Gender and accessibility in Rwanda and Malawi

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ABSTRACT

We examine the role of mobile devices in access to social, economic, and architectural spaces and resources by people with vision impairments in two urban agglomerations in Rwanda and Malawi using a survey and open-ended interviews. We discuss ways in which the intersection of gender and disability distinguishes the ways men and women experience access in their respective societies.

General Terms

H.5.m.: Miscellaneous. K.4.2 Social Issues: Assistive technologies for persons with disabilities.

Keywords

Accessibility; Rwanda; Malawi

1. INTRODUCTION

Work in ICTD in the last decade has found that some forms of economic marginality can be negotiated by technology -- thus mobiles may enable fisherfolk to get better prices for their daily catch [1], give greater voice to poor rural populations through citizen journalism forums [2], or increase the ability to control trading relationships for marginal farmers [3]. Likewise, work has examined the areas in which information technologies fail or are simply not enough to impact the nature of marginality and much work in the last decade has recounted failure cases [4].

Other work in ICTD has moved away from the core impact question to examine how access to information technology is situated within the broader lives of marginalized populations such as low-income youth [5], commercial sex workers [6], elderly women [7], etc. Such work does not seek a specific outcome but uses a critical lens to document if and how the lives and functions of people are altered because of the access to technology. We take the latter approach to understand the various ways in which mobile phones play a role in the lives of people with vision impairments with data from Kigali, Rwanda; and Blantyre, Malawi. Although there has been qualitative research on technology and disability in parts of the Global South

the last few years, experiences of individuals can be vastly different by location and context. Narratives from the two locations studied here offer distinct voices to consider in contemporary discourses around technology and development, and also serve as a starting point for the discussion on technology and accessibility in their respective locations.

2. APPROACH

As researchers embedded in a context of work where participants' voices are frequently excluded from the mainstream discourses of technology and development, we focus on a retelling of individual narratives as a central element of our scholarly contribution.

We approach this work from an intersectionality perspective, which argues that people may be marginalized in multiple ways based on the categories of power that exist, and that these experiences of marginality are not just regulated by a monolithic account of marginal identity but by a constant combination of identities that is both contextual and evolving [8]. We argue that such intersectionality is frequently true for many of the populations that ICTD projects work with -- being a subsistence farmer or commercial sex worker, or working in fishing may often represent the coming together of multiple marginal identities. The intervening technology necessarily encounters each of these identities separately, or as one in its interaction with the individual.

Building on work on critical race and feminist theory, the frame of intersectionality has been extended and applied to the experiences of women with disabilities. It proposes that the layering of other forms of marginality resulting from gender in addition to that of disability relegates individuals to a state of non-citizenship by the very institutions designed to protect and empower them [9]. We argue that the separation of the gender identity from the identity and experience of being a person with a disability is not possible, and that failure to acknowledge this intersection undermines our ability to do research on disability and technology.

Recognizing the difficulty in assessing mechanisms on how multiple marginalities are examined in the lives of people [10], we conducted a mixed-methods study in which male and female respondents discuss ways in which technology has impacted their interactions with their social settings. There are two positions we propose in this work. First, gender is a key element that influences ways in which the technology artifact can be appropriated, which is in large part caused by the role of gender in social expectations around technology use. Second, we propose that women can and do use technology to circumvent some of the gendered disadvantages they face in public spaces and institutions.

2.1 Gender and Disability in Rwanda and Malawi

The government in Rwanda has for the last several years been fairly vocal in building institutional means for greater participation of women in society. Post-genocide creation of institutions such as a ministry of gender as well as women's councils built a legal framework for political consciousness on the role of women in public life -- the highest ratio of female representation in parliament in the world [11], workplace quotas, and increased access to education and land tenure [12]. Yet at the same time this has diverted attention from the static state of patriarchies in much of the social sphere [13], created new forms of social friction [14], and made little impact on gender violence or changed attitudes toward women in social roles [15].

Work in Malawi, without the Rwandan institution-rebuilding themes, has focused on its contemporary post-colonial concerns. These include women's agency in the ongoing move away from matrilineal societies [16], the inordinate impacts of famine on women [17], as well as the high social and economic burdens of HIV-AIDS on women [18]. The work on HIV in Malawi and gender violence in the Rwandan genocide both relate issues around the intersectionality of multiple marginal identities. In short, in both countries, research has focused on ways in which women's agency are disproportionately impacted by social and economic structures, irrespective of the formal legal means that are meant to prevent such exposure.

