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ACADEMY OF SCIENCE OF SOUTH AFRICA

Applying scientific thinking in the service of society

THE STATE OF WOMEN IN SCIENCE AND TECHNOLOGY IN SWAZILAND: RESULTS OF A SURVEY

Final report

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1 BACKGROUND

1.1 Context and objectives of the study

The Academy of Science of South Africa (ASSAf) has been commissioned by the UNESCO Regional Office in Windhoek to conduct research on the state of women in science and technology (S&T) in four southern African countries: Swaziland, Angola, Namibia and South Africa. A study on the state of women in S&T in a fifth southern African country, Lesotho, was undertaken by another service provider and already completed at the time of ASSAf's involvement in the project.

UNESCO conceptualised the overarching project, which should be seen against the backdrop of its Programme and Budget for 2010-2011 (35 C/5). The latter document, 35 C/5, was adopted by the UNESCO General Conference at its 35th session, by consensus, and is aligned with the broader strategic and global priorities and objectives set out in the Approved Medium-Term Strategy for 2008-2013 (34 C/4). It is particularly Major Programme II (MP II – Natural Sciences) within 35 C/5 that provides the context for the study and, more specifically, Main Line of Action 2 (MLA 2) within MP II. MLA 2 is directed at the reinforcement of capacity-building in the sciences and the strengthening of science education, especially in Africa. UNESCO's two global priorities – Africa and gender equality – feature as follows in MP II in the 35 C/5 document (UNESCO, 2010, pp. 83 & 87):

- MP II actions in Africa will have three strategic thrusts: creating an enabling environment to allow science and technology to flourish; building human resource capacity in science, engineering and technology; and facilitating the application of scientific knowledge to address the problems of poverty and environmental degradation. To these ends, all actions in the region will include technical assistance for policy formulation or review, and human resource capacity-building.

- Gender equality considerations will continue to be mainstreamed, to the extent possible, in all activities of Major Programme II. In science policy, gender equality will be mainstreamed recognizing the need to promote science policy by, for and about women. Activities will include support to the design, implementation and evaluation of gender responsive science and technology policies, including a gender-balanced composition of science decision-making bodies and the integration of the gender dimension effectively into science policy development plans.

The brief of the study, as formulated by UNESCO, provides additional support for an investigation into the state of women in S&T in developing regions like southern Africa. According to the brief, research has persistently shown that the numbers of women, a segment of society that comprises more than half of the world's population, are under-represented in S&T; both in the use of S&T products and the uptake of science-related careers. This lack often manifests itself in the skills shortage that most countries, including

those of southern Africa, continue to report, and this has an effect on the region's global competiveness and growth. At the same time, there is a lack of a co-ordinated approach in the reporting of gender and S&T statistics, and often data published cannot easily be compared across countries. As a result an accurate database of women scientists in the region has not been established yet. The study therefore aims to research and document the state of women in S&T in the five countries listed above, and compile information on women scientists that will contribute to the building of an online searchable database where details of women scientists in the countries aforementioned can be accessed easily. Finally, the surveys of women scientists will highlight the unique challenges, activities and perceptions of women scientists in the study countries.

The remainder of this introductory section provides a general overview of Swaziland (Section 1.2)[1], as well as a country-specific S&T profile (Section 1.3).

1.2 General profile of Swaziland

Swaziland is landlocked in southern Africa and almost completely surrounded by South Africa, except for a short border with Mozambique to the east. It has a population of about 1.37 million people. The government type is a monarchy, where the monarch is also the chief of state. The monarch appoints the prime minister from among the elected members of the House of Assembly. A constitution came into effect in 2006, but the legal status of political parties remains unclear.

Swaziland is heavily dependent on South Africa from which it receives more than nine-tenths of its imports and to which it sends 60% of its exports. Swaziland's currency is pegged to the South African rand, subsuming Swaziland's monetary policy to South Africa. The government also relies heavily on customs duties from the Southern African Customs Union (SACU), and worker remittances from South Africa substantially supplement domestically earned income. The government has also legislated that 30% of local pension funds need to be invested in Swaziland, boosting demand for government bonds. Customs revenues plummeted due to the global economic crisis and a drop in South African imports. The resulting decline in revenue has pushed the country into a fiscal crisis. The government has requested assistance from the International Monetary Fund and from the African Development Bank.

[1] Section 1.2 is taken from The World Factbook of the Central Intelligence Agency (CIA) (www.cia.gov).

Subsistence agriculture occupies approximately 70% of the population. The manufacturing sector has diversified since the mid-1980s. Sugar and wood pulp were major foreign exchange earners; however, the wood pulp producer closed in January 2010, and sugar is now the main export earner. Mining has declined in importance in recent years with only coal and quarry stone mines remaining active.

Approximately two-thirds of the population live below the poverty line. With an estimated 40% unemployment rate, Swaziland's need to increase the number and size of small and medium enterprises (SMEs) and attract foreign direct investment is acute. Overgrazing, soil depletion, drought, and floods persist as problems for the future. More than one-fourth of the population needed emergency food aid in 2006-07 because of drought, and more than one-quarter of the adult population has been infected by HIV/AIDS. The adult prevalence rate is 25.9% (2009 estimate), which is also the world's highest known HIV/AIDS prevalence rate.

1.3 S&T profile of Swaziland

Institutions

In August 2011 the government of Swaziland produced its final draft of a national science, technology and innovation policy (STI policy). This milestone event was preceded by a number of stakeholder meetings and consultancy reports, all of which were funded and supported by UNESCO. In June 2008, for instance, the Swaziland Ministry of Education commissioned a survey that was funded by UNESCO, with the purpose to provide an inventory of science and technology in Swaziland. A supplementary study was launched in 2009 and the findings thereof included in a national report of S&T in Swaziland, which was submitted to UNESCO in 2009 (Dlamini, 2009). The findings of the latter study feature prominently in the final draft STI policy.

Currently the responsibility for S&T lies with the Ministry of Information, Communication and Technology (commonly referred to as “Ministry of ICT”). However, the draft STI policy recommends that the ministry be changed into a Ministry of Communications, Science and Technology. In addition, it is recommended that a Directorate for STI also be established within the ministry in order to create and maintain an enabling environment for the implementation, monitoring and evaluation of the STI policy and the co-ordination of STI activities at national, regional and international level (Kingdom of Swaziland, 2011).

According to the report by Dlamini (2009), the total estimated Gross Expenditure on R&D (GERD) in 2008 was about 41.5 million Euros. This corresponds to about 0.2% of the country’s GDP. This ratio of GERD over GDP is too low to make an impact, especially

considering that the average for Sub-Saharan Africa is 0.3% and that of the world is 1.7% (UNESCO Institute of Statistics, figures for 2007). Moreover, the R&D expenditure figures per sector of performance are shown in Figure 1.1. The higher education sector, which is essentially the University of Swaziland (UNISWA), accounts for about 63% of all R&D performed in the country.

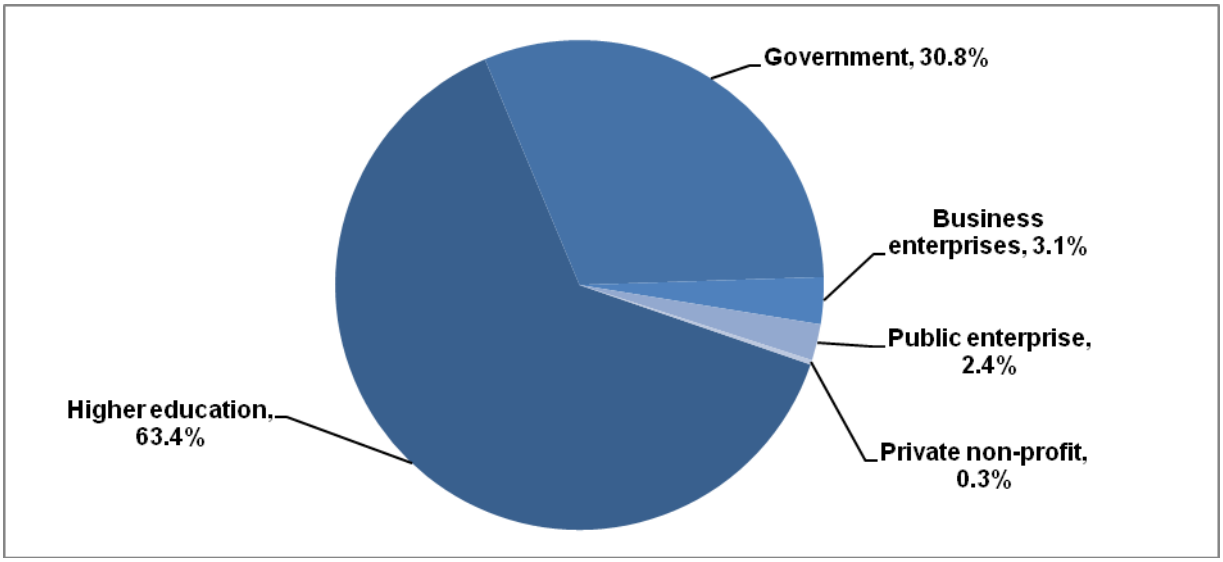

Figure 1.1: R&D expenditure by sector of performance, 2008

Source: Compiled from Dlamini (2009, Table 5B, p.30)

In the *higher education* sector, the entities within UNISWA that perform research are, apart from staff within academic departments, the UNISWA Research Centre (URC) and the Swaziland Institute for Research in Traditional Medicine, Indigenous and Medicinal Food Plants (SIRMIP). According to Dlamini (2009), the (then) colleges are not mandated to perform research but some staff members do so in their personal capacity, particularly members who are affiliated to national or regional associations and societies. Currently, there are only four colleges in the higher education sector as three of the original seven amalgamated in 2010 to become the Southern Africa Nazarene University (SANU).[2] In 2011, a third university was established, namely Limkokwing University (Kingdom of Swaziland, 2011). The reasons for establishing these new universities do not generally feature in documents that are available in the public domain, apart from the following quote by the Prime Minister, Dr Barnabas Sibusiso Dlamini, in the Government's Programme of action for 2008-2013:

> We have, in the past, produced too many humanities graduates. To meet the needs of our modern economy we shall shift the emphasis to technical and scientific skills. We shall draft legislation to accommodate the establishment of new universities. (Dlamini, 2008: 6-7)

[2] SANU is composed of the following three former colleges: Nazarene College of Nursing, Nazarene Teacher Training College and Nazarene College of Theology. The four remaining colleges are Ngwane Teachers' College, the Vocational & Commercial Training Institute - Matsapha (VOCTIM), Swaziland College of Technology (SCOT), and William Pitcher College.

There are a few other institutions in the *government* sector that also undertake research to some extent. These include the Mathematics/Science and Prevocational Departments of the National Curriculum Centre within the Ministry of Education, the Energy Department and Department of Geological Survey and Mines, both of which are part of the Ministry of Natural Resources and Energy; and the Agricultural Research Division at the Ministry of Agriculture. The Agricultural Research Division carries out research in support of national agricultural objectives and for that reason plays a very important role in socio-economic development (Dlamini, 2009).

The Swaziland Posts and Telecommunications Corporation (SPTC) conducts research in the *public enterprise* (parastatal) sector, although to a limited extent. Moreover, in the *business* sector, according to the survey of Dlamini (2009), about 45% of business enterprises conduct research in support of their industrial activities. However, only 15% of enterprises perform in-house research. In the other instances the research is conducted outside Swaziland, e.g., in the USA, South Africa and other parts of Africa.

The final draft national S&T policy also makes reference to a Royal Science and Technology Park (RSTP) to be established and which will be composed of the Biotechnology Park and the Information Technology Park. The RSTP will act as a bridge between industry and the public sector institutions and universities (Kingdom of Swaziland, 2011).

An autonomous policy-making body, the Swaziland National Commission for Research, Science and Technology (SNCRST), is also envisaged. The SNCRST will facilitate S&T/R&D activities and is expected to work closely with the proposed directorate for S&T within the new Ministry of Communications, Science and Technology (Kingdom of Swaziland, 2011).

Human resources

In terms of human resources, the percentage of female researchers was 33.2% in 2008, which does not represent any improvement over the corresponding figure for 2000, namely 33.1%. In terms of a breakdown by sector, the share of female researchers only marginally improved between 2000 and 2008 in the higher education sector (from 34.8% to 36.1%, see Figure 1.2). Moreover, in both the government and business enterprise sectors the shares of female researchers in 2008 were noticeably smaller than the corresponding figures for 2000.

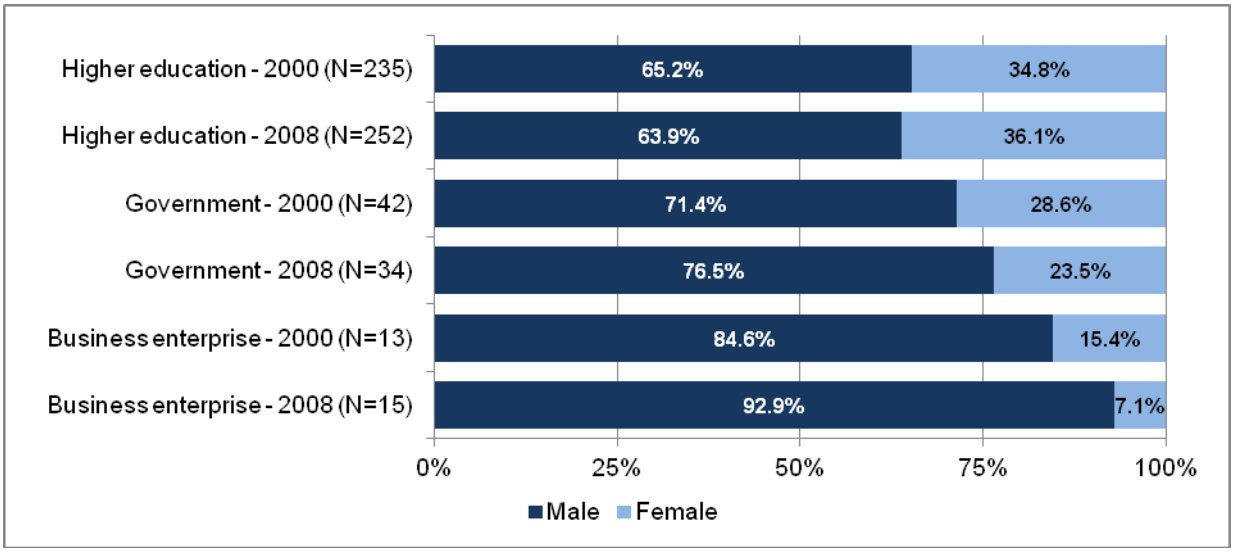

Figure 1.2: Percentage of male and female researchers in Swaziland, by sector (2000 versus 2008)

Source: Dlamini (2009, Figure 1, p. 13)

Turning to the higher education sector specifically, Table 1.1 shows that women academics in Science, Engineering and Technology (SET), compared to women academics in the social sciences, are more likely to be in possession of a doctoral qualification (25/60 women in SET versus 12/91 in the social sciences). Doctoral qualifications are primarily obtained outside the country. Thus, it could be argued that relatively larger proportions of women in SET, compared to women in the social sciences, pursue advance studies outside Swaziland. This tentative interpretation, however, needs to be verified in further studies. Moreover, in SET, only 35% of all academic staff with a masters degree are female (the corresponding figure for the social sciences is 53%). This means that at both the masters and doctoral level in SET there is a need to increase the representation of women. It also needs to be remembered that some of the SET women with masters and doctoral qualifications are in health sciences, particularly nursing, which is traditionally a female-orientated discipline.

Table 1.1: Highest qualification of academics at higher education institutions by gender and broad science cluster, 2008

Highest qualification	Social sciences cluster				SET cluster			
	Female	Male	Total	% Female	Female	Male	Total	% Female
PhD, Doctorate or similar	12	30	42	29%	25	56	81	31%
Masters degree	47	42	89	53%	19	35	54	35%
Bachelors degree	30	13	43	70%	15	10	25	60%
All other qualifications	2	1	3	67%	1	39	40	3%
Total	91	86	177	51%	60	140	200	30%

Social sciences cluster = Education, commerce, hospitality, humanities, and social sciences.

SET cluster = Agricultural sciences, engineering & technology, medical & health sciences, and natural sciences.

Source: Compiled from Dlamini (2009, Table 6b, p. 32)

Table 1.2 considers data for UNISWA only, for the 2009/10 and 2010/11 academic years. It does not disaggregate the figures in terms of qualification but does provide a breakdown by faculty. As can be seen, the two faculties most closely associated with SET (i.e. agriculture and science) also recorded the smallest shares of female representation (33% and 14% respectively in 2010/11). These figures, however, represent marked improvements over the corresponding figures for the previous year (i.e. 27% and 9% respectively).

