and provides mentors and fellows with an opportunity to develop mentoring skills.

**Identifying optimal levels of engagement**

Fellows and mentors were asked to indicate the number of formal mentoring sessions that had taken place during the year, and what mode of communication had been used (face-to-face or phone/ Skype). A further question elicited information about whether the reported frequency of contact was considered too low, just right, or too high (see Figure 4). The intersection of these two questions allowed AWARD to identify the optimal level of engagement between fellows and mentors.



**Figure 4: Satisfaction with frequency and type of communication: Matched fellow and mentor data**

AWARD recommended 12 monthly meetings over a year of the mentoring relationships. Monitoring data confirmed, that on average, this objective was reached. Fellows met with mentors on average once per month and communicated telephonically/ via Skype at least once per month. There was, however, significant variation in contact frequency depending on the

individual mentor and fellow, ranging from once per month to four times per month.

In the 2013 and 2014 cohorts, approximately 70 percent of fellows and mentors indicated that the reported frequency of contact was “just right”. A higher proportion of 84 percent of fellows and mentors agreed that their frequency of interaction was “just right” in the 2015 cohort.

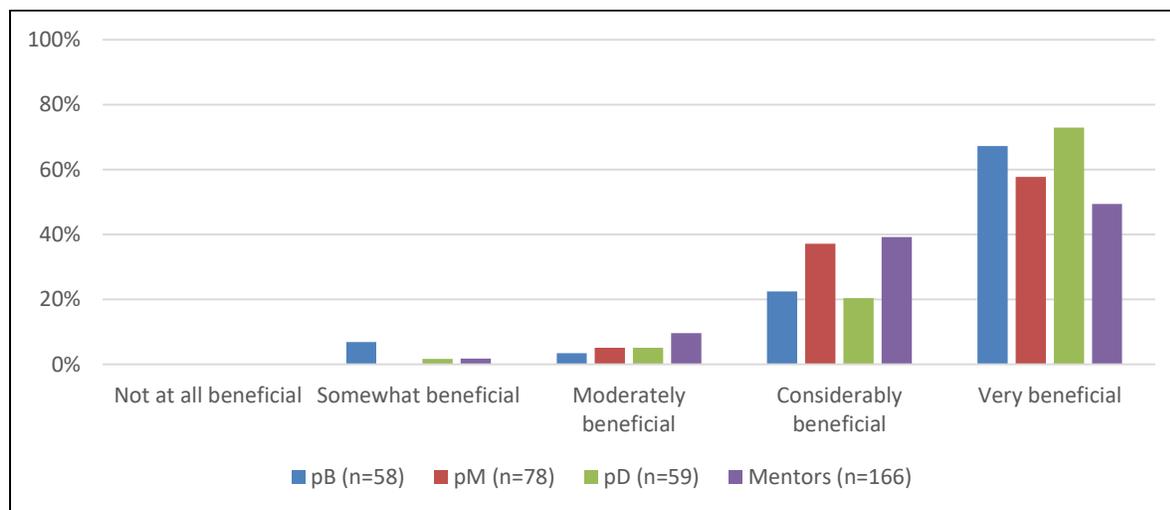
From the qualitative data, it is noted that for fellows, “just right” infers that their needs were met and time was used optimally, with an emphasis on quality not quantity. Mentors on the other hand, indicated that for them it was about flexibility and appropriate scheduling.

## ***Benefits of mentoring***

### *Benefits to fellows*

Fellows were asked to rate the mentoring program in terms of the benefits they had derived, specific to their career goals, in addition, mentors were asked to rate the impact they believe they had on the fellows’ career. Sub-questions included rating mentorship in terms of: focus and motivation, progress toward goals, value of access to mentor’s network, access to guidance from mentor, and collaborative opportunities.

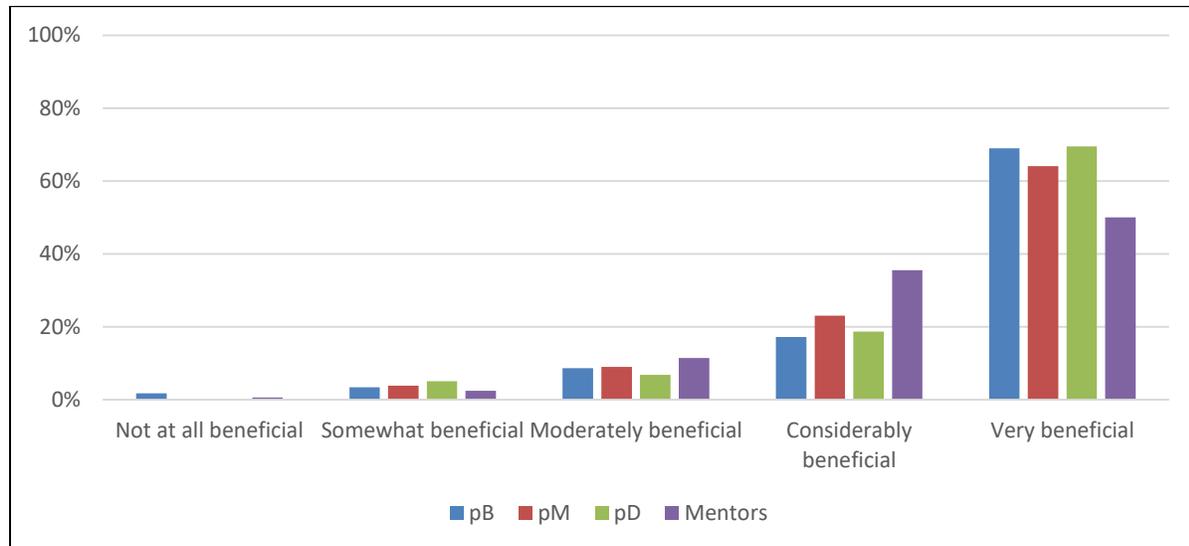
**Overall career development:** The mentorship relationship is significant in the career development of the fellows – regardless of cohort or level, although mentors are slightly less positive about their impact on the fellow’s career. Despite this, the clear majority of fellows and mentors rated the relationship as considerably or very beneficial to the fellows’ overall career development (see Figure 5).