Research shows that the intersectionality of gender and disability is particularly dire in some of the poorest parts of the world [19]. Here, it is more than the identities, per se, but the nature of social restrictions on women, alongside the structural and economic lack of accessibility for people with disabilities, that negatively affect the lives of these populations as a whole. In much of Africa, women with disabilities are more likely to experience poverty[20], and have limited access to health care [21] or companionship [22]. They are more likely to experience stress related to social isolation [23], and are likelier, than blind men, to marry another blind person [24].

Research on the social experience of disability in Malawi mirrors these findings from elsewhere in the region -- access to good quality of life is poorer for women with disabilities than for those without, and they are likelier to be abandoned by men post-pregnancy [22]. This was true for one of the respondents in our study. In Rwanda, research shows that social ostracism and dehumanizing attitudes were significant in women's experiences with disabilities [25]. Work on the state of preparedness of institutions suggests that poor labor prospects for women, caused by resource shortages and inadequate instructional material, exacerbates the poor workforce preparation of people with disabilities [26].

Such themes emphasizing the multiple layers of social exclusion are seen in much of the work on disability and society in the region. Resource shortages intersecting with identities and the corresponding expectations imposed by society and by individuals themselves, impact women's access to social inclusion on various fronts.

2.2 Study sites

The two sites were selected as part of a multi-location study of technology and society. Both countries are largely rural, agrarian, landlocked, and dependent on primary products for export income -- Malawi on tobacco, and Rwanda on coffee and tea and more recently tourism. The two countries are recent signatories of the United Nations Convention on the Rights of Persons with Disabilities.

Both countries have had troubled recent history. Rwanda's catastrophic genocide of 1994 killed an estimated 20% of the country's population and since then, the government has been run under the de-facto rule of former military leader Paul Kagame. Malawi emerged from a single-party dictatorship in 1993. It has had multi-party democracy since but has been vulnerable to climate fluctuations because of its reliance on rain-fed maize. Dominated by small-holder subsistence farming, it has suffered multiple food crises, including a famine in 2002. The gradual sustained loss of access to seafood has made access to food and livelihoods increasingly precarious. The country has one of the highest HIV/AIDS prevalence rates in the world, at about 10% of the population.

In 2004, Rwanda and Malawi had comparable per capita GDPs – at US$202 and US$198 respectively, according to a 2003 World Bank estimate. Rwandan per capita income increased dramatically over the next ten years to US$633 in 2013, largely a result of a period of strong post-genocide reconstruction. Conversely, Malawi's per capita income grew marginally to US$226 during the same period, set back in part by a foreign exchange crisis in 2009. Owing to the weak institutions in both countries till relatively recently, there has been limited state infrastructure for services or access to education for people with disabilities. In both countries, living conditions, access to institutions and workplace training have been documented as poorer for people with disabilities than for people without disabilities [27] [28].

3. METHODOLOGY

We conducted 76 surveys and 20 interviews of people with severe vision impairments or complete vision loss who use mobile phones and work or live in one of two metropolitan areas -- in and around Kigali, Rwanda; and in the Blantyre-Zomba corridor in Malawi.

3.1 Survey

The survey in Kigali was conducted by two researchers, an English-speaker and a Kinyarwandan speaker. The survey in Blantyre was conducted by a single researcher who surveyed in English and Chichewa, using interpreters. The survey had 85 questions and took about 30 minutes to administer. We recruited survey respondents who used a mobile device, were older than 18 and were employed or seeking work. Since all conditions were a requirement for inclusion in the study, respondents had to be selected by snowball sampling.

Table 1. Sample description 1

	Employed	Unemployed	Total
Blantyre	27	13	40
Male	19	7	26
Female	8	6	14
Kigali	13	23	36
Male	11	15	26
Female	2	8	10
Total	40	36	76

In Rwanda, the surveys were conducted by starting with connections through organizations like the Kigali Institute of Education (KIE); thereafter the sample snowballed to respondents' contacts. The surveys were conducted in three primary locations -- Kigali, Masaka and Rubavu. In Malawi, the surveys were conducted by starting with connections through the Malawi Union of the Blind (MUB), and the Malawi Council for the Handicapped (MACOHA), and thereafter through referrals to individuals and organizations. The surveys were conducted in three primary locations -- Blantyre-Limbe, Domasi, and Zomba.

Table 2. Primary mobile expenditures (Converted at 2013 avg. 1US$ = Rwandan Francs 630, 1US$ = Malawi Kwacha 320)

	Min. cost (US$)	Max. cost (US$)	Median cost (US$)
Mobile Device Cost			
Malawi	3.00	600.00	11.70
Rwanda	7.50	52.00	18.00
Monthly Expenditure			
Malawi	0.45	75.00	9.00
Rwanda	0.30	45	6.00

The median age of respondents in Rwanda was 31 years, with ages ranging from 18 to 52. In Malawi, the median age of respondents was 34 years, with ages ranging from 20 to 55. The median number of years using cellphones in both countries was 6 years. Survey questions were close-ended with a few exceptions around the themes of the process of procuring the phone, feature preferences and desirables, and use of the device in daily work and job searching.