Table 1.2: UNISWA staff by faculty/division and gender, 2009/10 and 2010/11

Faculty / division	2009/10				2010/11			
	Male	Female	Total	% Female	Male	Female	Total	% Female
Agriculture	40	15	55	27%	41	20	61	33%
Commerce	8	7	15	47%	9	9	18	50%
Education	22	14	36	39%	19	13	32	41%
Health science	7	29	36	81%	10	29	39	74%
Humanities	12	17	29	59%	14	19	33	58%
Science	51	5	56	9%	49	8	57	14%
Social science	20	16	36	44%	19	16	35	46%
UNISWA Research Centre	2	0	2	0%	1	1	2	50%
SIRMIP	3	1	4	25%	3	2	5	40%
Subtotal	*165*	*104*	*269*	***39%***	*165*	*117*	*282*	***41%***
Administration	33	18	51	35%	31	17	48	35%
Library	9	5	14	36%	5	9	14	64%
Institute of Distance Education	2	7	9	78%	2	7	9	78%
University Planning Centre	1	1	2	50%	1	1	2	50%
Institute of Postgraduate Studies	1	0	1	0%	1	1	2	50%
Academic Development Centre	1	0	1	0%	0	1	1	100%
Centre for Community Service	1	0	1	0%	0	1	1	100%
ICT Centre	1	0	1	0%	1	0	1	0%
Subtotal	*49*	*31*	*80*	*39%*	*41*	*37*	*78*	*47%*
Total	**214**	**135**	**349**	**39%**	**206**	**154**	**360**	**43%**

Source: UNISWA (2010, p. 116; 2011, p. 114)

Also in terms of students enrolments, the faculty of science at UNISWA has the smallest proportion of women students, namely 28% in 2010/11 (Table 1.3).

Moreover, Swaziland's Gross Outbound Enrolment ratio is 2.7, which means that the number of students from Swaziland who are studying abroad comprises about 2.7% of the total tertiary enrolments in Swaziland. In 2009, the top five study destinations for students from Swaziland were South Africa (3 453 students); the USA (153 students); Zimbabwe (131 students); the UK (45 students) and the Russian Federation (17 students) (GED, 2011).

Table 1.3: UNISWA student enrolments by gender per faculty, 2009/10 and 2010/11

Faculty	2009/10				2010/11			
	Male	Female	Total	% Female	Male	Female	Total	% Female
Agriculture	530	419	949	44%	461	395	856	46%
Commerce	271	269	540	50%	255	269	524	51%
Education	218	216	434	50%	212	227	439	52%
Health Sciences	188	237	425	56%	198	233	431	54%
Humanities	165	215	380	57%	156	199	355	56%
Science	262	101	363	28%	268	103	371	28%
Social science	314	259	573	45%	303	267	570	47%
Institute of Postgraduate Studies	52	63	115	55%	72	87	159	55%
Institute of Distance Education	722	1022	1744	59%	770	1081	1851	58%
Total	2722	2801	5523	51%	2695	2861	5556	51%

Source: UNISWA (2010, p. 114; 2011, p. 112)

Table 1.4 reports the number of graduates in the entire higher education sector, not only at UNISWA. In two fields of study, in 2008, female representation was less than 50%, namely natural sciences (42%, n=30) and engineering and technology (8%, n=1). Moreover, in both fields, female representation has decreased since 2000. The numbers of graduates in engineering and technology are also critically low, compared to the numbers in agricultural sciences and various fields of social sciences and humanities.

Finally, the principle of gender equity is one of the guiding principles of the final draft STI policy of Swaziland, with the objective of improving both the representation of and participation by women in the S&T system. In this regard the policy presents the main challenge as one of influencing individual choice towards pursuing SET subjects and careers (Kingdom of Swaziland, 2011).

Table 1.4: Total number of graduates in higher education, by field of science, gender and level of education (2000 versus 2008)

Field of science	2000									2008								
	Masters degree		Bachelors degree		Diploma		Total		% Female	Masters degree		Bachelors degree		Diploma		Total		% Female
	F	M	F	M	F	M	F	M		F	M	F	M	F	M	F	M	
Natural sciences	0	0	18	19	7	9	25	28	47.2%	1	1	16	17	13	23	30	41	42.3%
Engineering & technology	0	0	1	7	0	0	1	7	12.5%	0	0	1	12	0	0	1	12	7.7%
Medical & health sciences	0	0	14	1	44	38	54	39	58.1%	0	0	38	18	54	28	92	46	66.7%
Agricultural sciences	1	2	53	53	33	47	87	102	46.0%	1	2	60	74	92	48	153	124	55.2%
Social sciences	0	0	75	85	10	15	85	110	43.6%	0	0	74	47	12	21	86	68	55.8%
Humanities	1	1	75	70	37	18	113	89	55.9%	0	0	72	45	65	19	137	64	68.2%
Commerce	0	0	41	35	49	53	90	88	50.6%	0	0	40	32	43	32	83	64	56.5%
Education	0	0	51	30	76	64	127	94	57.5%	1	1	5	13	67	49	73	63	53.7%

Source: Dlamini (2009, Table 8, p. 34)

2 SURVEY METHODOLOGY

2.1 Target group

The introductory study on Lesotho, which was conducted by another service provider, does not explicitly state what fields were considered as part of SET. Neither does it explicitly state what degree qualifications served as eligibility criteria for selecting respondents. However, an inspection of the database of women scientists in Lesotho, together with the study findings, reveals that candidates with diplomas were included.

In the study of Swaziland, however, the focus was restricted to women scientists with postgraduate qualifications, for the following reasons: (1) the South African reference group for the study felt that laboratory technicians, who are mainly in possession of diplomas and undergraduate qualifications, did not qualify for inclusion; (2) the focus should ideally be on those who can meaningfully contribute to knowledge production in Swaziland, namely those with some level of postgraduate qualification; and (3) the fact that the largest employer of women scientists in Swaziland, namely UNISWA, was not operational during the period of data collection, leading to the assumption that most of the staff remaining on campus would be those with higher qualification levels as they were the ones most likely to be engaged in knowledge production.

The survey therefore targeted professional women in Swaziland working in SET and who are in possession of at least an honours degree or an equivalent qualification (e.g. postgraduate diploma) in SET. Moreover, for the purposes of the study, SET was taken to mean agricultural sciences; engineering sciences; geography; geology and environmental sciences; health sciences; natural sciences; science education; and technology. It was only discovered later – in retrospect – that the Lesotho study did not include women scientists from the health sciences, specifically nursing. Women scientists from the health sciences were therefore also excluded in this report to facilitate comparability of data with the Lesotho report.

2.2 Survey questionnaire

A questionnaire was compiled to collect relevant information pertaining to the state of women in S&T in Swaziland. The questionnaire used for a previous study in Lesotho was expanded to include more questions about factors and conditions affecting the participation of women in SET.

The modified questionnaire, which is attached as Appendix 1, consists of five sections. The first section solicits demographic information, followed by a section that enquires about the

respondent's entry into S&T. Questions pertaining to the respondent's current job constitute the core of the third section, whereas the fourth section briefly enquires about future mobility. The final section only applies to university employees and asks questions about their involvement in projects as well as the volume and nature of their research output.

2.3 Fieldwork methodology

The National Profile of Science and Technology (S&T) in Swaziland, produced by Dlamini (2009), was used to guide the survey in terms of the organisations and institutions that could be expected to employ women in SET. Such institutions included those of higher education, government departments, parastatals and business organisations. It is important to note that since the national profile was published, the Nazarene colleges have developed into the Southern Africa Nazarene University (SANU). Moreover, Limkokwikng University, which offers technology-based programmes, also started operating in April 2011.

The fieldwork component was managed by Dr Qandelihle Simelane of Swaziland who appointed four Research Associates. Each Associate received responsibility for a particular sector in the Swaziland SET system. The division of labour was as follows:

Research Associates	*Area of responsibility*
Sindiswa Mkhatshwa	Business
Khetsiwe Myeni	Higher education
Nozipho Mamba	Government
Sithini Shongwe	Parastatal

Potential respondents in the targeted organisations were given the option of receiving either an electronic or hard copy of the questionnaire. The electronic copies were distributed as email attachments after attaining an individual's email address, or a list of email addresses in the case of higher education institutions. In the latter institutions most staff members were not yet back at office when the questionnaire distribution started on 3 January 2012.

Responses to the emails were very slow and some of the emails returned a non-delivery error message. Some respondents, who were not met by the Research Associate during the initial visit to the particular institution, also chose to ignore the emails.

The effectiveness of emails in delivering questionnaires was also limited by the accessibility of internet and email services. Internet speeds were often found to be very slow, resulting in individuals abandoning the exercise of downloading the questionnaire and hence not responding. Some academics also do not open their emails. All of these point to a generally low uptake of information technology, even in institutions of higher education in Swaziland.

Hence, even the users of technology had to be visited by the Research Associates after email and telephone reminders failed to yield a response.

In some settings, especially in business entities, the hard copies were left for distribution with an officer of the company who was often in the Human Resources Office. The officer then distributed the questionnaires to those in different shifts. Moreover, in business settings, the approach adopted by the fieldwork team was to capture all women with university level education in SET, irrespective of their declared levels of qualifications. This approach was informed by suggested sensitivity regarding qualifications on the part of some employees. Targeting only those with higher degrees was suggested to the researcher as being 'divisive'. Submitted questionnaires were sorted after the field work in order to identify and remove those with qualifications below an honours degree.

Some general observations regarding the fieldwork experience warrant some mentioning:

- The collection of names for the database and the administration of the questionnaires happened more or less at the same time. However, there is not a perfect match between the names in the database and those who completed the questionnaires, as some individuals preferred to complete the questionnaire without submitting their details for the database, and vice versa.
- Some potential respondents chose not to respond and often cited privacy as a reason for their non-participation – 'wishing not to have their personal details in database'. Ethically, respondents were free to opt in or out of the research. Thus, having to provide their names for a database provided some respondents with sufficient reason not to complete the questionnaire.
- The timing of the field work component of the study (December 2011 and January 2012) was not ideal, as many people were on leave and therefore not able to participate in the study.
- Relatively few women in SET have qualifications at junior degree level and even fewer have higher degrees. At one organisation, for instance, only two women met the eligibility criteria. The experience was that such individuals tended to be overloaded with work, hence getting appointments with them or just requesting time to complete questionnaires turned out to be a huge challenge.
- Research Associates were not always able to secure appointments with relevant individuals and were instructed to leave the questionnaires at the reception and to return and collect them on a set date. In such cases, questionnaires were often not completed, despite a number of follow up visits.

- There was also a challenge regarding expectations of those in health studies, especially the nurses, who expected that there would be a “consent form”, notwithstanding the introductory letter that was attached.
- In some companies, employees were not permitted to receive and complete questionnaires without the formal permission of their immediate supervisors. At one parastatal, for example, the senior manager did not take the time to meet with the researcher and review the documents, and hence employees were unable to participate.
- Many of the respondents were not willing to share their personal profile information. At one company, employees cited company policy against sharing such information with researchers/ interviewers as an excuse for non-participation.
- Secretaries were found to act as ‘gate keepers’ in some companies and also generated challenges.

Despite all these challenges, the fieldwork manager provided ASSAf with 60 completed questionnaires, of which 17 were submitted as electronic files and 43 as hard copies. However, of the 60 submissions, only 33 were captured, implying that 27 questionnaires were discarded for the following reasons:

- five of the electronic files were duplicates;
- 16 of the questionnaires were from the health sciences and were excluded for reasons given earlier;
- six of the questionnaires were excluded as they were from irrelevant fields (home economics and consumer sciences, and social sciences)

It should be noted that during data capturing it emerged that four of the 33 questionnaires were completed by respondents with a first degree (undergraduate qualification) as their highest qualification. Although the focus of the Swaziland study, as explained in Section 2.1, is on respondents with postgraduate qualifications, the four questionnaires were nevertheless captured and analysed. The reason was that the total number of usable questionnaires was already so low and the researcher was reluctant to reduce this number even further to below 30.

A stakeholder meeting was also held in Swaziland in May 2012, where the results of a final draft of the report were presented. During this workshop seven more questionnaires were completed. However, only five of these were completed by women in SET and one each by women in health and consumer science. Thus, the total number of valid questionnaires (by women in SET) is 38. The results of these 38 questionnaires are reported here. In a few

instances, the results are also compared to those from women in health (nursing) and consumer science.

The number of entries in the database was more satisfactory. It includes the details of 95 individuals, of which 38 are from the health sciences.

3 SURVEY RESULTS

3.1 Demographics

The respondents' ages ranged from 26 to 59 years, with 43 years being the mean and median age. Only 33 of the 38 respondents specified their age. According to Table 3.1, which classifies the ages in 10-year brackets, all age brackets are well-represented in the sample, with the 51-60 age bracket slightly dominating. However, in terms of the other four demographic variables presented in Table 3.1, most respondents tended to be single (47%), black (87%), Swazi citizens (84%), and residing in urban areas (76%).

Table 3.1: Demographics of survey respondents

	Count	Percentage
Age		
30 years and younger	7	18%
31 to 40 years	7	18%
41 to 50 years	8	21%
51 to 60 years	11	29%
Not specified	5	13%
Total	38	100%
Relationship status		
Single	18	47%
Married	16	42%
Long-term relationship	1	3%
Separated/ divorced/ widowed	3	9%
Total	38	100%
Race		
Black	33	87%
Indian	1	3%
Other (e.g. mixed-race and Arabic)	3	8%
Not specified	1	3%
Total	38	100%
Area of residence in Swaziland		
Rural	7	18%
Urban	29	76%
Not specified	2	5%
Total	38	100%
Country of origin		
Swaziland	32	84%
Other (e.g. India and Zambia)	6	16%
Total	38	100%

Note: Percentages do not always add to 100% because of rounding errors.

Of the 31 respondents who answered the question about disability, only one respondent indicated that she had a disability but failed to specify the condition.

In terms of qualifications, most respondents had either an Honours degree or equivalent or a doctoral degree as can be seen in Table 3.2 (34% each). Most respondents obtained their highest qualification from universities in South Africa (32%) and Swaziland (26%), although a marked percentage (13%) graduated from a university in the USA.

Table 3.2: Highest qualification, SET field and years of experience of survey respondents

	Count	Percentage
Highest qualification		
First degree	4	11%
Honours degree/ postgraduate diploma	13	34%
Masters degree or equivalent	8	21%
Doctoral degree or equivalent	13	34%
Total	38	100%
Country where highest qualification was obtained		
South Africa	12	32%
Swaziland	10	26%
USA	5	13%
Nigeria	2	5%
Australia	1	3%
Botswana	1	3%
Canada	1	3%
Czech Republic	1	3%
India	1	3%
UK	1	3%
Zimbabwe	1	3%
Not specified	2	5%
Total	33	100%
SET field		
Science / Maths Education	9	24%
Engineering Sciences	5	13%
Information and Communication Technologies	5	13%
Agricultural Sciences	4	11%
Chemical Sciences	3	8%
Environmental Sciences	3	8%
Food Sciences	3	8%
Biological Sciences	2	5%
Earth Sciences	2	5%
Chemical & Biological Sciences	1	3%
Chemical & Mathematical Sciences	1	3%
Total	38	100%
Years of experience		
1 to 5 years	10	26%
6 to 10 years	4	11%
11 to 20 years	8	21%
21+ years	13	34%
Not specified	3	8%
Total	38	100%

Note: Percentages do not always add to 100% because of rounding errors.

Table 3.2 shows further that almost a quarter of respondents (24%) completed their qualifications in science and mathematics education, with the engineering sciences and ICT (both 13%) following closely in second place.

The experience of the respondents (in a science-related position) ranged between 1 and 35 years. The mean is 16 years. Table 3.2 shows that the largest percentages of respondents are grouped within the lowest (1-5 years) and highest (21+ years) experience categories – 26% and 34% respectively.

3.2 Balancing work life and domestic/family life

The respondents were asked to rate how successful they thought they were in balancing their work life and domestic/family life. The responses are shown in Figure 3.1. Only 3% of respondents thought they were not successful at all. In fact, 53% rated themselves as very successful in that regard.

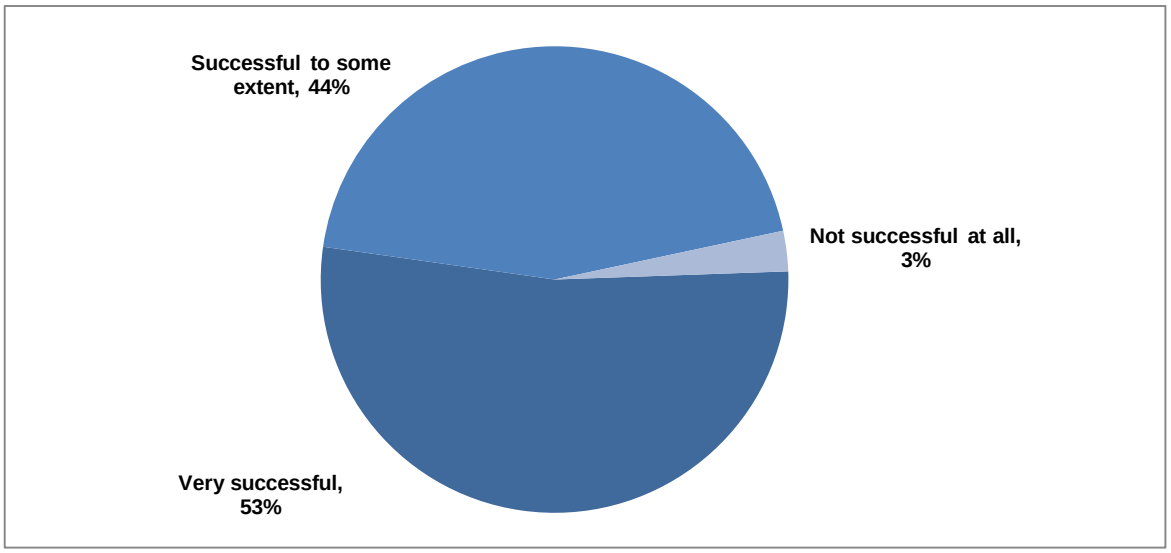

Figure 3.1: Rating of success in balancing work life and domestic/family life (N=36)

A comparison of SET respondents to respondents in traditionally more female-orientated science domains (nursing and consumer science), shows that women in SET are generally more satisfied with the way that they balance their work and domestic/family life (Figure 3.2).

