

Generational Gaps: Women, Rural Traditions and Community Networks*

Nicola Bidwell**

Abstract

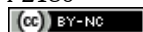
Community Networks (CNs) can provide access to telecommunications in low-income rural areas that are excluded by dominant connectivity models. Women and older people often constitute relatively higher proportions of these populations, thus this paper explores interactions between technology, gender and age in three CNs in rural Africa, Latin America and South Asia. All cases are situated both in local governance structures dominated by men, including a tribal authority, indigenous assembly, and a village council; and in collectivist cultures where women are involved in community work but not in decision-making. I generated data about people's everyday practices and opinions in relation to their local CNs in focus group discussions and interviews of different sorts with 76 men and 60 women, including network initiators, champions, operators, users and non-users. Older women significantly contributed volunteer labour but were less likely to use their CN, for instance because they did not own/know how to use devices, or because the location of hotspots was unsuited to their daily lives. Meanwhile, younger women frequently used alternatives to the CNs for connectivity and sometimes established their own enterprises in this; which contributed to some older women's perspectives that younger women were increasingly separated from communal traditions. This has the potential to amplify generational gaps amongst women and patriarchy within CNs. Such divisive potential may be further exacerbated by masculine bias of priorities in global discourse on telecommunications technology and policy, which tends to emphasise certain concerns about access over concerns about power relations embedded in infrastructure.

Keywords: Community Networks, WiFi, Rural, Global South.

* Received October 1st 2019, accepted May 28 2020.

** Adjunct Professor International University of Management. Windhoek, Namibia. nic.bidwell@gmail.com / <https://orcid.org/0000-0002-4284-2180>

<http://dx.doi.org/10.1590/18094449202000590004>



Lacunas Geracionais: Mulheres, Tradições Rurais e Redes Comunitárias

Resumo:

Redes Comunitárias (RCs) podem fornecer acesso a telecomunicações em áreas rurais de baixa renda, que são excluídas pelos modelos dominantes de conectividade. Geralmente, mulheres e pessoas mais velhas, constituem, de forma relativa, as proporções mais altas dessas populações, portanto, este artigo explora as interações entre tecnologia, gênero e idade em três RCs na África rural, América Latina e Sul da Ásia. Todos os casos estão situados em estruturas de governança local dominadas por homens, incluindo uma autoridade tribal, uma assembleia indígena e um conselho de aldeia; e em culturas coletivistas onde as mulheres estão envolvidas no trabalho comunitário, mas não na tomada de decisões. Eu gerei dados sobre as práticas cotidianas das pessoas e opiniões em relação as suas RCs locais em discussões de grupos focais e entrevistas de diferentes tipos com 76 homens e 60 mulheres, incluindo iniciantes em redes, apoiadores, operadores, usuários e não usuários. Mulheres mais velhas contribuíram significativamente com trabalho voluntário, mas eram menos propensas a usar as suas RCs, por exemplo, porque não possuíam/não sabiam como usar os dispositivos, ou porque a localização dos pontos de acesso não era adequada para suas vidas diárias. Enquanto isso, as mulheres mais jovens frequentemente usavam alternativas às RCs para conectividade e, às vezes, estabeleciam seus próprios empreendimentos nisso; o que contribuiu para as perspectivas de algumas mulheres mais velhas de que as mulheres mais jovens estavam cada vez mais separadas das tradições comunitárias. Isso tem o potencial de ampliar as lacunas geracionais entre as mulheres e o patriarcado nas RCs. Esse potencial de divisão pode ser ainda mais exacerbado pelo viés masculino de prioridades no discurso global sobre tecnologia e política de telecomunicações, que tende a enfatizar certas preocupações com o acesso sobre as relações de poder embutidas na infraestrutura.

Palavras-chave: Redes Comunitárias, WiFi, Rural, Sul Global.