3.2 Interviews

The ten male and ten female interviewees from each country were selected from within the sample of surveyed individuals and given the option of conducting an in-depth interview. Interviews lasted 30–60 minutes. Interviews were translated and transcribed. Four researchers who were not involved in data collection conducted the subsequent coding process. Since the interviews were semi-structured and sought to explore specific pre-determined themes, we had greater ability to code and analyze the outputs.

Two of these researchers developed a preliminary coding scheme based on a subset of interviews; these codes were later incorporated into a common scheme with the help of a third independent researcher. More interviews were folded in with the coding scheme recategorized each time, and after seven iterations the final codebook was created.

The final node structure consisted of a codebook consisting of 53 children nodes at a two-level hierarchy, and a total of 1,992 instances of codes. The inter-rater agreement between the first two coders was κ (Cohen's kappa) = 0.70. The data from the survey were overlaid into the coded interview text and linked to the individual interview items for the subset of twenty surveyed individuals who were also interviewed.

The twenty coded interviews ranged in granularity of analysis from 25 codes and 121 instances at the lower end to 35 codes and 388

instances. In Table 3 below, we include a selection of sixteen significant children nodes, which are relevant to this paper, and from which the research presented here was selected. It is important that each of the parent themes was explicitly part of the interview schedule -- thus the interviewees themselves typically covered seven themes: career, sense of empowerment, social networks, gender issues, technology adoption, technology challenges, and perceptions of the state. Some of the nested codes in Table 3 (as marked with *), in this case purchasing habits, career prospects, workplace awareness, traditional networks, etc., were typically part of the interview schedule and thus were more likely to have higher instances of codes, whereas the majority of the other themes emerged organically

The final selection of the topic of discussion in this paper followed a deeper textual reading by an arbitrating researcher who had no familiarity with the research or transcripts. This researcher came up with big-picture themes based on her reading of the transcripts from both countries without access to the codes and categorizations created by the analysis group. The three themes that emerged from this researcher's work were trust, social norms, and gender. We did not set out to conduct a research solely on gender and accessibility, but following the second thematic analysis we concluded that the issues of gender emerged as powerful overarching themes.

Table 3. Coding scheme (selections). * Question about the topic was specifically asked in the interview. # Code was used in examining gender in this study

	Interviews where occurred	Total instances occurred
Careers (parent)	20	279
AT in the workplace	8	34
AT Misc.	8	22
Career prospects *#	16	51
Job search process	13	63
Physical challenges	4	10
Workplace awareness*	19	99
Empowerment due to AT (parent)	20	247
Economic #	5	20
Empowerment Misc.	5	9
Mobility #	18	114
Privacy #	4	15
Socializing #	15	89
Social Networks (parent)	20	160
Tech-mediated networks	4	8
Traditional social networks *#	19	152
Gender and technology (parent)	20	225
Access #	9	34
Purchasing habits *#	19	118
Technology use distinctions #	19	73

The parent node "Gender and Technology" was among the most prominent themes in the coded transcripts, with 225 coded instances from the 1992 total instances, thus this theme was selected for

analysis over social norms and trust, even though both of the latter ideas also emerged in this paper in intersection with gender. We thought that social norms and trust were potentially powerful themes for a paper and that a separate analysis of these could be conducted in a subsequent study. Once we identified gender, we looked at the coded interviews to seek out which parent and child nodes had themes of social, architectural, and economic access that were related to gender. These codes, highlighted with # in Table 3, are the nodes we used to select quotes.

4. FINDINGS

The survey was intended to gain understanding of the use of a range of Assistive Technologies (AT) on phones, but the actual use of advanced functions was very low. Only four users had phones with pre-loaded AT on a smart phone, and two more were regular, active AT users. As we see in Table 4, access to smart devices and Internet was fairly limited on the mobile (a few respondents used GPRS-based Internet access). However, the lack of software such as speech synthesizers on the phones did not point to lack of awareness of AT -- 52 of the 76 users surveyed were screen-reader users on a desktop environment.

Table 4. Low vision and blind users by access to smart phones and Internet on their mobile device

	Using Internet on the mobile device	Using a smart phone
Low vision (up to 20/500 vision loss)	5 (13)	3 (13)
Profound to total blindness (20/500 to no light perception)	9 (63)	10 (63)

The most commonly used device across both samples was the Nokia 1000 series; a total of 30 of the 76 respondents used these basic phones with limited processing ability, and women were likelier to have less advanced phones (see Table 5). Most device purchases were local and tended to be driven by what was available nearby or supported by the major local phone companies. We found a few less common brands, including Donod in Malawi and Tecno in Rwanda. All smart phones were in the sample were purchased from Europe or South Africa. The entire sample used pre-paid recharge.