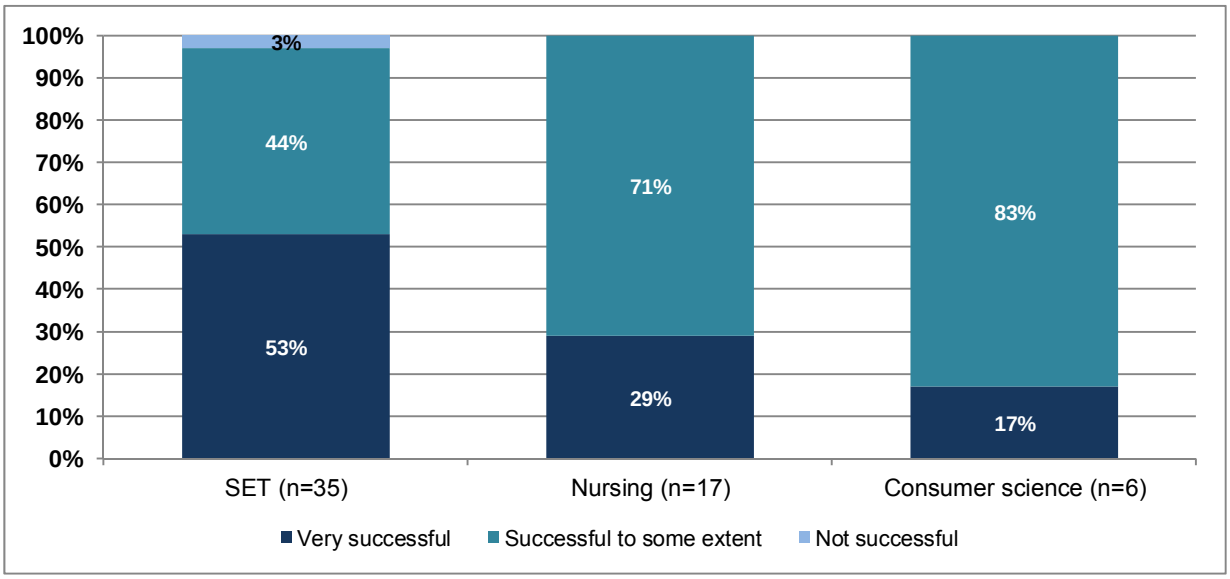

Figure 3.2: Rating of success in balancing work life and domestic/family life, by science domain

Table 3.3 was compiled in order to determine whether there was any association between the rating of success in balancing work life and domestic/family life, and the ages of the SET respondents, their relationship status, and whether or not they have any dependents. Four categories of dependents are considered: pre-school children (<6 years), children of school-going age (6-17 years), adult children (18+ years), and other family members (e.g. siblings, parents and/or grandparents). Each row in Table 3.3 represents an individual respondent.

Inspection of Table 3.3 reveals no obvious pattern as the various categories of dependents appear to be randomly spread across the two largest categories of success ratings (“very successful” and “successful to some extent”). Also in terms of respondent age and relationship status there seems to be no clear association with the rating of success.

Table 3.3: Rating of success in balancing work life and domestic/family life, by having dependents, and the age of respondents and their relationship status

Rating of success	Dependents				Age of respondent	Relationship status
	Children <6 years	Children 6-17 years	Children 18+ years	Other family		
Very	■	■	■		41 - 50 years	Single
Very	■	■		■	31 - 40 years	Single
Very	■	■			≤ 30 years	Married
Very	■				≤ 30 years	Married
Very	■		■	■	51 - 60 years	Married
Very	■				31 - 40 years	Single
Very		■	■	■	51 - 60 years	Single
Very		■		■	41 - 50 years	Married
Very		■			41 - 50 years	Divorced
Very		■			41 - 50 years	Married
Very		■			41 - 50 years	Single
Very		■			51 - 60 years	Married
Very			■	■	51 - 60 years	Married
Very			■		51 - 60 years	Married
Very			■		Not specified	Married
Very				■	≤ 30 years	Single
Very				■	31 - 40 years	Single
Very				■	Not specified	Relationship
Very				■	Not specified	Single
To some extent	■	■		■	31 - 40 years	Married
To some extent	■			■	31 - 40 years	Married
To some extent	■			■	Not specified	Single
To some extent	■				≤ 30 years	Single
To some extent	■				≤ 30 years	Single
To some extent		■	■	■	51 - 60 years	Single
To some extent		■	■		41 - 50 years	Married
To some extent		■	■		41 - 50 years	Widowed
To some extent		■		■	31 - 40 years	Single
To some extent		■		■	≤ 30 years	Separated
To some extent		■			31 - 40 years	Married
To some extent			■	■	51 - 60 years	Married
To some extent			■	■	51 - 60 years	Married
To some extent			■	■	51 - 60 years	Single
To some extent			■		51 - 60 years	Single
To some extent					≤ 30 years	Married
To some extent					≤ 30 years	Single
Not at all			■	■	51 - 60 years	Single

Note: The blue shaded cells indicate the presence of dependents.

3.3 Entry into science

It was generally around the time of leaving school and entering university (16-19 years) that most respondents (68%) decided to follow a science career, according to Figure 3.3. This should be seen against the backdrop of a finding still to be presented (see Table 3.6), namely that many respondents were encouraged by their high school teacher(s) to enter a scientific career. Moreover, as Table 3.4 indicates, 66% of respondents did not explore any other career besides a science career. Discussions with individual scientists indicated that most got 'streamed' into sciences, at school, based on their subject performance. This led them into science careers upon completing school. Of the 34% – or 13 respondents – who considered alternatives, seven respondents stated that they also looked into careers in the economic and management sciences.

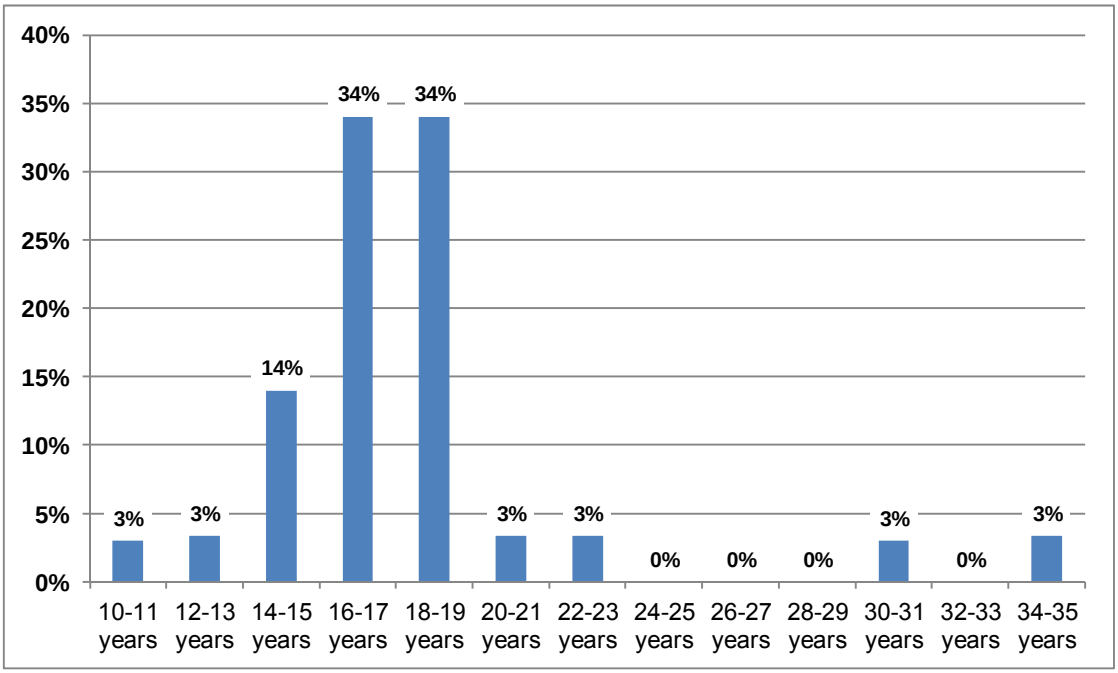

Figure 3.3: Age at which respondent decided to follow a science career (N=35)

Table 3.4: Consideration of any other career besides a science career (N=33)

Response	Number of respondents	Percentage
No	25	66%
Yes	13	34%
- Accounting / commerce /business	7	
- Clinical psychology	1	
- Law	1	
- Music	1	
- Nursing	1	
- Policing (police officer)	1	
- Not specified	1	

Closer scrutiny of the reasons why the respondents eventually decided on a science career (Table 3.5) shows consistent references to notions such as “passion”, “love”, “interest”, “success” and “excel” in relation to mathematics and science subjects.

Table 3.5: Reason why respondent chose a science career

Response
Because my specialisation in secondary school was mathematics and physics, so engineering was nearer to my basic knowledge.
Because the teachers said: "the smart ones do science".
Country had a shortage of science teachers. Automatic streamline to sciences if excellent in them at GCE level
Enjoyed science at school
Had good high school results
I am interested in designing of electronic circuits.
I did not choose it, I was channelled into the sciences
I enjoyed and passed the subject at school. It was also quite prestigious.
I formed it easier than arts subjects. Enjoyed practical classes.
I had a high inclination to be a problem solver for the Swazi constituency in terms of scientific issues.
I had an interest in the field.
I like experimenting and discovering new things.
I like it.
I love life, the environment and appreciate the beauty of it all integrating.
I love the challenge that comes with it
I used to get good grades in science and mathematics so it was more of an obvious choice
I used to pass science subjects better compared to the others.
I wanted accounting information systems and was not offered at the time. So had to do ICT.
I was excelling in science and maths at school. I liked maths a lot
I was good at it
I was good in science subjects at high school (passed them very well) and my main interest was to continue with science. At first I wanted to be a medical doctor.
Initially, it was due to university entry requirements, but as I continued I felt that it provoked a sense of inquisition about how, and why crops behave the way they do.
Interest in science
Interest; success at subject
It just came naturally.
Like dealing with tangible things. Experimental field is fun/ exciting. I also anticipated a self-sufficient/ self-employment career option.
Liked science and math at school and also performed well in those subjects
Love of science
My love of earth sciences drove me to my career choice (Geology)
Out of interest
Passion
Passionate about it
Very interesting because of my inquisitive mind and zeal to explore
Wanted a career in physiotherapy, but ended up in environmental science after first degree
Wanted to be a maths teacher for the love of the subject

The respondents were asked whether anyone objected to their decision to enter a science career and had to indicate, from a predefined list of significant others (e.g. father, mother, sister, friends) who objected. Similarly, they were asked whether anyone encouraged them to follow a science career, and had to indicate from the same list of significant others the ones that encouraged them. Figure 3.4 and Table 3.6 summarise the results. As can be seen, only 11% of respondents stated that they had encountered objections and a significant 94% reported that others encouraged them to follow a science career.

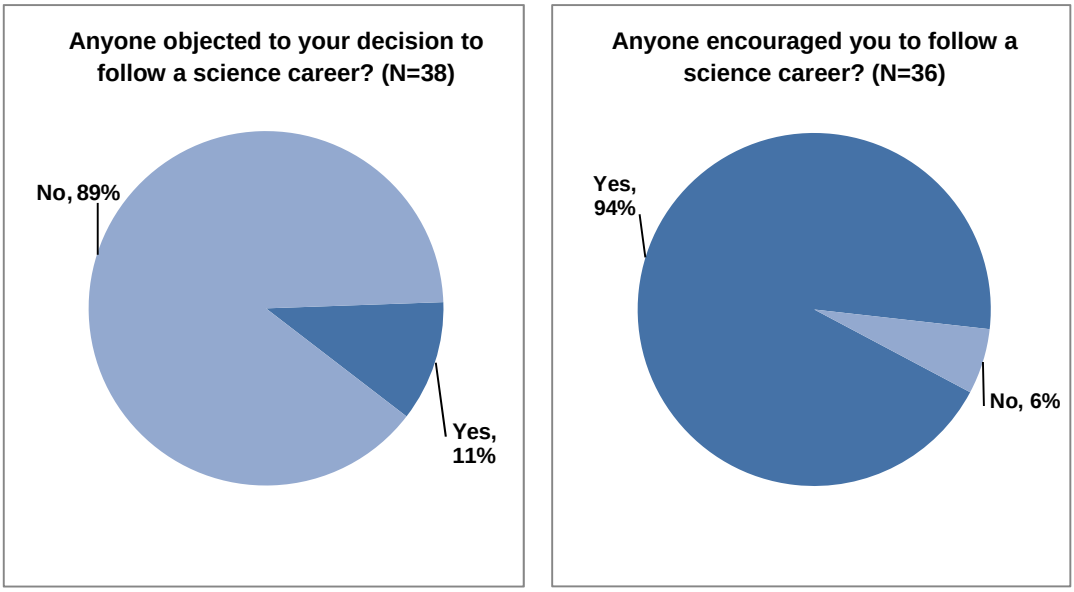

Figure 3.4: Extent to which significant others respectively objected to and supported the respondent's decision to follow a science career

Table 3.6: Significant others who respectively objected to and supported the respondent's decision to follow a science career

Significant other	Percentage of respondents who reported objection by significant other (N=38)	Percentage of respondents who reported encouragement from significant other (N=36)
Father	5%	28%
Mother	0%	44%
Sister(s)	3%	14%
Brother(s)	0%	14%
High school teacher(s)	3%	53%
Friend(s)	0%	22%

Note: Percentages do not add to 100% as respondents could have selected more than one significant other.

The respondents were mostly encouraged by their high school teachers and mothers to follow a science career (Table 3.6). Respectively 53% and 45% of respondents referred to the influence of these individuals in their decision. The role of the high school teacher in encouraging the girl child (or rather teenager) to eventually enter a science career is an important one. However, in order to develop appropriate measures to fully utilise this support system, more information is required. For instance, what is the subject affiliation of these

teachers (i.e. do they teach mathematics or science or career guidance) and what is their gender? Should it emerge that the supportive teachers are mainly female and in charge of mathematics and/or science-related subjects, an obvious recommendation would be to invest more resources to expand the pool of female science-based teachers.

Moreover, about a third of respondents were not alone in their scholarly aspirations as their brothers and sisters also completed masters and doctoral degrees (Figure 3.5). These degrees are not necessarily only in SET but could also include the social sciences and humanities. It is however unclear as to how to interpret this figure as no comparative data exist to determine whether a figure of 34% actually points to a lack of peer models. In other words, it is unclear whether 34% is higher or lower than expected. A comparison between this figure and the same for men would have provided some guideline.

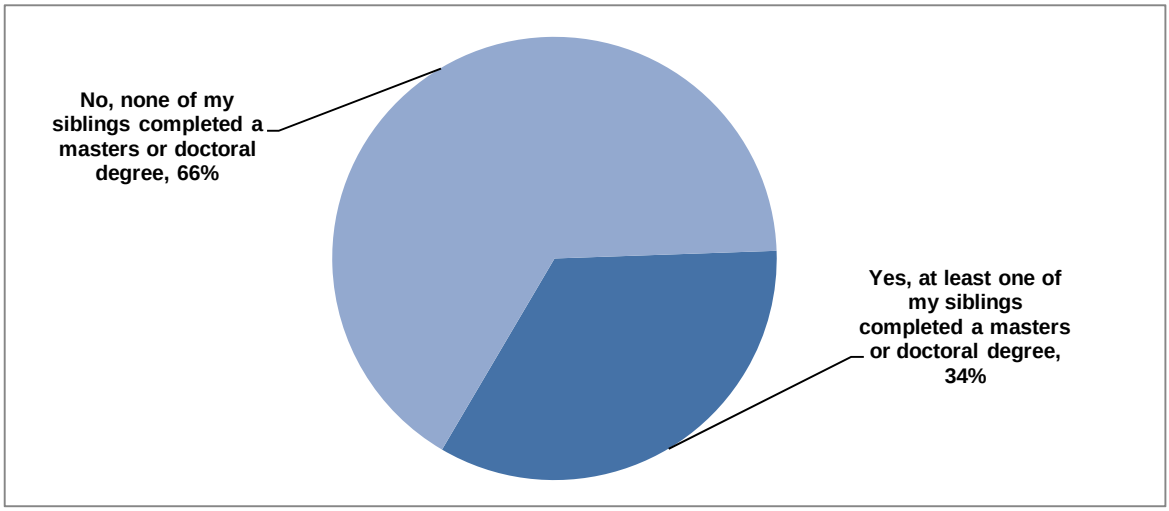

Figure 3.5: Whether siblings completed a masters or doctoral degree (N=35)

3.4 Current job

In total, 81% of the 36 respondents who answered the question about job location said that it is situated in an urban area of Swaziland.[3]

Moreover, 56% of respondents were employed in the higher education sector, with 48% working at university and 18% at a college (Figure 3.6). A broader conception of government was followed in the analysis, where it was viewed as consisting of national departments and their divisions as well as parastatals. These two categories were therefore combined, resulting in a total of 19% of responses from the government sector.

