A Qualitative Study on Constraints and Opportunities of Women’s Equal Participation in the Roads Sector in Malawi
MAKING INROADS FOR WOMEN

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ABSTRACT

Drawing on focus group discussion with young women in secondary schools and engineering and vocational schools, female engineers, contractors and workers in the roads sector and in-depth key informant interviews with government and non-governmental stakeholders as well as teachers from secondary and technical and engineering schools this qualitative research explores the reasons women in Malawi do not choose careers or enter employment in the roads sector and at the reasons behind them leaving the sector. The study found that women face a wide variety of challenges at different stages of their career cycle that lead to high rates of attrition. Many of the challenges are embedded in the culture of sexism, gender bias, and stereotypes that subtly, but often overtly sidelines women, who then choose a different career path. The report identifies a core set of actions that address key challenges of women attraction, selection and retention in the roads sector.
ACKNOWLEDGEMENTS

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Address gender stereotypes in school curricula and the classroom
Increase girls’ mastery and interest of foundational skills in math and sciences
Career talks and exposure to female role models
Provide scholarships and bursaries for women in engineering and TEVET studies
Provide remedial academic support to first year female engineering students
Counter the ‘chilly climate’ in the educational environment
Build professional role confidence to improve the school-work transition
Campaigns to encourage women to join the roads sector

Selection
Address gender bias in hiring
Reform public procurement to make it more gender-inclusive
Promote opportunities for networking for women in the roads sector

Retention and Advancement
Address sexual harassment in the workplace
Address work-like balance and improving working conditions
Establish welcoming workplace environments
Support career development and advancement of women

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ANNEX 1. Status of Women in Malawi
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The Government of Malawi (GoM) has taken steps to promote gender equality in the transport sector through the issuance of laws, policies, and guidelines. The National Transport Policy (2015) provides a platform for supporting gender-balanced and non-discriminatory provision and accessibility of transport services. Further, the Malawi National Transport Master Plan 2017-2037 explicitly recognizes the need to encourage women to work on roads maintenance. However, the existence of policies and guidelines has not translated into a balanced employment of women in the transport sector. Data from the National Roads Authority shows that over 90 percent of firms that it contracted between 2007 and 2011 to construct and rehabilitate roads in Malawi were male-owned, and 10 percent are small sized women-owned firms that participate in low value contracts like grass cutting and simple maintenance works.

The study aims to understand the constraints to women's equal participation in the roads sector in Malawi to inform the development of interventions to promote gender equality in the sector. The study adopts a career cycle approach that allows to identify and describe the barriers to career progression for women in the roads sector at each stage in the career cycle focusing on: attraction, selection, retention, and advancement. The study employs qualitative research methods consisting of focus group discussions with women and girls along the career cycle in the roads sector and key informant interviews.

The study has yielded insights into the multiple and overlapping factors embedded in the socialization, learning and hiring processes that result in high rates of attrition of women in the engineering and roads-related technical field at different stages of the career cycle, often called the “leaky pipeline” in policy discussions about women in STEM. From secondary school through university and vocational schools, female students report less confidence and aspiration in engineering and vocational training in the roads sector. At the selection stage, women face gender bias in hiring and difficult work environment, representing an exodus of talent among women who could otherwise become the next generation of architects, engineers, and roads sector contractors. At the retention and advancement phase women confront a difficult work environment where women are sidelined from career advancement opportunities, face sexual harassment and have difficulty balanc-
ing work and family obligations in a sector where many of the opportunities are in remote locations.

The roads sector in Malawi offers opportunities for women: opportunities in the forms of generating substantial incomes, designing transport infrastructure to foster socio-economic development, and providing role models for the young women of the future. Increasing the gender balance in the roads sector requires a comprehensive and multi-sectoral approach and one that needs to address the underlying causes that subtly results in gender stereotypes and gendered occupational cultures and career choices. The table summarizes the key study findings and core set of actions to help women overcome the obstacles at different stages of the career cycle targeting women at all age groups.

### Summary of key findings recommendations at each stage of women's career cycle in the roads sector

<table>
<thead>
<tr>
<th>FINDINGS</th>
<th>RECOMMENDATIONS</th>
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</table>
| **ATTRACTION** | • Gender disparities in access to education  
• Informational failures  
• Institutional failures  
• Aspirations molded by societal expectations  
• Concerns over university/workplace environment.  
• Inhospitable or ‘chilly environment’ and other institutional failures in tertiary institutions | • Provide CCTs for girls to remain in secondary schools ease financial constraints  
• Address gender stereotypes in school curricula and the classroom  
• Increase girls’ mastery and interest of foundational skills in math and sciences.  
• Organize career talks and exposure to female role models  
• Provide information on returns to education.  
• Provide scholarships and bursaries for women in engineering and TEVET studies  
• Provide remedial academic support to first year female engineering students  
• Counter the hostile educational environment in engineering schools and TEVET  
• Build professional role confidence to improve the school to work transition.  
• Campaigns to encourage women to join the roads sector |
| **SELECTION** | • Gender bias in hiring and in the selection of tender process  
• Lack of access to productive inputs  
• Concerns over work-life balance and husband’s discouragement  
• Concerns over quality of jobs and risk | • Address gender bias in hiring by tweaking the recruitment process  
• Reform public procurement to make it more gender-inclusive  
• Promote opportunities for networking for women in the roads sector |
| **RETENTION AND ADVANCEMENT** | • Difficult workplace environment  
• Work-family challenges  
• Lack of opportunities for promotion and continuous learning | • Address sexual harassment and sexual extortion in the workplace  
• Address work-life balance and improve working conditions  
• Establish welcoming workplace environments  
• Support career development and advancement of women |
1. Introduction

The Government of Malawi (GoM) has taken steps to promote gender equality in the transport sector through the issuance of laws, policies, and guidelines. Malawi is a signatory of CEDAW, a UN convention which advocates for the elimination of any form of discrimination against women. The country adopted the Gender Equality Act in 2013 and adopted the National Gender Policy in 2015. The National Transport Policy (2015) provides a platform for supporting gender-balanced and non-discriminatory provision and accessibility of transport services.

A recent report finds that, for 141 countries, the loss in human capital wealth due to lifetime gender income inequality is approximately $160.2 trillion (Wodon and de la Brière 2018). This suggests that globally, human capital wealth could increase by 21.7 percent and total wealth by 14.0 percent, with gender equality in earnings. Occupational sex segregation is a main driver of these observed gaps: Globally, one finds significant differences in the types of work undertaken by men and women. Women are often underrepresented in engineering, manufacturing, construction and science (and overrepresented in education and health for instance). These differences are not trivial, since they translate into gaps in earnings and productivity. Infrastructure sectors, such transport, are sectors that are often high-paying but remain male-dominated.

The GoM is aiming to promote gender balance in the transport sector. The 2015 National Transport Policy provides a platform for supporting gender-balanced and non-discriminatory provision and accessibility of transport services. The policy addresses the Ministry of Transport and Public Works’ (MoTPW) commitment to equal employment opportunity and affirmative action in the promotion of women professionals in the Transport sector. Objectives include increasing ratio of women to men with access to employment in the sector and income generating opportunities, reducing income disparities between women and men, and improving women participation and decision-making skills in com-
munity infrastructure. With the assistance from the EU and UNFPA, the MoTPW has developed Gender Mainstreaming Guidelines for the Transport Sector (GoM Ministry of Transport and Public Works 2014) to ensure that all programmes, projects, policies, Acts and Regulations and budgets integrates gender issues. Further, the Malawi National Transport Master Plan 2017-2037 established social inclusion as a cross-cutting issue, including considerations of its gender dimension 1. The Plan explicitly recognizes the need to encourage women to work on roads maintenance. The guidelines and the Plan have been developed against the backdrop of the implementation of the second Malawi Growth and Development Strategy (MGDSII) that emphasizes gender equality to achieve sustainable economic growth and alleviate poverty.

However, the existence of policies and guidelines has not translated into a balanced employment of women in the transport sector (MoTPW, 2016). Available data 2 for the ILO 3 indicates that women are under-represented in the transport sector (Figure 1). Data from the National Roads Authority shows that over 90 percent of firms that it contracted between 2007 and 2011 to construct and rehabilitate roads in Malawi were male-owned. Only 248 out of 3000 firms that were awarded contracts were women-owned. In addition to that, only 20 of the 248 registered are medium-sized firms while 228 are small sized firms (Figure 2) that participate in low value contracts like grass cutting and simple maintenance works. Likewise, of the 78 registered individual consultants, only two are women.


2 There are no cross-country gender disaggregated data of workers in the roads subsector. The LABORSTAT database maintained by the ILO includes data for the broader category of “transport, storage and communications”

3 LABORSTAT database maintained by the ILO includes data for the generic category of “transport, storage and communications”.

Box 1. Malawi’s Roads Sector and its key actors

Malawi’s public road network covers a total of 15,451km, comprising Main (21.7 percent), Secondary (20.2 percent), Tertiary (26.7 percent), District (22.7 percent) and Urban (8.7 percent) roads. Only 26 percent of the national classified road network is paved.

Institutional reforms in the road sector in 2006 led to the creation of the Roads Fund Administration (RFA) and the National Roads Authority (RA) to administer the collection and use of fuel levies and other eligible charges, for road maintenance respectively. The RA
reports to the Ministry of Transport and Public Works (MoTPW) responsible for policy and strategy development, regulatory and legislative functions. Road passenger transport and road safety regulation is within the jurisdiction of Directorate of Road Traffic and Safety Services (DRTSS), formerly the Road Traffic Directorate (RTD) under the MoTPW. The RFA is responsible for GoM’s annual road sector budget implementation and reports to the Ministry of Finance (MoF).

The National Construction Industry Council (NCIC) established in 1996, is mandated to Regulate, Promote and Develop the Construction Industry in Malawi. Their role includes: ensuring that all contractors, consultants, material manufactures/suppliers and all players in the construction industry are operating within rules set forth in the NCI Act (1996) and codes of ethics (2009); registering Contractors, Consultants, Material Suppliers and Manufacturers and also providing short courses to its members. One of the objectives of its five-year Strategic Plan is to develop efforts to increase participation of women and youth in the construction industry by up to 40 percent by the year 2023.

Malawi Institute of Engineers was established in 1998 to form a “voice, a platform and a center for information and technological knowledge sharing for engineers and technicians practicing in Malawi”. Their role includes: a) to represent, protect and assist the engineers as regards conditions of practice advancement and otherwise; b) to engage in formal or informal activities designed to foster and extend the study of engineering; c) to maintain a register of engineers who are deemed by the MIE to be qualified to practice the profession of engineering. Since 2017, the MIE also has a Women’s Chapter. The Chapter was an initiative of female MIE members who noted the low levels of participation of women in annual general meetings of the institution. The goal of the Chapter is to increase women’s participation in the industry, including the encouragement of girls to pursue careers in the field. Activities include career talks and mentorship programs4.

4 The Chapter has also partnered with WomEng (South Africa) as part of the GCRF Africa Catalyst program funded by the UK Royal Academy of Engineering. The aim of this project is to assist engineering bodies countries in Sub-Saharan Africa in setting up women chapter, leveraging off WomEng’s skills and experience. WomEng will assist in training and development of body members; this will include leadership and entrepreneurship training, continuous relevance amongst engineering professionals, diversity training and to develop an execution plan of critical programs, which include high school STEM awareness programs and university employability, entrepreneurship
The Malawi Polytechnic is a constituent college of the University of Malawi, including the faculties of: Applied Sciences; Built Environment; Commerce; Education and Media Studies; and Engineering. Currently, the Polytechnic is institution where all transport engineers are trained in Malawi. The ultimate goal is to improve the number of registered female engineers in sub-Saharan Africa. See also: https://www.poly.ac.mw/about/polytechnic

Figure 1. Percent of women in transport, storage and communications, 2017
There is a dearth of literature on constraints that hinder women’s equal participation in the roads sector in Malawi. This study, commissioned by the Malawi Roads Authority, aims to fill this knowledge gap. Specifically, it aims to understand the constraints to women’s equal participation in the roads sector in Malawi to inform the development of interventions to promote gender equality in the road sector. Given the multi-sectoral challenges it identifies, its findings are directed to a set of different actors across those sectors in Malawi and which are represented in the Advisory Committee that was established when initiating this research [see Annex 4].

The literature on women’s labor participation in the roads sector points to different constraints women face throughout the career cycle as depicted in Figure 3. The career cycle approach allows to identify and describe the barriers to career progression for women in the roads sector at each stage in the career cycle focusing on: attraction, selection, retention, and advancement. These barriers are related to gender norms (e.g. ‘gender stereotypes that define ‘men’s work’ and ‘women’s work’), to the legal framework (e.g. legal restrictions that inhibit the working time of women in some countries, most notably night-work), and ‘gender-intensified’ barriers that affect both sexes but bear down most on women (e.g. inadequate childcare provision or the absence of ‘family-friendly’ working arrangements create problems for both men and women, but as women invariably bear the primary responsibility for childcare and other household activities, they are more severely affected).

Figure 3. Women’s Career Cycle in the Roads Sector: Key Challenges

Source: Adapted from Turnbull 2013.
**Attraction.** Legal restrictions and societal gender norms and attitudes restrict women’s attraction to work in the roads sector. In some countries, legal restriction on women’s employment exist such as the prohibition of night work (Women Business and the Law 2018). But even if no legal restrictions exist, gender stereotypes (i.e. for instance the assumption that roads sector jobs are ‘not for women’ and preconceptions about the careers that young girls might, or might not, be interested in) may result in very few young women making the transition from school to employment in the roads sector. Attraction may come from exposure to the roads sector at school (e.g. careers advice), within the family or local community (e.g. growing up in a city-port or adjacent to an airport or railway yard) and will be heavily influenced by the Human Resource (HR) policies of roads sector organizations (e.g. corporate image, commitment to equal opportunities) and societal values (e.g. prevailing views on what constitutes ‘men’s work’ and ‘women’s work’) (Turnbull 2013). Young women may not be actively encouraged to consider the available career and job opportunities in the roads sector even though such options include a wide range of (often well-paid) manual jobs and professional and technical occupations. Further, roads sector jobs are also unlikely advertised to young girls at school as a potential career choice. As a result, women may be less likely to study technical careers and science, technology, engineering and mathematics (the so-called ‘STEM subjects’). This limits the possibilities of initial attraction and selection but also career progression, especially as there is a dearth of female role models or women in higher level/managerial roles who might train and/or mentor potential new recruits and support them as they develop their careers (Turnbull 2013). It should be noted that STEM careers differ from other careers in that they often entail obtaining ‘hard skills’ applicable to STEM jobs which require higher and lengthier investments in education, as well as accumulating work experience, which makes the ‘leaky STEM pipeline’ phenomenon far more important for women. In Malawi, the GoM’s guidelines for mainstreaming gender in the transport sector highlight the limited talent pool among women due to low numbers of women’s enrolment in STEM fields of study (MoTPW, 2016).