Since the majority of phones used were low-end devices, the main accessible features included the raised "5" key for keypad orientation, alarm, and audio intimation of cash balance on the SIM. The most desired features were screen-reading, voice-recording, and Internet banking.

The prominence of cellular devices in the lives of the respondents was extremely clear. 57 of 76 said they could go for a day at most without a phone at this point, and 44 of those 57 reported not being able to manage any fraction of a day of regular functioning without a phone. 43 respondents indicated having at no time in the last six months gone without a phone for a day. Older respondents frequently noted greater information exclusion before the mobile devices were available. The two most repeated themes discussed in the comparison to the past were that mobiles allowed respondents to manage communications without mediation and that respondents could pull information rather than wait for it to be brought to them.

The lack of access to smart phones meant that social media was negligible in discussions; only six people in the survey had ever used any kind of social media on their cellular device, and of these only two were using an audio-output. The main thrust of our argument is that the mobile device is a means of navigating a largely inaccessible environment and that even though there are significant strides for individuals' sense of agency, these continue to be undercut by structural impediments on social, economic, and architectural fronts.

4.1 Social Accessibility

In both Rwanda and Malawi, women are typically expected to manage domestic work alongside work related to subsistence farming. Estimates from the regions that are dominated by subsistence farming show that women work more hours daily than men because household activities get added to a range of agriculture-related work, and research in Malawi shows the average female puts in as much as twice the number of work hours as the average male [29].

If a woman has a vision impairment, she will be considered as a useless type of person. Because people, they tend to think she is nothing -- she is a good-for-nothing kind of person. She can't make her bed. She can't make the food for the family, so she can't do anything.

R6, Rwanda

The understanding of a woman as a productive member of society is thus *a priori* evaluated from the perspective of whether she is able to fulfill a set of domestic tasks. There had been no independent living movement in either country, and respondents overwhelmingly lived at home with relatives. A near-total lack of access to accessible internal home environments, as would be common in the Western world, including accessible appliances and tagged containers, were unavailable, thus the dependencies on family members extended beyond public spaces to the very home environments in which women lived.

In both countries, such expectations of feminine duties extended to daily household and ritual events. The lack of means to include individuals in these rituals suggests a broader exclusion from what it means to be a contributing woman in a social ecosystem.

[Say] a woman is supposed to attend the funeral, but a blind woman is timid of going there because they say, 'even if you can go there, you can't do some chores that are done during the funeral services,' so they just leave them behind.

M33, Blantyre

The definition of the individual in terms of their utility to the larger social unit is consequently also the means by which agency is assigned. Going by the quote from respondent 33 in Malawi, one can be excluded from social spaces, even those where access may be regulated solely through being part of a certain group. In the case of a funeral, an important social event, clan affiliation or being part of a family is typically the only requisite. There is likewise a bar of exclusion from the resources requisite to acquire technology, because it needs to be funded through the family to whose cash resources the individual may have limited recourse. Out of 24 women, 14 in our sample were unemployed, and 9 had no sources of cash without having to ask someone.

In Table 5 we find that about 15% of all men used donated mobile phones, whereas almost 40% of women had donated devices. The snapshot of amounts paid for devices in Kigali is more comparable

across gender; the differences are more perceptible in Blantyre, where the median price paid by men surveyed was almost twice of what women paid. In fact, the very difficulty of finding female respondents who had access to phones in our survey underlines the lack of access to AT of any kind for blind and low-vision women.

Table 5. Median cost of mobile device by gender

	Using free or donated device	Using purchased device	Mean cost of device	Median cost of device
Blantyre	9	31	$32.72	$11.70
Male	3	23	$45.70	$17.25
Female	6	8	$8.46	$9.00
Kigali	8	28	$19.28	$18.00
Male	5	21	$20.60	$18.00
Female	3	7	$15.37	$18.70
Total	17	59	$26.75	$15.00

The more instructive figure is that women in this sample were more likely than men to have a phone purchased off the shelf, rather than used. Of the 15 women who did not have phones gifted to them, 13 had an instrument that was purchased off the shelf, and only 2 had used instruments, whereas among men, 26 had new instruments while 18 had used instruments. This difference, where women are more likely to buy off the shelf, is also seen in other research that shows women pay more for their technology than men due to information asymmetries [30].

(Women need to buy from showrooms) because women are really very bad at bargaining. They're so bad at bargaining that if a seller tells them that a brand of cell phone costs 4,000, they will be shy as to the response they will give… I know all the average (people) and what kinds of cell phones they have. But women simply can't deal with those things --with electronic devices, women are just -- they can't do it.… But if I go to the store and I want to buy a cell phone I will say I want a Nokia 8 and if they bring it to me and then I feel it and I say, yes -- that's the brand I want.