[3] The fieldwork team pointed out that there was a challenge with this question as some respondents thought their residences were neither rural nor urban (i.e. peri-urban), hence they may have indicated urban to avoid rural.

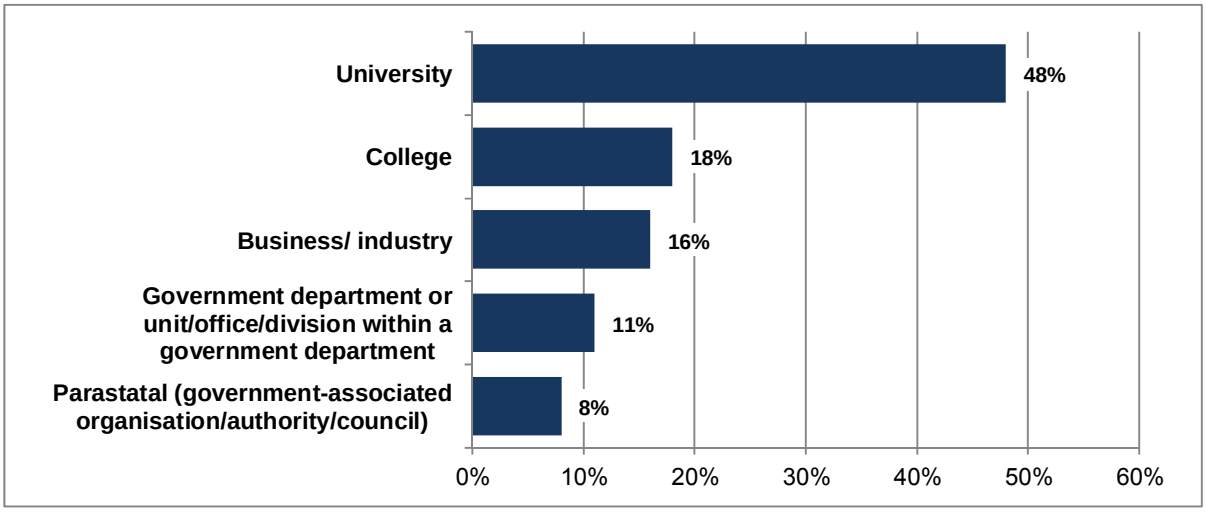

Figure 3.6: Sector where respondent is working (N=38)

In terms of employment status, most respondents stated that they were full-time (92%) and permanently (84%) employed (Figure 3.7).

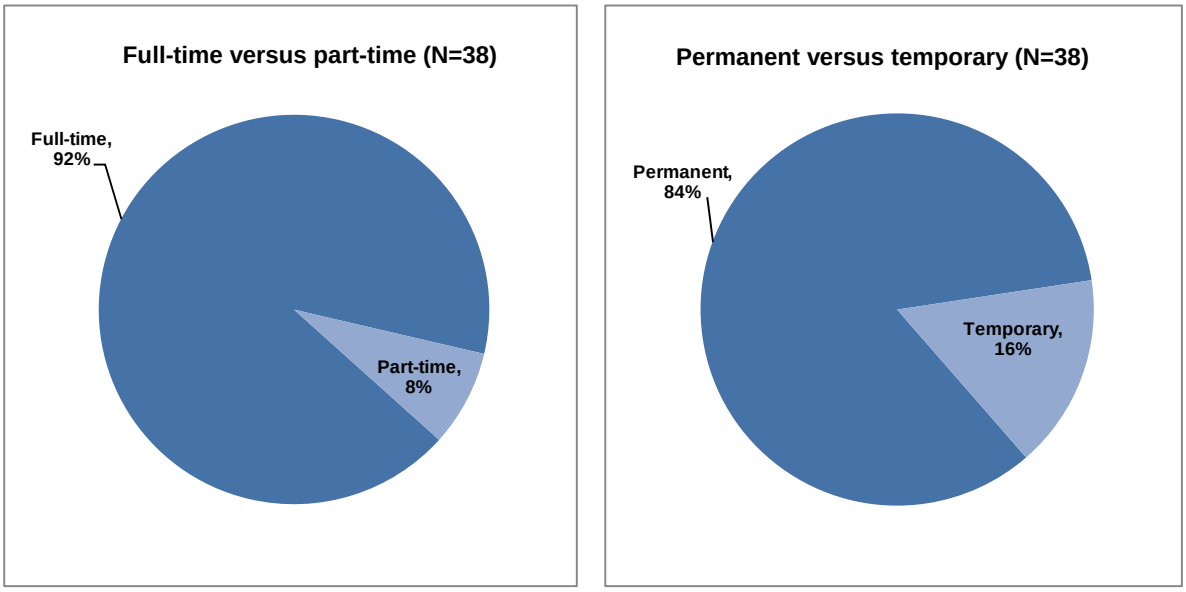

Figure 3.7: Terms of employment: full-time versus part-time, and permanent versus temporary

The larger proportion of respondents (41%) earned between E10,001 to E20,000[4] per month before any deductions, with only 8% of them earning E10,001 or less (Figure 3.8).

[4] 1.00 USD=7.50809 SZL (E)

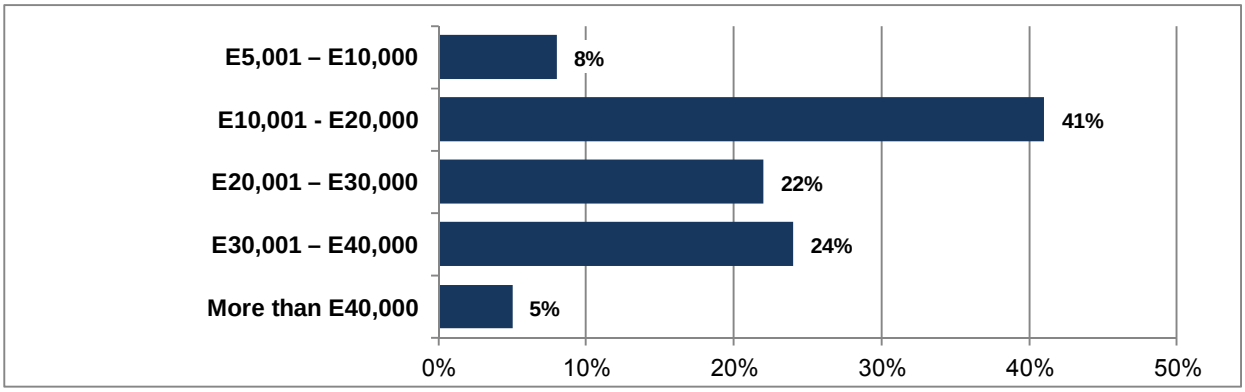

Figure 3.8: Current monthly gross income (in Swazi Lilangeni – E, N=37)

Figures in US Dollars are as follows: 665-1,330 USD; 1,331-2,659 USD; 2,660-3,989 USD; and 3,990-5,320 USD.

However, the respondents' monthly gross income varied significantly in terms of the highest qualification achieved and sector of employment, as will now be discussed.

According to Figure 3.9, the highest category of income (more than E40,000) is associated with doctorates (17%). The second highest category of income, i.e. between E30,001 and E40,000, is more characteristic of respondents with doctoral and masters degrees (42% and 38%) than it is of respondents with honours and first degrees (8% and 0%). Also, in terms of sector of employment, the highest income bracket (above E30,000) only featured in the university and business sectors (53% and 33% in Figure 3.10). The government sector was the only sphere that included respondents in the lowest income bracket (E5,001 to E10,000), namely 43%. However, it is important to remember that these percentages are based on very small sub-groups. Thus, a percentage as "high" as 43%, in Figure 3.10, refers to only three respondents out of a total of seven. Still, further information is required to determine, firstly, whether the lower income of women in SET in government would still persist when more respondents are studied, and, secondly, how the salary of women compares to that of men in the same sector.

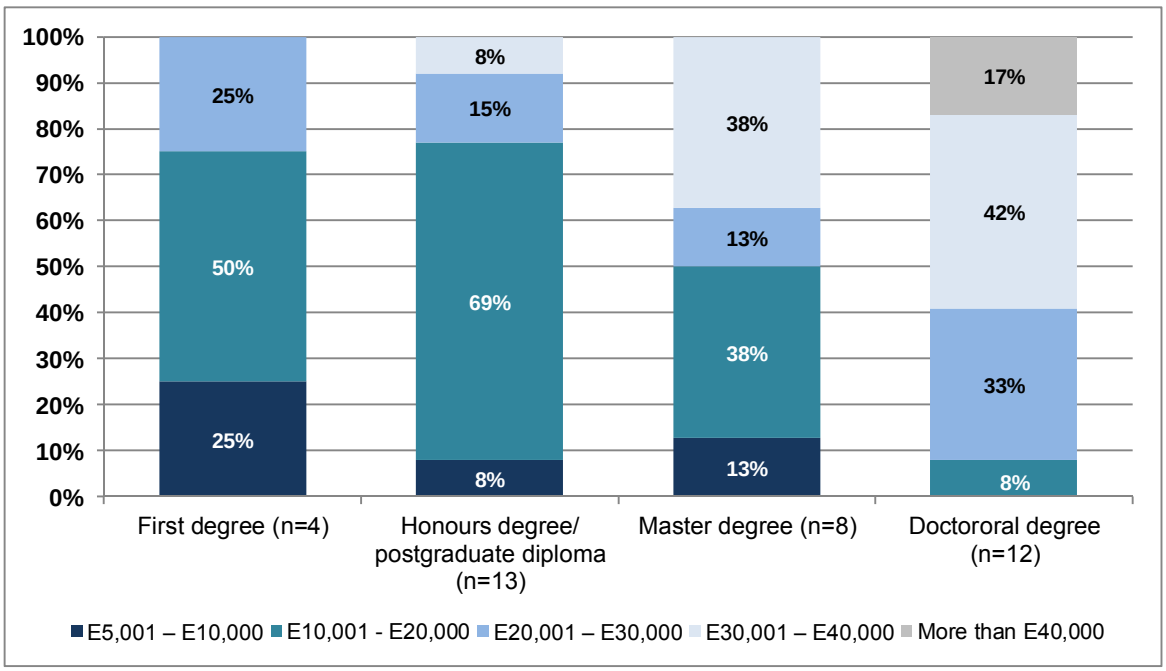

Figure 3.9: Relationship between monthly gross income (in Swazi Lilangeni, E) and highest qualification (N=37)

Figures in US Dollars are as follows: 665-1,330 USD; 1,331-2,659 USD; 2,660-3,989 USD; and 3,990-5,320 USD.

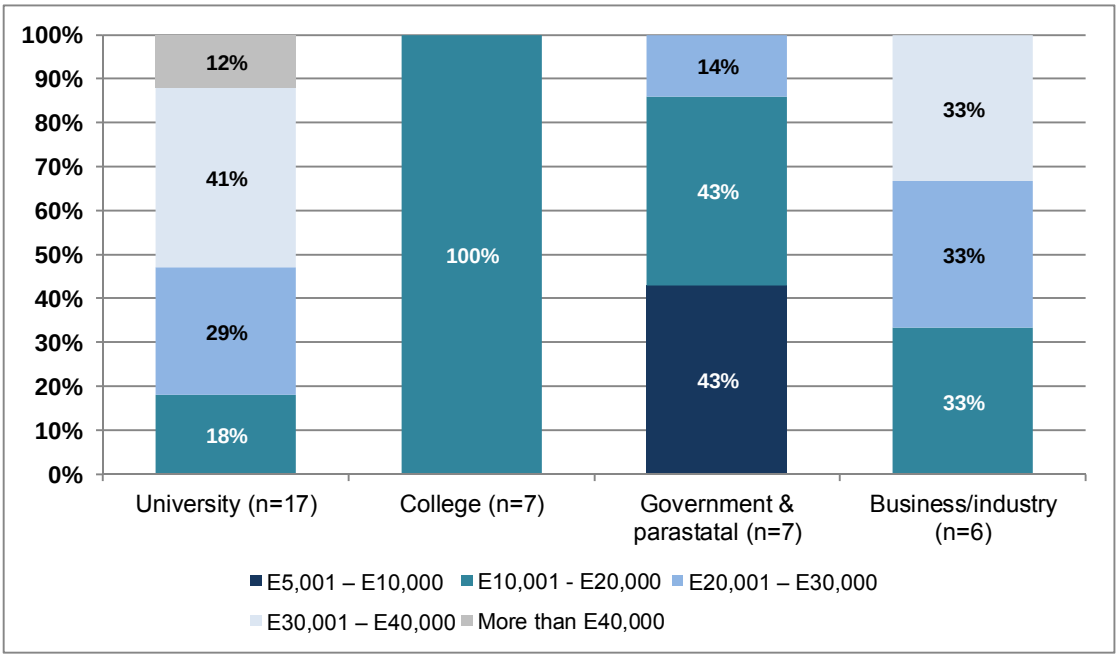

Figure 3.10: Relationship between monthly gross income (in Swazi Lilangeni, E) and sector of employment (N=37)

Figures in US Dollars are as follows: 665-1,330 USD; 1,331-2,659 USD; 2,660-3,989 USD; and 3,990-5,320 USD.

The respondents were requested to rate their current job in terms of occupational level, which consisted of five categories ranging from entry-level to executive level. Most

respondents (46% in Figure 3.11) classified themselves as occupying mid-level positions. Only two respondents marked the executive level.

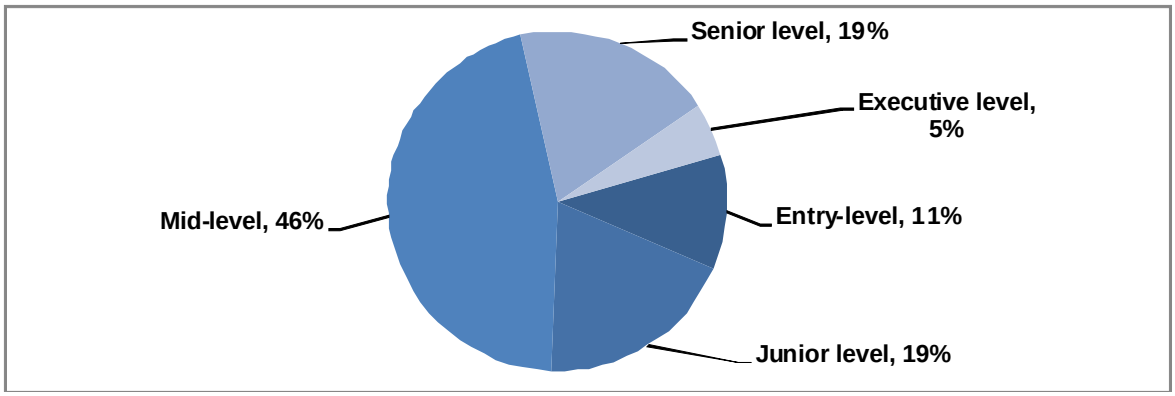

Figure 3.11: Level of current job (N=33)

The levels of the respondents' rating of their current job, as expected, tended to correlate with monthly gross income. Figure 3.12 reveals that the highest income bracket, E30,001 to E40,000, was more prevalent among those at mid- and senior-level (31% and 29%) compared to those at junior and entry-level (14% and 0%).