**Selection.** Selection refers to both the formal and informal procedures used by the organization in the recruitment and hiring of people and or firm contractors with the attributes the organization desires. The process of recruitment may favor men because of inappropriate selection criteria, and/or the organization’s bias and reluctance to hire female candidates. In terms of the former, one can find countless examples in the roads sector of outdated job/person specifications for posts that have been transformed by new technology (Turnbull 2013). For example, physical strength is no longer a requirement of many roads jobs – but can be used as a barrier to women’s entry into the sector. In the World Bank-supported Rural Road Infrastructure Improvement Project in Nicaragua in which women’s labor participation reached 46 percent, women reported they did not have the opportunity to take on what was perceived to be “men-only” jobs, such as laying heavy cobblestones. Women were typically
given “lighter” or “clean” tasks like administrative duties and traffic signaling (Casabonne, Jimenez and Muller, 2015).

**Retention.** *Retention refers to the ability of the organization/sector to retain female recruits.* Low retention of female recruits can be attributed to poor working conditions and workplace environment, and an insufficient flexibility in arrangements that enable women to reconcile work and family life, unequal pay and lack of training and professional development (Shah et al. 2007, Project Wise 2009). Common concerns by women in terms of working conditions include the absence of basic amenities (e.g. separate toilets, changing rooms and sanitary facilities), and insufficient attention to health and well-being (e.g. hazardous working conditions, personal protective equipment designed specifically for women, and safety and security especially at night and/or when working in geographically isolated locations) (Turnbull, 2013). In addition, the heavy dominance of men in certain roles can lead to women feeling isolated in the workplace, particularly if they experience sexist attitudes during their work (European Commission 2016). Violence against women and sexual harassment is one of the most important factors limiting the attraction of transport jobs for women and breaking the retention of those who are employed in the transport sector (Turnbull, Lear and Thomas 2009, Pillinger 2017). Other concerns are related to earnings, i.e. unequal pay, unequal access to premium wage rates (e.g. overtime or weekend work that is difficult to reconcile with family commitments).

**Advancement.** *The final stage of the career cycle is the progression from a job to a career and a sense of realizing one’s potential, which is arguably the litmus tests of quality employment.* To reach the final stage of the career cycle in the roads sector is extremely difficult for women as there is both horizontal segregation (a ‘sticky floor’) and vertical segregation (a ‘glass ceiling’). The ‘sticky floor’ highlights the fact that women’s careers in the roads sector might ‘never get off the ground’ because they are confined to feminized roles with limited training or career opportunities. So even when women secure entry to male-dominated sectors and occupations, they are typically excluded from the ‘most masculine’ tasks (e.g. very physical, dirty and/or dangerous work, as well as many ‘technical’ roles), which in turn can stall or even curtail their promotion prospects (Turnbull 2013). The ‘sticky floor’ is compounded by the barrier of the ‘glass ceiling’, with very few female role models or mentors to support career progression and limited opportunities for training and development. Women who secure employment in the roads sector are often regarded as ‘pioneers’ or ‘trail blazers’ for future generations of women.

It is worth noting that some barriers are not discrete, nor stage specific, but rather interconnected and reinforcing the need for a holistic approach to women’s employment in the roads sector. For example, working around the cycle from initial attraction, transport jobs are unlikely to be ‘advertised’ to young girls at school as a potential career choice because of gender stereotypes (i.e. the assumption that roads jobs are ‘not for women’ and preconcep-
tions about the careers that young girls might, or might not, be interested in). As a result, women are less likely to study STEM field subjects which not only limits the possibilities of initial attraction and selection but also career progression, especially as there is then a dearth of female role models or women in higher level/managerial roles who might train and/or mentor potential new recruits and support them as they develop their careers. If there are few, if any, women in a roads organization, or at least in particular roles (e.g. civil engineering), then the organization is less likely to offer flexible working arrangements or (re)design equipment, tools, personal protective equipment (PPE) and the like. This, in turn, reinforces the lack of attraction of roads sector jobs to women.
3. Methodology of the Qualitative Study

The qualitative research consisted of focus group discussions with women and girls along the career cycle in the roads sector and key informant interviews\(^6\). Research was implemented between August 2017 and October 2018, detailed in Figure 4. This section lays out the key features of the research methodology.

Figure 4. Research implementation Phases

Qualitative and quantitative research represent different research paradigms. Quantitative methods are valuable for drawing conclusions that are valid for the broader population under study. They are particularly suitable for measuring the frequency of a problem and its distribution in a population. In contrast, qualitative methods allow for understanding nuances and details of complex social phenomena from the points of view of those who experience them. Although findings cannot be generalized for the entire population, they reveal multiple layers of meaning for a particular group of people, which is important when studying human behavior, beliefs, attitudes, and perceptions. Findings from qualitative research should be understood and used in

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\(^6\) This research follows the principles of protection of human subjects outlined by the Belmont Report (1978) and the guidelines for conducting research in Malawi as established under the 2013 National Commission for Science and technology Act. This study was reviewed and approved by the National Committee for Research in Social Sciences and Humanities of the National Commission for Science and Technology (NCST) in May 2018.
ways that are different from quantitative findings. The objective is not to test causalities and generalize findings. It is precisely by studying the conditions, meanings and practices found in specific contexts that qualitative research can provide deep insights into the heterogeneity within a generalized picture. Exploratory qualitative data serves to build and refine theories, and also helps understanding limitations in the application of general theories to specific contexts.

**To better define the study's design, the team implemented an initial scoping and engagement phase.** In addition to preliminary desk and literature review, the team consulted with 27 governmental and non-governmental stakeholders in Malawi in August 2017. The objectives of these initial consultations were to map existing data and information on the barriers to women's participation in the road sector; identify existing interventions aimed at increasing women's participation in the sector as well as challenges and lessons learned from their implementation; and gain recommendations about the most appropriate research design considering local priorities and realities. These initial conversations with stakeholders were documented through extensive field notes, which were analyzed in-depth. They allowed the team to assess and develop relevant research questions, themes, field sites, sample population and size as well as articulate recruitment strategies for participants in the study.

The key research questions below reflect both a career cycle approach and a pragmatic approach to understand the challenges women face at different stages in their career in the roads sector⁷ and come up with concrete policy recommendations to promote women's participation in the sector.

*Which factors shape occupational choices for young women and their perceptions of technical careers in the road sector?*

*What are the challenges young women face in engineering and technical vocational schools in the roads sector?*

*What are the barriers women face in accessing economic opportunities in the road sector as employees, consultants and contractors?*

*What are the challenges women face to remain and succeed in technical positions in the road sector?*

*Which strategies can women use to cope positively and surpass the challenges faced along their trajectories?*

**Data collection focused on the district of Blantyre, southern Malawi.** The district was selected as main site because it concentrates major institutions relevant to educational and employment opportunities in the road construction sector, such as the Malawi Polytechnic and the Malawi Institute of Engineers, as pointed by stakeholders during initial consultations. Cooperation with these institutions helped to facilitate participant recruitment from these institutions. Secondary and technical schools where the team could conduct data collection were identified.

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⁷ The study attempted to keep the data collection as bound as possible to the individuals connected to the roads sector but in some cases, this was not possible. For example, the closest we could get was to civil engineering students or technical students in areas related to the road sector.
A smaller portion of data collection also took place in Lilongwe, the country’s capital, with key informants from several governmental ministries as well as with contractors.

The sample selection followed a purposeful design criterion based on the specific areas of research (Table 1). The qualitative study combined six focus groups discussions (FGDs) — each with five to twelve women and girls —, and 11 key informant interviews (KIIs).

FGDs drew upon participants’ attitudes, feelings, beliefs, experiences and reactions by eliciting a discussion of multiple perspectives within a group context. Apart from providing a wider range of responses to research questions, social processes at work in a group interview also serve to evolve standards of behavior, which can release inhibitions and call for open reports intimate experiences and sentiments (Merton, Fiske and Kendall, 1990). FGDs were conducted by a moderator and a note-taker of gender matched to participants and lasted approximately one and a half hours. Six different FGD guides were developed to guide FGDs with the different sample groups (see Annex 3). These guides were developed based on themes identified in the literature and initial consultations with stakeholders. The interviews were conducted in both English and local language (Chichewa) as chosen by participants. Table 2 presents the major themes addressed in each interview guide.

Key informant interviews (KIIs) were conducted with government and non-governmental stakeholders as well as teachers from secondary and technical schools and University. Interviews lasted between 60 to 90 minutes. Annex 2 presents the interview guide for KIIs designed to broadly address the four research questions presented in Table 1. The KIIs aimed to deepen the understanding on existing programs and institutions and collect information on how to build on those to promote women’s participation in the road sector.

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8 Initially, the team planned to conduct FGDs with consultants and contractors in Blantyre. As not enough women could be recruited for the FGDs to be conducted in Blantyre, the site was moved to Lilongwe, where only the FGD with contractors was feasible.
The third method of data collection employed for this component were field observations made by research team in a variety of forms: research diaries; field reports; and observation sheets for each interview and FGDs conducted (see Annex 2). Field researchers’ observations aimed to provide a better understanding of the context of interviews and interviewee’s lives as well as capture non-verbal communication during interviews.

Table 1. Purposeful Sample Selection

<table>
<thead>
<tr>
<th>Guiding Research Question[s]</th>
<th>Themes</th>
<th>Group Interviewed</th>
<th>Number of FGD</th>
<th>Number of participants</th>
</tr>
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<tbody>
<tr>
<td><strong>AT ENTRY</strong></td>
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<tr>
<td>1. Which factors shape occupational choices for young women and their perceptions of technical careers as attractive?</td>
<td>• Relations: family composition, trajectories and relationships; perceptions about their community; role models.</td>
<td>Young women in secondary school identifying their careers. One rural and one urban school with career talks</td>
<td>2 FGDs</td>
<td>22</td>
</tr>
<tr>
<td>2. What are the challenges that girls face in engineering and technical schools?</td>
<td>• Future: aspirations, perceived ability to make decisions about their future.</td>
<td></td>
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<tr>
<td></td>
<td>• Education: experiences and attitudes towards school; knowledge about and attitudes towards technical/entrepreneurial careers; perceived barriers to follow technical careers (existence of economic opportunities, salaries; affordability).</td>
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<td></td>
<td>• Public policies: knowledge and perceptions, scholarships; career talks⁹</td>
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<td></td>
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<tr>
<td></td>
<td>In addition:</td>
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<td></td>
<td>• Deciding for and accessing technical education: decision process; motivators and de-motivators; attitudes from family/partner/peers; information about technical careers and means of accessing this info; availability of financial and logistical support.</td>
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<td></td>
<td>• Barriers to succeeding in university or technical school: peer environment and networks; sense of meritocracy and belonging; infrastructure and relations with teachers; coping strategies/resources in crisis moments.</td>
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<tr>
<td></td>
<td>Young women in university studying civil engineering</td>
<td></td>
<td>1 FGD</td>
<td>11</td>
</tr>
<tr>
<td></td>
<td>Young women in a technical school</td>
<td></td>
<td>1 FGD</td>
<td>10</td>
</tr>
</tbody>
</table>

⁹ Career talks with young women in secondary schools are organized by the NCIC, the Malawi Institute of Engineers (MIE) and the Malawi Polytechnic. The objective is to provide career guidance to motivate female students to go on and study construction-related programs at tertiary level. For this study, the team coordinated with the Roads Authority to organize a career talk in combination with data collection in schools. Girls were interviewed before and after the career talk.
<table>
<thead>
<tr>
<th>Guiding Research Question[s]</th>
<th>Themes</th>
<th>Group Interviewed</th>
<th>Number of FGD</th>
<th>Number of participants</th>
</tr>
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<tbody>
<tr>
<td>3. What are the barriers women in technical professions face in accessing economic opportunities in the road sector as employees, consultants and entrepreneurs?</td>
<td>In addition:</td>
<td>Women transport engineers</td>
<td>1 FGD</td>
<td>5</td>
</tr>
<tr>
<td>4. What are the barriers women faced in remaining and succeeding in technical tracks?</td>
<td>Employment: professional trajectories; barriers and facilitators in looking for a job; work conditions and peer environment; infrastructure and relations with male peers and bosses; sense of belonging; sense of fairness/meritocracy; coping strategies/resources in crisis moments.</td>
<td>Women road workers</td>
<td>1 FGD</td>
<td>11</td>
</tr>
<tr>
<td></td>
<td>Entrepreneurship: barriers to securing contracts; access to financial resources; access to networks; Access to opportunities and barriers to competitiveness.</td>
<td>Women contractors in road sector</td>
<td>1 FGD</td>
<td>5</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td></td>
<td>7 FGDs</td>
<td>64</td>
<td></td>
</tr>
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</table>

**RECOMMENDATIONS THROUGHOUT THE LIFE CYCLE**

<table>
<thead>
<tr>
<th>Guiding Research Question[s]</th>
<th>Themes</th>
<th>Group Interviewed</th>
<th>Number of FGD</th>
<th>Number of participants</th>
</tr>
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<tbody>
<tr>
<td>5. How can we build on existing interventions/institutions to promote women’s participation in the road sector in Malawi?</td>
<td>What are the different factors that might influence girls’ choice of career and their perceptions of technical sectors as attractive?</td>
<td>Key informant interviews (KII) 10</td>
<td>10</td>
<td>11</td>
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<tr>
<td></td>
<td>What are the perceived challenges and opportunities to women’s participation in the roads sector?</td>
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<td></td>
<td>How have policies and programs responded to these challenges at local, regional and national levels?</td>
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<td></td>
<td>What is working well and what are the lessons learned?</td>
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<td></td>
<td>What actions would you recommend to support more progressive and equal gender roles in the sector in future?</td>
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<tr>
<td><strong>TOTAL</strong></td>
<td></td>
<td>7 FGDs</td>
<td>75</td>
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Besides the general limitations of qualitative research mentioned earlier, there are specific limitations inherent to this particular piece of research: Certain themes and realities were not possible to be explored in-depth in this research. For instance, there may be additional structural barriers to women’s entrepreneurship and education in Malawi that will not be addressed in this study but indirectly affect the outcomes for women in the engineering field. Also, the study’s sample was limited to women in certain locations of rural and urban Blantyre and Lilongwe - the two most densely populated districts of Malawi. Women and girls from these locations may face cultural or socioeconomic challenges that are different from those who live in other geographic locations.

10 Key informant interviews are planned with representatives from the following organizations: Ministry of Transport and Public Works [1]; National Construction Industry Council [1]; Ministry of Gender, Children, Disability and Social Welfare [1]; Ministry of Labor [1]; The Malawi Polytechnic [1]; Ministry of Education [1]; the Malawi Institute of Engineers [1], Malawi Roads Authority [1]; Principal/teacher from one selected rural and one selected urban school [2]; Principal/teacher from one selected technical schools [1].
4. Findings

Interviews with female students in secondary and tertiary engineering and vocational training schools, women workers in the Malawi roads sector, and key informant interviews have yielded insights into the multiple and overlapping factors at various levels—the individual, institutional, and societal—that influence, interact and reinforce each other, producing cumulative effects. Many of these factors are embedded in the socialization, learning and hiring processes that result in high rates of attrition of women in the engineering and roads-related technical field at different stages of the career cycle, often called the “leaky pipeline” in policy discussions about women in STEM.

