An Assessment of The Impact of The Stem-Kenya Mentorship Program on Career Choice and Employment of Young Women in Kenya

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Abstract

In Kenya, various intervention programs have been implemented to support the youth in making informed career choices and prepare them for employment by imparting practical skills and foster the right work attitude. These initiatives include apprenticeship, internship and mentorship programs. However, there are notable gender disparities not just in the uptake of these programs, but also in school to work transition whereby female participation in the job market is 29.5 per cent compared to males at 36 per cent. This is more apparent in Science, Technology, Engineering and Mathematics (STEM) related fields. As a mitigation, UNESCO launched the UNESCO-STEM government of Kenya mentorship program in 2014 to inspire girls to embrace STEM by organising scientific camps of excellence in specific schools in different counties. This paper presents the findings of an ongoing impact evaluation study to assess the UNESCO-STEM Government of Kenya mentorship program on career choices, income levels and employment status. . A sample of 177 young women (those that went through the STEM mentorship programme and those who did not go through the programme) was used. This sample was selected form a target population of 2,000 by employing Yamane's (1967) formula for determining sample size. The study adopted the cohort studies approach, which is a non-experimental longitudinal design that takes a sample of a people who

share an essential characteristic. Questionnaires and interview schedule tools were utilized to collect data. Quantitative data was analysed using STATA while qualitative using NVIVO software. From the study findings, it can be concluded that participating in the STEM mentorship program broadened the participants' scope of employment opportunities. However, there are marginal benefits in placing young women in STEM related courses. The ongoing study recommends redesigning and implementation of the program at a larger scale to enhance women economic empowerment and certification of the participants.

***Keywords*: STEM Government Mentorship Program, STEM Subjects, Career Choices, Income Levels, Employment**

Introduction and Background to the Study

Mentorship is a pathway through which individuals enhance their work readiness and chances of employment. It is a relationship whereby a more knowledgeable experienced person guides a less knowledgeable and less experienced individual (Clutterbuck *et al.*, 2017). Usually, the mentor must be in the same profession or area of expertise as the mentee for a mentorship relationship to be said to occur. This is achieved through formal and informal career guidance and role modelling. It is acknowledged that mentorship has the ability to impart significant knowledge and expertise which can lead to career progression of learners especially in Science, Technology, Engineering and Mathematics (STEM) related fields (Kram, 1985; Tennenbaum *et al.*, 2001; Karanja, 2021). Various interventions have increased the proportion of young women participating in science and technology at secondary school level (UNESCO, 2007). However, there have been limited gains at tertiary levels as fewer women than men enrol in the more lucrative careers such as engineering and computing. These gender disparities have implications on the future of work for women. The paper is based on a study which aimed at evaluating UNESCO-STEM Government of Kenya mentorship program for secondary school girls.

Globally, formal mentoring is increasingly becoming an area of focus as a major tool in capacity building especially in regard to marginalized groups including women (Goh *et al*., 2008). Willemsen, (2016) opined that mentorship is key in career progression particularly for women in (STEM). Through building the technical capacity of women, we can make them more confident and visible and enable them to be networked as well as enhance their leadership and research skills, thereby using mentoring as a bridge to close the gender gap in STEM. Additionally informal mentoring has been found to be used in providing avenue to information and resources that are effective in enhancing career growth especially for women (Hymowitz, 2007).

In 2014, UNESCO Kenya in collaboration with the Government of Kenya decided to initiate a mentorship programme geared towards inspiring secondary school girls to embrace science subjects with a view to enhance their participation in STEM courses and careers. The project was undertaken through mentorship talks by STEM achievers. The programme also facilitated the girls to visit higher educational institutions specializing in STEM courses. The visits were extended to industries where STEM careers were prevalent to enable students to observe actual application of STEM related skills and knowledge. Given the innovative nature of the programme and the high demand for it, Kenyatta University Women Economic Empowerment Hub in 2021 sanctioned a study to assess the impact of the study in terms of whether it succeeded in increasing the number of girls pursuing STEM courses in institutions of higher learning and engaging in careers in STEM fields.