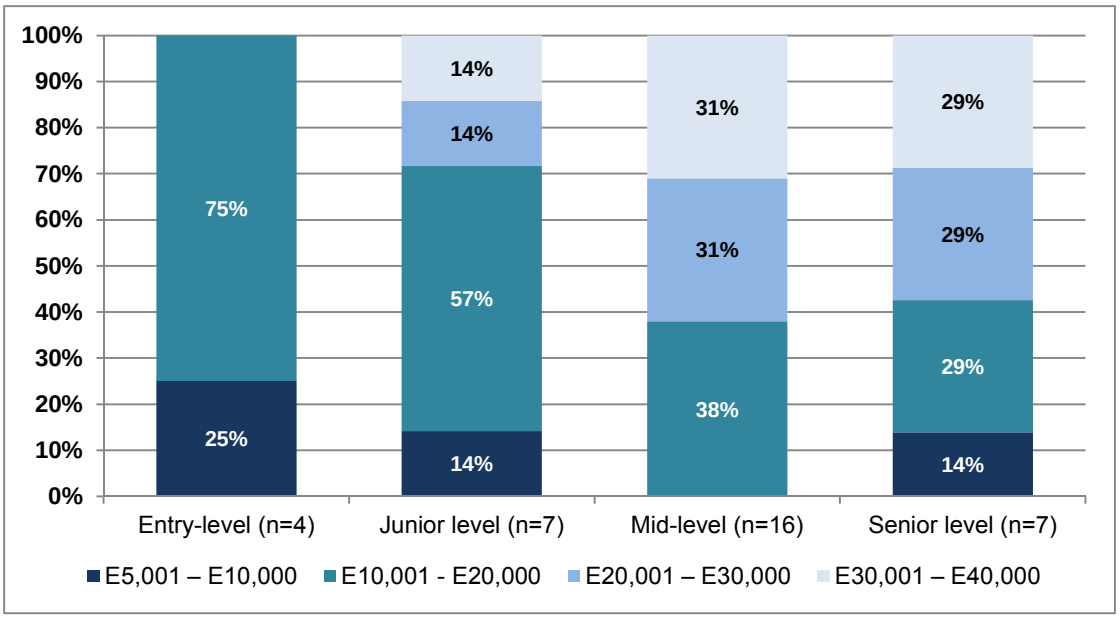

Figure 3.12: Relationship between monthly gross income (in Swazi Lilangeni, E) and level of current job (N=33)

Figures in US Dollars are as follows: 665-1,330 USD; 1,331-2,659 USD; 2,660-3,989 USD; and 3,990-5,320 USD.
Note: Two respondents at executive level are excluded.

Given that 60% of respondents were from the higher education sector it is not surprising that 74% of respondents reported training and teaching as their major duty in their current job

(Figure 3.13). Perhaps a more interesting analysis is the breakdown of major duties by sector of employment (Table 3.7) and level of qualification (Table 3.8).

In terms of the sector analysis (Table 3.7), the university respondents were primarily involved in teaching/training (94%) and to a lesser extent also in research (50%) and supervision (33%). In the colleges teaching and training prevailed (100%). The respondents from government mainly performed tasks related to planning and organisation (57%), combined with administration, supervision and training (43% each). In the business sector, 83% of respondents reported commercial production and manufacturing as their major duty, with a marked share (50%) also participating in advisory services and consulting.

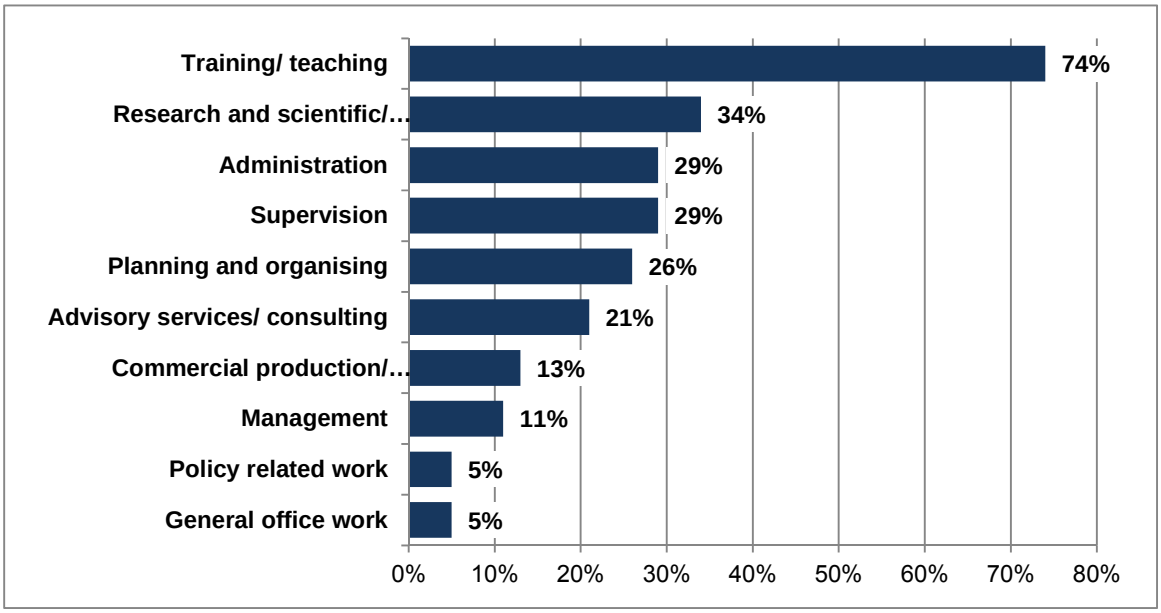

Figure 3.13: Major duties associated with current job (N=38)

Table 3.7: Major duties associated with current job, by sector of employment

Duties	University	College	Government	Business
Administration	22% (4 out of 18)	29% (2 out of 7)	43% (3 out of 7)	33% (2 out of 6)
Advisory services/ consulting	17% (3 out of 18)	0% (0 out of 7)	29% (2 out of 7)	50% (3 out of 6)
Commercial production/ manufacturing	0% (0 out of 18)	0% (0 out of 7)	0% (0 out of 7)	83% (5 out of 6)
General office work	6% (1 out of 18)	0% (0 out of 7)	14% (1 out of 7)	0% (0 out of 6)
Management	0% (0 out of 18)	14% (1 out of 7)	14% (1 out of 7)	33% (2 out of 6)
Planning and organising	17% (3 out of 18)	14% (1 out of 7)	57% (4 out of 7)	33% (2 out of 6)
Policy related work	6% (1 out of 18)	0% (0 out of 7)	14% (1 out of 7)	0% (0 out of 6)
Supervision	33% (6 out of 18)	29% (2 out of 7)	43% (3 out of 7)	0% (0 out of 6)
Research and scientific/technological development	50% (9 out of 18)	14% (1 out of 7)	29% (2 out of 7)	17% (1 out of 6)
Training/ teaching	94% (17 out of 18)	100% (7 out of 7)	43% (3 out of 7)	17% (1 out of 6)

Moreover, in terms of level of qualification, all 13 scientists with doctoral degrees worked at UNISWA, which explains why 100% of those with doctoral degrees reported training and teaching as their major duty. However, knowledge production activities – such as research and supervision (38% and 15%) – did not appear to be the major duties of doctoral respondents, as would generally be expected. The latter two activities are mostly associated with respondents in possession of a Masters degree (50% and 63%) (Table 3.8). However, the group sizes were too small to draw any firm conclusions from these observations.

Table 3.8: Major duties associated with current job, by level of qualification

Duties	First degree/ honours/ PG dip	Masters or equivalent	Doctoral or equivalent
Administration	35% (6 out of 17)	25% (2 out of 8)	23% (3 out of 13)
Advisory services/ consulting	29% (5 out of 17)	38% (3 out of 8)	0% (0 out of 13)
Commercial production/ manufacturing	24% (4 out of 17)	13% (1 out of 8)	0% (0 out of 13)
General office work	12% (2 out of 17)	0% (0 out of 8)	0% (0 out of 13)
Management	24% (4 out of 17)	0% (0 out of 8)	0% (0 out of 13)
Planning and organising	35% (6 out of 17)	50% (4 out of 8)	0% (0 out of 13)
Policy related work	6% (1 out of 17)	13% (1 out of 8)	0% (0 out of 13)
Supervision	24% (4 out of 17)	63% (5 out of 8)	15% (2 out of 13)
Research and scientific/technological development	24% (4 out of 17)	50% (4 out of 8)	38% (5 out of 13)
Training/ teaching	53% (9 out of 17)	75% (6 out of 8)	100% (13 out of 13)

The majority of respondents believed that their job duties matched their educational levels and fields of study (95% and 89%, respectively) (Figure 3.14). The alignment between job duties and educational level/field of study, as reported by SET women, is as good as that reported by women in traditionally female-orientated disciplines (i.e. nursing and consumer science, Figures 3.15 and 3.16).

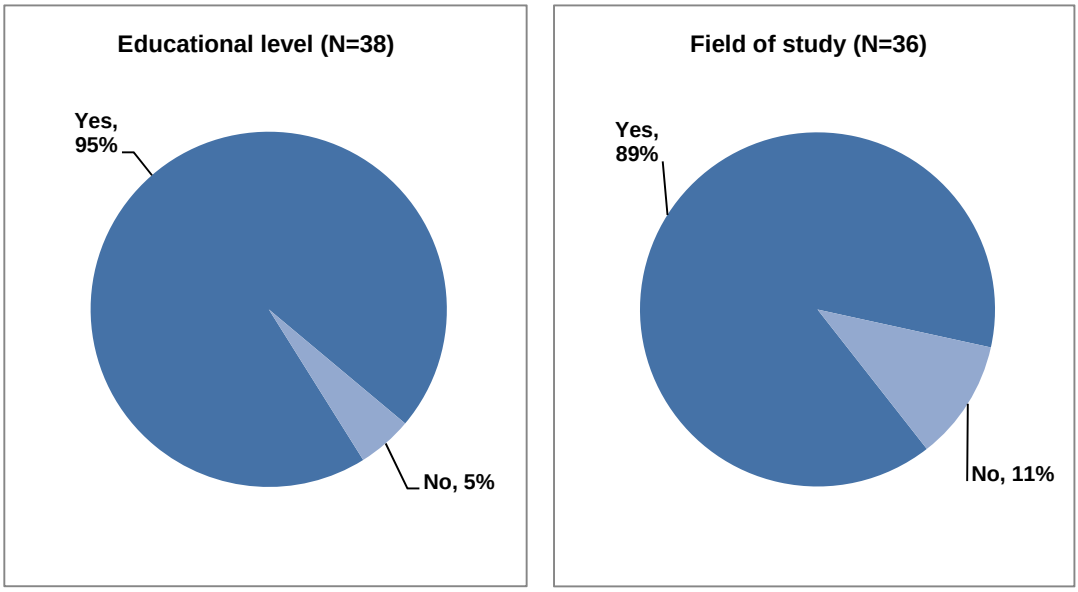

Figure 3.14: Extent to which job duties match the respondent's educational level and field of study

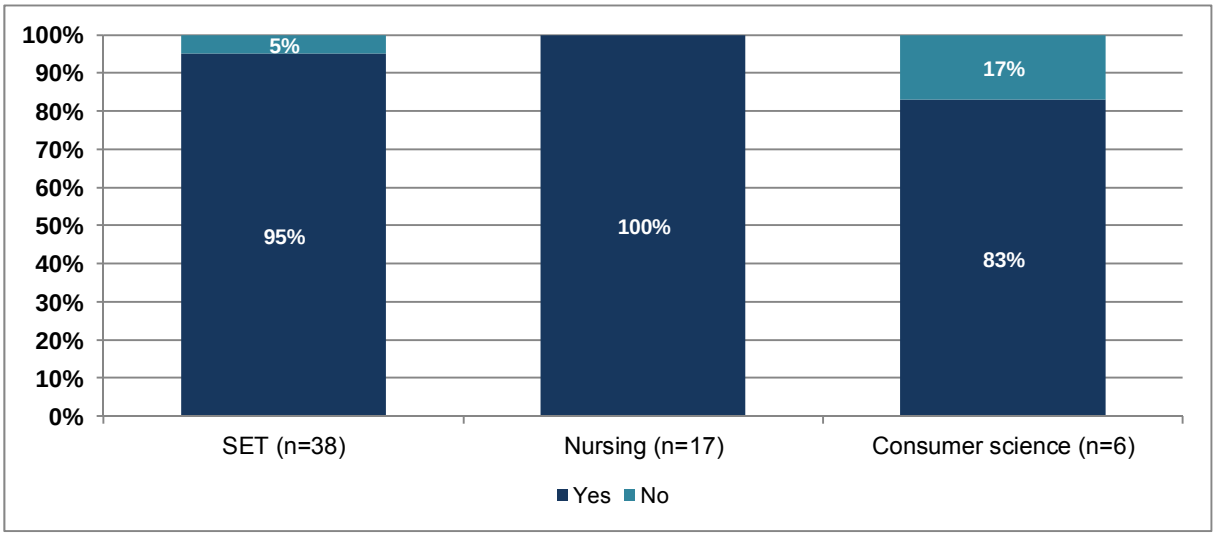

Figure 3.15: Extent to which job duties match the respondent's educational level, by science domain

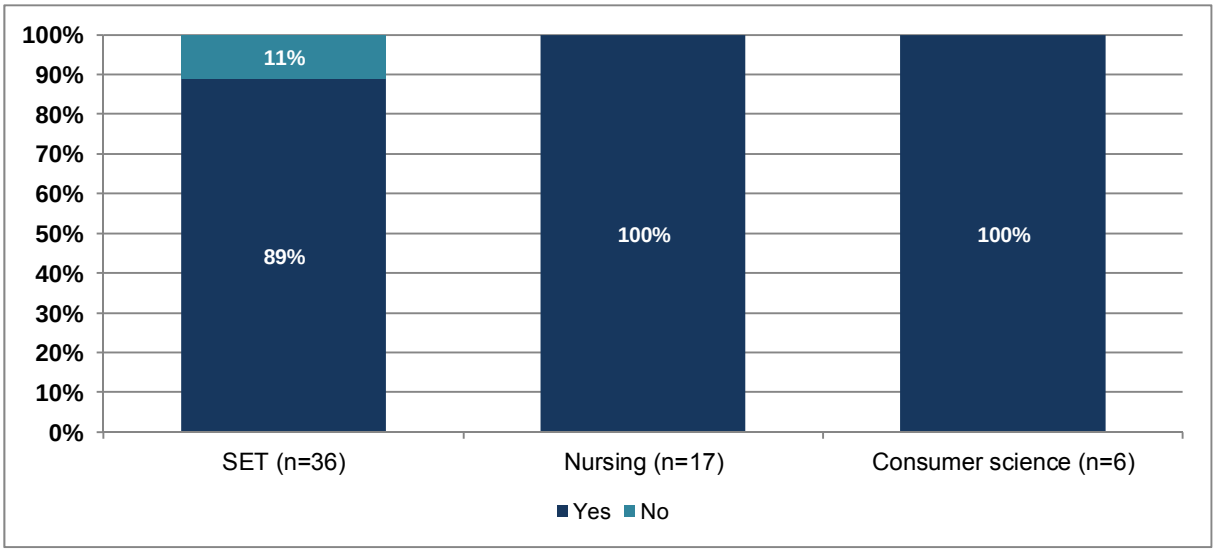

Figure 3.16: Extent to which job duties match the respondent's field of study, by science domain

The respondents' general satisfaction with their job can also be seen in the fact that no single respondent perceived her job as not realising her professional ideals. The respondents could have selected any of three categories ("to a significant extent", "to some extent" and "not at all") to rate the extent to which the job was perceived as a realisation of their professional ideals. However, only the first two categories were selected by all respondents (Figure 3.17). Greater alignment between the current job and professional ideals was reported by those in the business sector (67%) and those with doctoral degrees (67%).

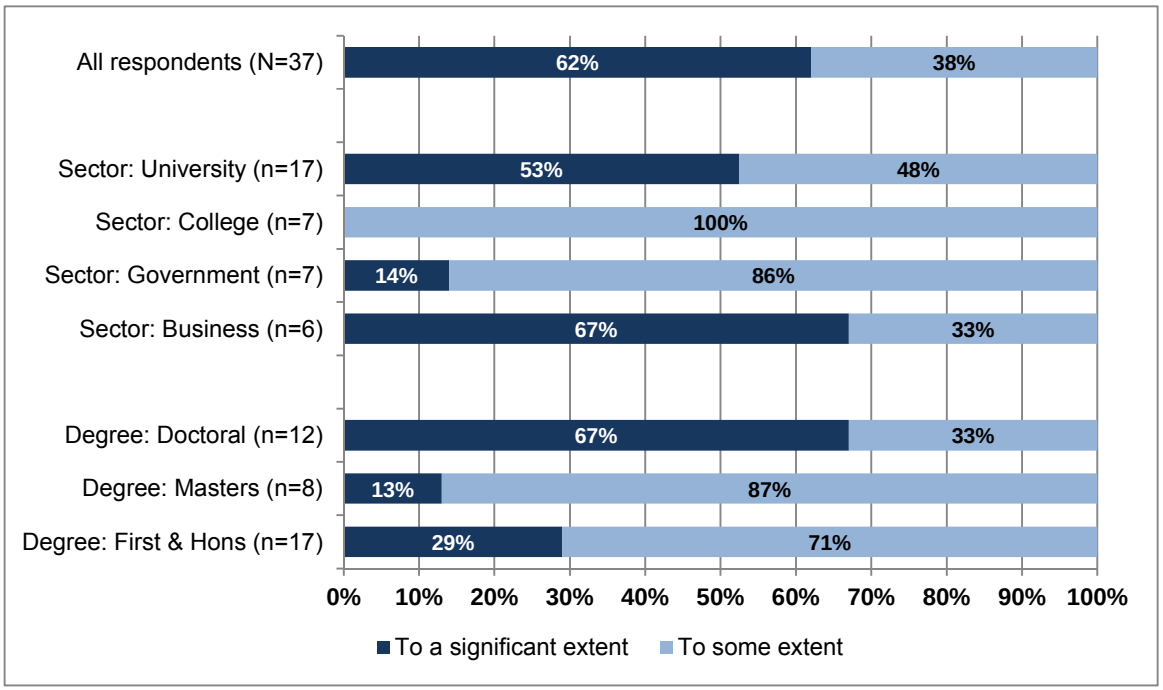

Figure 3.17: Extent to which current job is a realisation of professional ideals, by sector of employment and level of education

Again, the extent to which the SET women's current job is a realisation of their professional ideals, is about the same as that reported by women in a traditionally female-orientated science domain, such as nursing (Figure 3.18).