Introduction

On a hot October afternoon, after the final structured discussions in my multiple case study, I sat chatting to eight women in a Central Javanese village's volunteer group. The women had participated in discussions and interviews a few days before, but our conversation this particular afternoon was imbued with a tender, jovial and respectful informality that had grown between us over in the past two weeks at lunchtimes. The women in the volunteer groups had prepared extensive lunches for myself, the interpreter, and men working in the village offices, with a hospitality that had humbled me. All mothers and grandmothers aged over 35 years, the women explained that fewer younger women participated in any of their volunteer groups these days, "*they are more connected to their phones*", one woman said. Actually, relatively few younger women had taken part in the focus groups in which we discussed people's use of the WiFi network in their village, which was used most by younger and middle-aged men. As I noticed in some other community networks in rural villages, younger women sought alternative communications. The women of the volunteer organisation in Central Java worried that traditions of village care might not persist across generations if younger women did not participate. I was left wondering how excluding women might impact on the sustainability of rural community networks, given women and older people comprise high proportions in rural populations in the 'global south'.

Rural community networks (CNs) have attracted interest in the past decade as ways to increase access to telecommunications in the 'global south' (e.g. Siochrú and Girard, 2005). Generally, CNs are defined as decentralised telecommunications networks that are built and operated by citizens for citizens (Baig et al, 2015). The "network" in a CN can be WiFi interconnecting local access points to an intranet between or to a shared internet connection, or it could involve a cell-phone system, and sometimes a low-power FM radio (LPFM) is also considered to be a CN (see: Global Information Society Watch, 2018). The "Community", to which the definition

refers, comprises inhabitants in the geographic locale where a network is deployed who collectively own, manage and maintain the network infrastructure as a common resource. In 2016 representatives of CNs from around the world at the Internet Governance Forum in Guadalajara recognised that bottom-up strategies that embrace “diversity in the first square mile can truly empower individuals and communities” and made several declarations that aim to promote both gender-balance and community management (Declaration on Community Networks, 2016). Achieving these, however, is not without tensions in the context of gender power relations in technical domains and the traditions of some societies. This paper explores some of these tensions in relation to gender and generation in three cases of rural CNs in Africa, Latin America and South Asia. All three cases are located in societies where women undertake considerable voluntary labour and local governance structures are dominated by men. However, I begin by situating the paper in the literature about women and CNs to suggest the importance of accounting for age.

Women and Community Networks: Related Work

CNs were first created by technology enthusiasts before the internet and then adopted by social activists (e.g. Song et al, 2018) and spread to rural and urban areas. Many CNs are small, for instance PamojaNet’s WiFi and a public access kiosk provides the population of Idjwi Island, in Lake Kivu Democratic Republic of Congo, free internet during off-peak times. Some CNs, however, provide internet connectivity to large populations, for instance Guifi.net in Spain has over 32,500 nodes over a vast geographic area, while Macha Works has inspired the launch of CNs in nearly all the provinces of Zambia (Mweetwa and Van Stam, 2018). Historically, the CN movement, and the overlapping cultures of free and open source software, low-power radio and Internet governance advocacy (Terrell et al, 2017, Reagle, 2013, Dunbar-Hester, 2010) associate with white masculinity. In a recent book

about the technical, policy and social concerns of CNs around the world (see: Global Information Society Watch 2018), over half the 75 authors had names that suggested they were white, and under a third of its 44 articles had women in their author lists. We might anticipate, but not justify, racial bias since the movement originated in North America and Europe some thirty years ago yet, given the movement has sought to inclusively empower non-experts, it is surprising that just five were written only by women compared with 20 articles written only by men. Associations between technological skills and masculinity differ little from industry globally where, for instance only 21% of telecom engineers are women, and women represent far less than 10% of CEOs and CIOs of sector members of the International Telecommunications Union (ITU) (International Telecommunications Union, 2018). That is, despite efforts by the CN and allied movements to disrupt the exclusion of the “old-school engineer way” there is a persistent gendering or a “dudecore” (Dunbar-Hester, 2010).