Observably, women remain underrepresented in the STEM courses offering the best career prospects, greatest impacts and highest salaries (Hoobler, *et al.*, 2014). The underlying causes for under-representation of women in science include factors that operate at the individual, family, school, and societal/cultural levels. Hence, it is important to provide women with multiple incentives and avenues to succeed (Meinzen-Dick *et al*., 2011). However, clear cause-effect correlations between mentoring and outcomes on attitudes, leadership etc. has not been demonstrated. It was therefore imperative to conduct in-depth interrogation of existing mentorship initiatives to provide evidence-based data on their effectiveness. Despite the fact that some work has been done regarding career attitudes at workplace, the relationship between, mentoring done in schools and colleges and subsequent career attitude, progression and employability has not been done

which was the focus of this study on whose basis the paper is anchored. This paper is derived from an ongoing WEE-Hub AIM study specifically focusing on the STEM programme.

In Côte d'Ivoire, combining a formal apprenticeship training with both classroom training and a stipend had a sustained impact on skills and earnings; treated youth participants were found to earn 15 percent higher (Crépon, Bruno and Patrick Prémand, June 2021). Positive effects on earnings persisted after four years. The study concluded that subsidized apprenticeships improve earnings for beneficiaries. Similar results were evidenced in Uganda in a study Alfonsi *et al.*, (2020) conducted in partnership with a nongovernmental organization, Bangladesh Rural Advancement Committee (BRAC), which established that vocational trainees saw lower income earnings in the short run compared to trainees who received other forms of training. The current studies focused on earnings for young women in STEM

In Nairobi, Kenya, a study by Atkin *et al.*, (2021) conducted compared the effect of offering an AI-informed digital skills training course to the effect of providing the same course plus job referral after beneficiaries completed the training. Findings of the study revealed that earnings of participants with the job referral were found to be 40% higher, and 10 percentage point's lower unemployment than those in the comparison group, who didn't receive the referral but attended the training. The effects were particularly strong for women participants. Further evidence from the study showed that the promise of job referral induced extra effort to trainees during the training. Another study by Okonya (2021) that sought to establish the Interest in Stem Subjects and Careers by middle school students in Kenya. A mixed method approach was used while the current study used cross sectional design

Further, most of the studies pay attention to gender gap in STEM related courses. For example Yonghong Jade Xu (2017) established how individuals influences choice of STEM occupation among male and female of university students in USA. The study also revealed that STEM graduates were likely to have a higher rate of employment than the non-STEM graduates. The current study focused on the intervention and women economic empowerment and compared those young women who went through the UNESC0-STEM Kenya Government mentorship Program and those who did not. Besides, Magaji, Muthima and Ogeta (2021) conducted a study to find out the relationship between admission policy and women in STEM enrolment in a Nigerian university. The study recommended ministry of education to develop a policy for female in catchment areas. The current study focused on young high school women and their career choices. Whereas in 2021, UNESCO conducted a study to establish the subjects the high school girls who went through the UNESCO-STEM Government of Kenya mentorship program were undertaking. The current study focused on the impact of the STEM mentorship for young women on career choices, income and employment view of providing importance information for policy makers.

Statement of the Problem

Apprenticeship, Internship and Mentorship (AIM) programs provide learners with opportunities to explore and learn new skills, affirm career choices and learn more about particular industry as part of their work readiness. In Kenya, the level of females in STEM programs is deficient as compared to their male counterparts. These disparities are usually evident in low up take, income disparities between men and women, and school to work transition. According to Owino *et al.*, (2016), female participation in the Kenya labour market is 29 percent compared to 36 percent for male. The Kenyan government implemented the STEM mentorship program to enhance youth preparedness by the time they enter the labour market.

However, despite the implementation of this intervention program, gender gap still exists. There are limited empirical studies to show whether these programs promote women economic empowerment. This ongoing study evaluated the impact of UNESC0-STEM Kenya Government mentorship Program on young women. The study variables were career choices, income levels and employment outcome. It will also assess how mentorship programmes are designed to encourage female students to pursue STEM fields to facilitate school to work transitions for young women and girls.