**Figure 5: Benefits of mentoring to fellows’ overall career development**

**Focus and motivation:** Mentoring was considered important for increasing fellows’ focus and motivation by the clear majority of fellows (at least 85 percent) across all levels of qualification (see Figure 6). Mentors again rated their impact on focus and motivation lower than the fellows did, but still highly positively. Qualitative data did not provide any insights into why mentor

ratings were lower than fellow ratings; it is possible that these differences are as a result of the fact that mentors are rating their perception of how fellows benefitted, whilst fellows are rating their own experience.



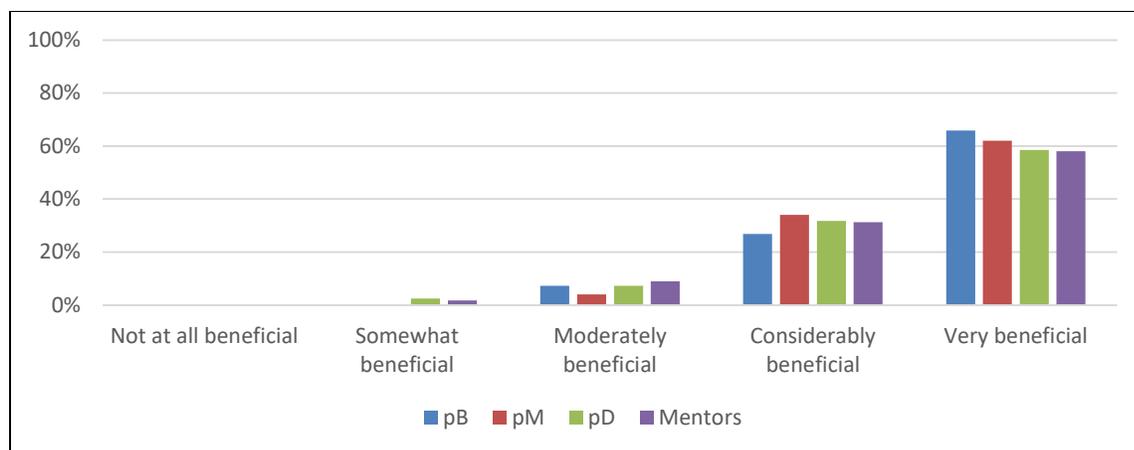
**Figure 6: Benefits of mentoring on fellows' focus and motivation**

Shared experiences (such as the MOW) which fellows and mentors attend together, as well as the former experience of the mentor emerged from the qualitative data as important motivating factors. Two examples are provided below.

*“I started sharing my personal experiences with her, as I was mentored by a seasoned scientist in Ghana before I returned to Liberia. As a result of sharing my personal experiences, I also recommended some motivational books to her and she bought them for her reading and she started being focused and motivated.”* (AWARD mentor, mentor feedback form)

*“Before the fellowship she had been experiencing some delays in her research project which prompted her to abandon her Ph.D. However, with my encouragement, she renewed her interest and vigor. Now she is in the International Centre of Insect Physiology and Ecology- ICIPE for a science placement for 6 months where she will conduct some of her experiments.”* (AWARD mentor, mentor feedback form)

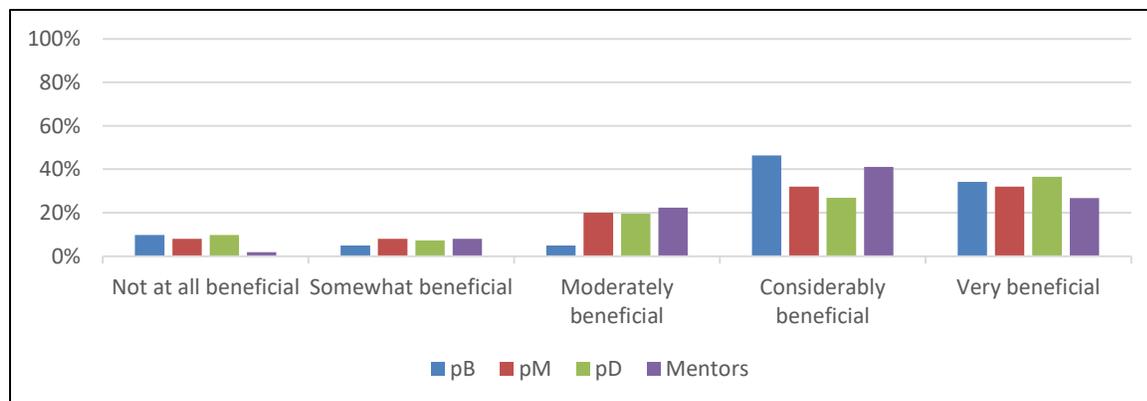
**Progress on specific career goals:** More than 90 percent of fellows indicated that the mentoring relationship was considerably or very beneficial in aiding them to attain specific career-related goals, as illustrated in Figure 7.