Low gender representation also persists in research about and policy advocacy for CNs. A brief search in the Association for Computer Machinery’s Digital Library, in May 2019, shows that only 18% of 50 authors of the top 10 most recent papers about CNs had women’s first names and just one paper studied relationships between CNs and gender (see: Shewarga-Hussen et al, 2016). Feminist researchers also note an absence of diverse perspectives on regulations impacting CNs (Zanoli et al, 2018) and that white men dominate lobbies and advocacy for telecoms technology and policy (Anonymised, 2018). Indeed, while media activists have sought to include women in teaching about technical skills and public use of the radio spectrum since the mid-1990s (Dunbar-Hester, 2010) in 2018 women are rarely present above 10% in international legal and regulatory discussions or speak more than 20% of the time (ITU). Feminist researchers propose that this under representation influences perspectives on how telecoms are considered viable and sustainable and this affects the way that

success in measured and timeframes for success (Zanolli et al., 2018), and ideas about scale, skill and quality (Anonymised, 2018).

Citing Eglash (2002), Dunbar-Hester (2010) explains that the geekiness associated with technology endeavours performs in the lack of diverse inclusion in community connectivity projects as geekiness associates with white masculinity. That is, the identity of the technology activities, as much as the actual activities or acts of people who do them, is exclusionary. Certainly, some of the equipment and activities associated with equipment in CNs strongly associate with masculinity. Dunbar-Hester (2014) proposes that excluded groups develop different strategies to enable them to access and identify with technoculture. Addressing the identity of technology activities is part of what feminists in hacker and maker communities do in Austria and Netherlands producing facilities, tools and relationships on which feminist practice relies, such as participatory design and safe space (e.g. Fox, 2015, Savic and Wuschitz 2018). Such feminist infrastructure is an example of integrating infrastructures to suit certain community principles and may enable groups that are excluded by white masculinity of geek culture to participate in CNs.

Configuring Power in CNs

Definitions of CNs located in the North American and European CN movement involve horizontal relationships between management, operation and use of networks. However, this definition has been adapted in leveraging CNs to afford connectivity to the unconnected in the “global south”, which often locate CNs in local governance arrangements and relationships with external technical organisations groups. This situation represents a set of paradoxes, since even proponents who oppose hierarchical power structures inherently deploy technical abstractions, conventions and artefacts that are already embedded with certain values and their own privileged expertise in order to promote egalitarian technological engagement (Anonymised, 2019).

In western democratic forms of a CN users set-up, operate and govern the network, and CN members are combinations of initiators, volunteers and users, who are geographically close to each other and to the technical infrastructure. Many CN activists aim to oppose concentrations of power, hierarchical engineering culture and paternalist approaches yet, as Dunbar-Hester explains imposing approaches that foster people's personal technological agency is universalist. Certainly the standards, protocols, software and infrastructure design deployed in CNs emerge from sets of interlinking infrastructures that are embedded with certain values, beliefs and norms (Anonymised, 2019), and CNs pays less attention to the ways these enact power relations than to, for instance concerns about network access and stability (Vicentin, 2017). Dunbar-Hester (2014) compares the perspectives of activists promoting personal agency in technology and connectivity to African American neighbourhood residents who sought 'keep up with society' and suggests a universalist approach to egalitarian technological engagement evades engaging with differences in power, access and status among different groups. Reflecting on CNs in Brazil, feminists in wireless initiatives observe that values about freedom, openness and collectivism can suppress or ignore the perspectives of the least powerful people and limit opportunities for CNs to develop their own goals (Zanolli et al., 2018). Indeed, valorising participation in software and network engineering in order to oppose 'expert power' perpetuates implicit power relations between the different tasks involved in CNs and this conflates with gendered divisions of labour, where men do computer work and women do organizing and logistics. Even in the US, when encouraged to focus on technical skills, women find it difficult to resist gendered division of labour (Dunbar-Hester, 2010).