Research Methodology

The study relied on primary data. Data collection instruments included questionnaires and interview schedules. A sample of 177 young women that included those that went through the STEM mentorship programme and those that did not go through the programme was achieved. Our target population was 2,000 participants, which took into consideration the estimated number of girls who had gone through the program. We employed the Yamane (1967) sample size formula, which is prescribed as follows:

$$n = \frac{N}{1 + N(e)^2}$$

Where *n* is the sample size, *N* is the population size, and *e* is the level of precision (level of confidence). Given that our estimated population size for respondents was 2,000 and at 94 percent level of confidence, our sample size is estimated at 244 respondents. However, there was a non-response rate of 27.5%. Due to the specific attributes of our targeted sample, purposive sampling technique was used in the study. Secondary data on participants who were enrolled into the program was sourced from the learning institutions where the program was implemented. Selection of counties was based on the location of beneficiaries of the STEM mentorship program. A tracer study approach was used to solicit information from those who received the intervention. Both quantitative and qualitative data was collected using questionnaires and interview schedules.

Data Analysis

The study employed cross-sectional research design. In the use of this approach, the study ensured that a sample of respondents who share essential characteristics, e.g., the specific time the prospective candidates joined the program, current residence and age bracket, was considered. The data collected was used to estimate the impact of the STEM mentorship program on the employment outcome, income and career choice of the graduates. To achieve the study's objectives, quantitative data analysis was conducted using STATA while NVIVO software was used in qualitative data analysis. Cross-sectional analytical approaches were used in this study.

For a better understanding of our data, a summary of the study's quantitative data was computed and presented in Table 1.

Table 1: Sample Statistics for Key Variables (N=177)

VARIABLE	NUMBER	PERCENTAGE OF TOTAL
Gender		
Female	177	100%
Male	0	0%
Participated in STEM		
Yes	81	46%
No	96	54%
Employment Status		
Employed	25	14%
Not Employed	148	86%
Age		
Below 25 Years	154	87%
26 - 35 Years	22	12%
Above 36 Years	1	1%
Marital Status		
Single	163	92%
Married	14	8%
Highest Level of Education		
Secondary Education	103	59%
Certificate	28	16%
Diploma	13	8%
Degree	30	17%
Course Taken at College		
Humanities	17	10%
Business	20	11%
STEM	44	25%
None	96	54%
Grade Achieved		
Grade A (Equivalent)	22	13%
Grade B (Equivalent)	80	49%
Grade C (Equivalent)	45	28%
Grade D (Equivalent)	17	10%
Promotion		
Promoted	9	36%
Not Promoted	16	64%
Income		
5,000 - 10,000	3	17%
10,001 - 15,000	3	17%
15,001 – 20,000	2	11%
20,001 – 50,000	6	33%
50,001 – 100,000	3	17%
100,001 – 200,000	1	5%

Sector of Employment		
In STEM	9	53%
Not in STEM	8	47%

Source: Author Computations

The data presented in table 1 captures a sample of 177 respondents, who went through the STEM Kenya Mentorship Programme (46%) and some who did not go through the programme (54%). For the sampled respondents, 14% were employed while 86% were not. For the age bracket, 87% were below 25 years, 12% were in the 26 – 35 years bracket while 1% were above 36 years. Ninety two percent (92%) of the respondents in the study were single while 8% were married. In terms of the highest level of education, those with secondary level education were 103 (59%), those who had a Certificate or Diploma were 41 (24%) while 30 (17%) had a degree. Considering all the respondents, 17 (10%) had taken a course in humanities, 20 (11%) undertook a course in business while 44 (25%) undertook a course in STEM; however, 96 (54%) respondents were holders of a secondary school certificate with no post-secondary school qualification. In their highest level of education, 22 respondents (13%) had a mean grade of A (or its equivalent), 80 respondents (49%) achieved a mean grade of B (or its equivalent), 45 respondent (28%) achieved a mean grade of A (or its equivalent), while 17 respondent (10%) scored a D (or its equivalent). Of the 25 respondents who were holding an employment position, 9 (36%) had been promoted at the time of the survey while 16 (64%) had not been promoted. In terms of income, 17% of the respondents had an income of less than Ksh. 10,000, 61% had an income of between Ksh. 10,001 and Ksh. 50,000 while 22% had an income of above Ksh. 50,000. For those who were working, 53% were in a STEM related sector, while 47% were not in a STEM related sector.

Career Choice

The study first considered the course taken at college. Figure 2 presents the career path chosen by all the respondents who went through tertiary level education.