R7, Kigali

In interviews, we asked interviewees to comment on men and women's purchase patterns. To some extent, women's purchase pattern was attributed to what may perhaps be interpreted as the "feminine qualities" of not understanding the market processes, as we find with R7 from Rwanda. Inherent in the feminization of why women buy from a store and its ascription to lack of "street smarts" is part of a commonly found refrain of attributing ingénue to women with disabilities, of being helpless, childlike, and therefore susceptible to the ills of the world [31]. But here we find it is not necessarily just an ableist bias but rather a gendered one that comes from a man with a disability. A look into purchasing behavior gives us more nuances into what are useful directions in examining women's access to markets.

Women are always having to be kept hidden because that's how they were brought up. There is this problem -- this issue of having luxury items. Of course some of the women will tell you that they bought their mobile devices. Well, they didn't actually. They got those as gifts.… [men] travel. They always get around and they know how much X has bought it and Y has bought it and how much Z has paid and they have to just make some kind of average.

R4, Kigali

The statement from R4 alleges a different bias -- that women have recourse to feminine qualities in accessing resources. Yet, we see no evidence of this in our data. R4's second statement raises an important point on the gendered social space of second-hand phones. Social networks that enable access to second-hand technology are better available to men. In both locations, men had better access to social networks in part due to fewer imposed travel restrictions, which gave access to used phones through contacts. Women were more dependent on formal sources, added to which they had less access to the cash resources needed for the technology.

Less access to social networks reduces ability to triangulate prices or know brands and technologies. Research has shown that there is an extremely active used device market for low-end Symbian devices for people with vision impairments because these can be sold with the pre-loaded software. This is significant with the majority of basic phone users, since the comparatively better phones of the wealthier users will invariably end up in the used-phone markets in time.

Outside of networks within communities of people with disabilities, the lack of non-visual means of interacting with sighted people creates a more fundamental barrier to broadening social networks. Even in the few integrated spaces, such as places of higher education, we find respondents citing a lack of bridge between themselves and sighted people, who perceive them as a necessary other.

Disability in general and vision impairment in particular is yet to feature in that very well, to the extent that the graduate of the school, that's the person with no noticeable disabilities, does not know how to interact with a person who has visual impairment, and that creates fear. That lack of knowledge creates fear on 'how do I deal with that person?'

M5, Blantyre

Attitudes of avoidance of people with disabilities in social, professional or even casual settings have been observed the world over [32]. What compounds the case here is a lack of institutional means or mass media to create greater awareness about disabilities. The consequent lack of familiarity in the mainstream, especially on AT use, creates a frozen 'visibility' of disability which assumes blind people cannot manage independent digital communication.

The role of religion emerges in the ways disability was perceived in both countries, which have extremely high rates of practiced religion [33]. Belief systems were typically the frame through which people with vision impairments were seen, putting charity-oriented perspective at odds with visions of independent, working blind professionals.

The problem we have in Rwanda -- people understand the activity, or the working, of the blind person as a mystery. So, they don't understand -- they say, oh: 'the God is all might,' which means I'm not doing normal work. So, we need that -- the community -- to understand that we're working normally. There is no miracle there.

R5, Kigali

Such use of religion and God in discussions related to people with disabilities by able-bodied persons is a commonly seen in research in various parts of the world [34]. The attribution of AT use to a larger-than-life entity 'others' the individual, removes her from the task and attributing it to a higher entity, whether God or the technological artifact itself.

Removing people with disabilities from interest in what is considered 'mainstream' was also found in how respondents discuss

personal relationships and technology. On one hand, the female body is a constant object of sexual attention that drives restrictions on her 'dangerous' movements by family members. Yet, the disabled body is itself desexualized, so the role of private relationships or companionship of people with disabilities is typically excluded from the broader mainstream-led discourse on disability.

I think at least if I was able to send messages on my own, at least my love would really improve. You know what, sometimes it happens that maybe you have a certain message you feel like sending, it's something like a secret, you don't need just to disclose it anyhow to any people I mean anybody, so if I was like able to send message on my own, I would be like the very very happiest person.

M26, Blantyre

Mobiles enabled access to privacy and agency over one's communication. For men and women alike, this enabled the creation, maintenance, and control over communication frequency in relationships of all kinds. This factor may go unnoticed, if we examine the role of mobiles from a pure 'productivity' lens. Approaches of seeking 'development' through quantifiable outcomes are often common in ICTD. Yet as we see in Table 5 below, the perceived impacts on independence and social participation are ranked very highly by both genders in the two locations.