**Figure 7: Benefits of mentoring on fellows' progress towards specific career goals**

Qualitative data confirmed the value of the MOW in helping fellows to set clear goals for the mentorship period, and the important part of the mentoring relationship is the role that the mentor plays in helping the fellow keep on track with their purpose road maps.

**Access to mentor's networks and opportunities for collaboration:** Fellows and mentors reported lower benefits in terms of access to networks from the mentorship relationship than was the case for the other benefits noted above (see Figure 8). Less than 40 percent of fellows indicated that the mentoring relationship was very beneficial to them in this regard (compared to more than 60 percent who indicated very beneficial in terms of focus and support to achieve goals).



**Figure 8: Benefit to fellow of being linked to mentor's networks**

Accessing networks is one of the areas where a shared research area influences the mentorship relationship positively. In some instances, the mentors' networks lead to career opportunities for the fellows. Three examples below illustrate the benefit of a shared research area, and the difference in approach to networking needed when a fellow and mentor are not in the same role.

*"I had also access to my mentor's network and I have interacted with renowned breeders during the meetings that my mentor invited me to attend. We intend to conduct collaborative research together."* (AWARD fellow, fellow feedback form on mentorship)

*“My network was not in agriculture so it was not as beneficial as should have been, but I was able to help her with access in her own field, with my guidance.”* (AWARD mentor, mentor feedback form)

*“The mentoring relationship has been very beneficial for my Fellow (mentee) because it enhanced her decision-making and thought processes, fast-tracked the completion of her PhD, exposed her to my networks through which we are already making contacts for her PostDoc.”* (AWARD mentor, mentor feedback form)

Linked to the idea of networking fellows into influential and relevant networks, is the assumption that through the mentorship relationship, fellows may be connected to new collaboration opportunities. This benefit of the mentoring partnership was not rated as highly as the relational aspects of the mentorship (e.g. motivation and guidance), however, there are examples in the qualitative data of how connecting fellows to their specific mentor has opened research and career opportunities for the fellows. Again, being in the same area of research appears to make collaborative opportunities more likely.

*“We started together a collaboration on an aspect of her work that involved biogas production from livestock waste for the rural women which we intend to continue even now that the mentoring programme is over.”* (AWARD fellow, fellow feedback form on mentorship)

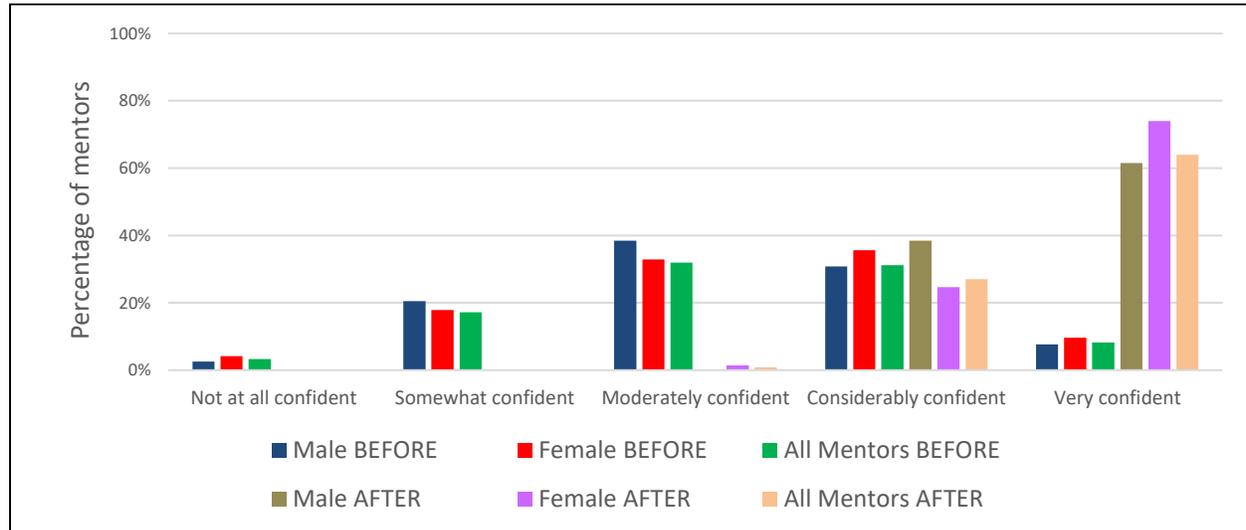
### *Benefit to mentors*

The mentors were asked to rate how the experience of being a mentor had impacted them as professionals, specifically in terms of their mentoring skills, confidence in taking on the role as a mentor, reputation as a mentor, and their awareness of gender issues in agricultural research and development. On each aspect, mentors rated their perceived skills before being a part of the program, and self-reflected abilities after the engagement with the program.