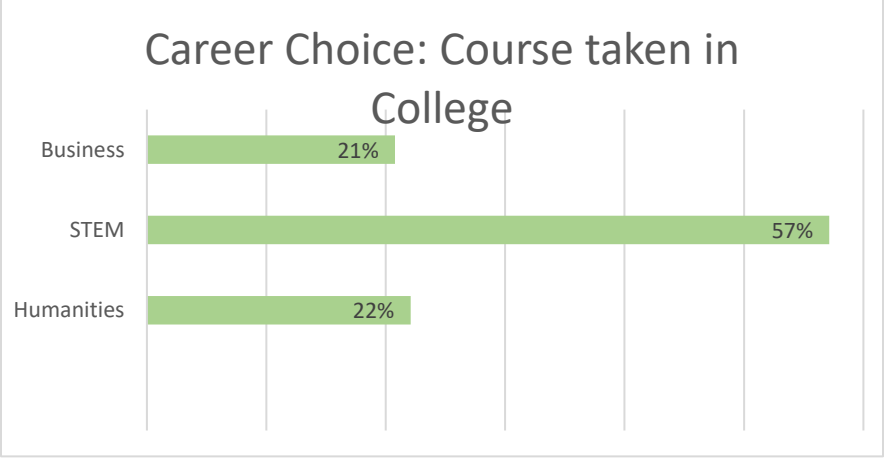

Figure 1: Career Choice

Data Source: Study Survey Data.
N = 81

From figure 1, twenty one percent (21%) chose to pursue a business related course, 57% chose a STEM course while 22% pursued a humanities course in college. Those who had not yet enrolled for college were not captured in this analysis. We then proceeded to ascertain career choice for the 81 respondents who had gone through the STEM Kenya mentorship programme. Figure 2 presents the outcome.

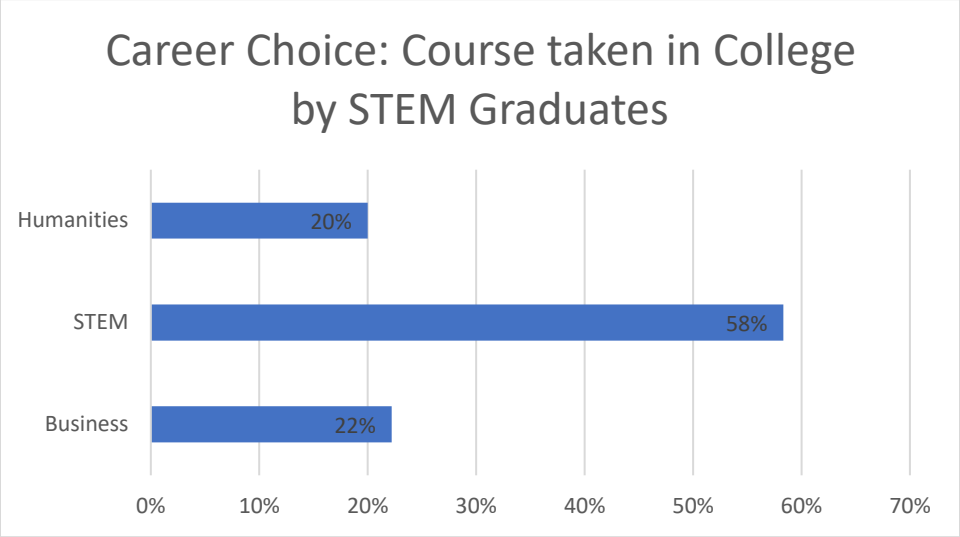

Figure 2: Career Choice for STEM Graduates

Data Source: Study Survey Data.

N = 81

The results presented in figure 2 (career choice for STEM graduates) are largely similar to the results in figure 2 (career choice for all graduates). For a clearer picture, we compared these results with the analysis done for those who did not go through the STEM Kenya mentorship programme as presented in figure 3.