4.2 Economic Accessibility

Being channeled toward certain occupations has been part of the educational and professional experience of people with disabilities across several contexts [35]. In both countries, relatively nascent educational infrastructure for people with disabilities and the lack of access to Braille training and materials have been a barrier to access to appropriate career training.

A person with a disability is expected to do nothing but get help. People with education, those who've acquired formal education, often approach a person with disability with a medical view whereby you need to get treatment to recover the loss of ability through impairment. Or, if that is not possible, then you are left aside.

M5, Blantyre

In this setting, access to digital information through screen-reading technology has been an important means of increasing the availability to learning resources and advancement within the educational system. Yet while 52 of the 76 surveyed were desktop AT users, only 13 had screen reader access on phones. Mobiles are used more as logistical devices in the pursuit of education or work options rather than core computing devices as in other parts of the world.

When I had not a mobile phone, I can say that I felt -- broke. It means that I was like -- one, or alone. But after having a mobile phone, I felt open ... when I needed someone to help me with my studies, so I contacted them with the mobile phone. So this changed me. This transferred me from being alone to being open to others.

R5, Kigali

Perceptions of independence or social participation from access to mobiles recorded higher than economic benefits (Table 6). Arguably one can feel more 'independent' or 'participative' as an individual, whereas economic gains are measured on relatively tangible scales of increased earning or access to new job opportunities.

Table 6. Comparison of means, scoring of mobiles' perceived impact on various factors (Likert scale 1-5 – '3' is neutral)

	Blantyre		Kigali	
	Male (26)	Female (14)	Male (26)	Female (10)
Independence	4.46	4.64	4.56	4.40
Productivity	4.30	4.07	4.62	4.10
Safety	3.92	3.78	4.62	4.30
Social participation	4.38	4.07	4.65	4.90
Economic participation	4.23	3.50	3.92	4.30
Income	3.34	3.20	3.84	3.60

Although our research was conducted in primarily urban areas, urbanization in the two countries is low -- 15.7% in Malawi and 19.1% in Rwanda, among the lowest in the world (UNESCO 2011), respondents were largely urban transplants and had several family connections to rural areas, and spent time in the countryside even if they did not participate in the local economies. Likewise in Malawi, respondents were removed from "ganyu," or temporary agro employment, which is a common activity for Malawians helping out in their own holdings or in those of neighbors, friends, or other farmers for cash [18]. The separation from participation in subsistence farming as part of the daily economic life becomes a cultural exclusion from an activity that ties together people as a point of common reference. The gendered expectation of workplace participation served as an additional impediment for female interviewees.

Nursing is a very likely preference for a girl child. And because a lot of people believe that a blind person cannot be a good nurse -- then that means that I am excluded from nursing. That's one of my choices -- gone. And then, as it has been in Rwanda, people will be thinking that I cannot be a good teacher because I am a blind. Well, teaching is considered more a feminine job and then that's another choice for me that's gone.

R3, Kigali

The need for better access to social networks to participate in the labor force emerged as a deterrent to workplace access for women. As with their access to lower-cost technology discussed in the previous section, men were able to use their social networks and relative freedom to navigate gendered spaces to create connections that could lead to openings.

The boys that I know with VI (vision impairment) and who have good jobs are those who could just go around and talk to so many people. And they met like in pubs and in the bars and they talked. And then later on they could just find a job. But it would really be a -- it would seem to be a bit odd for a woman to just invite a man to a pub and talk. Sometimes people would have to think that it is though you are just selling yourself -- as if you are offering your body.

R9, Kigali

The lack of prominence of people with disabilities, particularly those with vision impairments, in the workplace impacted the prospects of both men and women seeking work. Research has shown that able-bodied persons may have ideas about what kinds of adjustments or discomforts they may encounter themselves in

working with a colleague with disabilities [36], which in turn makes people unwilling to work alongside people with disabilities.

For respondents seeking work in white collar settings, the situation is further complicated by employers' unawareness of screen-reading technology, their concerns about exactly what programs will be supported and which not, and finally what it would cost to acquire and maintain the requisite AT.

Sometimes if you just go and apply for a job – if you include it in your CV, in your application letter that you can use the new technology, they simply won't believe you. They will always keep asking themselves – how is she going to do it? How does she proceed? And where are you going to get that technology? How are they going to procure that equipment? Maybe they believe it's expensive or something like that.

M9, Blantyre

4.3 Architectural Accessibility

Accessible transportation and architecture had an overarching effect on various kinds of social and economic accessibility. Rapid changes in the landscape, pushed by the population pressures has led to positives such as greater access to public transit, but created pressures on walkability, new street configurations, and allowed for constructions that are not accessible. Inter-city travel has improved because of street infrastructure, but travel to suburbs or urban satellites such as Limbe near Blantyre, or Rwamagana near Kigali, was more congested because of urban developments. Taking a taxi was an expensive option, but mobiles did enable booking taxis, making the travel easier and safer overall.