Gendered power relations may be further exacerbated in attempts to avoid universalising a canon of personal technological agency. Many CNs in resource-scarce rural regions where there is little local technical capacity involve technicians and paid employees, based in towns or cities, far from rural villages

supporting existing approaches to communal resources via local governance structures like traditional village authorities. In South Africa, for instance, CN equipment was located in the homes of tribal authority leaders (Rey-Moreno et al, 2014, 2016) and prior to the CN a technology intervention in the same area revealed how power relations between different levels of local tribal authorities and between women and men determined decisions (Anonymised et al, 2013). Yet, norms in women often undertake invisible labour that sustains a CN economically (Shewarga-Hussen et al, 2016). Often CNs facilitate access to network and support services provided by other entities such as commercial providers, or support organisations that maintain the network and business infrastructure for one or more local networks beneficiaries. Thus, users do not directly influence CN decision and these CNs, are somewhat similar to public WiFi. For instance, Gram Marg (Belur et al., 2017). Further, the placement of WiFi. Various constraints limit women's access to public WiFi social constraints on movements in India, and safety concerns in South Africa (Mudliar, 2018; de Lanarolle et al, 2017).

Access and Age

There is little literature about the effect of the intersection of age and gender on inclusion by CNs. In fact, of 44 articles about CNs over 40 different countries, older people and elders were mentioned only eight times, and rarely as participants in ICT activities (see: Global Information Society Watch 2018). Yet age matters significantly in the use of ICT in general, sometimes even more than gender. Surveys in Asia, Latin America and Africa suggest older people, particularly older women, are left out (Rashid, 2017) while in countries like Germany some 66% of men, but only 43% of women, between the ages of 60 and 69 years were female online users (Buchmüller, 2011). Feminist CN programmes in Brazil include people of diverse race, sexuality, gender/gender identity yet there is a notable absence of elderly women (Zanolli et al, 2018). An ICT programme in the Seychelles targets unskilled young

people and the older population in training, and notes that ICTs that many people aged over 40 years feel afraid and anxious because of their unfamiliarity; however, there are only two CNs with activities oriented specifically to include elders. Fantsuam CN in Nigeria in fact targets people aged over 70 years in basic digital literacy programmes, and mothers, rape victims and teenage girls in information and support services because it serves a region that is populated by elders, adolescent girls and young women, after sectarian violence killed many young men (Dada, 2018). To increase diversity amongst users and ensure older people engage beyond buying internet access for their children, TakNet focuses on ways that access can more effectively be part of their day-to-day life. Indeed, as literature about women's use of public WiFi, which I next discuss, suggests understanding the inclusion of women at different life-stages in CNs involves recognising that women's routines and access to support vary at different stages of life.

Based on a sample of 5,000 men and women surveyed between 2007–2012 in Bangladesh, Philippines, Ghana, Brazil and Chile (Rashid, 2017) describes that 90% of users of public access ICTs were aged 34 years or under and, compared to men, women relied more on mobile phones and less on computers to access the internet. Various studies suggest that public WiFi in South Africa is frequented more by men than women, younger than older people and middle-income more than lower-income diarists. (de Lanarolle, 2017; Chigona et al, 2016). Public WiFi is less well used by women than men in the US (McConnell and Straubhaar, 2015) in Switzerland, where business oriented, and more men use it for e-mail and mobile work, and when there is a higher female presence it is in younger women who use it for social networking (Picco-Schwendener et al., 2017). Women during the so-called “rush-hour of life” (Scheerder et al, 2019), when they spend most time managing children amongst other duties, have less time to access public WiFi. Detailed diary studies in South Africa reveal how women devote considerable time using their phones to manage small economies of data, such as through local device-to-device sharing, but fit this into busy routines (de Lanarolle, 2017). A study

of home internet access in Holland shows that women's lives posed more challenges to coordinate not only their jobs and household duties but also the lives of their partners and children. These women were more concerned about the daily purposefulness of ICT and its role in interpersonal communication or care for others, while men used ICT more for entertainment and self-referentially; and women between 30–45 years, used ICT to manage considerable organizational complexity in their lives (Scheerder et al., 2019).