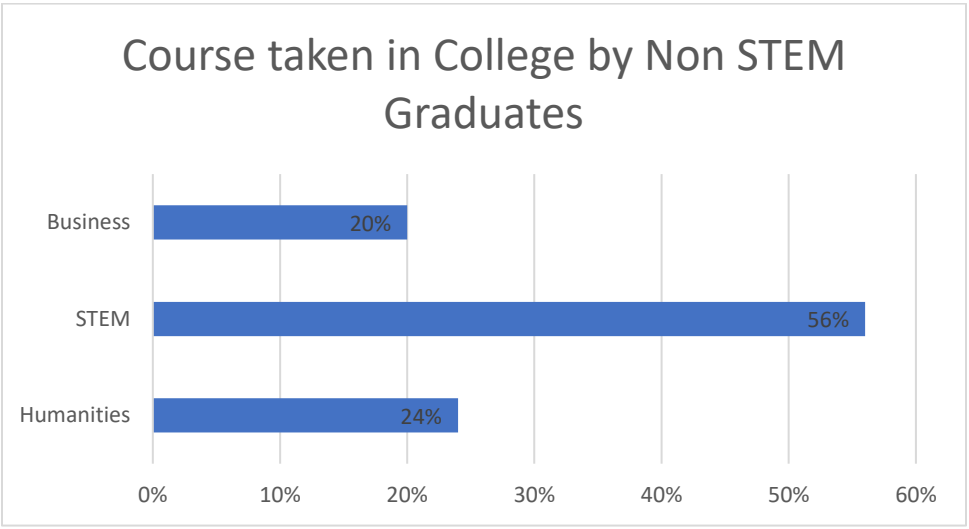

Figure 3: Career Choice for Non-STEM Graduates

Data Source: Study Survey Data.

N = 41

Results presented in figure 3 are also similar to the results presented in figure 2. From the findings in figure 2 and figure 3, for those who pursued a STEM related course, there is a 2 percent difference between STEM graduates and non-STEM graduates (58% and %56%) implying that the program had marginal benefits.

Moreover, 77.8% of the respondents pointed out that the STEM program had broadened their scope of employment opportunities. Table 2 demonstrates how STEM had broadened their scope of employment opportunities.

Table 2: How STEM Broadened Respondent's Employment Opportunities

	N	**%**
STEM helped me choose a course that is marketable thus enhanced my employability opportunities	42	68.9
STEM gave us exposure to expose us to career paths and employment opportunities	9	14.8
I gained confidence, experience, leadership & life skills through the programme	6	9.8
It gave me a chance for internship	2	3.3
It has given me the motivation to mentor other scholars to be the best in the society	1	1.6
The mentorship experience helped me to identify how I can give back to my county especially in disease prevention gave them a chance for internship	1	1.6
Total	61	100.0

Data Source: Study Survey Data.
N = 61

As shown in the table, 68.9% of them reported that the STEM program helped them to choose a course that was marketable thus enhancing their employability opportunities. From the qualitative data collected in this study, this happened in the following ways; that through the STEM program, graduates were able to select a STEM career which was marketable in Kenya; the program exposed them to diverse opportunities; the exposure broadened their thinking and made them be inclined to STEM courses; STEM enabled them to pursue a career in science that increased their chances in the competitive science industry, that it provided them with useful information, and exposed them to role models who were inspiring. Further, 14.8% of the respondents reported that the STEM program gave them exposure to career paths and employment opportunities. From table 2, it is also clear that other respondents reported that the STEM program helped them to gain confidence, experience, leadership and life skills.

However, 31.1% of the respondents who had attended STEM program said that it did not broadened their employment opportunities because; they had not gotten a job related to the course they took (analytical chemistry), they were not yet employed, and they had no connection with any STEM mentors who could help in them in securing employment opportunities. The respondents also indicated that they were not offered a certificate to show they had attended the program and therefore it did not directly impact on

employment possibilities, they had not been able to be where their heart would desire to be, in terms of a career, despite having a bachelor's degree.

Employment Outcome

It is important to note that the STEM mentorship programme focused on young women only and therefore the analysis was done for this group only.