**Mentoring skills:** The clear majority of mentors, both male and female, considered themselves to have had some degree of mentoring skill prior to the program (only six percent did not indicate as such). After the experience as mentor for a year, the perceived skill had shifted to predominantly “considerably skilled” (57 percent) followed by “very skilled” (43 percent). This reflection by the mentors supports the earlier finding that AWARD plays an important role in developing mentorship skills and providing exposure to well conceptualized and effectively managed mentoring models.

*“I had no background in formal mentoring before the AWARD programme but the experience has been an eye opener, the training has been very helpful to me personally and I am introducing mentoring to our research programme in my institution now. I have learnt new things and approaches and I am confident that I will be a better mentor whenever the opportunity arises again.”* (AWARD mentor, mentor feedback form)

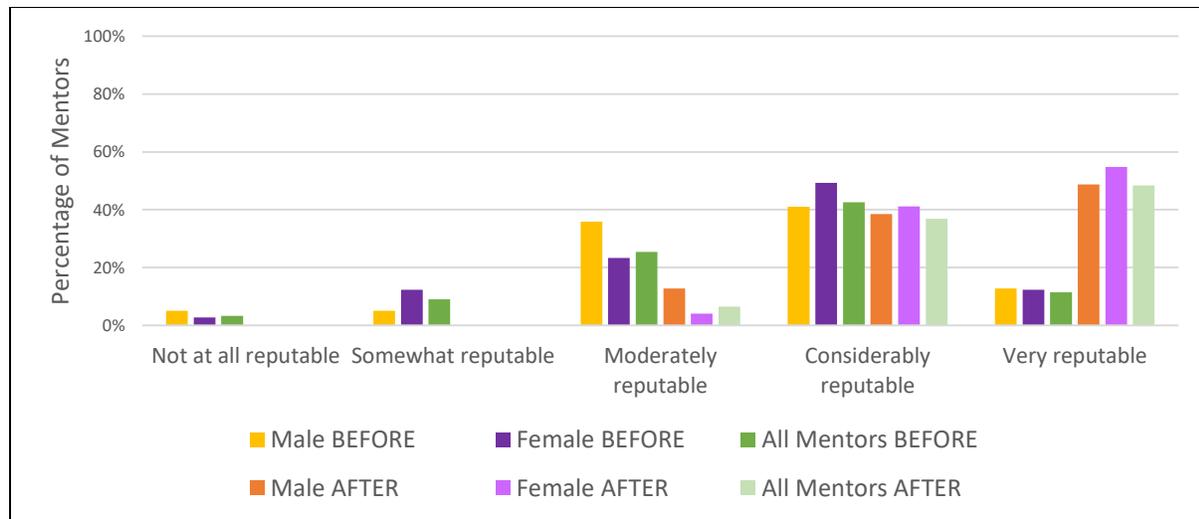
**Confidence as a mentor:** Mentors reported that their confidence in mentoring was boosted by the program (Figure 9). Most mentors, regardless of gender, rated themselves as moderately or considerably confident at the start of their involvement with the program. This shifted to most mentors rating themselves as very confident at the end of their involvement. Considerable gains in confidence are specifically noted amongst the female mentors.



**Figure 9: Benefits to mentors' confidence**

The mentoring workshop and the negotiation skills workshops were cited in the qualitative data as occasions which added great value to building confidence for the mentors. Learning 'on the job' – while a steep learning curve – was valuable and contributed significantly to assertiveness and overall confidence.

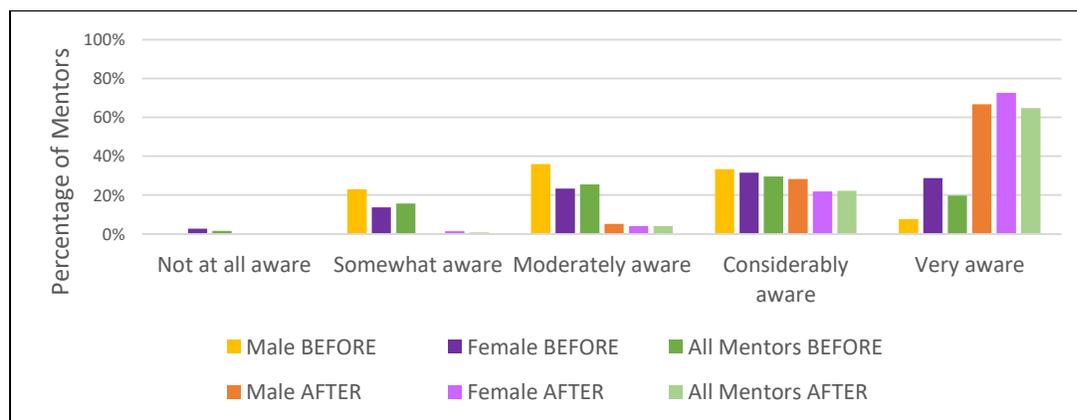
**Reputation as a professional role model:** After the experience as an AWARD mentor, 55 percent indicated that they were perceived as "very reputable", with 45 percent indicating they were now "considerably reputable" as a professional role model (Figure 10). Although a greater proportion of female mentors rated themselves as considerably reputable prior to their involvement in the mentoring program, after the program the profiles of male and female mentors were highly similar – with approximately 50 percent rating themselves as being very reputable, and approximately 40 percent rating themselves as considerably reputable.