The leaky pipeline starts early. From secondary school through university and vocational schools, female students report less confidence and aspiration in engineering and vocational training in the roads sector. At the selection stage, women face gender bias in hiring and difficult work environment, representing an exodus of talent among women who could otherwise become the next generation of architects, engineers, and roads sector contractors. It should also be mentioned, as Annex 1 shows, that in Malawi there is a lower share of girls than boys that complete secondary education, which affects the leaky pipeline. Table 2 summarizes the key findings that relate to the different phases of the career cycles and correspond to the four main research questions of the study.

<table>
<thead>
<tr>
<th>Table 2. Summary of key sets of findings related to the career cycle phases</th>
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<tbody>
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<td>ATTRACTION</td>
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<tr>
<td>• Gender disparities in access to education</td>
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<tr>
<td>• Informational failures</td>
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<tr>
<td>• Institutional failures</td>
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<tr>
<td>• Aspirations molded by societal expectations</td>
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<tr>
<td>• Concerns over university/workplace environment.</td>
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<tr>
<td>• Inhospitable or 'chilly environment' and other institutional failures in tertiary institutions</td>
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</table>
The qualitative study identified seven sets of gendered factors that influence girls’ occupational choices and restrain them into selecting STEM and other technical and professional careers in the roads sector, namely: 1) factors that relate to access and quality of primary and secondary education; 2) informational and institutional failures that affect the decision to select a STEM fields of study; 3) stereotype threat or a negative notion that women are not good at math and sciences; 4) aspirations that are molded by societal and parental expectations of the types of jobs suitable for men and for women (gender-role stereotypes) 5) girls’ concerns over male-dominated university and workplace environment; and 6) inhospitable environment and other institutional failures that presents difficulties for girls to success in engineering and technical studies. We explore each on turn.

Gender disparities in access to education

Gender disparities in access to education is a key and foundational factor that impacts the number of women in technical and engineering careers in the roads sector. In addition, participants noted that parents place a larger share of the domestic work burden on girls compared to boys and so they have less time to devote to homework and studies impacting girl’s education performance including their school attendance. Participants also indicated that a higher proportion of girls drop out of secondary school due to teenage pregnancy and orphanhood as households demand girls time in home production and care of siblings. Box 2 describes the educational system in Malawi.

“[Today] there is free [primary] education, so both boys and girls go to school, but that is not enough. Because for the girl child, they wake up very early in the morning to sweep the compound, to prepare the fire, prepare breakfast, sometime even go to draw water before even think to go to school. For the boy child it is different. The boy child will wake up to go straight to have a bath, eat something, go to school. Back from school, the girl child will get a pail and draw water, help the mother with the household work. The boy child will go scorch free. So that’s the

Research question #1: What factors shape occupational choices for young women and their perceptions of technical and engineering careers in the roads sector?
beginning, already you can see the girl child’s mentality is home bound, yeah. You are given most of the household work while the boy child thinks differently”.

-Key informant.

Language barriers also pose a constraint for girls in rural areas, diminishing the pool of girls entering the roads sector as skilled workers. Female students from rural schools that participated in the study were not comfortable in conducting the focus group discussion in English, which demonstrates the extent of the barrier they will face in trying to access university since national examinations for entry into university are done in English.

Furthermore, findings suggest that financial constraints remain serious barriers to post-primary education for girls. Schooling materials, tuition and other special fees such as exam fees may be too high for poor households to afford and especially for households in rural areas. Parents may also pri-

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**Box 2. The Education System in Malawi**

The formal education system in Malawi follows an 8–4–4 structure: eight years of primary education (Standard 1–Standard 8), four years of secondary (Form 1–Form 4), and four years of university level education.

At the end of their primary education, students take the Primary School Leaving Certificate Examination (PSLE), which determines their eligibility for entry into secondary school. At the end of two years of secondary education, pupils take the national Junior Certificate of Secondary Education (JCE), which is followed by the Malawi School Certificate Examination (MSCE) two years later. Technical and vocational training can start after either JCE or MSCE.

Tertiary education is provided by an array of educational institutions, including primary and secondary teacher training colleges, technical and vocational training schools, and university colleges. For university entrance and for the secondary teacher training college, an MSCE certificate is required. For primary teacher training, the policy is to take MSCE graduates, but those who passed the JCE may also be accepted.

Primary, secondary, teacher, and higher education levels fall under the authority of the Ministry of Education Science and Technology.

Source: World Bank 2010
oritize paying for boys’ fees when the financial re-
sources are scarce.

**Informational and institutional failures in secondary schools**

While theoretically a person’s choice of his/her career, education or training reflects his or her interest, information plays a significant role in career decision making. The study revealed a lack of information about technical and engineering professions among female secondary school students in both urban and rural areas. In general, girls had very little knowledge about engineering, what an engineer does for a living, and how one can become an engineer. Girls in a rural secondary school that participated in the FGD said that engineering jobs had to do with things like mat weaving, repairing fridges, bikes and cars. In urban areas, only a few students had a better idea about engineering.

“Initially my understanding was that engineering is about cellphone and fridge repairing but due to that career talk session, I have now learned that engineering is not about what I have been thinking all this time. Indeed, I was ignorant on this. Engineering is about road construction, buildings and other things, and I think I have really been motivated with that presentation.”

– FGD young women in rural secondary school

In urban areas, girls made negative associations with engineering and road sector-related opportunities as low skilled jobs and “dirty jobs”. This was discouraging to them in comparison to other careers like law, accounting and business. Prior to the career talk on engineering and roads sector technical careers, girls said they did not know that there were different types of engineering and roads construction jobs that did not involve hard physical labor and getting dirty. They expressed interest and were encouraged at the prospect that technical and engineering careers also involved aspects of design and supervision.

“I think that most people think it is very tough and the clothes they wear are not impressive and even the work is not impressive, and they can even get sick often. So, most people want jobs where they will just sit like accountants.”

– FGD young women in urban secondary school

FGDs and KII found that prestige and status con-
tinue to be attached to university education. Young people (and their parents) seek career paths in the so-called professional occupations, even though in Malawi there are few employment opportunities in the profession for which they wish to train. Technical, Entrepreneurial and Vocational Education and Training (TEVET)\(^\text{12}\) is often regarded as inferior, or as a second choice after professional education, regardless of the student’s interests or abilities. Girls therefore dismiss promising and meaningful career paths in areas where employment demand is great-

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\(^\text{12}\) After completing two years of secondary education, students can take the National Junior Certificate of Secondary Education (JCE), followed by the Malawi School Certificate Examination (MSCE). These two certificates can give access to TEVET. TEVET is provided in technical colleges, community-based training centers, private technical and vocational training providers, and the apprenticeship training system which combines on-the-job practical training with theory courses in college. Most of public formal TEVET is provided in seven Technical Colleges (TCs) that provide four years technical and vocational training courses (World Bank 2010).
er, simply because of the stigma attached to technical and vocational occupations.

The study also showed that girls’ occupational choices are shaped by their exposure to their environment, revealing differences between urban and rural locations. In rural areas, girls are exposed to a limited set of occupations and role models that shape a narrow understanding on the careers they could follow. Students in rural areas mentioned careers they see every day, such as nurses at the clinic, teachers at their school, and police. Girls expressed a desire to pursue an occupation that will allow them to “make a difference” for their families and their communities. In contrast, in urban areas, a more diverse set of career options are perceived as possible by young girls, often influenced by professional trajectories of family members, such as accountant, lawyer, surgeon, entrepreneur. Further, in urban areas, secondary school girls expressed the view that education holds the key for advancement in life.

“I am a student under the sponsorship of TEVET. I was confronted by my father for choosing to enroll for this course under the TEVET vocational skills program. He wanted me to have pursued a different course and not this one. When I got shortlisted to come and study for this course mainly in brick laying, I thought my father won’t pay for my college fees. Some three days before my departure to school, my father was still not clear if he will pay the fees for me. Most of the times, many boys talk badly about us ladies who have gone to a technical college to pursue courses in vocational skills. I really had some setbacks but still I survived and here I am continuing pursuing my studies at this college”.
– FGD young women in TEVET studies establishment

“Even boys are considered students of a low class because they are at a technical college. Some of them did very well during their secondary education and when they enroll with a technical college, people end up downgrading upon them for ending up at a technical college.”
-FGD with female students in TEVE studies establishment

In addition, focus group discussions revealed a stark difference between urban and rural girls regarding the influence and support they receive (or not) from family, mentors, school staff when making career choices. All rural girls interviewed reported having made the decision on careers they wanted to pursue by themselves. Their reasons were that they were afraid of being misguided or discouraged. This shows that they lack individuals whom they can trust to guide them through these choices. This can also be because, in contrast to urban girls, they are less likely to have family members who have done post-secondary studies, leaving them unable to guide their children through the process. Urban secondary school girls said they discussed career choices with family members and mentors who facilitated access to information about different careers and what is necessary to pursue it in practice.

“I did not consult anyone because in many circumstances people just end up frustrating you when you consult them.”
– FGD young women in rural secondary school
“I consulted my relative so that we should help each other in career choices because she already went through this, so I had already decided that I want to be a doctor, but I wasn’t sure which one exactly. So, when we talked about that in our family, one spoke about becoming a surgeon, the other one said you should do physio therapy considering how you are and the way you know yourself. So, I saw that from the way I am and the way I know myself what I can manage: I can really do physio therapy. So, if there would be some difficulty I would still be able to do it.”  
– FGD young women in urban secondary school

Further, secondary school and university students also noted that sometime their career choice happens somewhat randomly as they don’t quite know what the available choices are. They sometimes ask their parents or others about what they should include in their career choice forms, which indicates that they are not making an informed decision.

“You know in the past kids in the past our age not this middle one we were so obedient to our parents so at the secondary school we were given the forms that can you fill these forms and bring them tomorrow what I did I just gave them to my dad there these forms we need to fill and I don’t know what to write so my dad said okay put engineering I wrote I can’t remember the other two choices and I just had to submit and I was selected that’s how I ended up being here am really proud now because I never knew it would be like what it is now.”  
– FGD with female engineers

The study pointed to various institutional failures in secondary school in terms of not introducing female students to engineering concepts early on, not exposing them to female role models in the engineering and roads sector, and not teaching girls growth mindset, grit and perseverance skills. Key informants from secondary schools, the Polytechnic and the Roads Authority emphasized the need to expose engineering concepts and science and technology applications to female students at young age to start attracting them to engineering careers. In the view of the Principal of an urban secondary school, this should start in Form 1 when girls are beginning to make career choices. In later grades, schools could engage large private sector companies to hold science and engineering competitions to motivate students in the field. The interviews also emphasized the need for students to receive career guidance, providing students with information about the requirements for engineering and roads sector related studies. Key informants also emphasized the importance of organizing career talks and exposing girls to female engineers and skilled workers in the roads sector. This would help to break gender stereotypes and overcome certain mental models, and help young women navigate and overcome their concerns and encourage them to selected technical/engineering studies.

**Aspirations molded by societal expectations**

The study found that social norms about gender roles and stereotypes mold girls’ career aspirations. Gender roles are common beliefs about what men and women tend to do, as well as what men and women are supposed to do. The study revealed that there are strong mental models that engineering and
roads-sector related jobs are a man’s occupation, involving heavy machinery, tough, ‘dirty’ and incongruous with the female gender role. Indeed, focus group discussions with secondary school girls and girls in engineering and TEVET studies revealed that parents discourage girls to pursue engineering and technical careers. Girls also perceive that they have less chances of getting married if they pursue these careers as boys will be intimidated by girls that are too smart or educated. Girls expressed concerns that their future husband would not allow them to work as an engineer or roads sector skilled worker in work sites away from home. They also voiced concerns about their ability of combining their caregiving and household duties with a career in the roads sector once they have families of their own. Another issue that came up in FGDs with secondary school was their reluctance to enter into engineering studies due to the longer duration: five years as opposed to four years for a business administration degree.

“According to the Malawian culture girls engaging in engineering or bricklaying look awkward because it is not work that women should do - it is for men.”

– FGD young women in urban secondary school

“Some girls get discouraged with the way how people talk when they see that a girl is in college studying technical and engineering courses. They say that these are courses suitable for men and not women.”

– FGD young women in rural secondary school

“I told my dad about it [that I wanted to do engineering] but he didn’t like the idea. He was like you are just a girl, you can’t do this, this is just for guys. So, I told him, ‘you know dad, I can do it, despite that I am a girl I also want to be rich at some point’. Me too, I can solve those beams and slabs. Then I applied and luckily enough I was taken, but my dad was not happy because he was like ‘this course is for guys not ladies. But I challenged him and I said that I will work hard and finish this course no matter what.”

– FGD with female students in Polytechnic

On the flip side, many female students in the Polytechnic that participated in the focus group discussion, mentioned that they were attracted to the engineering career because of the encouragement they received from their fathers and because their own father or another close family member was an engineer. This shows how parents expectations and aspirations for their daughters helps to shape their academic trajectories. The more parents encourage their children's after-school STEM activities, provide STEM educational materials and content, the more their daughters become interested in engineering and STEM. Parents’ beliefs about their children's ability to perform well in mathematics increased their confidence in mathematics and sciences. This shows that parents are critical early socializers of their children's academic interests.

“My dad is a civil engineer. So, from a young age it was strict upbringing, even for my sister he’d choose what she’s going to do. As for me, he said you are going to do civil engineering, but it also happened that I was very good at my sciences in high school. And despite that, my teachers in high school said I wouldn’t do it - so that gave me more motivation that you know what, I’m going to do it and let me work harder in the science subjects that I need to get into that program.”
“Okay, the very first time I heard about civil engineering, I was in secondary school and people who were doing career guidance, I think they were from Chanco, and others from Poly as some sort of a group, so it was from them that I got to hear about civil engineering. Also, seeing my uncle who was also in the same field. So, the interest came because of those two.”

- FGD with female students in Polytechnic

“For me it was my dad who motivated me. He had seen my interests growing up he was in IT and he would teach me computer stuff and I was so fascinated with that. Even when it was time to watch TV I would want to watch shows where they are building stuff, inventing things, scientists and all. [For me] this decision was made way back when I was in primary school. He told me: ‘You should be an engineer. You just need to put your mind to it.’ So, he like set that path for me when I was young.”

- FGD with female engineers

Stereotype threat

In addition to affecting preferences, stereotypes affect women through a phenomenon known as “stereotype threat” (Box 3). Focus groups and key informant interviews revealed that girls have internalized beliefs that boys are better at math, science, and physics. The male dominated environment in engineering university and TEVET careers also reinforces and activates the negative stereotypes about women’s abilities. The interviews also indicate how negative stereotypes about women’s math abilities are transmitted to girls by their parents and teachers, shaping girls’ math attitudes and ultimately undermining performance and interest in science, technology, engineering, and math fields.

“Most of the times people say math is not for girls, so to go for engineering you need to have done really well in math. So as girls you face a challenge of fear that I won’t be picked - so it is better I just apply for another course all together.”