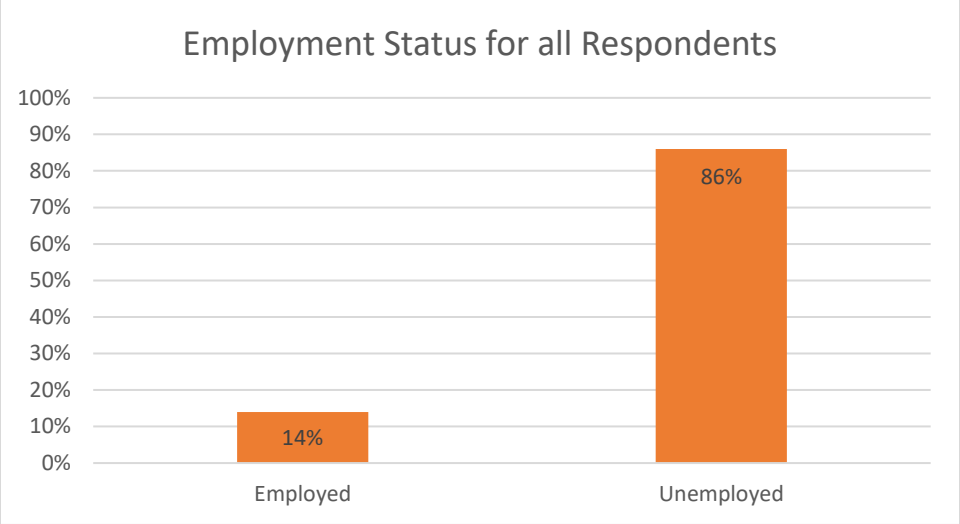

Figure 4: Employment Status for all Respondents

Data Source: Study Survey Data.
N = 177

The analysis in figure 4 demonstrates that 14 percent of all the respondents were employed while 86 percent were unemployed. This result is not surprising since a majority of the respondents (59%), as demonstrated in table 1, had no tertiary level qualification. Figure 5 presents results for respondents who had tertiary level education. Further, the effect of high youth unemployment in the country could also have contributed to lower employment of the graduates.

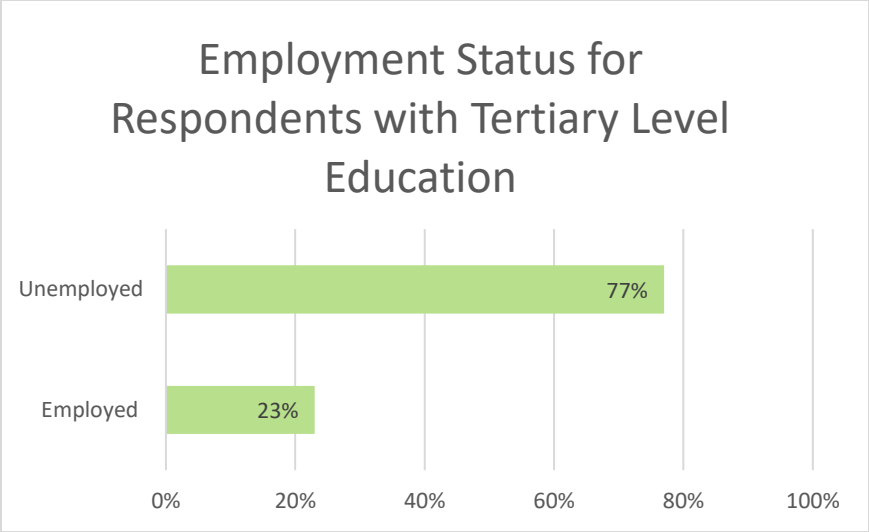

Figure 5: Employment Status for Respondents with Tertiary Level Education

Data Source: Study Survey Data.
N = 69

As indicated in figure 5, the result for those with tertiary level education is marginally better than the result for all respondents. This implies that tertiary level education had a marginal effect on the employment outcome of young women in Kenya. Further the analysis considered the employment status of those that went through the STEM mentorship programme and had tertiary level education as presented in figure 6.