**Figure 10: Benefits to mentors' reputation as a professional role model**

From the qualitative data, it was noted that additional approaches by others to become a mentor is the primary benchmark indicative of reputational improvement (noted by 26 percent of mentors). Public speaking ability, particularly the confidence to undertake it, was particularly noted as an acquired skill that led to an enhanced reputation (and is directly linked to the development of confidence during the program as noted above).

**Awareness of gender issues in agricultural research and development:** It cannot be assumed that women in agricultural research are aware of gender related issues in the sector. Responses from mentors to the question on how their involvement as a mentor had influenced their awareness of gender issues in agricultural research and development confirms that this is an incorrect assumption (Figure 11).



**Figure 11: Changes in awareness of gender related concerns in African ARD: Percentage of mentors disaggregated by gender**

Although higher than the proportion of men (eight percent), less than 30 percent of female mentors indicated that they were very aware of gender issues in agricultural research and development prior to their involvement in the program. The proportion of males and females who indicated that they were very aware of gender issues in agricultural research and development increased dramatically by the end of the mentorship period.

Attendance at the Negotiation Skills Workshop was referred to by respondents as a very positive experience, and one which heightened their awareness and sensitivity to gender-related matters. Most mentors admitted to a superficial knowledge of gender issues prior to the program, going so far as to explain that pre-program, their knowledge was limited to an understanding that there are two biological sexes, maturing to a nuanced knowledge of the depth and breadth of the topic following engagement with the Fellowship.

*“AWARD has equipped me with knowledge and skills to lead and manage as a female in a male dominated organisation. Culture and gender implication for women leaders have become clearer to me.”* (AWARD mentor, mentor feedback form)

### ***Factors contributing to successful mentoring***

The success of the mentoring partnership is dependent to a large degree on the individuals involved in the relationship. However, there are distinct external factors that might positively or negatively affect the connection. Fellows and mentors rated seven potentially influential factors identified as elements that could affect the success of the relationships. The seven factors are personality, age, gender, social or cultural background, research area or discipline, commitment, and geographical location or distance.

Detailed analysis of quantitative findings indicated that four of the seven factors influenced the partnership in a positive manner. The most influential of these was commitment to the partnership, followed by shared research area or interests, a compatible personality, and proximity to each other.

#### ***Commitment***

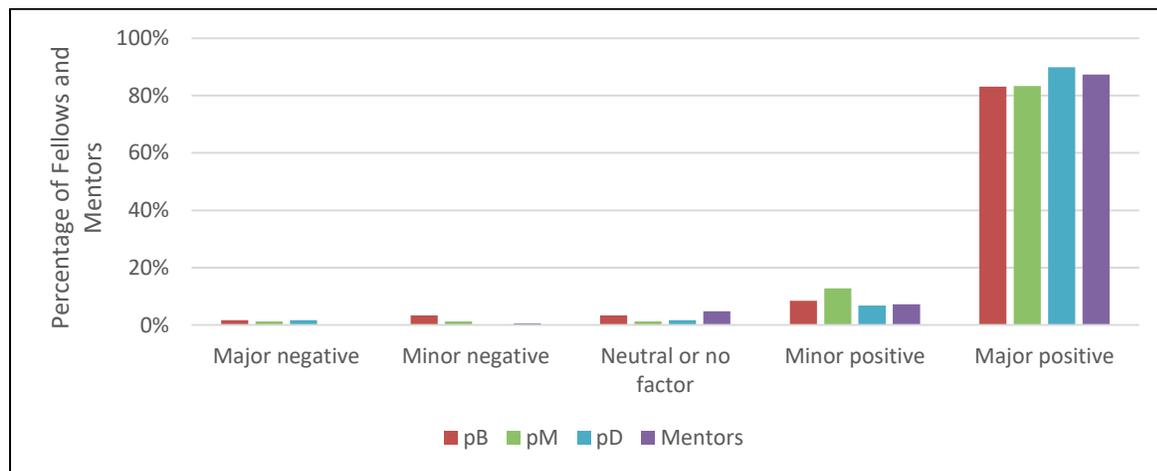
Commitment to the partnership was viewed as crucial to the success of the mentoring process by both fellows and mentors. This factor stood out as being fundamental, with the clear belief that mentorship is a relationship and both parties must commit for it to succeed. More than 74 percent of fellows and mentors, regardless of cohort, rated commitment as a major positive factor (see Figure 12).

Qualitative responses confirmed not only the value of commitment, but the value of commitment to the mentoring partnership from both the fellows and the mentors. This sentiment, and the effect of one person not committing fully, is echoed in the quotes below:

*“Commitment was a very important factor because I knew I only had a year with my mentor and I was bent on achieving results within this time. This helped me strategically plan my time with him.”* (AWARD fellow, fellow feedback form on mentorship.)