— FGD young women in urban secondary school

Box 3. Stereotype threat

Stereotype threat describes a threat—sometimes referred to as an anxiety—that people experience when they fear being judged in terms of a group-based stereotype (Steele, 1997; Steele & Aronson, 1995). Stereotype threat has been theorized not only to influence women’s performance in math and science, but also to contribute to disengagement from fields in which women are negatively stereotyped, such as engineering and other STEM subjects.
Too few placements in engineering schools

The above-mentioned findings relate to difficulties in attracting women into the roads sector-related engineering fields. In addition to these constraints, the fact that there is just one engineering college in Malawi with a limited number of placements, means that young women face a tough competition to get selected and might get discouraged to pursue it. Further, the district quota which involved students being selected into higher education based on their district or region rather than straight merit, might also discourage students from applying even if they feel they have a chance because of their academic standing.

Other factors that led women choose engineering/technical careers

Young women interviewed by the study pointed to several factors that interested them related to the engineering and road-sector related technical careers. Some viewed that the careers allow them to make a difference in their communities and personal interest in the engineering and technical careers. They also mentioned that it may bring better job prospects, income opportunities, and the possibility of engaging in entrepreneurship. Young women also expressed the desire to prove themselves and challenge gender stereotypes.

“What influenced me to enroll for this course was that I have always wanted to have my own company. I don’t have an interest of getting employed by any person due to issues of underpayments. I need to have a company of my own and be an employer.” -FGD with female students in TEVET studies establishment

Economic class or status may also play into young people being attracted to engineering albeit for different reasons. Young people’s whose parents are engineers or have a professional degree will likely be more exposed to STEM fields of study and thus more likely to choose and have the grades and qualifications to apply. That said, girls from higher economic status would not choose TEVET education and choose a university degree that has higher prestige than engineering. On the other hand, young people from a lower economic status may see engineering and technical-related fields with more prestige and as a way to higher economic status.

The key benefit female students feel they gain from their degrees is the challenge, prestige and the practice application of their courses. Female students mentioned they liked the fact they are breaking the gender norms by studying engineering and technical studies. They enjoyed the attention and prestige it brings. The female students in the technical vocational college said they liked the hands-on practical application of what they are learning. They also find that the business development courses are a good complement to their technical coursework to pursue entrepreneurship in the future.

“I have liked the challenge of something most people are scared to do. And then, when you are telling someone, I am doing civil engineering, like you are a

13 Since 2009, Malawi has a quota system for admitting students to public universities based on their district of origin. In addition, there is a 50/50 quota for male/female students in universities.
Research question #2: What challenges young women face in succeeding in engineering and technical vocational schools?

girl, and I’m like yeah, I know! It’s the challenge ..the harder it becomes the more I push for it.”
– FGD young women at the Polytechnic

“As a brick laying student, I get excited with the way we get trained to actually interpret the plan or design of something on paper and get it on the ground for actual construction. Not any ordinary person can manage this. It requires someone to get trained first.”
– FGD young women at the TEVET studies establishment

Hostile climate and other institutional challenges

At the tertiary level, the study found several institutional and logistical-related challenges for women in engineering and technical colleges. The first was that as these careers are currently male-dominated, female students in the Polytechnic and vocational training program experienced a hostile or ‘chilly climate’ in which they feel unwelcome (Box 3). In the Polytechnic, since there are many more male students than female students, female students feel intimidated of participating in study groups largely made up of young men. Young women described negative group dynamics in which they were mocked by their male peers which impacted their confidence and self-esteem. Female students also expressed that teachers lacked confidence that they would succeed in their courses. In this climate, even highly skilled and motivated women may wonder if they belong, are valued and respected in the engineering field. This social marginalization may thus feed on itself and worsen female students’ academic outcomes over time.

“In our first days at this campus, boys used to intimidate us a lot. They could ask us some mockery questions like: “What are you girls up for at this college?”. They could laugh at us during our practical lessons. Despite all these discouragements, we still worked hard and today we able to do well in class due to our hard work.”
– FGD young women at the TEVET studies establishment
Box 3. The ‘Chilly Climate': Subtle Ways in Which Women Are Often Treated Differently at Work

The ‘chilly climate’ is a commonly used phrase that describes a myriad of unconscious diminishing behaviors that often proliferate in any male-dominated environment. Most of the behaviors are what has been described as “microinequities,” a term coined by Mary Rowe of Massachusetts Institute of Technology (Rowe and Girlando-Kerr 2017). They describe the small everyday inequities through which individuals are often treated differently because of their gender, race, age, or other “outsider” status. Taken by itself, a microinequity may have a miniscule effect, if it has any at all, and is typically not noticed by the person it happens to or by the person who asserts it. Yet when these behaviors occur again and again, and especially if they are not noticed or understood, they often have a damaging cumulative effect, creating an environment that is indeed chilly -- an environment that dampens women’s self-esteem, confidence, aspirations and their participation. Some examples are listed below:

Behaviors that communicate lower expectations for women

• Grouping women in ways which indicate they have less status or are less capable.
• Doubting women’s work and accomplishments.
• Expecting less of women in the future.

Yielding to the influence of internalized stereotypes

• Focusing on a woman’s appearance, personal qualities and relationships rather than on her accomplishments.
• Expressing stereotypes that discourage women from pursuing professional careers, such as “Women are naturally more caring and men are naturally more aggressive.”
• Assigning tasks according to stereotyped roles. Women are assigned to be the note-takers.

Excluding women from participation in meetings and conversations

• Interrupting women more than men or allowing their peers to interrupt them. Women may be more vulnerable when interrupted -- they may not participate again for the rest of a meeting.
Further, female students said that they would appreciate and benefit from additional support. They mentioned the need for peer support networks of female students in engineering to help new female students cope with the stress of the workload and find strategies to build emotional resilience. At a TEVET college, female students wished there would be financial support or a more direct pathway from TEVET to engineering studies, which presently doesn’t exist.

Another institutional challenge relates to the issue of on-campus accommodation. Polytechnic students reported that the inability to find accommodation close to the college library hinders their ability to study and to participate in school discussions. Because group work can be long hours and often goes into the night, those who live far do not have means or feel safe to go to the library. A key informant from the Ministry of Education Science and Technology also mentioned that lack of on-campus accommodation posed a stronger challenge for female students than for male students.

*Treating men and women differently when their behavior or achievements are the same.*

- Treating women who ask extensive questions as trouble-makers and men as interested and bright.
- Believing that women who ask for information don’t know the materials, but that men who ask are smart, inquisitive and involved.
- Viewing marriage and parental status differently for men and women -- as disadvantages for women and advantages for men.
- Judging women who speak tentatively as being less competent or knowledgeable.

*Overt hostile behavior toward women*

- Ridiculing or making denigrating remarks about women's issues or making light of issues such as sexual harassment and sexual assault.
- Discouraging women from conducting research on women's issues.
- Calling women names if they are interested in women's issues or protest sexism.

_Source: Sandler, Silverberg and Hall 1996._
Concerns over work-life balance and husband’s discouragement

The study found that women also choose to forgo careers in the roads sector due to concerns over work-life balance and working conditions. Work-life balance is an important issue especially for women in engineering and technical jobs related to the work sector. Because culturally women are expected to fulfill the responsibilities associated with home and family and men are expected to be the breadwinners, women may experience negative outcomes as a result of a culture of working long hours and working in remote locations, more frequently than men do. Thus, when work responsibilities become incompatible with the demands of family life, women, especially mothers, find themselves in a situation in which they must choose between work and family. Women also face pressure from their husbands not to enter the roads sector because of the concerns but also because of jealousy and partners’ suspicions of affairs with clients and co-workers.

“In a family setting if the husband does not want his wife to work he can say ‘Because you spend a lot of time at the work place I don’t want you to go anymore’. And we have seen many cases of women stopping going to work at the husbands’ orders. They say you should be home and take care of our children because if you go to work other men will see you since you work a lot with men.”

-Key informant, staff member in TEVET studies establishment

Concerns over quality of jobs

Concerns of quality of jobs also surfaced in the FGDs. Female engineers favored jobs in large companies rather than small companies because jobs are less precarious, and women are less exposed to uncomfortable situations that could arise in a small consulting company owned by men. In terms of entering the field of entrepreneurship in the roads sector, it was mentioned that women are usually not inclined to enter entrepreneurship because they are less risk averse.

[On working with consulting company] “Normally, they are owned by men. They have wives and now this man employs you, a lady. I have noted there hasn’t been good relationship between the wife of that owner of the company and this engineer. So, some people have ended up resigning.”

-FGD with female engineers

“I think it’s also to do with risk. You know, we women have a lot of fears. Is this going to work? Am I going to manage this? But the guys are more risk takers. That’s why you’ve got I think the larger number of men being contractors than women.”

-FGD with female engineers

SELECTION

Gender bias in hiring and in the selection of tender process

FGDs and KII identified that there was gender bias in hiring, as employers are significantly less likely to hire a woman compared to an equally capable man. Female engineers perceive that employers have a perception that women are less capable, and they are afraid that women won’t be able to put in the hours and to travel on-site. Notwithstanding, the gender quota\textsuperscript{14} has allowed women to access job opportunities according to FGD with female engineers. In terms of the procurement process, female contractors still perceive that there is discrimination on the basis of gender during bidding process favoring companies owned by men as there may be a perception that women-owned companies might not carry out the public works properly. Further, there is a greater likelihood of men-owned contracting companies knowing upcoming bids or accessing contracts because of men’s business networks in the sector, which women do not have access to.

“In the view that you are a lady contractor most of times, I am sure, when the technical personnel are doing the evaluations you are under graded, they are not sure if you might do it according to specifications.”

-FGD with female contractors

“The other challenge is that the construction industry has clients and most of them are men like engineers, consultants and they meet with their fellow men contractors at different forums; drinking places is where they can negotiate for the contracts or whatever. But we as women we are not able to meet with them to discuss anything concerning our job so networking with the client organizations it’s a little bit difficult for us women because of the forums where they can network with the fellow men. Yeah, they will meet watching football, at the club drinking so it’s not possible for us.”

-FGD with female contractors

In contrast, unskilled female roads workers said that they found it easy to access jobs in roads construction and maintenance and there was no difference in pay with male workers. However, women complained that jobs were short term (3 months duration) and therefore workers are exposed to higher job insecurity and vulnerability. Women said they would like opportunities for training in specific skills which would help to find employment once the roads contract ends. In addition, they would like opportunities to do other jobs in road construction

\textsuperscript{14} Malawi encourages 30 percent female representation in governmental institutions.
that are at present only given to men, such as driving heavy machinery.

“In the road work most of the times we use machines and most of those machines are driven by males. If you look at us women here, we have well-built women who can drive and move a machinery. So, maybe if we saw a woman driving that machine it can help other women be attracted [to jobs in the roads sector].”

-FGD with unskilled female workers in the roads sector

Lack of access to productive inputs

Female-owned contracting companies face difficulties in accessing key access productive inputs, namely start-up capital and credit. Female contractors said that the capital requirements for registering as a contractor with the Roads Authority are very high and prohibitive to women. Further, women-owned companies face challenges in coming up with funding for implementing projects as they face barriers that make it difficult to access lines of credit such as collateral requirements, or the need for a guarantor. FGDs with female contractors and engineers also indicated that husbands often takes over the running of the companies when they become profitable.

Corruption and sexual extorsion

Sexual harassment also come in to play in the firm contracting process. Key informants pointed to the issue of sexual favor requests in exchange for a job and how gender issues play in during hiring process.

Female contractors and female job candidates often face sexual harassment, where individuals in positions of power demand sexual favors as bribes to get jobs. Sexual extorsion leads to severe physical and mental health consequences, including psychological problems, unwanted pregnancy, marital problems, risk of HIV infection and social marginalization. Victim blaming makes it extremely difficult for women to report such crimes and to seek redress.

RETTENTION AND ADVANCEMENT

Research question #4:
What are the barriers women face in remaining and succeeding in careers in the roads sector?

Difficult work place environment

A key factor that affects women’s job satisfaction in the roads sector is being treated in a condescending, patronizing, or discourteous manner by supervisors, senior managers, and co-workers. Female engineers and contractors that participated in FGDs said they often experienced specific undermining behaviors from supervisors and co-workers, such as having their ideas belittled; being talked down to, being perceived as less capable, and generally having their efforts to be successful on the job
undercut. Women also perceived they lacked support from fellow women colleagues, who engage in gossip or question them on their decision to take on on-site jobs for leaving their family obligations.

“[Colleagues] look down upon you that maybe you cannot perform. Because sometimes when you are a woman, people might say, ‘she comes to the site maybe she won’t’. If it was a man, they would listen to him quickly. If it was a woman, they would say” ‘she cannot help us’ because in our culture we are seen as inferior to men.”

- FGD with female engineers

In addition, female engineers said that there is a deep-seated cultural mindset that women cannot lead. And if they do get promoted, women have difficulty earning the respect from their now subordinates and team. They often find themselves in a position where they tend to please team members and accommodate them.

“I will give an example based on my experience. Let's say you are promoted. [Your colleagues that now report to you] will not accept that you are not at par now. They now have to get instructions from you. It takes you to accommodate those people, so that you move together. Otherwise, they would want to frustrate you. It's not easy. If you are not strong enough you may bow down and leave the organization.”

- FGD with female engineers

Sexual harassment was an issue that was also mentioned in the FGDs. The study found that women in the field at all levels are exposed to both unwanted sexual attention (unwelcome verbal or physical sexual advances) and sexual extortion (when favorable professional or educational treatment is conditioned on sexual activity). Female engineers that participated in the FGD said they feel uncomfortable talking with their male colleagues, especially married men, because they fear being misunderstood and damaging their reputation. Women engineers interviewed also mentioned that they could suffer retaliation from superior if they refuse advances. In addition, women unskilled workers said they are ridiculed in the streets and sometimes called prostitutes.

Sexual harassment at the workplace has economic and career effects on working women as numerous global studies show. It increases absenteeism, work withdrawal and wanes organizational commitment (Merkin 2008, Willness et al. 2007). Because sexual harassment forces some women out of jobs, it likely influences their career attainment and earning loss (Lopez et al. 2009). Study participants mentioned other effects of sexual harassment on women’s careers including hindering skills transfers and acquisition from male peers.

“Maybe they want you to have a relationship with them and that kind of a relationship it’s not just you know mere relationship we are talking about deep things whereby somebody wants to help you and he says that what is it that you are going to give me? It’s not always cash it maybe sexual, you know, benefits, it can be money, it can be … it’s something that

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Sexual harassment is defined as an unwelcome sexual advance, request for sexual favor, other verbal, non-verbal or physical conduct of a sexual nature that unreasonably interferes with work, alters or is made a condition of employment, or creates an intimidating, hostile or offensive work environment (World Bank Training to Staff on Sexual Harassment).
you look at yourself and you say this will tarnish my image maybe as a Christian, as a mother or a wife.”
-FGD with female contractors

“So some bosses want to take part and sleep with the woman, have sex with her, and give her the job position.”
-FGD with women unskilled road workers.