For women older than 50 years, a wider difference appears, in part because they did not grow up with the internet and because they have less intensive family responsibilities. In Holland women between 50 and 65 years who are ICT users at home are more selective and feel less compelled to be online than younger women (Scheerder et al., 2019). In rural China, however, older women gradually become familiar with technology and accommodate their use into their daily rhythms because they have time to play, such as online games, and are motivated to use ICTs to stay in touch with their children who have migrated to cities (Oreglia, 2014) Older women in China find it easier than older men to ask for help with technology because the women accept their lack of knowledge and are willing to be taught by their children.

Three Cases

This paper describes rural CNs in Mexico, Indonesia and South Africa that were part of multiple case study. The study sought to characterise the impacts of CNs in their local constituencies, identify the ways that CNs exclude people and determine opportunities for widening their benefits for six CNs in two countries in each of Asia, Africa and Latin America. These six cases were selected from some 40 potential CNs based on the CNs': visibility to the team, directly or via contacts, and interest expressed; rural location and distribution across three continents; logistics and predicted accessibility of sites in short visits; opportunities to obtain data about diverse business models,

technologies used and services provided; length of establishment; languages spoken; and the potential for this set to represent a wide range of impacts. and, to a lesser extent potential impacts from a review of online documentation of 23 CNs in 19 countries. It is impossible to determine whether these cases are typical, especially significant, deviant or extreme. In this paper I focus on cases in which participants explicitly referred to links between their CN and existing local governance structures, ancestral ties to the area and communal traditions, such as expectations of voluntary work. Additionally, all cases are in countries with medium development indexes, although they vary in Gender Inequality Index (GII), which is more equal for South Africa, at 0.389, and less equal for Indonesia, at 0.453 (United Nations Development Programme, 2018).

Province of Oaxaca, Mexico

Unlike the other two CNs described here, the CN in Mexico provides a mobile phone call and SMS service using the Global System for Mobile communication (GSM). The services cover a small town and five villages with a population of 2500 Mixtec people. The CN is one of 15 that are owned and operated in Oaxaca Province by different indigenous communities and supported by Telecomunicaciones Indígenas Comunitarias AC (TIC). Local subscribers to the CN pay a USD 2.2 monthly fee (42 pesos) to the local network administrator, who forwards about 40% to the support organisation to cover overall costs and emergency equipment. Users pay cost related rates to top up their airtime in order to pay for long distance calls, which averages about USD 1/month.

The CN is a 2-hr drive from the nearest major town and encompasses about 15 Km² of densely forested mountains. It provides the only GSM service in the area, however, there are long established satellite phones and landline services to central offices in the small town, and public WiFi in the plaza, which provides free but slow internet connection for up to 30 mins per day, and four WiFi internet franchises, which connect to some homes. I was

introduced to the CN by Rhizomatica, the organisation that supports TIC.

Eastern Cape Province, South Africa

The CN in South Africa provides internet access to Xhosa inhabitants of rural villages in remote and impoverished Eastern Cape. The CN is managed by a cooperative that links to the tribal authority governing 12 villages with a population of about 7,000. As common for CNs globally, the network sends signals in radio frequencies that do not need licenses and uses low cost equipment and WiFi hotspots that enable users to connect to a fast connection to the internet. Subscribers buy monthly vouchers, which at the time of the study cost USD 2.2 (R10), and the service is further subsidised by provision to local businesses.

At the time of our study just a few hotspots had been installed across an area of about 10 Km². There are no local cybercafés or WiFi franchises and, but the area is covered by two Mobile Network Operators which provide costly and imperfect 3G services. I am familiar with the area (Bidwell, 2016; Bidwell et al., 2013), but for the purposes of this research my link was mediated by Zenzeleni Networks, the organisation that supports the CN.