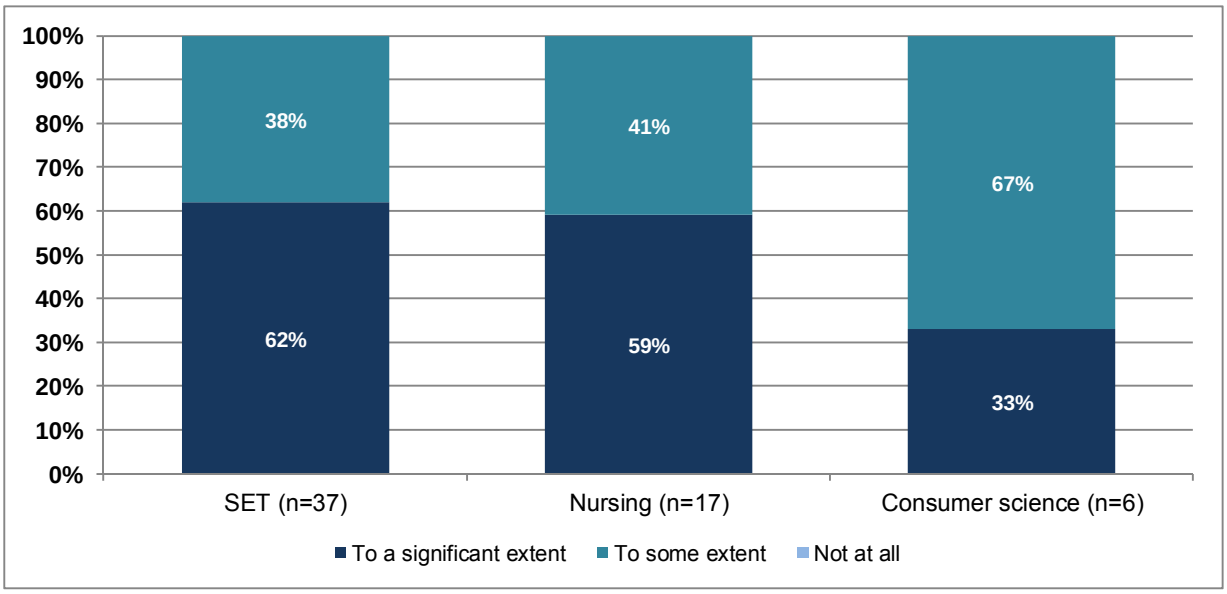

Figure 3.18: Extent to which current job is a realisation of professional ideals, by science domain

Moreover, as shown in Figure 3.19, a relatively large proportion of respondents were either satisfied or very satisfied with their job security (81%) as well as with their level of responsibility (76%). What the respondents were least satisfied with, were opportunities for further training (62% dissatisfied/very dissatisfied) and opportunities to advance into higher ranks (62% dissatisfied/very dissatisfied).

Whereas opportunities for further training are rated as less satisfactory by respondents in all sectors (Table 3.9), those in the business sector did not really see opportunities for advancement into higher ranks as a challenge. Approximately 60% (n=3) of respondents in the business sector rated the latter as satisfactory, compared to only about 30% of respondents in the other sectors. Respondents from the business sector were also more satisfied with their general working conditions and the intellectual challenge of their positions (83% in each case). Furthermore, respondents at the colleges were dissatisfied with the status of their positions (33% satisfaction). The latter percentage was substantially below the corresponding figure for the other sectors (between 71% and 83%).

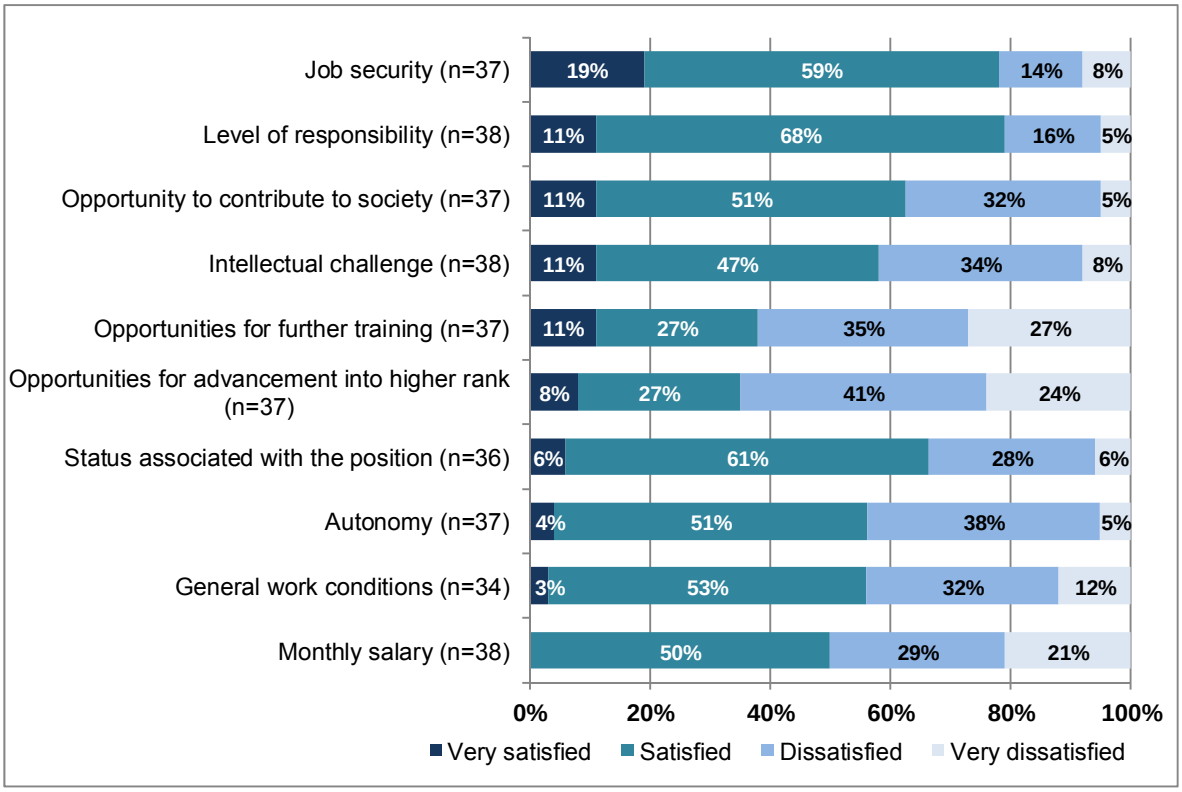

Figure 3.19: Level of satisfaction with different aspects of current position

Table 3.9: Percentage of respondents who reported satisfaction ("very satisfied" and "satisfied") with selected aspects of current position, by sector of employment

Aspect	University	College	Government	Business
Monthly salary	61% (11 out of 18)	29% (2 out of 7)	43% (3 out of 7)	50% (3 out of 6)
Status associated with the position	71% (12 out of 17)	33% (2 out of 6)	71% (5 out of 7)	83% (5 out of 6)
Job security	77% (13 out of 17)	71% (5 out of 7)	71% (5 out of 7)	100% (6 out of 6)
General work conditions	59% (10 out of 17)	33% (2 out of 6)	40% (2 out of 5)	83% (5 out of 6)
Opportunities for advancement into higher rank	33% (6 out of 18)	29% (2 out of 7)	29% (2 out of 7)	60% (3 out of 5)
Opportunities for further training	35% (6 out of 17)	43% (3 out of 7)	43% (3 out of 7)	33% (2 out of 6)
Intellectual challenge	56% (10 out of 18)	43% (3 out of 7)	57% (4 out of 7)	83% (5 out of 6)
Level of responsibility	89% (16 out of 18)	86% (6 out of 7)	57% (4 out of 7)	67% (4 out of 6)
Autonomy	53% (9 out of 17)	71% (5 out of 7)	57% (4 out of 7)	50% (3 out of 6)
Opportunity to contribute to society	72% (13 out of 18)	43% (3 out of 7)	86% (6 out of 7)	20% (1 out of 5)

As far as fringe benefits are concerned (Figure 3.20), the respondents were generally satisfied with their organisations' procedures regarding maternity (84%) and compassionate leave (76%). The mature age of some of the respondents also needs to be taken into consideration, as maternity leave would no longer be of importance to them. Respondents were the least satisfied with available assistance for education/tuition (24%). Moreover, in

terms of sectors, respondents in the business sector appeared to be generally more satisfied with their fringe benefits than respondents in the other sectors. Two exceptions were housing allowances and study leave. In both cases respondents in the university sector were more satisfied.

Lastly, respondents in the colleges seemed to be the least satisfied with their fringe benefits and this appears to be the case for most categories in Table 3.10. The most salient exception is maternity leave.

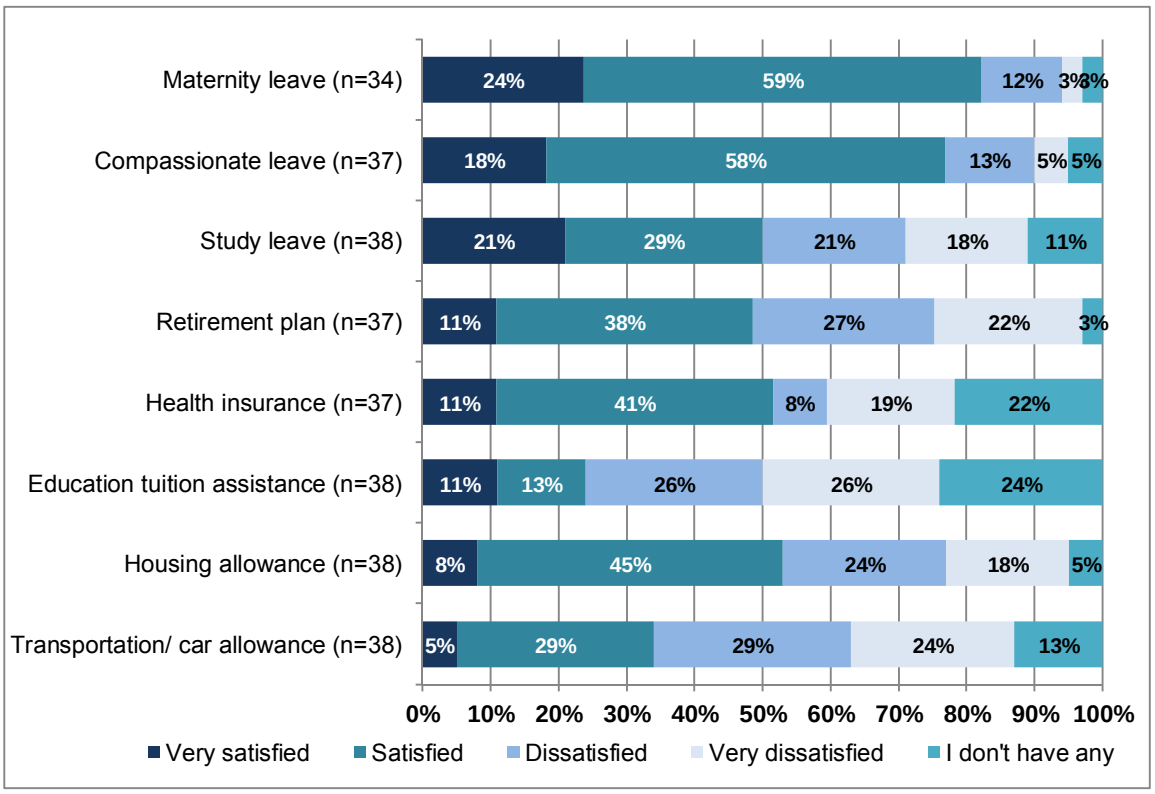

Figure 3.20: Level of satisfaction with fringe benefits associated with current position

Table 3.10: Percentage of respondents who reported satisfaction ("very satisfied" and "satisfied") with fringe benefits associated with current position, by sector of employment

Benefit	University	College	Government	Business
Health insurance	72% (13 out of 18)	0% (0 out of 7)	17% (1 out of 6)	83% (5 out of 6)
Retirement plan	33% (6 out of 18)	33% (2 out of 6)	57% (0 out of 7)	100% (6 out of 6)
Education tuition assistance	28% (5 out of 18)	0% (0 out of 7)	14% (1 out of 7)	50% (3 out of 6)
Housing allowance	78% (4 out of 18)	0% (0 out of 7)	29% (2 out of 7)	67% (4 out of 6)
Transportation/ car allowance	39% (7 out of 18)	14% (1 out of 7)	14% (1 out of 7)	67% (4 out of 6)
Maternity leave	71% (10 out of 14)	71% (5 out of 7)	100% (7 out of 7)	100% (6 out of 6)
Compassionate leave	78% (14 out of 18)	29% (2 out of 7)	100% (7 out of 7)	100% (6 out of 6)
Study leave	61% (11out of 18)	29% (2 out of 7)	57% (4 out of 7)	33% (2 out of 6)

The respondents generally had access to a computer and internet at work (97%) although 16% shared a computer (Figure 3.21).

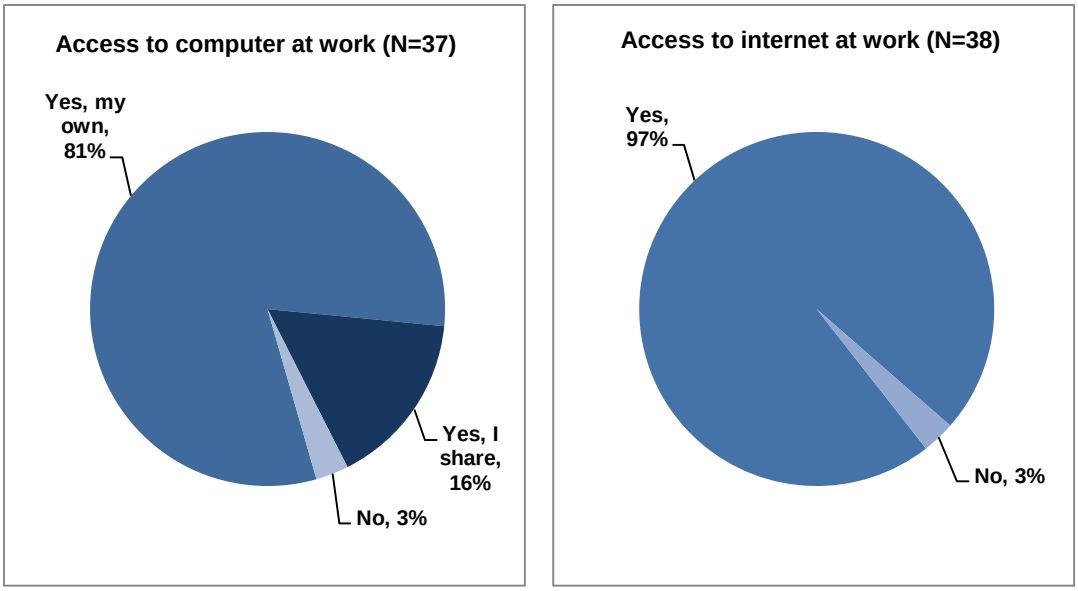

Figure 3.21: Respondents' access to a computer and internet at work

When asked whether their organisation provided any support to working mothers, e.g. in terms of facilities, programmes or policies, only 8% of respondents (which means three respondents) could answer in the affirmative (Figure 3.22). The remainder of responses was slightly skewed towards those who did not know (53%). Of the three respondents who said yes, one was employed at an university, the other in a business and the other at a parastatal. Only the respondent from the parastatal motivated her response: "Maternity leave is provided and they have workshop for gender-based violence".