I get a taxi to go from Rwamagana to Kigali. So when I have a contact phone of someone who I go to meet with him – I am not afraid. Because I know when I reach Kigali he can orient me, he can give me some information to reach him.

R5, Kigali

The challenge of last-mile transit was true for both locations, especially during first-time travel. Mobiles were clearly seen as critical in this respect, either for individuals themselves to be spoken through directions, or as a means of negotiating location through passers-by.

Short urban hops in towns and cities in both Rwanda and Malawi are served by a range of formal and informal transit options. These include pillion-ride motorbike cabs and bicycle taxis (with a 'pillow seat' behind the driver), both of which can be inexpensive means of getting around, but uneasy for blind riders in general, and females specifically because of the seating arrangements. More generally, female respondents had misgivings about risks from other individuals, and being taken advantage of when one was identified as a blind person.

Men are so courageous, they can move along without relying on somebody, they can move along maybe without having a guide besides them, because they are courageous, unlike women. It's very difficult for a woman to move alone without a guide. Most of the time, it's like we doubt about ourselves and on top of that a lot of women don't like using canes. Because the canes are very important as far as independent movement as far as blind person is concerned.

M26, Blantyre

Female respondents cited safety issues associated with the mode of travel – taxis were more expensive and isolated. 26 of 27 Rwandan men took motorbike taxis regularly, whereas only about 60% of males or females in Malawi ever took a motorbike taxi. Buses were the most common mode of transportation (75 of 76 used buses). While there was no use of transit tech such as scheduling apps, having a mobile enabled booking motorbike taxis through known local riders.

The quality of sidewalks varies throughout Kigali. Well-trafficked, arterial downtown streets are relatively well-maintained, but sometimes uneven or patchwork and obstructed by vendors. Neighborhood routes often lack sidewalks, incline sharply and are often unpaved and uneven, obstructed by vendors, rocks and debris. In and around Blantyre, most daily navigation involved a mix of going through paved thoroughfares and smaller residential or commercial streets. As with Kigali, sharp footpath edges were a hazard, and street vendors were an obstruction to foot traffic. In both locations, commute typically included at least some interaction with mud paths – market areas for instance were typically unpaved which did poorly in rain.

Women are shy, they don't like walking. They think that they can be laughed at if they fall in a pit somewhere, but men they don't care.

M33, Blantyre

Street infrastructure has impacts on gendered expectations of public appearance. Even if the infrastructure is inadequate, the individual is nonetheless subject to the norms of public behavior. Women noted for instance that men had an advantage of not needing to carry anything – since their phones, money etc. could be fit into pockets, whereas women needed to carry bags which were susceptible to theft or loss, and often took away the use of both hands during commute.

Decisions to travel involved cost, and the rapid changes in public spaces increased the risk of disorientation. The mobile played a two-edged sword on this front. On one hand, people had greater ability to control the interactions they needed – thus meeting someone in public could be replaced by having a phone conversation. Conversely, this potentially increased isolation and perpetuated the status quo of inaccessibility in public spaces.

Sometimes (one would) be stranded, if they can see that we are stranded, they need to assist, because you can simply maybe standing somewhere without anyone to take care of you,...But then afterwards when I got my mobile phone, what would happen is I would call friends and they would come home...I call them. "Can you come, I'm alone"

M2, Blantyre

The interaction that M2, whose friends are largely sighted, explores an contrast that we find in Malawi compared to studies of social networks of women with vision impairments in other contexts. Blind women end up developing in-group friendships and social connections due to segregated institutions [37]. However, this may also well be a generational moment. We find that older respondents often did not go to blind schools or had much less access to others with shared experiences of disability growing up, and thus lacked social networks to enable other means of access such as technology recommendations etc. However, with economic and political stability in both countries and the corresponding growth of institutions, this story may be different in a few years.

Accompaniment, or depending on a sighted person, was an impediment to commuting for both sexes, particularly females. Mobiles played a role in reducing this dependence because commute partners were usually just a fail-safe. In the typical scenario they would not be needed, but in the words of respondents,

the possibility of an incident during the travel experience would make it helpful to have that companion.

I can (now, after having the mobile) feel confident that I can leave this campus for Limbe. And my independence is in that, because otherwise I can be doubting, to say 'should I really go' or I need to take somebody sighted to take me there. Just because I wouldn't have a reliable means of communicating with people in Limbe to meet me. I would be thinking of having bus fees too, for two people. So I will have to negotiate for somebody, organize bus fare for two people, and my independence there would be limited.