Central Java, Indonesia

The CN in Indonesia brings WiFi internet access to around 50 home subscribers, two local government offices and two hotspots in a village of six hamlets populated by 5,900 people. WiFi contracts are with a private company, but the village enterprise office, BUMdesa, manages subscriptions and takes 20% of this to assist with their own connection. Two of the private sell hourly and daily vouchers for access to the internet, as well as offering free access to customers, in their restaurant and shop. There are no other local cybercafés or WiFi franchises, but the area is covered by two Mobile Network Operators MNOs, which provide costly and imperfect 3G services. I was introduced to CN

by Pusbindes, a voluntary organisation that supports rural communities in ICT enterprises.

Participants

A total of 72 women and 60 men participated in 76 focus groups discussions (FGDs) and interviews of different types (Table 1). Participants in studies were connected to CNs in varied ways because the organisation of the CNs vary, but can be broadly grouped into four, sometimes overlapping, categories:

- (1) Initiators, champions, technicians and coordinators in support organizations;
- (2) CN leaders and operators in rural villages;
- (3) CN users living in rural villages who might also be in participant type (2);
- (4) CN non-users, people in rural villages who do not use the CN directly because they cannot, chose not to, or are mediated by other people. Might also be in participant type (2)

Table 1: Numbers of people participating in different categories across studies

Initiative	Duration (days)	1: Initiators, leaders, champions and technicians in support organisations		2: Managers, coordinators, volunteers and operators		3: Users		4: People who do not directly use the network themselves	
		M	W	M	W	M	W	M	W
Indonesia WiFi CN	7	10	3	3	3	11	11	9	9
Mexico GSM CN	9.5	2	2	2	1	15	21	2	1
South Africa WiFi CN	12	4	1	5	2	11	15	7	5
Total	28.5	16	6	10	6	37	47	18	15

A total of 110 participants in types (1), (2) and (3) inhabit the rural areas in which CNs are deployed. Prior to visits I sent information about the study to hosts liaising with the CNs, however most recruitment happened during visits. I intended to include many users in rural villages and separate dedicated sessions for non-users, but there was wide variation amongst CNs in recruiting non-users, partly reflecting how easy it was to get in touch with them. I sought to include people with diverse characteristics, age, education, employment, income etc to gain insights to different dimensions that might shape access to, involvement in and benefits from CNs. This included seeking equal numbers of women and men in all categories.

Data Generation & Interpretation

Interviews and FGDs were structured by different topic guides, which were adapted as conversations emerged, and recorded by audio and, when participants permitted, video. Interviews with people responsible for setting up and maintaining the CN, locally and/or within a support organisation lasted 2 to 5 hours. FGDs with users and non-users of CNs lasted up to 3-hours, and interviews varied from a few minutes to 2-hours. Some FGDs and interviews with users also included the details of participants' lived experiences of the CNs and its relevance to the rest of their lives in diary accounts using a Day Reconstruction Method (de Lanorelle, 2017). I also engaged with participants in situ and undertook interviews that integrated topics into unfolding situations. The data in these and the planned interviews and FGDs also included soft and hard documents, such as media illustrating participants' use of the CN (e.g. WhatsApp messages). I recorded interfaces to applications and systems comprising the CNs, and posters, signs, maps etc. I also observed participants' interactions with each other and with documents, equipment, devices and other objects in settings. Sometimes these arose in specific activities, such as an intensive workshop that a support organisation hosted for the 15 CNs it supports, performing in a

video to advertise a festival, and other times they arose more spontaneously, such as participating in family activities in a park, a traditional dancing practice etc.

Mostly participants spoke in their home languages (isiXhosa, central Javanese, Mexican Spanish) which was interpreted into English, simultaneously whenever feasible. In South Africa and Indonesia, we had men and women interpreters and in Mexico only women, and I sought to separate interviews and FGDs with men and women, facilitated by men and women interpreters respectively, though this did not happen in Mexico, where some FGDs included both men and women. The interpreters in South Africa were from the communities, whereas in Mexico and Indonesia they were people with some familiarity with the areas.