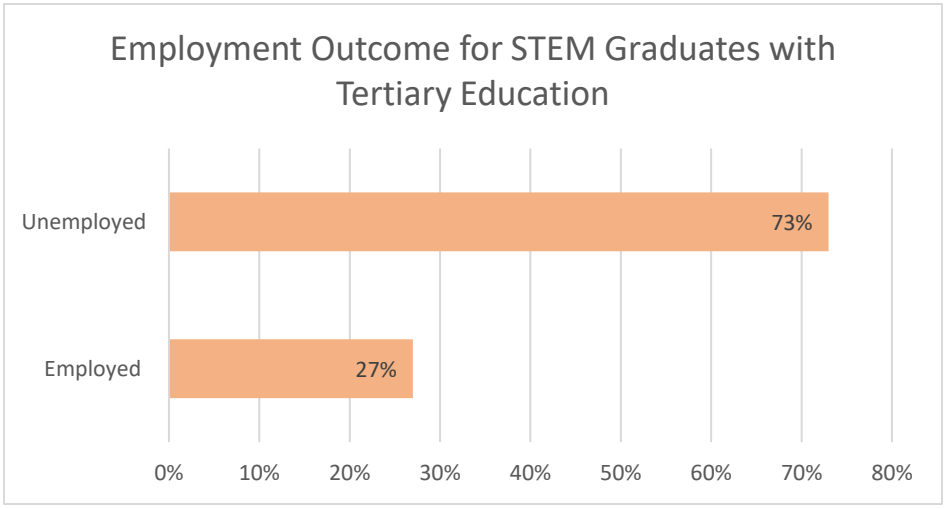

Figure 6: Employment Status for STEM Graduates with Tertiary Level Education

Data Source: Study Survey Data.
N = 30

Figure 6 shows that 27 percent of STEM graduates who had tertiary level education were employed while 73 percent were unemployed. Comparing the results in figure 5 and 6, it can be deduced that the contribution

of the STEM mentorship programme to the employment status of young women in Kenya is minimal. This result is further affirmed by the correlation test results presented in table 4.

Table 4: Correlation between Participating in STEM Program and Employment Outcome

VARIABLE A	VARIABLE B	CORRELATION COEFFICIENT
Participating in STEM Mentorship Program	Employment Status	0.07105

Data Source: Study Survey Data.
N = 177

The correlation coefficient as indicated in table 4 is 0.07105. This result affirms that, for young women in Kenya, there is a weak correlation between participating in the STEM mentorship programme and getting employed. However, the correlation is positive.

The study further looked at whether the course taken at the tertiary level had an impact on the employment outcome. The results are presented in table 5.

Table 5: Correlation between Course Taken at College and Employment Outcome

VARIABLE A	VARIABLE B	CORRELATION COEFFICIENT
Course taken at tertiary institution (STEM = 1, 0 otherwise)	Employment Status	0.06579

Data Source: Study Survey Data.
N = 177

The correlation coefficient as indicated in table 3 is 0.06579. This result therefore indicates that for young women in Kenya, there is a weak correlation between taking a STEM course in college and getting employed.

Income Level

The study sought to analyze the impact of participating in the STEM apprenticeship programme on income levels. The study first considered the income level for all the sampled young women who declared their monthly income.

Table 6: Income Levels for Sampled Young Women (N = 18)

MONTHLY GROSS SALARY IN KSHS. (RANGE)	FREQUENCY	PERCENTAGE	CUMULATIVE PERCENTAGE
5,000 – 10,000	3	16.7%	16.7%
10,001 – 15,000	3	16.7%	33.4%
15,001 – 20,000	2	11.1%	44.5%

20,001 – 50,000	6	33.3%	77.8%
50,001 – 100,000	3	16.7%	94.5%
100,001 – 200,000	1	5.5%	100.0%

Data Source: Study Survey Data.

Table 6 demonstrates that 44.5 percent of the respondents with an income had an income of between Kshs. 5,000 and Ksh. 20,000. Interestingly, 33.3 percent of the respondents had an income of between Ksh. 20,001 and Ksh. 50,000 (largest income group) while 22.2 percent were in the Ksh. 50,001 – Ksh. 200,000 range. This table therefore demonstrates that a majority of the respondents who were earning had an income of more than Ksh. 20,000. A comparison was then done for the income levels of all the respondents who reported their income and those that went through the STEM programme.