*“We would not have made it if we were not committed. Commitment is everything as far as a course or project is concerned. I saw the mentorship as a project, I needed it successfully completed and so got committed to it. I made sure I adjusted my programmes to fit into my mentor's time table to accommodate her busy schedule. She too was always calling to find out topics and date/time for the next meeting. This to a good extent, got us successful in the contract.”* (AWARD fellow, fellow feedback form on mentorship.)

*“This commitment should come from both parties. Speaking for myself, I think my levels of commitment were not at optimum. Sometimes, I would wait for my mentor to get in touch and was not in the forefront and did not take a leading role in the communication process. I remember during the mentoring orientation workshop it was emphasized that as a fellow, one needed to take charge and not wait for the mentor to take the first step or make the first call. I may have managed some months but for the better part of our partnership, my communication skills and level of commitment could have been better.”* (AWARD fellow, fellow feedback form on mentorship.)

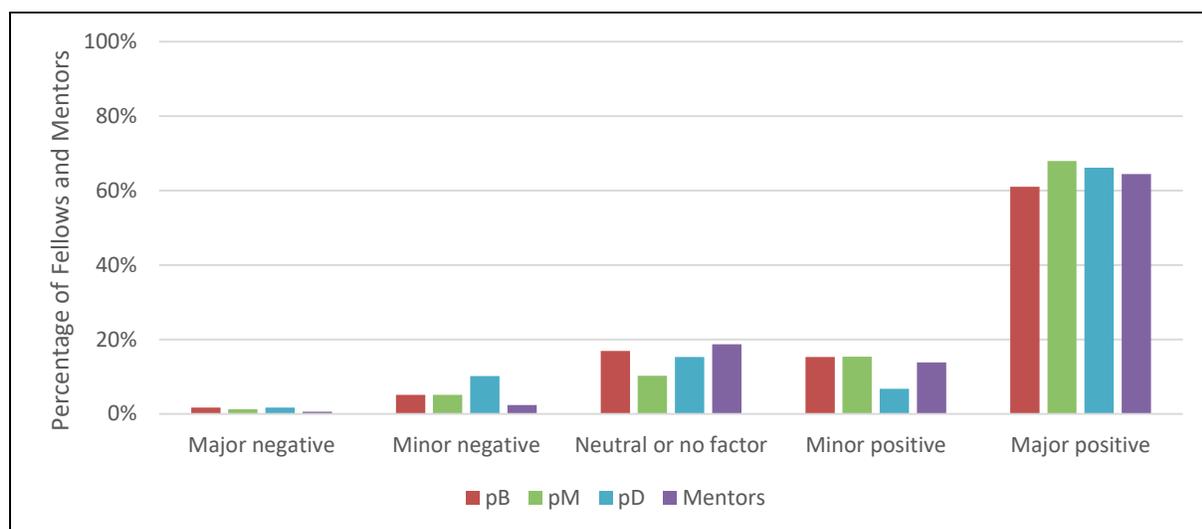


**Figure 12: Influence of commitment on the mentoring relationship**

Quantitative data analysis resonates strongly with the qualitative responses of the fellows regarding their satisfaction with the fellow-mentor match. Fellows who were unable to contact their supervisors, or who were not able to establish regular meetings or get feedback were less satisfied with the partnership. This critical combination of reciprocal commitment and communication has been identified in other studies examining the components of successful scientist mentoring programs (Straus *et al.*, 2013)

#### *Shared research area*

A matched research area (that is, mentor and mentee coming from similar disciplines) was viewed as contributing strongly to the success of the mentoring relationship (Figure 13). This finding held true for both mentors and fellows, and very little difference was noted between fellows of varying levels of qualification.



**Figure 13: Influence of shared research interests on the mentoring relationship**

From the qualitative data analysis, it is noted that experienced mentors were not as adamant on this factor as fellows, putting less emphasis on research area for success in mentoring. Fellows found tremendous value from being connected to a mentor in a similar research area as the commonality in research facilitates, access to networks, and practical advice on research.

*“Both of us are food scientists, and it was easy to identify common research goals, and collaborators. It was easy to link her up with a colleague in Louisiana State University when she went there as a Borlaug fellow.”* (AWARD mentor, mentor feedback form)

*“We are on the same research area. My mentor was familiar with the research terrain therefore she was able to offer practical and workable straight-to-the-point solution to my research need. We were not beating about the bush to get research problems solved.”* (AWARD fellow, fellow feedback form on mentorship.)

Qualitative data also showed that being in a different – or more remotely related field – was not an entirely negative experience. The experience of the mentor can mediate disciplinary differences and add value to the mentoring relationship.