After visits I coded the data to create concepts, synthesise themes and distil theories about relationships between practices, benefits and impacts. Grounded analysis yielded common and contrasting characteristics among the different CNs and interrelated themes, such as features of the CNs and qualities of the impacts they had in their specific settings.

Findings

My data illustrated many benefits of CNs to local economies, including direct savings on the cost of communications for users, increased income from trade, business and employment (Anonymised). In Indonesia and South Africa, where the only alternative internet access is through mobile operators, many participants expressed that their networks' major benefit was the low cost of connectivity and participants in Mexico stated that their CN economically supported their community as opposed to profiting commercial telecommunications companies.

Women's Access and Age

The convenience of using the CNs' services in places that are part of everyday lives significantly impacted access, as well as

factors like phone ownership and familiarity, language and education. These factors conflate with gender and age. The CNs did not generate demographic data about who did and did not subscribe to their networks, often because of their privacy protection policies. In the Mexican CN, for instance, only the Presidenta, Vice-president of the assembly, that governs the CN, and the local network administrator have access to the names and numbers of subscribers to the local GSM network. we mostly spoke to users, rather than non-users, in Mexico and while some participants who used the CN's services believed that people that everyone had a phone, saying, for instance, "even the grandmas like me have a phone", others mentioned that they regularly lent their phones to people who did not own one. For instance, the woman owner of a small cantina explained that in the previous 20 days, two people aged 48 and 50 years had used her phone because it was too expensive for them to own a handset. The Vice-president of the assembly explained that people who lacked access to a phone in order to be able to subscribe to the services, were principally aged 50 to 60 and, while they might live alone with no income, they also tended to be people who do not know how to use phones, speak Spanish and/or read or write. This exclusion shared some similarities with non-users in South Africa and Indonesia. Several older cooperative members of the CN South Africa who do not own phones able to access WiFi explained that the earlier intranet system had been more useful to them as it enabled them to use special handsets to make VoIP calls between villages. Indeed, most users of the CNs in South Africa who participated in data generation tended to be in their late twenties to thirties (medians 27 years for women and 32 years for men). An older man in Indonesia said "*We are stupid elders. (...) We feel sometimes inferior if we can't use [the internet]*". However, women in Indonesia were also more likely to report financial constraints on phone ownership and use. A woman employee of the support organisation explained the different CNs in Mexico explained that normally men register numbers on behalf of women family members, but that many users are women. There were

relatively more older participants in data generation in Mexico, and about a quarter of them owned only a simple phone which connects to the CN's service better than a smartphone. Another half of participants also accessed internet services through local providers of which half had monthly subscriptions to one of the three small franchises that provide WiFi connectivity to their homes.

In comparison with the other CNs it was striking that the Mexican network fitted in better with diverse people's lives because of its wide range. Different middle-aged woman explained how the CN's coverage reached the fields and small shops where they worked, and kept them connected at home at night. This contrasted with the South African and Indonesian CNs where the few WiFi hotspots were in places of village administration. At the time of the study, the South African CN had only two working access points, so while some people received a signal throughout their homes, some in one room, others at the bottom of their garden, many others walked to a certain place. A grandmother, whose home as the site of a tribal authority member had an access point, noted her embarrassment when people stood in poor weather to access, while middle-aged women said that she would like to pay to install a router on her home in order to improve the signal. Adapting routines to use WiFi was not always unwelcome; for instance, a young mother explained she spent around 10% of her prior communication costs because she walks to the end of her home's garden three times a day to access a WiFi signal.