<div align="right">M1, Blantyre</div>

5. DISCUSSION

The intersection of disability and gender permeate the life experiences of our respondents. The identities people choose, or are assigned to them, govern not only the way they perceive themselves, but more fundamentally dictate the ways social and economic resources are assigned to them.

Technology, when brought into this mix of structures, identities and the existing power relationships that guide them, can indeed have the impacts that transform systems or individual actors within them. But as we find in this data, being a person with a severe visual impairment may not as a single category capture the breadth of impacts technology may or may fail to have.

We find as much or more in common between the 'categories' of 'Malawian women' and 'Rwandan women', as we do between, for instance: 'Malawian men with disabilities' and 'Malawian women with disabilities.' In turn, we may have as much or as little to say about what makes their shared experience with technology common. Categories such as disability, nationhood, or gender do not work separately, but are rather necessarily interconnected on how they shape experiences of those whose lives fall in those intersections.

The respondents in both locations are subjected to different systems of marginalization, depending on the economic, social and architectural contexts we examine. Resulting impacts of technology touch not only the ways in which big life decisions are made, but in a very visceral manner, the nature of the mundane daily experience which is eventually what add up to the life trajectories around social aspiration, personal desires, career prospects.

When kinship is strengthened through shared experiences, say for instance in harvest activities, declining people with disabilities from attendance excludes them from affiliated benefits of that kinship. But when women are specifically singled out of social participation in family or clan activities such as funerals, their ability to participate is subjected differently than those of men with disabilities. Such examples abound in the interviews. Gendered expectations of family roles, public appearance, or social norms may reduce women's access not only to employment, but even what brands of mobile devices they could buy easily.

We find here that inaccessible streets, reliance on two-wheelers, or gendered notions and experience with sexual danger are factors in assessing women's use of mobiles, but without the lens of intersectionality, these would be missing or flattened under meta-categories of impacts or themes that apply across the board to persons with vision impairments.

The social construction of ableism in Malawi and Rwanda are arguably comparable to that in many other nation-states. Indeed, while both countries have signed the UNCRPD, access to educational institutions for people with disabilities is low, public spaces are inaccessible, and the workplace has little awareness of people with disabilities participating as productive employees. That one of the disability groups we interviewed noted their primary goal as stopping 'blind people from begging' underlines the extent of exclusion.

In nation-states like Rwanda and Malawi, each tagged with the ignominious title "Least Developed Country" by the UN, it may well be that the ability to functionally support institutions and cultural attitudes for more accessibility will be seconded to other priorities in nation-building. Gauging from the commonalities in their experiences, the important question then is, what do these two countries teach us about means of approaching accessibility elsewhere?

For an ICTD audience, the related question is, where is technology, as an artifact of individual agency, situated in this equation? Indeed, arguments of technology being able to "fix" problems are already largely rejected within much of the community that has worked on projects that have examined how the rubber hits the road on technological artifacts trying to solve systemic challenges. But these two cases nonetheless remind us how it is important to look beyond the individual as the self-driven change agent and instead look at agglomerations and categories at various levels to understand where support is needed – and where that support won't just come from technology.

6. CONCLUSION

Mobile devices clearly have important effects on the lives of people with disabilities. We find that despite the distinctions in the ways people experience some of the effects, impacts themselves are beyond doubt – people are able to negotiate public access, manage communications and social relationships in ways they were never able to. Although economic impacts are self-assessed as relatively lower by our respondents, they nonetheless underline just how much a part of their daily being the technological artifact has become.

Much as we find a lot that brings together the experiences of women with vision impairments in Rwanda and Malawi, it is important that patriarchy may work in very different ways in these contexts than perhaps in neighboring states like Uganda, South Africa, or for that matter parts of rural Malawi or Rwanda where we did not work in [38]. Indeed, the marginality of being rural and disabled is vastly underrepresented in most studies of disability and society.

Yet, there is much in common as shared experience that we can use in understanding what makes a community of people included or excluded from a social system. It is urgent, and critical that these narratives be explored and discussed within the ICTD community as potential areas where technologies have a role to play. As a community of researchers involved in both the design and examination of technological artifacts, it is critical that we access the narratives of users of these technologies find their lives impacted by technologies built and shipped far from their immediate settings.

Intersectionality, specifically around issues of gender, is a lens that helps us understand better where the technological artifact figures in changing a group's access to resources and inclusion in society. No category or sub-category of users is static, or can claim to be adequately illustrative of the group it claims to represent. But yet, gender issues represent a pervasive enough class of issues that studies of technology and accessibility in the Global South need to address it as a fundamental point of departure in examining the impacts of design decisions on society.

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