**Work-family challenges in the roads sector**

The study found that family-related challenges pose significant hurdles for women in the roads sector. Female engineers and contractors said jobs in the roads sector are often incompatible with women’s ability to balance critical career experiences with family demands. Among the challenges are extended work travel to the field that is often a requirement. As roads sector occupations have remained predominantly populated by men, there are sustained cultural norms and expectations of what is an “ideal” roads sector employee and one that is not conducive to the careers of individuals also managing extensive family demands. The study also reveals that the patriarchal culture in Malawi instills a deep-seated notion in women themselves that their primary societal role is taking care of their family. While women interviewed advocated for equal opportunities in the roads sector, at the

**Box 4. Factors that increase the likelihood of sexual harassment in the road sector**

Various factors increase the likelihood that women in the roads sector in Malawi become targets of sexual harassment:

- A culture where sexual harassment and violence against women is normalized and highly embedded.
- Male-dominated work settings.
- Unequal power relations where female engineers and contractors are dependent on male superiors for jobs and career advancements.
- Lack of effective legal policies and procedures to prevent sexual harassment.
- Uninformed leadership at all levels lacking the tools, intention, and/or focus needed to undertake the key actions necessary to reduce and prevent sexual harassment.
same time they expressed the importance of fulfilling their roles as caretakers. This causes women to either not apply to roads sector jobs that are incompatible with their family caring responsibilities or to face a heavy double burden.

“In a family setting if the husband does not want his wife to work he can say because you spend a lot of time at the work place I don’t want you to go anymore. And we have seen many cases of women stopping going to work at the husbands’ orders. They say you should be home and take care of our children because if you go to work other men will see you since you work a lot with men. So, the men become biased that even there you also date the bosses yes.”

- Key informant, TEVET studies establishment

**Lack of opportunities, promotion and continuous learning**

Women engineers that participated in the FGDs said that they struggled with the undervaluation of their skills in the workplace. They are not given learning and job opportunities that will help them advance in the organization. When they ask for these opportunities, they are made to feel that they should be content with what they have and not ask for more.

“[There is a] cultural element. We are perceived to be the homemakers if there are children in the house I don’t know maybe I would say 70% of the responsibility is on the woman and then even taking care of the home it’s the woman, everything pretty much. Home management, it’s the woman. If this woman is an engineer at the office, they expect her to perform as much as the man. After that when she goes home she has to be 100%. We have to be 100% at home, 100% at work, 100% everywhere. That’s a major challenge.”

- FGD with female engineers

**Determination and resilience of women in the road sector**

As we see in the previous section, the study reveals multiple constraints and challenges that women face, which led many to opt out from job opportunities in the roads sector in Malawi. Despite all these difficulties, there are many women that remained firm, took the challenge with resolve and are working and contributing to the sector. There are various commonalities of experiences in the stories of female engineering and technical students and female roads workers, engineers, and contractors. Many of these women spoke about the satisfying aspects of engineering and technical studies and in their job such as breaking gender stereotypes, social value, and prestige and independence. Female focus group participants also said that the main sources of resilience, dedication and strength is their commitment to their role and their belief in the positive contribution that their role can bring about. It can be inferred from this study that agency, in its manifestation of self-confidence, self-belief and a strong sense of purpose, is a key determinant in women ability to demonstrate their capabilities against the odds. It is apparent that for these women, their agency is uncompromisingly coupled with their faith in themselves and in their ability to make positive contribution.
“To me it’s more of an exciting thing because I look at my background and then when am able to finish a job, I feel so excited because the achievement alone shows that the impact that it’s going to give maybe to the community it’s a good one.”

-FGD with female contractors

“I just like challenging jobs like making bridges, you know. I just feel so fascinating when am doing that. And whenever I see I have done a beautiful bridge I feel so good in my mind, looking at it am like wow this is great I have done it. Sometimes when I am working with the men, it feels so good because you put all your power there, you are pushing something because me I do the work as well. It just feels good.”

-FGD with female contractors

To cope with the challenges listed above the women have to work extra harder to give out the required output and to give in quality work. The other thing is as women to believe in yourself because it’s not easy in a men-dominated field. We ought to get to a stage where it’s normal for a woman to be in a high position in technical work. That is the goal.

-FGD with female engineers

“But one thing for sure that I have noted when you are an engineer even in college people respect you because they take you as somebody who is so powerful and intelligent.”

-FGD with female engineers

“Being in a male-dominated industry gives us a platform to show that women are also capable. It gives you a push. I think that if I was in a profession that was dominated by women, I wouldn’t have that much drive. I need to really work hard so that I can prove myself.”

-FGD with female engineers

“It’s a male-dominated industry pretty much. It gives us a platform to step out of our normal. We want to prove that we can be the same as men.”

-FGD with female engineers
5. Policy Implications

The previous section shows that the lack of gender diversity in the roads sector in Malawi is a multilevel problem requiring multisectoral solution and cooperation across sectors. The findings also show that gendered barriers are subtle, often the result of gender stereotypes, and gendered occupational cultures. Differences in the status of women, especially regarding career choices, the division of household responsibilities, and differences in paid and unpaid labor are still engrained in the society and continue to play a powerful role in shaping the career development of men and women. Therefore, efforts in this area need to be multifaceted and multi-sectoral and address the underlying causes of the leaky pipeline of women in the roads sector.\(^{16}\) Table 4 lists promising initiatives to help women overcome the obstacles at different stages of the career cycle targeting women at all age groups.

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**ATTRACTION**

*Interventions in secondary schools*

*CCTs for girls to remain in secondary schools ease financial constraints*

The adoption of free primary education in Malawi resulted in remarkable progress in boosting girls’ enrollment at the primary level. However, at the secondary level, a larger proportion of girls than boys drop out due to financial constraints, pregnancy, orphanhood and other factors. Several impact evaluations have shown that cash transfer programs can boost student’s participation in secondary education. These programs provide families with a small cash transfer if their children meet certain school attendance tar-

\(^{16}\) As mentioned earlier, this study was supported by a multi-sectoral Advisory Committee to whom the following recommendations are directed. The Advisory Committee was chaired by the Ministry of Transport in Malawi and the Roads Authority - both of which are key actors in governing the process of driving change across the ‘leaky pipeline’.
Table 3. Policy Recommendations Each Stage of Women's Career Cycle in the Roads Sector

<table>
<thead>
<tr>
<th>ATTRACTION</th>
<th>SELECTION</th>
<th>RETENTION AND REALIZATION</th>
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<tbody>
<tr>
<td>• Provide CCTs for girls to remain in secondary schools ease financial constraints.</td>
<td>• Address gender bias in hiring.</td>
<td>• Address sexual harassment and sexual extorsion in the workplace.</td>
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<tr>
<td>• Address gender stereotypes in school curricula and the classroom.</td>
<td>• Reform public procurement to make it more gender-inclusive.</td>
<td>• Address work-life balance and improving working conditions.</td>
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<tr>
<td>• Increase girls' mastery and interest of foundational skills in math and sciences.</td>
<td>• Promote opportunities for networking for women in the roads sector.</td>
<td>• Establish welcoming workplace environments.</td>
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<tr>
<td>• Organize career talks and exposure to female role models.</td>
<td>• Provide information on returns to education.</td>
<td>• Support career development and advancement of women.</td>
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<tr>
<td>• Provide scholarships and bursaries for women in engineering and TEVET studies.</td>
<td>• Provide remedial academic support to first year female engineering students.</td>
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<tr>
<td>• Counter the &quot;chilly climate&quot; in the educational environment in engineering schools and TEVET.</td>
<td>• Campaigns to encourage women to join the roads sector.</td>
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<tr>
<td>• Build professional role confidence to improve the school to work transition.</td>
<td>• Further improving English language skills in rural areas are important to improve the chances of students in rural locations to enter into technical studies in the roads sector.</td>
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gets (for example, an 80 percent attendance record is often required). Baird et al. (2014) reviewed 35 evaluations of conditional (CCT) and unconditional (UCTs) programs (10 of which include secondary school outcomes) to assess their impacts on enrollment, attendance, and test scores. Using meta-analysis to pool results from all 35 studies, they found that both CCTs and UCTs significantly increased school enrollment and attendance relative to a control group. Not surprisingly, the programs that included some element of conditionality tied to enrollment or attendance led to larger increases in these outcomes (a 60 percent improvement in the odds of enrollment in their sample) than did UCTs (18 to 25 percent improvement in the odds of enrollment). In addition, further improving English language skills in rural areas are important to improve the chances of students in rural locations to enter into technical studies in the roads sector.

Address gender stereotypes in school curricula and the classroom

The study showed that girls are less self-confident than boys in their math and science problem-solving skills and report stronger feelings of anxiety towards mathematics. As participants noted, this is linked to
negative gender stereotypes in the classroom perpetuated by students, teachers and parents.

The national school curriculum can reinforce social and gender inequalities by implicitly upholding traditional gender stereotypes or by disregarding the diversity of learning needs and styles among girls and boys throughout the country. Alternatively, a national curriculum can promote positive messages about equality between women and men. Many developing countries have undertaken efforts to remove gender biases from textbooks and curriculum and to change teacher attitudes that tend to reinforce gender inequality. Furthermore, efforts can be made to represent more equality and diversity in roles that exists at present. Such an approach might encourage children to think beyond the social roles they see around them.

Further, schools can educate parents through such avenues as parents’ nights/workshops regarding the importance of STEM performance and participation for women so that parents understand that women and men’s STEM abilities, regardless of performance, are comparable and are highly subject to effort and experience. Suggest that they provide daughters with STEM materials (calculators, computers, math games), opportunities and self-learning options (e.g., good print and online materials) related to increasing knowledge and skills, learning about female role models, coping with math anxiety, and accessing career information.

Increase girls’ mastery and interest of foundational skills in math and sciences

Foundational knowledge in math, physics, spatial skills, not to mention critical reasoning and reading skills, is necessary to absorb engineering and technical content on a deeper level and paves the road to success in getting into engineering and TEVET institutes. Efforts should be made to strengthen female students foundational skills in math and sciences and engage them in spatial skills training and encouraging them in handling equipment and tools.

The school curricula should also explicitly impart a growth mindset. Individuals with a growth mindset believe that intelligence is malleable, and that effort, practice, and persistence can enhance ability over time, while individuals with a fixed mindset believe that intelligence is a static trait or an innate ability. Studies have shown that youth with growth mindsets had higher academic performance and higher completion rates of challenging math courses than youth with fixed mindsets (Blackwell, Trzesniewski, & Dweck 2007; Yeager and Dweck 2012). Individuals with a growth mindset are also more likely to persist in the face of a challenge, while individuals with fixed mindsets are more likely to give up for fear of failure. Fixed mindsets can be problematic, particularly for girls and women who believe that math ability is due to innate intelligence. After conducting several decades of research on this topic, Dweck et al. [2007] found that girls cope less well than boys when confronted with difficult math material and are more susceptible than boys to experienc-
ing reduced math performance when they endorse a fixed mindset. Therefore, downplaying the role of innate intelligence in these fields should hopefully encourage more women to pursue STEM careers. As growth versus fixed mindsets seem to emerge during late elementary school, emphases on effort, persistence, and hard work should begin as early as possible to enhance academic performance.

Teachers can also foster girls' long-term interest in math and science by choosing activities connecting math and science activities to careers in ways that do not reinforce existing gender stereotypes and choosing activities that spark initial curiosity about math and science content. Teachers can also provide ongoing access to resources for students who continue to express interest in a topic after the class has moved on to other areas.

**Career talks and exposure to female role models**

The study showed how career talks of women in the roads sector as engineers and technical workers greatly helped increase secondary school girls' knowledge and interest about careers and job opportunities in the sector. Young women cannot be what they cannot see, thus exposing girls early on to role models promotes positive beliefs regarding women's abilities in math and science, invalidates stereotypes, helps widen their aspirations and to explore career avenues that they may not have considered originally.

Career talks can showcase how professionals' everyday work aligns with the societally beneficial outcomes that are the ultimate goals of engineering and TEVET careers in the roads sector. Young women should learn the societal benefits of jobs in the roads sectors, how they provide opportunities for working with others and improve the socio-economic development of the country. Highlighting the communal aspects of road sector careers can increase young women's interest in these careers.

A key informant said that the Women's Chapter in the Malawi Institute of Education (MIE) is struggling to recruit female engineers to volunteer to give career talks to secondary. To address this challenge, the MIE could recruit female Polytechnic students instead who might have less family obligations and more time to volunteer. These volunteer opportunities could also help female engineering students' network with professionals in the field that are part of the Women's Chapter.

**Provide information on returns to education**

A potentially effective, low-cost, policy intervention to encourage women into engineering and professional careers in the roads sector is to better inform female students about the returns to schooling in different fields. In Mexico, the pilot program, *Percepciones (perceptions)* provides students in public, technical, high schools entering 10th grade information about the returns to high school and tertiary education. Impact evaluation results included improved learning outcomes, especially math test scores among girls. In addition, as a result of the information treatment a significant number of girls switched from biology-related tracks to the more
Interventions in engineering colleges and TEVET institutions

Provide scholarships and bursaries for women in engineering and TEVET studies

In addition to actively attracting women in the engineering and technical fields in the roads sector through career talks and gender quotas, the government and private corporations and foundations can provide scholarships to women in the engineering and TEVET studies. This would ease the financial constraints of women enrolling in tertiary studies as revealed in the study.

Provide remedial academic support to first year female engineering students

The study found that female students in engineering may have a skills disadvantage and therefore struggle academically in their first year of studies. Policies placing first-year engineering students assessed as needing remedial math and other coursework directly into college-level quantitative courses, with additional support, can increase student success and increase college graduation rates.

Counter the ‘chilly climate’ in the educational environment

The study found that women entering male-dominated engineering and technical fields experience a ‘chilly climate’ in which they feel unwelcome. A sense of belonging has measurable effects on an individual's physical and mental states. Therefore, tertiary educational institutions should change environmental cues to signal that women are respected, valued, and welcomed in these settings. Sensitizing male students and teachers about the chilly environment and the importance of building a more welcoming, diverse and inclusive student environment is one possible intervention. Sponsoring social events such as 'Women in Engineering' and peer networks of female students from different grades can also help address the social alienation of women in the university/TEVET environment and in the field.

Further, in order to increase retention and improve the environment for female students in engineering and TEVET studies, the Polytechnic and TEVET institutions could establish a mentoring program within the faculty where senior female engineering /TEVET students could mentor junior female engineering students to nurture the progression of the younger engineering students, lower their dropout rates, and increase women's confidence in their abilities.
Build professional role confidence to improve the school-work transition

Emerging research suggests that ‘professional role confidence’ is significantly associated with engineering persistence and that women tend to have less professional confidence than men have (Buse et al 2013, Cech et al 2011). Professional role confidence can be divided into two discrete concepts: expertise confidence (the confidence that one possesses the requisite skills and knowledge to be a professional in a chosen field) and career-fit confidence (confidence that the field is consistent with one’s interests, values, and identity) (Corbett and Hill 2015). To increase female students’ “professional role confidence”, engineering and TEVET institutions can:

- Emphasize the wide variety of expertise necessary to be successful as an engineer. A narrow focus on math and science obscures the other areas of expertise—writing, communicating, organizing, and managing—that engineers need to be successful.