### *Personality*

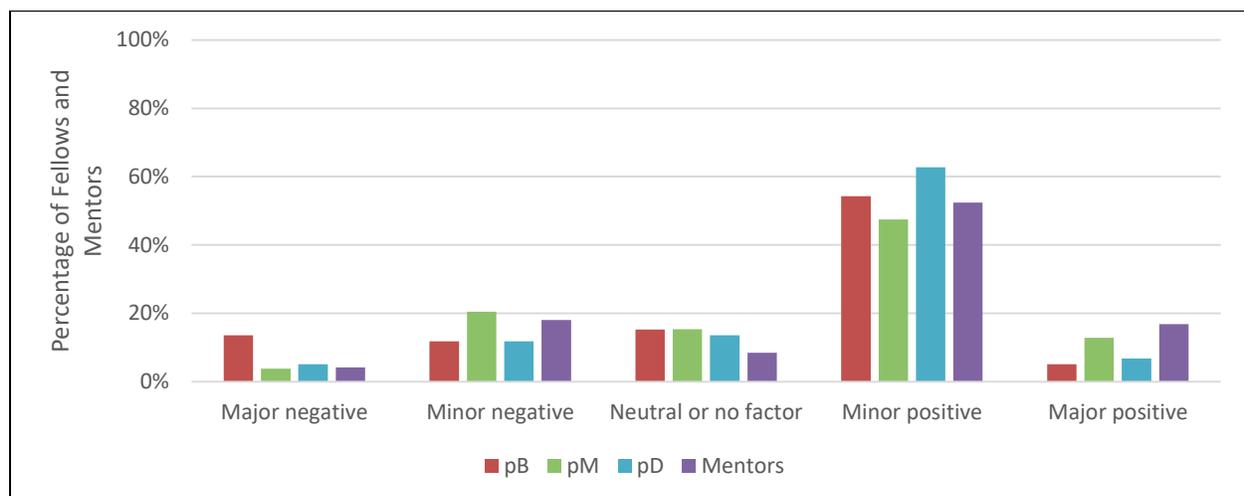
Personality was another factor influencing the mentoring relationship positively. There was, however, no clear pattern in the qualitative responses that suggests similarity or difference in personality as the key ingredient. There were positive views for contrasting scenarios: similar personalities succeeding, and for opposing personalities partnering well – as well as the opposite.

Straus *et al.* (2013) found that a personality difference was one of the factors that led to the breakdown of mentoring relationships. It emerged clearly from the qualitative data that the reason why personality did not emerge as a negative factor in the mentorship relationship, is the specific way AWARD prepares both its fellows and mentors to manage personality differences.

Early in the mentoring process fellows and mentors complete the Myers-Briggs personality inventory, and structured discussions are held to aid the mentor-fellow pair to understand each other and manage their relationship accordingly.

### *Proximity*

Although identified as one of the factors influencing the mentoring relationship positively, proximity was one of the most strongly argued factors, with a greater emphasis placed on the positive impacts of closer proximity (see Figure 14). When compared to the response patterns for commitment, research area, and personality, a noticeably higher proportion of fellows and mentors indicated that proximity (i.e. the distance between them) had a negative impact on their relationship. Generally, fellows who indicated that proximity was a negative factor in their experience demonstrated a distinct preference for face-to-face interaction, despite the technological advancements that facilitate a remote partnership.



**Figure 14: The influence of proximity on the mentoring relationship**

While remote contact can offer benefit, the information and frequent contact afforded by proximity offers “next level benefit”, opening more nuanced doors than simple work-related assistance. Time and money were notable barriers to those who lived close enough to travel to meet, but not close enough to walk to meet.

### *Age*

Age was not identified as one of the factors influencing the mentoring relationship as strongly as the previous four factors. The substantially higher proportion of fellows and mentors (more than 40 percent in each case) indicating that age was no factor or a neutral factor in the relationship is indicative of this.

Qualitative data analysis indicates that in instances where the mentor was significantly older than the mentee, age was viewed positively as this was tied into elements of respect and experience. Although there were positive aspects to having an older mentor, fellows with a mentor of a

similar age also experienced the relationship positively, citing the benefits of peer-to-peer learning.

### *Socio-cultural background*

Data show that language and professional custom remain important, yet this factor garnered the highest “neutral” ratings (more than 50 percent of fellows and mentors) indicating that this factor was less important in mediating success of the mentoring relationship.

Qualitative data analysis however showed that socio-cultural context specific to different countries must be borne in mind as cultural norms are important to consider when matching a fellow and mentor.

*“Still the cultural and religious value of people matter a lot. For me having a male mentor, and cultural back ground made me to be more reserved than free in my interaction. Because I have been out of my country for a while and developed liberal attitude, it might make my mentor uncomfortable. But through the interaction, I have learned that there are things I have to consider in my career in Ethiopia.”* (AWARD fellow, fellow feedback form on mentorship)

*“I think this had an impact in our mentoring setting, since I was always the one to suggest the days and times of meeting. In my culture, this may be seen as rude and disrespectful. So sometimes I shied away from making appointments for fear of being seen as rude and over-riding.”* (AWARD fellow, fellow feedback form on mentorship)

The strong negative experiences of a very limited number of fellows highlights the importance of sensitivity to this factor.

### *Sex of the mentor/mentee*

No distinct pattern emerged from the data to suggest that female mentors are more appropriate for female scientists. However, there seems to be different benefits accrued to the mentee dependent on the gender of their mentor. Where the mentee and mentor were both women, the relationship was ‘opened’ and extended beyond simply the professional (to include issues of work life balance, personal challenges, etc.). Male mentor-fellow relationships very seldom included this more ‘open’ element, most likely due to cultural norms.

*“I think from my interaction; it will be better to share experience from fellow women. When I got the chance to meet other fellows and mentors, I have seen the bond and interaction among them. I was not able to have free women like interaction with my male mentor. Thought it helped me to understand the mental set up of men in science.”* (AWARD fellow, fellow feedback form on mentorship)

It is vital that socio-cultural restrictions on male-female meetings be noted in the selection of mentors and that in circumstances where social practices would restrict engagement between male mentors and female fellows that this be addressed and male mentors discouraged to ensure

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maximum benefit to the fellow.