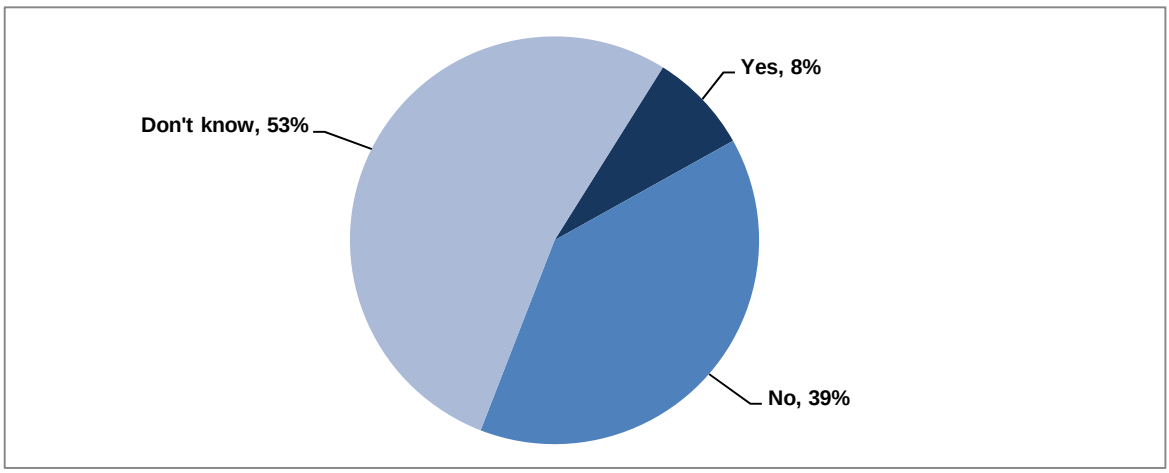

Figure 3.22: Whether employer provides any support to working mothers (N=38)

Women scientists face specific challenges in their career. The respondents were invited to elaborate on the challenges that they had experienced and to also suggest potential measures to overcome the challenges. The challenges relate to the attitudes and behaviour of men, as well as to constraints in terms of time, support, resources and opportunities (Table 3.11). The table also includes an interpretation of the nature of change suggested (last column in table). In many cases the respondents suggested changes that need to be implemented at a systemic or institutional level. Examples of the latter are scholarship initiatives and empowerment schemes as well as changes in the policy environment. Two more categories of change emerged from the responses. These are (1) the targeting of male attitudes – either men need to change their mindsets, or programmes need to be implemented to facilitate such changes, preferably from an early age; and (2) changes that women themselves can adopt. The latter includes activities such as working harder to increase visibility, improving one's time management to pursue scholarly interests, and deliberately searching for and exploiting opportunities (e.g. sponsors).

Table 3.11: Challenges experienced by respondents in their role as "woman scientist" and potential measures to overcome challenges

Challenge experienced	Potential measures suggested	Nature of change required
Males are still better preferred than females	Need to be given opportunities to prove ourselves. Need to come forward and be counted.	Systemic / institutional change Respondent needs to do something
Limitations in many aspects e.g. funding to study further, support from employer, family, responsibilities, limited pay compared to male counterparts in similar position	Advocacy from international partners and other related bodies; policy and legislation review; programs for men from a tender age to socialise them to the needs of women	Systemic / institutional change Male attitude change
Always considered weak to do other activities. Better suited for secretarial work. Ideas and opinions taken less serious. Promotion is difficult to attain. Scholarship opportunities.	--	--
There is no gender responsive budgeting at all. Pregnant women are not given some time to rest during pregnancy, very few of them hold the top position, and even if there is one in a top position her contributions are not seriously considered. Age factor is another problem, young members of staff are not taken serious when trying to contribute to the betterment of the institution	Educating the authorities on gender issues, monitor progress and evaluate	Systemic / institutional change
I am employed as lecturer but because of my education and experience I might be senior lecturer or higher position while impossible to change my position title because I am in contract and promotion is difficult	--	--
Male chauvinism	Work hard and prove yourself to them	Respondent needs to do something
Balancing personal life and professional life. Taking care of children on working days	--	--
Finding time for research. Juggling working on home responsibility leaves very little time for research	A lighter work load might help	--
Lack of opportunity to grow	Support, financial and otherwise; free up/ provide time to pursue other interests other than teaching	Systemic / institutional change Respondent needs to do something
Need to balance home, marriage and work	--	--
We are a very rare species. Thus we do not have ability to make great impact as we not seen as role models for female students.	Having more female students taking science subjects at school. Having clear empowerment schemes to recruit more female staff members.	Systemic / institutional change
Limited opportunities for self-advancement	Availability of more scholarship opportunities	Systemic / institutional change
I am not sure because I am not in the job I would have preferred to be in upon leaving university. I suppose I could be in it if I wasn't a woman. That's a computer related job.	Maybe if I'd get a sponsor to further my studies in computer science, I would finally reach my goal and get some job satisfaction in the sciences.	Respondent needs to do something
Being unable to upgrade myself due to lack of scholarships and study leave with pay.	Provision of scholarships and study leave with pay	Systemic / institutional change
Having the responsibility of caring for families at the same time as that of working on projects	Not so sure yet	--

Challenge experienced	Potential measures suggested	Nature of change required
I upgraded by financing myself to obtain a BSc from UNISA, graduated in 2008 but further studies hindered by lack of sponsors.	None - because most sponsors and government do not sponsor one if one is above 45 years.	Systemic / institutional change
Discrimination esp. dress code; lack of freedom to express your opinion; education opportunities limited	Review of TSC act of 1981, outdated; local/internal policies need to be put to place	Systemic / institutional change
Time management between family and work (balancing activities)	--	--
The lack of confidence in my abilities based on my gender	By doing my work diligently and very well in order to prove myself as a professional.	Respondent needs to do something
The males do not accept us. They still believe women are not fit for the job.	It is an attitude problem; the males can be taught to accept the females.	Male attitude change
Oppression from men	Equal opportunities	Systemic / institutional change
Finding time for research. Juggling working on home responsibility leaves very little time for research	Men to change the way they look at us when at work	Male attitude change
Over loaded with work so to fail or not to meet targets on time	To divide work equally	Systemic / institutional change
I don't feel I am taken as seriously as I ought to be but I doubt that has anything to do with gender, it could just be my work environment.	--	--
No availability of government scholarships to do further training. For other scholarships one is forced to resign yet I have children and parents to fend for.	Look for alternative scholarships which can sponsor tuition and provide allowance	Respondent needs to do something
No support from male colleagues. Undermined	Mind-shift	Male attitude change
Sometimes there is a lot of work, one has to work under pressure but it does not happen all the time	--	--
In Swaziland, there are limited job opportunities in the field of science.	--	--
Career growth - as a woman there is a line drawn for you not to cross regardless of your qualification.	Continuous learning	Systemic / institutional change

3.5 Mobility

Approximately 42% of respondents said that they were planning to move to another country in the near future (Figure 3.23). This translates into 17 respondents, of which ten clearly expressed South Africa as their choice (Table 3.12). The reasons for choosing South Africa primarily related to better opportunities and more money, although one respondent mentioned South Africa's relatively (presumed) better treatment of women as her main motivation.

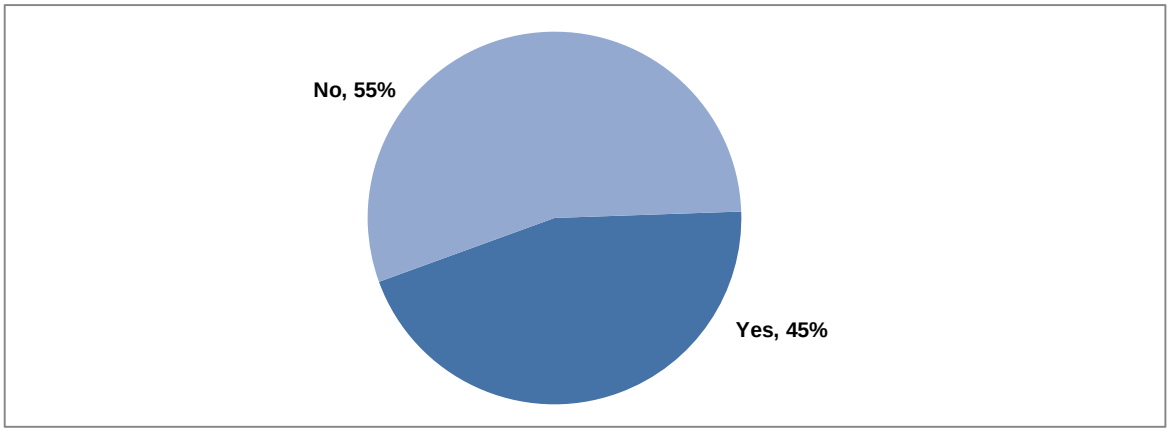

Figure 3.23: Whether respondent plans to move to another country in near future (N=38)

Table 3.12: Country where respondent plans to move to in the near feature, together with the reason why

Country	Reason
South Africa (10)	Returning to my country of origin
	More educational opportunities, pay is good, freedom of expression, professionalism, competitiveness is fair
	Earning increased
	Better salaries and growth potential in my profession
	If Swaziland does not recover economically one will be forced to look for a job in South Africa because it is nearer to Swaziland
	Better opportunities for greater and better pay.
	Better business opportunity, better income, more stability in income.
	Have been recruited by South African university to teach.
	They respect women. They also honour them in higher positions
South Africa/ Australia (1)	There are better opportunities for further study or better jobs which can satisfy financially, to an extent
Nigeria (2)	Country of origin
	End of contract tenure
Australia/ Canada (1)	Professional growth opportunities and general living conditions
Mozambique (1)	My fiancé will be working there
Zambia (1)	Home
Not decided yet (1)	

3.6 University employees

Tables 3.13 to 3.15 provide a brief overview of the knowledge production of women scientists at UNISWA. The figures are based on the 18 respondents from that institution. As can be seen, female university scientists spend about two-thirds of their time on teaching and training, which, together with administrative duties, leaves only about 20% of their time for research activities.

Table 3.13: Percentage of time spent on research, teaching and administration respectively (n=16)

	Mean % of time spent	Median % of time spent	Minimum	Maximum
Research	19%	20%	0%	45%
Teaching/training/supervision	67%	65%	40%	95%
Administration	14%	10%	0%	50%
	100%	**--**		

Moreover, about 81% of the respondents (i.e. 13 out of 16) participated in a project during the last three years and 65% (i.e. 11 out of 17) of respondents also reported publishing an international journal article during the same period.[5] The figures in Table 3.15 require some contextualisation as they refer to a highly selective sub-group of female university scientists and it is not known how these figures compare with the university norm or with those for men. Unfortunately, such data are not available.

Table 3.14: Indicators of research/scholarly activity in the last three years

Indicator	Mean number	Median number	Minimum number	Maximum number	% of respondents reporting at least one
Number of projects worked on (n=16)	2.19	2	0	8	81%
Number of peer-reviewed local journal articles (published or accepted for publication) (n=17)	0.59	0	0	5	23%
Number of peer-reviewed international journal articles (published or accepted for publication) (n=17)	2.18	1	0	15	65%
Number of monographs/books (published or accepted for publication) (n=17)	0.06	0	0	1	6%
Number of chapters in books (published or accepted for publication) (n=17)	0.94	0	0	8	29%
Number of papers presented at local conferences (n=17)	0.65	0	0	3	35%
Number of papers presented at international conferences (n=17)	1.94	0	0	21	41%
Number of unrefereed reports (n=17)	1.12	0	0	10	23%

[5] South African journals, from Swaziland's point of view, are also considered as "international". Thus, the international journal articles could mainly appear in regional journals. Further research is required to investigate this speculation.

Finally, according to Table 3.16, the university respondents were highly dissatisfied with their institution's support for attending science conferences, either national or international, as well as with support to cover the page fees of publications and for the editing of publications. Although just more than a third of respondents (35%) expressed some satisfaction with support received to attend research training events, the general opinion was one of dissatisfaction.

Table 3.15: Level of satisfaction with research-related support received from university

Support	Very satisfied	Satisfied	Dissatisfied	Very dissatisfied	Not applicable
Support to attend research training seminars/workshops (n=17)	0%	35%	24%	41%	0%
Support for the editing of publications (n=16)	0%	13%	25%	38%	25%
Support for the page fees of articles (n=17)	0%	6%	24%	47%	24%
Support to attend local conferences (n=17)	0%	24%	29%	47%	0%
Support to attend international conferences (n=17)	0%	0%	41%	59%	0%

4 THE WAY FORWARD

The survey, although valuable as one of the first – if not the only – study to investigate the status of women in SET in Swaziland, is not without shortcomings. In fact, a major shortcoming is the fact that the survey was conducted during the holiday season and that not all qualifying candidates were present to participate. Also, given the time constraints and the small science system of Swaziland, the target group definition (postgraduates only) was maybe too strict and university graduates (i.e. those with undergraduate or first degrees) should also be included in future studies of this nature in the SADC region. These issues (the timing of the survey and the target group definition) resulted in the final number of respondents being too small for any conclusive interpretations to be derived from the study. In addition, it needs to be added that there is currently no comparative lens through which to view the study's findings, e.g. comparative statistics for male scientists in Swaziland. Neither does the internet provide a wealth of background information on Swaziland as far as its science system is concerned, meaning that it is difficult to contextualise the findings.

It is therefore suggested that a number of follow-up studies be conducted, to elaborate on and clarify some of the results emerging from the survey. The suggestions are as follows:

- A focus group study of first year university students in SET at UNISWA, to discuss the influence of high school teachers and significant others in their decision to enroll for SET at university. Separate male and female focus groups are suggested, which would allow the analyst to juxtapose the different themes and perspectives generated by each group.
- A study of the income and remuneration levels of female and male scientists in the different sectors. This study could rely on secondary data analysis, for example, an analysis of data extracted from the payroll systems of the major S&T institutions in the country, or relevant data collected by the national statistics agency where such data do exist.
- A focus group of Swazi women scientists to discuss their multiple roles and responsibilities as well as their frustrations, aspirations and support systems, and what it means to be a Swazi woman working in a SET field.
- A bibliometric study of the scientific publication output of men and women in Swaziland, followed by interviews with the most productive female authors in order to determine their strategies of productivity.

Lastly, in terms of refinement of the methodology for future surveys, it is advised that the collection of a candidate's contact details (for storage in a database) be separated from the survey administration. The simultaneous collection of names and questionnaires, as it was executed in this study because of time constraints, resulted in respondents doubting the anonymity of the survey and therefore deciding not to participate. A two-layered process is suggested, one where the database is compiled in advance and, once finalised, used as a sampling frame for the selection of the survey participants.

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APPENDIX 1: QUESTIONNAIRE

A. DEMOGRAPHICS

1. In what year were you born? ……..……

2. What is your relationship status?

Single	1
Married	2
Not married but in long-term relationship	3
Separated	4
Divorced	5
Widowed	6
Other (Specify: ……..……..…..…..)	7

3. Do you reside in a rural or urban area of Swaziland?

Rural	1
Urban	2

4. What is your country of origin?

Swaziland	1
Other (Specify: ……..……)	2

5. What is your race?

Black	1
Indian	2
White	3
Other (Specify: ……..……)	4

6. What is your highest completed qualification?

Honours degree/ postgraduate diploma	1
Masters degree or equivalent	2
Doctoral degree or equivalent	3
Other (Specify: ……..……..……)	4

7. At what institution and in what country did you obtain this qualification?

   (a) Full name of institution: …….

   (b) Country: ……

8. In what science field did you complete your highest qualification?

Agricultural sciences	1
Biological sciences	2
Chemical sciences	3
Earth sciences	4
Engineering sciences	5
Environmental sciences	6
Health sciences	7
Information and communication technologies	8
Marine sciences	9
Material sciences	10
Mathematical sciences	11
Medical sciences: Basic	12
Medical sciences: Clinical	13
Physical sciences	14
Science / maths education	15
Other (Specify: ……..)	16

9. How many years of experience do you have in a science-related position?

   ……..…. (years)

10. How successful are you in balancing your work life and domestic/family life?

Very successful	1
Successful to some extent	2
Not successful at all	3

11. Are you responsible for the daily care of any of the following persons, in other words, do any of them depend on you for their daily living? (Please select ALL that apply.)

Child(ren) younger than 6 years	1
Child(ren) 6 to 17 years	2
Child(ren) 18+ years	3
Parent(s)	4
Grandparent(s)	5
Brother(s) / sister(s)	6
Other (Specify: ……..)	7

12. Do you have any disability? (With disability is meant hearing impairment, visual impairment or any impairment which limits the physical function of limbs or fine or gross motor ability.)

No	1
Yes (Specify: ……)	2

13. (a) Do any of your siblings (i.e. brother or sister) have a masters or doctoral degree?

Yes, at least one of my siblings completed a masters or doctoral degree	1
No, none of my siblings completed a masters or doctoral degree	2
I do not have siblings	3

(b) If YES, in what broad field(s) did your sibling(s) obtain the masters or doctoral degree? (You may select both options if applicable.)

Agricultural sciences / Engineering / Health sciences / Natural sciences / Technology	1
Social sciences / Humanities / Arts	2

B. ENTRY INTO SCIENCE

14. Why did you choose a science career?

……

……

……

15. Did you ever consider any other career (besides a career in science)?

Yes	1
No	2

16. If yes, what other career(s) did you consider?

……

……

17. How old were you when you decided to follow a science career? …….. (years)

18. (a) Did anyone object to your decision to follow a science career?

Yes	1
No	2

(b) If YES, who objected?