- Including engineering design activities in the field early in undergraduate coursework allows students to see the differences between textbook problems and the creativity and critical thinking necessary for actual engineering problem solving. Recognizing that these areas of expertise are critical to the engineering role also shifts the image of who is a good fit for engineering and stops the devaluing of competencies and contributions that are female stereotyped.

- Enable early contact between students and professionals. Meaningful contact with engineers in the field provides students with role models and mentors and also helps students understand the breadth of skills that they will need to be successful. Individuals with low professional role confidence could benefit from interaction with professionals with whom they can identify.

- Communicate that engineering and technical skills and competencies are learned, not innate. A conception that some people’s brains are hardwired to do engineering work (and that men are better at math and science than women are) contributes to low professional role confidence by perpetuating a stereotype that some people are natural engineers while others are a poor fit for engineering.

Campaigns to encourage women to join the roads sector

In order to attract more women in the sector and challenge traditional gender stereotypes, relevant agencies can launch campaign that showcases women engineers and tradeswomen in the roads construction industry. The targeted media campaign can be in the form of billboards or TV advertisements and job advertisement sites. For example, in Massachusetts, USA, the campaign ‘Building
Box 5. Showcasing Female Role Models in Transport

UK’s Freight Transport Association (FTA) and the NGO Everywomen hosts an annual ‘Women in Transport & Logistics Awards’. The awards program celebrates the achievements of phenomenal women reshaping the UK’s transport and logistics industry, while showcasing the range of exciting career opportunities it has to offer. Each award category honors an exceptional “Leader” who is driving change, and an individual at any stage of their career who is going above and beyond for their organization. An overall “Industry Champion of the Year Award” is presented to a man or woman making an impact on attracting and retaining women in transport and logistics. New for 2018 was the ‘Male Agent of Change’ category award, awarded to a man for his active commitment to advancing the progress of women working in transport and logistics. The ‘Industry Champion Award’ also recognizes a man or woman who is championing the progress of women working in transport and logistics.

Source: www.everywoman.com/tlawards

Address gender bias in hiring

The study suggests that female skilled workers in the road sector may face discrimination when applying to a position as hiring managers are more likely to hire a man over a woman. One way to counter this inherent bias against women is to tweak the recruitment process by instituting several measures, as follows:

- **Language analysis of job descriptions**: Use an application available for free\(^{17}\) to review gen-

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\(^{17}\) Use a tool like Textio tool (https://textio.ai/gendered-language-in-your-job-post-predicts-the-gender-of-the-person-youll-hire)
der-coded language from job descriptions. The tool uses a simple color scale to highlight words (like “ambitious” and “driven”) that will appeal more to men and words (like “nurturing” and “collaborative”) that will speak more to women, so job descriptions can be reworked to be more balanced.

- **Blind recruitment**: Remove personally identifiable information from the resumes of applicants including their name and gender.

- **Work sample tests**: Require the applicant to do a work sample tests, which mimic the kinds of tasks the candidate will be doing in the job. They are deemed to be good indicators of future job performance. Evaluating work sample tests from multiple applicants also helps calibrate your judgment to see how Candidate A compares to Candidate B.

- **Institute the Rooney Rule**: The American National Football League (NFL) created a policy that requires teams to interview minority candidates for senior football operations and head coaching jobs called the “Rooney Rule”. In this case the Rooney rule can be applied so that for X number of candidates that are interviewed, X number (or X percentage) would be women. This policy recognizes that if there is only one women in the job candidate pool, there is a statistically smaller chance she will be hired.

- **Structured standardized interviews**: Research shows that unstructured interviews — which lack defined questions and whereby a candidate’s experience and expertise are meant to unfold organically through conversation — can introduce gender bias by for example, asking whether the applicant is in a relationship or married. On the other hand, structured interviews, whereby each candidate is asked the same set of defined questions, allows employers to focus on the factors that have a direct impact on performance. It is suggested to use an interview scorecard that grades candidates’ responses to each question on a predetermined scale.

- **Gender-diverse panel**: Employ a diverse set of interviewers. Women are much more likely to join a company when they can interact with women who are already there and can testify to a company’s commitment to diversity. In addition, a gender-diverse panel also helps decrease the likelihood of gender bias in hiring.

In some countries, participatory gender audits (PGA) have been conducted to determine these requirements and ensure that selection criteria are appropriate and not gender biased (ILO 2012). PGA’s go beyond a purely technical assessment and include personal and institutional biases in the culture of the organization. Through a process of reflection, PGAs shine a light on the ‘unwritten’ or ‘unsaid’ biases of selection that lead to an underrepresentation of women.

**Reform public procurement to make it more gender-inclusive**

Female-owned contractors in the roads sector interviewed as part of this study said they faced considerable barriers and challenges to accessing procure-
ment tender and winning procurement contracts for roads works projects. These challenges were: high minimum capital requirements to register as a vendor, inadequate access to credit, high financing costs, fewer networking opportunities, inadequate technical and managerial skills, and gender bias in tendering process. Some of the potential measures to redefine procurement policies and processes to open up opportunities for female-owned contractors may include the following:

**Box 6. Preferential Procurement Policies in Different Countries**

Some countries have preferential public procurement policies specifically aimed at enterprises owned by women.

- **In Israel**, the Mandatory Tenders Law states that when two bids receive the same number of points after evaluation, the bid from a ‘business controlled by a woman’ shall be chosen (Government of Israel Ministry of Finance 2008). The law’s ‘Encouragement of Women in Business’ amendment further explains that a company needs an accountant’s certification to prove that it qualifies as a ‘business controlled by a woman’.

- **In Kenya**, every procuring entity needs to allocate at least 30 percent of its procurement value to youth, women and persons with disabilities (Republic of Kenya 2015). Further, performance securities (bonds, guarantees and letters of credit) are not required in procurement reserved for enterprises owned by women. Every six months, procuring entities at national and county levels have to report to the national public procurement authority with data on the value of goods and services procured from enterprises owned by women. The authority consolidates these data and reports to Parliament.

- **In India**, the government reserves some items for exclusive purchase from suppliers in the small-scale sector (Government of India Ministry of Finance, 2006). This sector includes several suppliers that work through women’s development organizations in rural areas.

- **South Africa** applies an elaborate preference points system, through which enterprises owned by women receive extra points for their bids.

Source: Harris (2017)
• Formation of joint ventures: The Roads Authority and other stakeholders to support efforts by female contractors aimed at improving their capacity to compete effectively such as formation of Joint Ventures or joining forces with other contractors in tendering processing and execution of contracts.

• Revising the capital requirements for registered vendors and simplify access to bank guarantee

• Providing training to women-owned contractors to improve their capacity in the preparation of responsive bids and on other skills where female-contractors might be deficient on.

• Improvement of fair competition, avoiding corruption practices and enhance transparency in the supplier selection process: through the use of e-procurement or a implementing a database that contains records of contractors’ performance can assist the Roads Authority and stakeholders in monitoring performance of local firms in various aspects number of project tendered, problems encountered, exceptional good performance.

• Consider using preferential procurement policies to promote the participation and selection of enterprises owned by women (see Box 6).

Promote opportunities for networking for women in the roads sector

Another key challenge identified by this study was that networking events and opportunities are centered around male-friendly activities such as congregating in sports bars, often involving alcohol. Therefore, more diverse forms of social/networking for opportunities that are women-friendly should be sought and promoted to improve access for employment and career development for women. The relevant Ministries and agencies can host events that bring together professionals in the roads sector and undertake outreach for women in the sector as part of this initiative.

RETENTION AND ADVANCEMENT

Address sexual harassment in the workplace

Sexual harassment, an issue in many workplaces, is a significant barrier to the successful integration of women into the roads sector, as this study found. It is typically acute in the roads sector as when women spend long periods away from home, are geographically isolated, and work in a predominantly male environment. Such problems are also aggravated by employees’ lack of awareness about the existence of anti-harassment policies at the workplace and/or lack of trust in the complaint process, as well as the tendency not to report such situations.

Therefore, addressing sexual harassment in the workplace is key in making the workplace safe for women. Ultimately, employers have the most power to establish a work environment that treats all workers equitably and with respect. They can and should do this by setting and promoting clear policy,
conducting sexual harassment prevention training, monitoring the workplace and conducting prompt and thorough investigation of complaints.

In terms of addressing sexual extorsion in roads works bids, several actions\(^\text{18}\) can be pursued such as:

- Revise anti-corruption and/or gender-based violence laws to cover sexual extorsion. For example, Section 27 of the Tanzania Prevention and Combating of Corruption Act of 2007, makes it an offense for “any person in position of power or authority” to “demand [ ] or impose [ ] sexual favors” as a condition of the exercise of that authority.
- Awareness raising and public education programs and training on SEA, SH and sexual extorsion to Roads Authority staff.
- Develop brochures to tell people where to file complaints, simplify complaint procedures, improve record keeping.
- Establish Codes of Conduct in the Roads Authority with clear accountability structures.
- Establish effective grievance procedures.
- Have more female officers overseeing land administration/registration process.

**Address work-like balance and improving working conditions**

In terms of work-life balance, working conditions in the roads sector, most notably non-standard working hours, such as night work and shift work, and working away from home, can push women out of the industry. Flexible working patterns, extended hours, variable start/finish times, shift-work, and 24/7 operations make it difficult and at times impossible to reconcile work and family commitments. This study found that women in the roads sector face double burden, with responsibilities to both work and family and women face resistance from their husband and family for travelling to roads construction sites where possibly housing and sanitary conditions are often inadequate and unsafe for women.

Roads construction companies can support employees to achieve a work-life balance by establishing flexible working arrangement such as flexible working patterns: variable start/finish times, shift-work, providing part-time work, adjusting shift work rosters, creating job share arrangements. Flexible working arrangements can be established by reengineering the conventional method of working and creating virtual working environment. This would increase presence of women in managerial and senior positions.

To improve working conditions, roads construction companies can ensure the provision of various amenities in the road construction sites, such as:

- Sanitary facilities (e.g., restrooms, water tanks, and drinking water) were provided on-site during the construction period.
- Canteens
- Solid and liquid waste-collection systems
- Provision of daily transportation for staff between a central location and the project site; thus, buses, vans, pickup trucks, and cars are used for
Establish welcoming workplace environments

The study found that women face a chilly work environment that lowered women’s job satisfaction, including being treated in a condescending, patronizing, or discourteous manner by supervisors, senior managers, and co-workers. Road sector organizations and companies can improve the workplace environment through a number of actions and policies.

- Increase the number of women at all levels of management.
- Provide opportunities for women to develop a support network of other technical women.
- Be proactive and vocal about management’s commitment to increasing the representation of technical women in your organization.
- Formally recognize necessary nontechnical work such as working well with others and mentoring—work that is not male-stereotyped—along with technical work.
- Instill a corporate culture that encourages a supportive, friendly, and respectful environment, and work to root out uncivil and undermining behaviors.

Support career development and advancement of women

To advance women’s career development in the roads sector, employers should support career development and advancement of women by:

- Communicating clear responsibilities, goals, and paths toward advancement.
- Assigning employees challenging projects that help them develop and strengthen new skills.
- Providing training and development opportunities for employees.
- Acknowledging and rewarding employees’ contributions.
- Ensuring that employees have manageable workloads and are not expected to routinely work excessive hours.
- Providing opportunities for senior technical workers to mentor students or junior-level technical workers.
- Facilitating opportunities for employees to work on projects and issues that are socially relevant.
The roads sector in Malawi offers opportunities for women: opportunities in the forms of generating substantial incomes, designing transport infrastructure to foster socio-economic development, and providing role models for the young women of the future. However, as in many other countries, the roads sector in Malawi is a male-dominated sector and presents major challenges for equal opportunities for women.

This small in-depth qualitative study sheds light at the reasons women in Malawi do not choose careers or enter employment in the roads sector and at the reasons behind them leaving the sector. The study found that women face a wide variety of challenges at different stages of their career cycle that lead to high rates of attrition. Many of the challenges are embedded in the culture of sexism, gender bias, and stereotypes that subtly, but often overtly sidelines women, who then choose a different career path.

For women to make inroads into the transport sector, changes need to be made within the education system and within the industry. This requires multi-sectoral efforts and cooperation that emphasize the structural and systemic constraints to address the embedded gender norms that steer women away from STEM and technical fields, and not place the primary burden on women having to 'catch-up'. The report provides an action plan that identifies a core set of actions that address key challenges of women attraction, selection and retention and advancement in the roads sector.

6. Conclusion
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Malawi is a small and densely populated land-locked country in Sub-Saharan Africa of 18 million people in sub-Saharan Africa. Malawi is principally an agricultural country with about 83 percent of its population dependent on subsistence agriculture [Malawi’s Fourth Integrated Household Survey 2016-2017]. The country has one of the lowest levels of per capita income in the world. Gross National Income per capita was US$486 in 2017 [WDI 2017]. In 2010, 71.4 percent of Malawians were below the extreme poverty line of 2011 PPP $1.90 per person per day and 88.8 percent were below the $3.20 per person per day poverty line (Figure 3). Malawi’s human development challenges are reflected in its ranking of 170 out of 187 countries on the United Nations’ 2016 Human Development Index (UNDP 2016).

Malawi has a very young age structure: 56 percent of the population is under the age of 20 [UN Population Prospects 2017]. In 2017, the fertility rate was 4.6 births per woman, slightly lower than the sub-Saharan Africa average of 4.8.

Malawi’s Constitution recognizes women’s right to full and equal protection by the law, and non-discrimination on the basis of their gender or marital status. The Constitution calls for legislation to eliminate customs and practices that discriminate against women. The Malawi government has developed laws, policies, and programs that promote protection and respect for women’s and girls’ human rights. The government’s blueprint for development, the Malawi Growth and Development Strategy III (MGDS) 2017-2022, promotes gender equality and gender mainstreaming in all sectors [Government of Malawi 2017]. The government of Malawi has also developed a national gender policy revised in 2015 [Government of Malawi 2015].

Yet, women in Malawi generally fare worse than their male counterparts on most social and economic indicators, including secondary and tertiary education enrolment and literacy, labor force participation, asset ownership, political participation and gender-based violence. Malawi ranks 170 out of 188 on the UN’s 2015 Gender Inequality Index [GII]. Patriarchal beliefs and attitudes still prevail and customary laws and traditional and cultural practices, many of which are harmful to women’s rights, shape the lives of women and girls [Malawi Human Rights Commission 2005].

In terms of educational outcomes, while primary enrollment for both boys and girls has increased in the past two decades, school completion rates are
In 1994, the government of Malawi eliminated school fees for publicly financed primary schools. Since then, primary completion rates increased from 36 to 77 percent for girls and 46 to 77 percent for boys between 1994 and 2013 (Figure 6). However, gross enrollment rates over 100 percent indicates that a portion of students’ age exceeds the official age group (e.g. repeaters) (Figure 7).