## **Discussion and recommendations for practice**

### ***Implementation success as the foundation for impact***

The mentoring component of the fellowship received consistently high ratings from stakeholders, confirming the appropriateness and success of the specific model selected for the African agricultural research and development context. In line with Sipe and Roder (1999) and DuBois *et al.* (2002), AWARD's degree of infrastructure was high, with the Mentoring and Partnerships Coordinator keenly involved in ensuring that each fellow was matched to the best mentor possible. The careful matching was complemented with mentoring tools and training, especially during the MOW.

Both the mentoring workshop and tools have proved critical to supporting the accountability processes of the mentoring relationship, and in particular in preparing the fellow and the mentor for the mentoring experience. The mentoring model has successfully aided fellows and mentors to set expectations and manage boundaries – two of Broder-Singer's (2012) components of effective mentoring programs. The mentoring training has also clearly mediated some of the potential challenges of mentorship relationships, specifically the potential for so-called 'personality clashes'. The replication of the model in other institutions is a further indication of the success of the approach, both in terms of its design and content.

### ***Contribution to mentoring capacities***

Through its mentoring partnership initiative, AWARD sought to contribute to increasing the research capacity and technical skills of African women scientists in agricultural research and development organizations. Through being the first exposure to mentoring for the vast majority of fellows, and more than half of the mentors, the mentoring program has most certainly contributed in line with its intentions. Data from mentors clearly shows shifts in capacity to mentor, and the increased requests for mentors – to serve as mentors to others outside the program adds further validity to this claim.

### ***Benefits of mentoring confirmed***

Fellows' data confirm the benefits that mentoring has for female scientists, both in the form of psychosocial and career support which ultimately contribute to their career progress (Carter and Silva, 2010; Crisp and Cruz, 2009; Ely *et al.*, 2011; Ragins and Kram, 2007; Rathgeber, 2002; Webb, 2008; Willemsen, 2016). For fellows, psychosocial support is expressed through the strong contribution the relationship makes to their focus and motivation. Examples of career support took various forms. In line with the literature, one of the challenges women face is the lack of access to networks. It was encouraging to find examples of sponsorship emerging in the analysis (Carter and Silva, 2010; Willemsen, 2016). Having similar research areas was highly beneficial to the majority of the fellows as it allowed them to access the mentor's research and collaborative networks while simultaneously effectively solving the fellows' research problems. This is sponsorship in practice, and in some cases it opened doors for advancing the fellows'

careers, such as completion of a PhD program and identification of a post-doctoral opportunity. Beyond the immediate benefits to fellows, the data clearly shows the ripple-effects of the model – where benefit was also accrued by mentors and through their increased capacities to institutions (Blake-Beard, 2001; Gardiner, 2005; Ragins and Cotton, 1999). Mentors improved their mentoring skills, confidence, and professional reputation as role models. The latter being of interest in that serving as a role model is one of the types of support mentors can offer their mentees. Of particular interest however, is how the mentorship experience contributed to the improved understanding of the issues women face in agricultural research and development – with drastic increases being noted by both male and female mentors. This shift is significant as it means that there is an increase (within institutions and the sector) in the number of males who are likely to champion gender issues.

### *Does sex matter in mentor selection?*

Ultimately, the AWARD experience indicates that the answer is both yes and no, similar to the findings noted by Willemsen (2016). Although there are differences in the experiences of fellows dependent on the gender of their mentor, data did not suggest that female fellows should be paired with female mentors in order for positive outcomes to emerge.

However, where fellows were paired with male mentors, there emerged issues of socio-cultural perceptions of the inappropriateness of the interaction, especially in informal settings. In designing similar programs, it may be useful to have work-based mentoring sessions, coupled with institutional sensitization of the mentoring approach and process, in mentoring relations involving male mentors. This would ensure that the benefits of learning from and obtaining sponsorship from male mentors are safeguarded while maintaining the comfort levels of the female mentees.

### *Overcoming geographic constraints*

Where there were proximity challenges and the pairs could not meet face-to-face, they had technology mediated sessions, although it emerged that there was a preference for face-to-face interactions complemented by Skype or phone conversations. AWARD and others wishing to improve the design of mentoring experiences have an opportunity to explore how to better employ new technologies in this regard.

## **Conclusion**

This paper laid out AWARD's mentoring partnership approach while exploring how it fits in with existing mentoring frameworks and exploring the data from the program's ongoing monitoring and evaluation efforts. The evidence obtained from the monitoring and evaluation of the program is for the most part consistent over time, and generally consistent between fellows of different levels of qualification and mentors of different genders.

The overall design of the program – including its matching processes, training offered to both mentors and fellows, and frameworks for accountability, adaptive management and

benchmarking – is a high potential model for other programs and institutions seeking to implement a mentoring initiative specifically targeted at women in science in the African context.

The benefits of the mentorship approach which accrue at mentee, mentor, and institutional level confirm the value of mentoring programs in African agricultural research and development. The inclusion of content related to the importance of gender responsiveness in the sector further enhances the impact that a mentoring initiative can have.

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