Father	1
Mother	2
Sister(s)	3
Brother(s)	4
High school teacher(s)	5
Friend(s)	6
Other (Specify: ……)	7

19. (a) Did anyone encourage you to follow a science career?

Yes	1
No	2

(b) If YES, who encouraged you?

Father	1
Mother	2
Sister(s)	3
Brother(s)	4
High school teacher(s)	5
Friend(s)	6
Other (Specify: ……)	7

C. CURRENT JOB

20. Which ONE of the following sectors best describes your current job?

University	1
College	2
Government department or unit/office/division within a government department	3
Parastatal (government-associated organisation/authority/council)	4
Business/industry	5
Other (Specify: ……)	6

21. Is your current job a part-time or full-time position?

Part-time (You work only part of the day or part of the week)	1
Full-time (You work more or less the whole day, every day of the month)	2

22. Is your current job a permanent or temporary position?

Permanent position	1
Temporary: contract position of at least 3 years (fixed term)	2
Temporary: contract position of less than 3 years	3
Temporary position, no contract	4

23. How much is your current monthly gross income (in Swazi Lilangeni, E)?

Less than E5,000	1
E5,001 – E10,000	2
E10,001 – E20,000	3
E20,001 – E30,000	4
E30,001 – E40,000	5
E40,001 – E50,000	6
More than E50,000	7

24. Is your job located in a rural or urban area of Swaziland?

Rural	1
Urban	2

25. What is your official job title? ……..

26. Which ONE of the following levels best describes your current job?

Entry-level	1
Junior level	2
Mid-level	3
Senior level	4
Executive level	5

27. What are your major duties? (Select ALL that apply.)

Administration	1
Advisory services/ consulting	2
Commercial production/ manufacturing	3
General office work	4
Management	5
Planning and organising	6
Policy related work	7
Research and scientific/ technological development	8
Supervision	9
Training/ teaching	10
Other (Specify: ……)	11

28. (a) Do these duties match your education level?

Yes	1
No	2

(b) If NO, please elaborate below:

……

……

29. (a) Do these duties match your field of study?

Yes	1
No	2

(b) If NO, please elaborate below:

……

……

……

30. To what extent is your current job a realisation of your professional ideals?

Not at all	1
To some extent	2
To a significant extent	3

31. Please rate your level of satisfaction with each of the following aspects of your current position:

	Very dissatisfied	Dissatisfied	Satisfied	Very satisfied
Monthly salary	1	2	3	4
Status associated with the position	1	2	3	4
Job security	1	2	3	4
General work conditions	1	2	3	4
Opportunities for advancement into higher rank	1	2	3	4
Opportunities for further training	1	2	3	4
Intellectual challenge	1	2	3	4
Level of responsibility	1	2	3	4
Autonomy	1	2	3	4
Opportunity to contribute to society	1	2	3	4

32. Please rate your level of satisfaction with the following fringe benefits associated with your current position:

	Very dissatisfied	Dissatisfied	Satisfied	Very satisfied	I don't have any
Health insurance	1	2	3	4	0
Retirement plan	1	2	3	4	0
Education tuition assistance	1	2	3	4	0
Housing allowance	1	2	3	4	0
Transportation/ car allowance	1	2	3	4	0
Maternity leave	1	2	3	4	0
Compassionate leave	1	2	3	4	0
Study leave	1	2	3	4	0

33. Do you have access to a computer at your work?

Yes, a computer for my own use	1
Yes, a computer that I share with others	2
No	3

34. Do you have access to the internet at your work?

Yes	1
No	2

35. (a) Does your organisation provide any support to working mothers, e.g. in terms of facilities, programmes or policies?

Yes	1
No	2
I do not know	3

(b) If YES, please elaborate on the nature of the support provided.

……

……

……

36. What challenges do you, as a woman scientist, face in your career?

……

……

……

37. What potential measures can help you to overcome these challenges?

……

……

……

D. MOBILITY

38. (a) Do you plan on moving to another country in the near future?

Yes	1
No	2

(b) If YES, to what country and why?

Country: ……

Reason: ……

E. SECTION TO BE COMPLETED BY UNIVERSITY EMPLOYEES ONLY

39. How many projects have you been working on in the last three years? …….

40. (a) Are you the principal investigator/leader of any of the project(s)?

Yes	1
No	2

(b) If YES, how many projects? ……..

41. Please indicate the <u>percentage of time</u> that you spend on research, teaching and administration respectively. The three percentages must add up to 100%.

	% breakdown
Research	……..…….
Teaching/training/supervision	……..…….
Administration	……..…….
	100%

42. Please specify your main type(s) and numbers of research and development outputs during the last three years.

Outputs	**Number**
Peer-reviewed local journal articles (published or accepted for publication)	……
Peer-reviewed international journal articles (published or accepted for publication)	……
Monographs/books (published or accepted for publication)	……
Chapters in books (published or accepted for publication)	……
Papers presented at local conferences	……
Papers presented at international conferences	……
Unrefereed reports	……
Patents	……
Other (Please specify: …..……..……..)	……

43. Please indicate the number of scientific conferences/meetings attended during the last three years.

    (a) In Swaziland: ……

    (b) Outside Swaziland: ……

44. Please indicate your level of satisfaction with the following research-related support received from your university in your current position:

	Very dissatisfied	Dissatisfied	Satisfied	Very satisfied	Not applicable
Support to attend local conferences	1	2	3	4	0
Support to attend international conferences	1	2	3	4	0
Support for the editing of publications	1	2	3	4	0
Support for the page fees of articles	1	2	3	4	0
Support to attend research training seminars/workshops	1	2	3	4	0

THANK YOU

END OF QUESTIONNAIRE

The State of Women in Science and Technology in Swaziland

A UNESCO Project Coordinated by the Academy of Science of South Africa

Consultative Workshop on 9 May 2012 at the University of Swaziland, Luyengo Campus Conference Room at 10:00-15:30

Workshop Report

Introduction

The workshop was facilitated by Professor Marietta Dlamini (Director, University of Swaziland Research Centre), Professor Roseanne Diab [Executive Officer, Academy of Science of South Africa (ASSAf)], and Ms Dorothy Ngila (Liaison Officer, Academy of Science of South Africa). The workshop was attended by both males and females from the University's Faculty of Agriculture, Faculty of Science, Faculty of Commerce, and Faculty of Education, Curriculum and Teaching.

Professor Diab gave an overview of ASSAf, its mandate and responsibilities as well as the key project activities that the Academy was undertaking. Prof Diab also gave an overview of the project that ASSAf had been commissioned to undertake in Swaziland on behalf of UNESCO, noting that it sought to understand the status of women in science and technology (S&T) in the country. There was need to gather statistics that were comparable in southern Africa countries so that the status of women in S&T in the region could be fully understood. There was also a need to gather in-depth information on the reasons for the narrowing of the S&T human capital 'pipeline' in the region, as one moved into higher education and beyond.

Data had been collected in December 2011-January 2012 in Swaziland to determine the factors that led to entry into science, work-life balance challenges and opportunities, job satisfaction and opportunities for further training as well as support for working mothers. It was, however reported that the data collected were inadequate to allow firm conclusions and recommendations to be made. Hence the need for the follow-up workshop. The workshop was designed to assist in gathering additional information on the following:

- Why a science career;
- Support from organisations to working mothers;
- Challenges as women scientists; and
- Measures that can help overcome these challenges.

It was also anticipated that through the workshop, the existing database on women in S&T in Swaziland would be augmented and more questionnaires would be disseminated and completed by workshop participants. The following report summarises aspects that were discussed by workshop participants under the following headings:

a. The project questionnaire;
b. What is a science career;
c. Why choose a science career;
d. Challenges faced by girls and women scientists in Swaziland;
e. Measures to overcome the challenges; and
f. Potential collaborative activities for the southern Africa region.

The Project Questionnaire

The in-country researcher, Dr Q'andelihle Simelane, introduced the questionnaire to workshop participants. Useful inputs were received from participants and some challenges experienced in the administering of the questionnaire were raised by Dr Simelane:

- In most instances, completion of questionnaires in Swaziland was not done voluntarily. Group presentations on the study and requirements would have made the process smoother;
- The timing of the questionnaire completion process coincided with the vacation period and therefore many people were not at their offices;
- Another study on similar issues and targeting the same respondents had been conducted almost at the same time by the Association for Strengthening Higher Education for Women in Africa (ASHEWA), thus detracting attention from the UNESCO-ASSAf study; and
- It was easier to get responses when the research associates were present during the completion of the forms.

Participants suggested changes on the following aspects of the questionnaire:

<u>Demographics:</u>

- In what year were you born? This was regarded as a sensitive matter and it was recommended that it be removed or that categories be used;
- What is your relationship status? It was requested that the option, 'remarried' be added;
- Do you reside in a rural or urban area of Swaziland? This was viewed as difficult to answer definitively and it was suggested that the option, 'peri-urban' should be added;
- What is your race? This was considered a sensitive question, particularly the categories used. It would be important to contextualise the realities in the different countries. It was suggested that 'Asian' be used instead of 'Indian' and that an option, 'mixed race' be added;

- In what science field did you complete your highest qualification? The following were strongly suggested:
  - Health education and health sciences should be included as part of the survey as exclusion of these sectors was discriminatory and the final report would not capture the gains that Swaziland had made in the health sector. In this regard it was agreed that the final report would include a section on the health sciences;
  - Home economics/ science, and consumer sciences should be included as options; and
  - Science/ math education should read, 'mathematics education/ science education'.

Current Job

- How much is your current monthly gross income? This was a sensitive question. It was also noted that most Swazis concentrated on net incomes as opposed to gross incomes; and
- Is your job located in a rural or urban area of Swaziland? The option, 'peri-urban' was suggested as an addition.

Defining a Science Career

It was suggested that the questionnaire should introduce the definition of science to make sure that respondents understood what the parameters were. It was also noted that part of the problem in Swaziland in attracting more girls into science and mathematics was that science was conceptualised a science career. It was reported that the workshop discussion was restricted to basic sciences.

Why a Science Career

The following reasons were provided by participants as the main motivating factors for pursuing a career in science:

- Vision of pursuing a science career in the future;
- Science teaches one a range of skills that makes one sought after in the job market;
- If one has a science education background, one is more likely to find a job in an era where there is a general shortage of jobs. For instance, in Swaziland, there is a shortage of science teachers and people who are not necessarily qualified educators but have a science background can find a job;
- Increased provision of information to girls on their S&T capabilities
- Science is challenging and interesting;
- Science allows one to be able to provide solutions to society's problems;
- Science allows one to gain skills in how to manufacture products;
- Science allows for practical classes and the answer is always predictive; there is no subjectivity;

- To some people, they are good at science and mathematics naturally, and are able to pursue these subjects further;
- Some participants had been almost forced into a science career because their science grades at high school were very good;
- Career guidance and counselling at school level encouraged some participants to get into a science career; and
- The family structure was such that it encouraged one to get into a science career.

Challenges for Women Scientists in Swaziland

The following challenges were identified as those facing girls and women scientists in the pursuit for excellence in science and technology in Swaziland:

Teaching Science in Swaziland

- There is a general shortage of science teachers in Swaziland. When encouraged to study science education, science teachers are provided with both pay and scholarships and they tend to get into administration once they have graduated as the pay is higher; and
- There are a large number of teachers in the humanities in Swaziland.

For Girls

- Girls face transitional problems (high school to university) and are lost in the pipeline due to early marriage, attraction of the humanities and social sciences, and societal expectations;
- Boys are expected/ encouraged to pursue careers in the sciences rather than girls;
- Boys capture the attention of the teachers by being more participatory in class than girls e.g. boys are more likely to raise hands to answer questions in science classrooms;
- Teacher attitudes towards girls in science education have not changed;
- Multiple problems at the school level including lack of sanitary facilities, lack of reading materials, and inadequate facilities;
- Cultural issues that socialise girls and women to certain roles and responsibilities; and
- It is believed that boys are more familiar with tools of science at an early stage and are able to engage better in science laboratories;
- Sons are more important than girls in the Swazi culture;
- Culture suppresses the abilities of girls to pursue education and hence science in most of Africa, of instance, if there is a shortage of finances in the family, the boy is given priority in terms of education;
- Levels of poverty in society also keep girls from reaching their potential;
- Girls tend to drop out of courses where they are a minority e.g. Physics

- Lack of incentives;
- Girls think that science is hard (psychological pressures); and
- The practice of traditional marriages in Swaziland robs the system of potential scientists

For Women Scientists

- Shortage of staff, working tools e.g. equipped laboratories, and long working hours;
- No support for mothers when they travel to workshops and conferences;
- Women scientists struggle to balance work/ home roles and responsibilities;
- When women are pursuing further education in science, there is a lack of support from supervisors and schools of science at universities of their needs. Many women scientists in Swaziland have studied abroad having left families behind, and in most cases study committees did not take this into consideration when they needed to finalise degrees faster;
- Non-supportive partners/ families;
- Policies to further studies abroad have previously been discouraging for women in Swaziland as husbands had to sign release forms for their wives to further their studies;
- Restrictions on scholarships where women have to most often leave their homes and children to pursue further studies;
- Female bosses in higher education where most women scientists are based are seen to be more aggressive, stricter, sometimes even more difficult, and therefore do not provide motivation to other women;
- Women leaders are perceived as tough and non-negotiating; and
- Women scientists are most often are overloaded as they have to balance work and home responsibilities.

Measures to Overcome Challenges in Swaziland

The following measures were suggested to overcome the challenges cited above in Swaziland:

For Girls and Science Education

- There is need to capitalise on career guidance and counselling in Swaziland. Girls to be encouraged to think about what they would like to become in life, and provided with the various options;
- Information dissemination is critical to not only girls but also teachers, administrators and society in general;
- The passion for science in girls should be nurtured;
- Mentoring and advocacy programmes should be put in place;

- Cultural issues that socialise girls into different roles and responsibilities should be discouraged;
- Support from parents/ partners is critical for girls and women to excel in science and technology and should be encouraged;
- Career guidance at school level should be intensified;
- Funding for education should be available especially for girls from disadvantaged backgrounds;
- More scholarships and information on these should be disseminated to girls and aspiring women scientists;
- Easy access to information on policies, programmes, scholarships, bursaries etc should be ensured
- Parents should be provided with guidance so that they can give opportunities equally to boys and girls through the parents-teacher associations;
- Teacher attitudes towards teaching girls (teaching girls science in an interesting manner) should be looked into and change should be advocated;
- A programme that will support mathematics and science teachers in Swaziland (there are a lot of problems in science and mathematics education) should be considered
- A law is needed to ensure that men take responsibility for provision and education of their children. There are many orphans and vulnerable children in Swaziland and the girls that are affected usually do not get to fulfil their education potential;
- Sanitary pads and proper sanitary facilities should be provided at schools for girls as the latter tend to attend school for shorter periods if these are not provided;
- Research should be undertaken to determine how many female teachers there are at schools and the role they are playing in mentoring girls under their care;
- The salary and incentive packages for the science teachers should be reviewed and further professional training encouraged; and
- Research on why girls deviate from science careers when they start university even though they have performed well at high school in these subjects should be undertaken.

For Women Scientists

- It is important that support groups are established amongst women scientists, whether in the form of research collaboration or informal support groups;
- Constant and consistent information should be gathered to track and document issues around the state of women in science and technology;
- More employment of women in science and technology should be encouraged;
- Established women scientists should be encouraged to engage in mentoring and other activities that influence other women;

- Women need to be supportive of each other (identify the strengths and weaknesses or each other and make sure that their talents are utilised and encouraged);

Support Structures for Working Mothers

The following support structures were highlighted as those that should be put in place for working mothers:

- Child care facilities should be introduced for working mothers at workplaces;
- Reduced travel jobs especially in science and technology leadership levels;
- Part time/ work share;
- Bosses should be supportive;
- Encourage personal and professional mentors that support young women scientists;
- Presence of a supportive mother and partner/ spouse;
- Flexi-time should be adopted by organisations;
- Both maternity and paternity leave should be granted to parents; and
- Multiple support structures for a studying mother should be considered.

Potential Collaborative Activities for the Southern Africa Region

Ms Ngila presented the following potential initiatives that women scientists in Swaziland could be engaged in within the region:

a. The SADC Women in Science, Engineering and Technology Organisation that was in the process of being established
b. A possible Organisation of Women Scientists for the Developing World Swaziland National Chapter could be established in Swaziland to work closely with FAWESWA
c. Information on regional prizes could be disseminated through the South African OWSD National Chapter to those that were included in the database

Conclusion

The hosting of a consultative workshop was important after the completion of a draft report because it allowed for the open discussion of the critical issues affecting girl education in Swaziland that were not discussed as part of the questionnaire process. In summary, the following key issues emanated from the discussion and survey process that may be cross cutting in all survey countries:

a. The state of girl education (both primary and secondary schooling);
b. There is need to facilitate more collaborative activities amongst women scientists;
c. Science education (teacher development and gender mainstreaming on that level);
d. Policy issues (gender mainstreaming, working mother support structure);
e. Opportunities for further training; and
f. Women leadership issues.