A substantially smaller number of girls and boys attend and complete secondary school. In 2016, secondary gross enrollment stood at 35 percent for girls and 39 percent for boys (Figure 2). Lower secondary completion rate is 19 percent for girls and 21 per cent for boys in 2016 (Figure 1). Moreover, merely 0.5 percent of young women and 0.8 percent of young men attend tertiary school. Literacy rates are also low, at 55 percent for women and 70 percent for men ages 16 and above (World Development Indicators 2015). Box 2 describes the educational system in Malawi.

There are wide gender gaps in women and men’s economic opportunities in terms of labor force participation, earnings and control of productive assets. In terms of labor force participation, 82 percent of men compared to 72 percent of women (ages 15 and above) are in the workforce (Table 1). Most women (90 percent) and men (80 percent) are employed in the agricultural sector, which is the mainstay of Malawi’s economy (Figure 3). A larger proportion of men (44 percent) than women (33 percent) are salaried workers (Table 1). In terms of occupation, while most male and female salaried workers are unskilled, a larger proportion of men than women are in higher skilled occupations (Figure 4).
### Table 1. Key Labor Indicators by Gender, 2017

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Men</th>
<th>Women</th>
</tr>
</thead>
<tbody>
<tr>
<td>Labor force participation rate for ages 15-24 (%) (modeled ILO estimate)</td>
<td>65</td>
<td>62</td>
</tr>
<tr>
<td>Labor force participation rate [% of population ages 15+] (modeled ILO estimate)</td>
<td>82</td>
<td>72</td>
</tr>
<tr>
<td>Vulnerable employment [% of employment] (modeled ILO estimate)</td>
<td>66</td>
<td>54</td>
</tr>
<tr>
<td>Contributing family workers [% of employment] (modeled ILO estimate)</td>
<td>6</td>
<td>9</td>
</tr>
<tr>
<td>Wage and salaried workers female [% of employment] (modeled ILO estimate)</td>
<td>44</td>
<td>33</td>
</tr>
<tr>
<td>Unemployment [% of labor force] (modeled ILO estimate)</td>
<td>5</td>
<td>?</td>
</tr>
<tr>
<td>Unemployment, youth [% of labor force ages 15-24] (modeled ILO estimate)</td>
<td>9</td>
<td>?</td>
</tr>
</tbody>
</table>

*Source: World Development Indicators*

#### Figure 3. Most men and women are employed by the agriculture sector

*Employment by Sector, 2017 (percent)*

<table>
<thead>
<tr>
<th>Sector</th>
<th>Men</th>
<th>Women</th>
</tr>
</thead>
<tbody>
<tr>
<td>Employment in agriculture</td>
<td>90</td>
<td>?</td>
</tr>
<tr>
<td>Employment in industry</td>
<td>80</td>
<td>10</td>
</tr>
<tr>
<td>Employment in services</td>
<td>10</td>
<td>10</td>
</tr>
</tbody>
</table>

*Source: World Development Indicators*

#### Figure 4. While the large proportion of the workforce is employed in low-skilled work, still more men than women are employed in medium and higher skilled work

*Employment by Occupation, 2017 (percent)*

<table>
<thead>
<tr>
<th>Skill level 1 (low)</th>
<th>Skill level 2 (medium)</th>
<th>Skill levels 3 and 4 (high)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Women</td>
<td>2,3</td>
<td>92,2</td>
</tr>
<tr>
<td>Men</td>
<td>8,3</td>
<td>86,1</td>
</tr>
</tbody>
</table>

*Source: ILO Key Labor Indicators, ILOSTAT*

*Note: Skills definition: Skills level 3: comprises Managers, professionals, and technicians; skills level 2: comprises: (1) Clerical, service, and sales workers, (2) Skilled agricultural and trades workers, and (3) Plant and machine operators, and assemblers; skills level 1: comprises elementary occupations.***
Most land is inherited, owned and operated by men. While data on gender-disaggregated land ownership is more than 20 years old, key informants interviewed as part of this study indicate that the majority of land is owned by men. Malawi, there are three major categories of land tenure: customary land, public land, and private land. Customary land is by far the most common form of tenure in Malawi. According to the National Census of Agriculture and Livestock (NACAL) 2006/07, about 80 percent of land used by agricultural smallholders was customary land. The inheritance of customary land follows the customary law. Land is transferred predominantly through inheritance from relatives and marriage is one of the means to land access (Kishindo, 2004). Two customary systems of inheritance, the matrilineal and the patrilineal systems can be distinguished in Malawi. Under a matrilineal system, chieftaincy is handed down through the female line and so is land. Under the matrilineal system of marriage, a man’s rightful heirs to his land are his sister’s children (Pachai, 1978). This system characterizes land transfers within the central and southern regions (Ng’ong’ola, 1982; Pachai, 1978; Peters, 2010). Under the patrilineal system, land is transferred from fathers to sons. It is in a way a mirror image of the matrilineal one where the powerful figure is the man other than the woman. However, research conducted in nine districts in Malawi, regarding women and inheritance property rights revealed that in both matrilineal and patrilineal systems of marriage women have few or no independent rights to land property due to the mixture of traditional customs and women’s unequal access to legal services, flaws in administration and adjudication of women’s inheritance claims at the local level (Ngwira et al., 2002; Chiweza, 2005).

Women in Malawi have low access to financial services. While there are no legal restrictions on women’s access to financial services including credit, the government reports that women face difficulties due to the need for collateral and the high interest rates charged by microfinance institutions (CEDAW, 2010). Bank loans often require even higher collateral, which women have more limited access to, and thus women tend to turn to credit through microfinance institutions (CEDAW, 2010). The Ministry of Finance has established a department charged with regulating microfinance institutions, so as to ensure that interest rates are not significantly higher than those offered in the commercial banking system, but data on the results of these efforts is not available (CEDAW, 2010). In 2017, the gender gap in access to account ownership with a financial institution or mobile money service provider was 8 percentage points, with only 30 percent of women owning an account compared to 38 percent of men (Figure 5).

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19 According to the 1993 Agricultural Census, the percentage of female landholders in 1993 was 32 percent (FAO Gender and Land Rights Database).

20 The customary system of land tenure has the traditional concept of considering land in a village as belonging to the community although the individual in the community has the right to cultivate it and sometimes uses the land as though he was the owner (Nothale, 1982). Public land refers to land occupied, used, or acquired by the Government or any other land, which is neither customary nor private. Private land refers to land owned, held, used, or occupied under a freehold title, a leasehold title, or a certificate of claim, which is registered as private land.

The percentage of firms owned by women and firms with women in the top management is low in Malawi. Approximately 28.1 percent of firms in Malawi have female participation in ownership and 14.2 percent have women in top firm management, which is slightly lower than the Sub-Saharan Africa average of 32 percent and 26 percent, respectively.

Violence against women in Malawi is widespread. Recent DHS data show that 34 percent of women had experienced physical violence and 21 percent sexual violence since age 15 (Figure 6). The same data indicate that rates of sexual violence and physical violence by an intimate partner vary by age, peaking with the 25-29 group (and are higher in rural than urban areas. Many women have experienced controlling behaviors from a husband or intimate partner [Malawi DHS 2015-2016]. These include insisting on knowing where they are at all times [60 percent], being jealous or angry if they talk to other men [50 percent], accusing them of being unfaithful [24 percent], not permitting them to meet their female friends [13 percent], and limiting contact with their families [11 percent].

Significant numbers of men and women believe that a husband is justified in beating his wife in certain circumstances. Sixteen percent of women and 13 percent of men say that a husband is justified if at least one of the following five circumstances occurred: she burns the food, she argues with him, she goes out without telling him, she neglects the children, and she refuses to have sex with him [Malawi DHS 2015-2016]. Attitudes towards wife beating do not appear to have changed since the 2010 MDHS. For both women and men, there was a 2-percentage point or less change in attitudes during this time.
Figure 6. A Large Proportion of Women in Malawi Experience Physical and Sexual Violence

<table>
<thead>
<tr>
<th></th>
<th>2004 DHS</th>
<th>2010 DHS</th>
<th>2015-16 DHS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ever experienced physical violence since age 15 (ages 15-49)</td>
<td>28</td>
<td>28</td>
<td>34</td>
</tr>
<tr>
<td>Physical violence in the past 12 months often or sometimes (ages 15-49)</td>
<td>13</td>
<td>14</td>
<td>16</td>
</tr>
<tr>
<td>Women who ever experienced sexual violence (ages 15-49)</td>
<td>14</td>
<td>25</td>
<td>21</td>
</tr>
<tr>
<td>Women who experienced sexual violence in past 12 months (ages 15-49)</td>
<td>11</td>
<td>12</td>
<td>14</td>
</tr>
</tbody>
</table>

**Research Objective.** This research explored constraints to and opportunities for the promotion of women’s participation in the roads sector as employees, consultants and entrepreneurs. The research was guided by five major questions:

1. Which factors shape occupational choices for young women and their perceptions of technical careers in the road sector?

2. What are the barriers women face in accessing economic opportunities in the road sector as employees, consultants and contractors?

3. What are the challenges women face to remain and succeed in technical positions in the road sector?

4. Which strategies can women use to cope positively and surpass the challenges faced along their trajectories?

5. How can policy makers build on existing formal and informal institutions to promote women’s employment in the road sector in Malawi?

These research questions were designed to capture the sequence of barriers women face through their life cycles when seeking to follow a successful career in the road sector - from early to mature age.

**Data collection.** Data was collected through 6 focus groups discussions (FGDs) with girls and women and 11 key informant interviews (KII). FGDs and KII were conducted sequentially, with KII implemented only at the end of the fieldwork. This sequence allowed a more appropriate identification of key informants to address knowledge gaps identified after focus groups discussions.

**Recruitment strategies and criteria.** Research participants for FGDs and KII were recruited through cooperation with local institutions as summarized in the table below. In all FGDs, the team attempted to recruit at least one person with disability – although it was not always possible.

**Research Instruments.** Five different guides for FGDs were designed: one for teenage girls in secondary schools; one for young women (18-24 years) in technical schools and universities; as well as one for each of the following groups: women engineers, women who are already engaged in the road sector, women technical staff in road sites and women contractors. FGDs explored four major themes related to women’s participation in the road sector: factors related to occupational choices; barriers to accessing economic opportunities; factors which might hinder women’s continuation and success in technical jobs;
Recruitment Strategy for Sample Group

<table>
<thead>
<tr>
<th>Sample</th>
<th>Recruitment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Young women in secondary school identifying their careers. FGDs will be conducted in rural/urban schools and before and after career talks.</td>
<td>The District Education Division Manager (EDM) of Blantyre supported the identification of three secondary schools: one for conducting a pilot, a rural school and an urban school. Non-pilot schools had to be mixed-gender and not boarding schools. In these schools, the head teachers helped identify 6-12 girls in Form 3 to participate in FGDs. Career talks were delivered in each school in coordination with the Malawi's Roads Authority (RA). Data was collected before and after the talks.</td>
</tr>
<tr>
<td>Young women in universities who are engaged in technical careers</td>
<td>The Head of Department of Civil Engineering in the Malawi Polytechnic identified 6-12 students from different years of civil engineering course to participate in the FGD.</td>
</tr>
<tr>
<td>Young women in technical schools</td>
<td>The EDM of Blantyre helped identify one technical school closest to the district capital offering courses pertinent to the road sector, such as bricklaying. The principal of the selected technical school then identified 6-12 current students for the FGD.</td>
</tr>
<tr>
<td>Women engineers</td>
<td>Women engineers were identified through the cooperation with Malawi's Institute of Engineers – Women's Chapter and the RA.</td>
</tr>
<tr>
<td>Women technical staff working on road site</td>
<td>The Roads Authority selected an active road construction site closest to the capital of Blantyre. Women participants were selected by the project's human resources official.</td>
</tr>
<tr>
<td>Women contractors in road sector</td>
<td>An initial number of contractors in Lilongwe were invited to participate through the cooperation with the Malawi Institute of Engineers – Women's Chapter, followed by snowballing.</td>
</tr>
<tr>
<td>Key informants: school teachers, governmental and non-governmental institutions related to the transport sector;</td>
<td>Coordination with the relevant institutions</td>
</tr>
</tbody>
</table>

and existing entry points to promote women's participation in the road sector. In addition, a guide for KIIs was developed, focusing on: perceived challenges to women's participation in the sector; effectiveness of current policy and programs; recommendations for strengthening women's participation. These guides were developed based on themes identified through the existing literature and initial consultations with stakeholders.

Ethical Considerations and Protocols. Prior to all interviews and focus groups, participants were given consent forms stating the broad objective of the research and its confidential nature; the sponsor of the study; the length of time that the focus group or interview would last; major themes that would be covered; costs and benefits of participating in the study; their right to withdraw their participation at any point—before, during, or after the research, and to choose not to answer any question. Participants were given the opportunity to ask any questions before signing the forms. In the case of underage

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22 This is equivalent to the one grade before the final year as, in the period the research was implemented, students in their final year of secondary school were preparing for their national exams to enter college.

23 This research followed major principles of protection of human subjects outlined in the Belmont Report (National Commission for the Protection of Human Subjects in Biomedical and Behavioural Research, 1978); (Ellisberg and Heise 2005: Researching Violence Against Women); Ethical Research Involving Children (Graham et al., 2013), and the guidelines for conducting research in Malawi as established under the 2013 National Commission for Science and technology Act.
secondary school girls, assent was obtained from each FGD participant. In addition, consent was also obtained from each school’s headmaster as adult guardians of the students.

**Data management.** Interviews conducted in local languages were transcribed directly into English. All interviews were audio recorded and transcribed. Transcripts were stored in a protected database managed by the research coordinator, along with observation sheets, audio files, sociodemographic data, and consent forms. To ensure confidentiality, consent forms with participants’ names made no direct link to the data, which was anonymized and stored under unique identifiers. No names were written on instruments or observations notes filled out by fieldworkers.

**Data analysis.** Interview facilitation, transcription and coding were done by different team members with the objective of quality checking each product and facilitating feedback processes between team members. Each field team member was instructed to keep daily fieldnotes containing detailed observations, informal conversations, key quotations, and themes arising from interviews and focus groups. These data were analyzed by the research coordinator in parallel to field work and guided subsequent episodes of data collection. The rest of the analysis unfolded as follows:

- **Episode profiles**\(^{24}\) were prepared for each data collection episode highlighting quotations and themes emerging from each question of interest or focus group protocols;
- A matrix containing quotations and themes organized by sample group and topic was prepared and then analyzed for the write-up of a draft version of the report;
- Draft study findings were discussed with the Advisory Committee and additional clarifications and feedback were sought.
- The final write-up was completed.

**Specific ethical protocols related to harassment and gender-based violence.** Although no direct questions related to violence were asked to participants, the team took special steps to mitigate risks associated with interviewing survivors of gender-based violence (GBV) or victims of sexual harassment. The following measures addressed these special risks:

- **Team training:** Although field workers were experienced, they also received a 2-day specialized training prior to fieldwork, including: revision of research objectives and questions; techniques for conducting FGDs and KII; revision of research instruments and protocols. The training also included: overall orientation on the concepts of gender and gender discrimination and inequality; principles of conducting human subjects research; how to recognize survivors of GBV and VAC; how to avoid disclosure during an interview to protect participants from harm; what to do if a disclosure occurs—what to say and not to say to participants; and how to recognize and deal with vicarious trauma experienced by the research team members themselves.