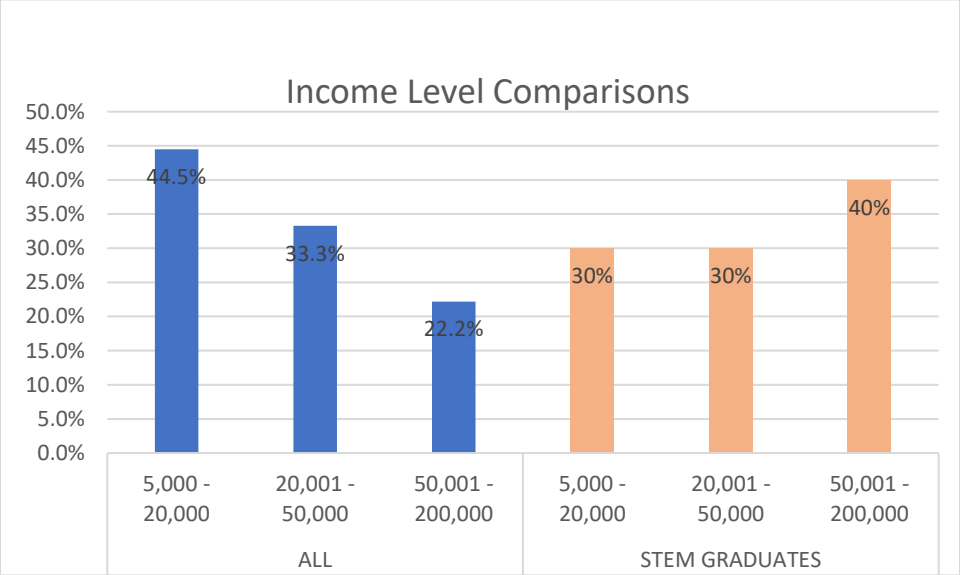

Figure 7: Income Level Comparisons

Data Source: Study Survey Data.
N (ALL) = 18
N (STEM GRADUATES) = 10

Figure 7 on income comparison demonstrates that respondents who went through the STEM programme had their income levels skewed to the right (had higher income levels) than in the general scenario where all respondents are considered. Moreover, STEM graduates with income levels between Ksh. 5,000 and Ksh. 20,000 (lower income) were 30 percent compared to 44.5% when all are considered. It is therefore evident from this analysis that the STEM programme has a positive impact on the income level of young women.

Finally, the study explored the relationship between the highest level of education attained by the respondents and the level of income as presented in table 7.

Table 7: Relationship between the Highest Level of Education Attained and Income Level

	5,000 - 10,001	10,001 - 15,000	15,001 - 20,000	20,001 – 50,000	50,001 – 200,000	Row Total
Secondary	1 20 33	2 40 67	0 - -	1 20 16.5	1 20 25	5
Certificate	0 - -	1 50 33	1 50 50	0 - -	0 - -	2
Diploma	2 40 67	0 - -	1 20 50	1 20 16.5	1 20 25	5
Degree	0 - -	0 - -	0 - -	4 67 67	2 33 50	6
Column Total	3	3	2	6	4	18

Source: Authors Computations from Study Survey Data

Notes: The first value in a cell indicates the actual number of young women. The second value in a cell gives row percentages while the third value in a cell gives column percentages.

Table 7 demonstrates that education level is a determinant of the income level for the sampled young women. Sixty percent (60%) of the sampled young women whose highest level of education was secondary school were earning a monthly income of less than Ksh. 15,000. For those whose highest level of education was certificate, 50% were earning between Ksh. 10,001 and Ksh. 15,000; similarly 50% were earning between Ksh.15,001 and Ksh. 20,000. For the holders of a diploma, 40% were earning a monthly income of between Ksh. 15,001 and Ksh. 50,000 while 20% were earning a monthly income of between Ksh. 5,001 and Ksh. 200,000. All the sampled young women who were holders of a degree were earning between Ksh. 20,001 and Ksh. 200,000. This demonstrates that higher levels of education attracted higher monthly incomes for the young women in Kenya.

Key Findings of The Study

The study made the following findings: the UNESCO STEM Government of Kenya mentorship program had broadened the scope of employment opportunities for young women in Kenya. Further, tertiary level of education improved the employment outcome of young women in Kenya albeit marginally. The STEM mentorship programme had a positive impact on the income level of young program and had marginal benefits in placing young women in STEM related courses in college comparing those who went through the program and those who did not.

Conclusion of the Study

Based on the findings of this study, it's logical to conclude that the UNESCO STEM Government of Kenya mentorship program is making small strides towards enhancing women economic empowerment. It was evident that the mentorship program had marginal benefits in placing young women in STEM related courses in college, and that the young women who participated in the STEM Kenya Mentorship program had a greater scope of employment opportunities. They also had a higher chance of receiving greater monthly incomes despite the impeding challenges. There is need for the program to be re-designed to have greater impact. The secondary school girls need to be assigned to mentors who are professionals in their fields and who would guide them in their career path. Certificates also need to be issued to graduates of the program to boost their career placement.

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