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\(^{24}\) Episode profiles are an analytic tool of ResearchTalk’s Sort and Sift, Think and Shift analysis approach. They permit “vertical” analysis of each transcript—a holistic story of what is learned from each data document.
• **Disclosure of mandatory reporting laws and reminders during interviews and focus groups:** Malawi has mandatory reporting laws for cases of GBV and VAC. During the consent process, the team informed participants that if certain information were disclosed (such as the identity of perpetrators or victims), this would trigger mandatory reporting. During interviews, researchers were trained to be continuously mindful of the need to avoid particular types of information that might trigger mandatory reporting. If the interviewer felt the participant was about to disclose such information, the interviewee was reminded of the mandatory reporting regulations. Participants were offered and reference to the District Social Welfare Officer when necessary.

• **Liaising with service providers:** The team drew upon a list of professional counsellors drafted with the help of the District Social Welfare Officers (DSWOs) and District Health Offices (DHOs). This list was shared with the research team to use in case respondents needed such counseling.
INSTRUMENT 1: GUIDE FOR FGDS WITH TEENAGE GIRLS IN SECONDARY SCHOOL (BEFORE AND AFTER CAREER TALKS)

Section 1: Before career talk

1. Ice-breaker: Thank you for agreeing to participate in this study. With our conversation, we would like to find out more about what young women want and expect for their future and the process for making important life decisions.
   a. So let’s start by hearing from each of you. When you think about your future, in 10-15 years from now, how would you like your life to be like? ? [Ask open first, and let them discuss freely. Then probe for deepening answers: what else?]
   b. Do you see yourself with a job or a career? If so, which one?

2. At some point in secondary school, you will have to make decisions about work and which subjects or careers you would like to pursue – some of you may already have done so. We want to understand the process you go through in making these choices.
   a. You mentioned several careers you are interested in. What are the different factors that have influenced your choice of career? [take each question separately, do not turn this into an individual interview]
   b. Do/did you make this decision on your own or did you talk it over with anyone in your life? [ask openly, then probe for who]
   c. Why did you decide to talk it over with this/these person(s)
   d. How did this/these talk(s) affect your decision?

3. Now we want to hear your views about technical and engineering-related jobs.
   a. What sort of opportunities do you think are available in this field?
   b. You have mentioned some job possibilities. What is your opinion about these opportunities?
   c. Do you see these jobs and careers as possibilities for your own future? Explain.
d. What do you think attracts some girls to pursue these technical jobs and careers? e. What are some of the challenges you think girls may face in trying to pursue these opportunities?

4. Are you aware of any interventions which might make technical careers attractive to girls?
   a. What do you know about them?
   b. Where did you come to learn about them?
   c. What is your opinion about these interventions? [ask openly, then probe for each intervention mentioned, probe for whether they think these interventions are helpful or not].

Section 2: During the career talk

Thank you for all your answers. Now, we are going to take a break as Miss X [say name of presenter] is going to talk to you about her experience of working as an engineer. [Ask teacher to explain the talk]

[NOTE: During the talk, please take notes. Register how the teacher introduced the talk, what the presenter is saying and how the girls and the teacher are reacting. For example: Do they look curious? Do they look bored? Do they ask questions? Which ones? Which topics do they seem more interested in?]

Section 3: After career talk

5. You just had a conversation about future, jobs and careers. What are your thoughts on the career talk you just had? [probe for positive and negative impressions, what worked well and what did not].

6. One of our objectives with this research is to identify strategies to attract more girls to technical schools and university so that they are able to pursue careers in the road sector. Do you have any suggestions on what could be done to achieve this goal?

7. We are reaching the end of our conversation. Is there anything else you would like to add or any question you would like to make to wrap-up? We thank you immensely for your participation. The information you provided will be very helpful in helping us think about ways to promote women’s access to opportunities in the road sector.

Instrument 2: FGDS with Young Women in University and Technical Colleges

Thank you for agreeing to participate in this study. With our conversation, we want to learn about the experiences of women who have decided to pursue technical jobs careers in the road sector, such as engineering.

1. You all have made this decision at some point in your lives and we are interested in understanding the factors that influenced you to pursue this track. Can you tell us a bit how that process was for you?
a. When making this decision, which factors attracted you to this career path?

b. What concerns, or reservations did you have at the time? Explain.

c. Did you take this decision on your own or did you talk it over with anyone in your life? Why and how did it affect your decision?

d. How do you think your experience was similar or different to that of other women?

e. How was it similar or different to that of men?

2. Now we want to learn about your experience as young women studying in technical schools/colleges.

a. Tell us what you liked about studying in this technical school.

b. Did you face difficulties or challenges at some point? What were those?

c. You have mentioned some of the challenges you went through. How did you manage or deal with them?

d. Did other students face similar challenges? Explain.

3. Thinking about your future, where would you like to be professionally in 10 years from now?

a. What you think may make it difficult for you to achieve your goals?

b. What could support you on your path?

4. In the road sector, some options are to work as employees, consultants and contractors.

a. What do you think is attractive and challenging in each of these options?

b. Do you think these factors you mentioned are the same for men and women or affect them in the same way? Explain.

5. One of our objectives with this research is to identify strategies to attract women to technical careers and support them in succeeding in the road sector.

a. Do you have any suggestions on what could be done to achieve this goal?

b. Are you aware of any initiatives being implemented - both by government and non-governmental institutions - and what is your opinion about them? (Probe issues around quotas, procurement of services, gender policies within working environment etc.)

We are reaching the end of our conversation. Is there anything else you would like to add or any question you would like to make to wrap-up? We thank you immensely for your participation. The information you provided will be very helpful in helping us think about ways to promote women’s access to opportunities in the road sector.

Thank you for agreeing to participate in this study. With our conversation, we want to learn about the experiences of women who have decided to pursue technical jobs or careers in the road sector and how this might affect their lives.
1. What is it like to be working as a transport engineer? *(ask openly, then probe for positive and negative aspects)*.
   a. Which process did you go through and which measures did you take to access this opportunity (training, life changes, etc.)?
   b. Are there challenges you faced in trying to access opportunities as an engineer? Explain.
   c. Are there challenges you faced in trying to succeed in these jobs? Explain.
   d. Which factors or strategies help/have helped you?
   e. How do you think your experience was similar or different to that of other women?
   How was it similar or different to that of men?
2. You all have made the decision at some point in your lives to follow technical career tracks and we are interested in understanding the factors that influenced your decision. Can you tell us a bit how that process was for you?
   a. How did you decide in this moment?
   b. What concerns, or reservations did you have at the time? Explain.
   c. Did you take this decision on your own or did you talk it over with anyone in your life (friends, family, teachers)? Why and how did it affect your decision?
3. Now we want to hear about your experience studying in technical schools/colleges.
   a. Tell us what you liked about studying in this technical school? Elaborate.
   b. Did you face challenges at some point? What were those? And how did you manage them?
   Did other students face similar challenges? Explain.
4. In the road sector, some options are to work as employees, consultants and contractors. What factors influenced you to become a transport engineer?
   a. What do you think is attractive and challenging in each of these options?
   b. Do you think these factors you mentioned are the same for men and women or affect them in the same way? Explain.
5. Thinking about your future, where would you like to be professionally in 10 years from now?
   a. What you think may make it difficult for you to achieve your goals?
   b. What could support you on your path?
6. One of our objectives with this research is to identify strategies to attract women to technical careers and support them in succeeding in the road sector.
   a. Do you have any suggestions on what could be done to achieve this goal?
   b. [If they have suggestions]: How do you think this could be implemented?
   c. Are you aware of any initiatives being implemented to attract women to these technical careers? Who is implementing them?
   d. How did you come to learn about these interventions?
e. You have told me some interventions you are aware about. Now tell me your opinion about them [probe for each intervention mentioned].

7. We are reaching the end of our conversation. Is there anything else you would like to add or any question you would like to make to wrap-up?

We thank you immensely for your participation. The information you provided will be very helpful in helping us think about ways to promote women’s access to opportunities in the road sector.

**INSTRUMENT 4: GUIDE FOR FGDs WITH FEMALE TECHNICAL STAFF WORKING IN ROAD SITES**

Thank you for agreeing to participate in this study. With our conversation, we want to learn about the experiences of women who have decided to pursue opportunities in the road sector and how this might affect their lives.

1. What is it like to be working in a road construction site? [ask openly, then probe for positive and negative aspects].

   a. Which process did you go through and which measures did you take to access this opportunity (training, life changes, etc)?

   b. Are there challenges you faced in trying to access these technical jobs? Explain.

   c. Are there challenges you faced in trying to succeed in these jobs? Explain.

   d. Which factors or strategies help/have helped you?

   e. How do you think your experience was similar or different to that of other women?

   f. How was it similar or different to that of other men?

2. Thinking about your future, where would you like to be professionally in 10 years from now? What you think may make it difficult for you to achieve your goals? What could support you on your path?

3. We are interested in understanding the factors that influence women’s decisions to pursue technical jobs in the road sector. Tell us about the moment when you decided you would pursue a technical job in the roads sector.

   a. How did you decide in this moment?

   b. What concerns, or reservations did you have at the time? Explain.

   c. Did you take this decision on your own or did you talk it over with anyone in your life (friends, family, teachers)? Why and how did it affect your decision?

4. Now we want to hear about your experience studying in technical schools/colleges.

   a. Tell us what you liked about studying in this technical school? Elaborate.

   b. Did you face difficulties or challenges at some point? What were those? And how did you manage them?
c. Did other students face similar challenges? Why/how?

5. One of our objectives with this research is to identify strategies to attract women to technical careers and support them in succeeding in the road sector.

a. Do you have any suggestions on what could be done to achieve this goal?

b. Are you aware of any initiatives being implemented - both by government and non-governmental institutions and what is your opinion about them? [Probe issues around quotas, procurement of services, gender policies within working environment etc.]

6. We are reaching the end of our conversation. Is there anything else you would like to add or any question you would like to make to wrap-up? We thank you immensely for your participation. The information you provided will be very helpful in helping us think about ways to promote women's access to opportunities in the road sector.

**INSTRUMENT 5: FGD WITH FEMALE CONTRACTORS IN THE ROAD SECTOR**

Thank you for agreeing to participate in this study. With our conversation, we want to learn about the experiences of women who have decided to pursue opportunities in the road sector and how this might affect their lives.

1. What is it like to be working as a contractor in this industry?
   a. Which process did you go through and which measures did you take to access this opportunity (training, life changes, etc)?
   b. Are there challenges you faced in trying to access opportunities as a contractor? Explain.
   c. Are there challenges you faced in trying to succeed in these jobs? Explain.
   d. Which factors or strategies help/have helped you?
   e. How do you think your experience was similar or different to that of other women?
   f. How was it similar or different to that of men?

2. You all have made the decision at some point in your lives to follow technical career tracks and we are interested in understanding the factors that influenced your decision. Can you tell us a bit how that process was for you?
   a. How did you decide in this moment?
   b. What concerns or reservations did you have at the time? Explain.
   c. Did you take this decision on your own or did you talk it over with anyone in your life (friends, family, teachers)? Why and how did it affect your decision?

3. Now we want to hear about your experience studying in technical schools/colleges.
   a. Tell us what you liked about studying in this technical school? Elaborate.
   b. Did you face challenges at some point? What were those? And how did you manage them?
c. Did other students face similar challenges? Why/how?

4. In the road sector, some options are to work as employees, consultants and contractors. What factors influenced you to become a contractor?
   a. What do you think is attractive and challenging in each of these options?
   b. Do you think these factors you mentioned are the same for men and women or affect them in the same way? Explain.

5. Thinking about your future, where would you like to be professionally and what are the factors which might help and prevent you from achieving your goals?

6. One of our objectives with this research is to identify strategies to attract women to technical careers and support them in succeeding in the road sector.
   a. Do you have any suggestions on what could be done to achieve this goal?
   b. Are you aware of any initiatives being implemented - both by government and non-governmental institutions and what is your opinion about them?

7. We are reaching the end of our conversation. Is there anything else you would like to add or any question you would like to make to wrap-up? We thank you immensely for your participation. The information you provided will be very helpful in helping us think about ways to promote women’s access to opportunities in the road sector.

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**INSTRUMENT 6: KEY INFORMANT INTERVIEWS**

Thank you for agreeing to participate in this study. With this conversation, we are interested in understanding the factors that influence young women's decisions about which subjects or careers to pursue. We want to understand the process they go through in making these choices to support the development of initiatives/policies that attract women to technical careers, specifically in the road sector.

1. What are the different factors that might influence girls' choice of career?
   a. At which point of the school life does a girl have to make such decision and how does the process work?
   b. What are the factors that might attract or repel young women from pursing technical careers?

2. Now consider the young women who have already chosen to attend technical schools/colleges.
   a. Are there any specific barriers you think young women face in trying to access or succeed in university or technical school? Explain.
   b. There are high rates of attrition of young women from technical schools/colleges. What are some of the causes you see behind this?
   c. What do you think could be done to better support young women in succeeding in these spaces?
3. After graduation, in the road sector, some options are to work as employees, consultants and contractors. What are the different factors that might influence young women's decision of which route to pursue?

4. We are interested in understanding the experiences of women who have decided to pursue opportunities in the road sector and the challenges they might face both in the workplace, but also in their communities and in their families.

   a. Are there any specific barriers you think women face in trying to access or succeed in technical jobs (probe for the three spaces)? Explain.

   b. There are high rates of attrition of young women from technical positions. What are some of the causes you see behind this?

   c. There are a number of women who have succeeded as employees, contractors and consultants within the roads sector in this country. How do these women cope with their technical work in the roads sector as contractors?

5. One of our objectives with this research is to identify strategies to attract women to technical careers and support them in succeeding in the road sector.

   a. Do you have any suggestions on what could be done to achieve this goal?

   b. Are you aware of any initiatives being implemented - both by government and nongovernmental institutions and what is your opinion about them?

We are reaching the end of our conversation. Is there anything else you would like to add or any question you would like to make to wrap-up? We thank you immensely for your participation. The information you provided will be very helpful in helping us think about ways to promote women's access to opportunities in the road sector.
ANNEX 4. 
Advisory Committee for this Study

Stakeholders

- Roads Authority
- Ministry of Transport and Public Works
- Ministry of Gender, Children and Social Welfare
- Ministry of Education, Science and Technology
- Ministry of Local Government and Rural Development
- Ministry of Labour, Youth, Sports and Manpower Development
- Ministry of Finance, Economic Planning Department
- Malawi Police Service
- Female Contractor
- National Construction Industrial Council of Malawi
- University of Malawi, The Polytechnic
- Malawi Institute of Engineers (MIE) - Women’s Chapter
- UNICEF
- UNFPA
- UNWomen
- CONGOMA
- NGO Gender Coordination Network - MEGEN
- Malawi Human Rights Commission
- YONECO
- Malawi Human Rights Consultative Committee
- Eye of the Child
- National Human Rights Council of Malawi
- Center for Human Rights and Rehabilitation (CHRR)