Women were more likely to discuss constraints on time. The mother of pre-teen children who works from 4:00 a.m. until after 7:00 p.m. to prepare food and serve up to 50 people a day in her little cantina in the market, in the market in Mexico-1 explained that she did not have time to sit down and use the local WiFi to access social media. In Indonesia WiFi access is limited to people who work at the village's administration and business enterprise offices, which affected the proportion and age of women users. While all 15 men also used mobile providers, many said they accessed the WiFi hotspots frequently, whereas few of the five

women frequently used the hotspots. Five of the men worked and 10 volunteered at the village's administration and business enterprise offices, and they ranged in age from 16 to 52 years with a median of 30 years. The men said that the network had slowed when they gave out the password to others, yet also used it for non-work activities, including their own businesses, and that they knew that their friends must be close to the WiFi if they were online on WhatsApp. In contrast the median age for women was 37 years and only one younger woman was employed by the business enterprise office, while the other women, who were older, only used the WiFi while doing community voluntary work.

Decision-making and Technical Skills

In all three cases decisions are made in local governance structures dominated by men. In Indonesia the chief invited only male heads of households to meetings with the District Communication Offices, where he proposed plans for WiFi in his village. Women non-users said that husbands usually tell their wives what is said in community meetings but did not tell them about the WiFi "*because they felt we know nothing about it [connectivity]*". The chief and his wife also explained that no-one wanted to stand against him in the last election as he was so popular, so his wife stood as his only opposition in order for the election to occur. Assemblies in Mexico usually only involve men, who head of households, and I observed only three women in a hundred people in an assembly. Mexican processes, however, require women's representation when an assembly is formally registered with authorities and increasingly women returning from university are nominated as president. Indeed, the assembly overseeing the CN I studied has its first woman Presidenta. In South Africa, the cooperative comprises of five men and three women, who are members or married to members of the tribal authority and the women in the cooperative said their gender did not exclude them from decision-making

Local ownership and decision-making are particularly important to the Mexico and South Africa CNs. In Mexico participants linked their vision for connectivity to their indigenous identity and self-determination and several users explained, “*The owner is the (local customary) authority... We like it because of (our) control.*” Cooperative members in South Africa insisted that they made the decisions and a woman cooperative member, who lived under apartheid, expressed ideals about self-determination and commitment by referring to a leader in South Africa’s liberation. Neither members of the South African cooperative nor the Mexican assembly had telecommunications expertise; rather, their ownership and control involved external initiators and support organisations. Cooperative members in South Africa, and some assembly members in Mexico, however, insisted that they made the decisions and fluently referred to the network devices used, and details of funding and phases of their network.

Local gendered power relations conflate with gender exclusions inherited from the telecommunications domain more generally and paradoxes emerge with respect to encouraging women’s representation in technical decisions in CNs and fostering local ownership. Men comprised more participants in villages who worked on technical tasks related to the CN, such as network monitoring and using computers to create accounts and sell subscriptions. Researchers supporting the CN in South Africa seven years before began teaching small groups of men and women to install some of the equipment, however it was mostly men who completed the training. Recently the support organisation, formalised from the formative research, commenced technical installation workshops about new equipment to another group of 10 men and women of different ages. Women participants in these workshops of 25-years and 40-years described their experience with great enthusiasm and appeared to feel confident of their skills. Indeed, as a 40-year-old single mother who has previously worked outside of the rural area remarked “*It’s not a new thing for women to be involved in technology*”. However, while the support organisation, like those supporting the other CNs, aspires to teach

technical skills to women in the CNs they serve their own staff usually comprises more men than women, and men staff usually undertake the technical tasks. All 18 men, that we spoke to, who were employed by the three organisations that supported the Mexican, Indonesian and South African were technically skilled, in software development, network administration and installing and monitoring equipment. However, just three of the seven women, worked on technical tasks so, overall, women comprised just 14% of participants we spoke to in support organisations who worked on technical tasks.

A man and woman employee of the support organisation in Mexico who were enthusiastic to have women employed in technology support, noted that there were no female applicants when they recruited for technical positions in the past two years. The woman explained that cultural and educational factors contribute to this. A mid-twenties networks engineer said that only 10 of the 40 students that commenced his university software engineering programme were women, and only seven of them completed. It is then, not surprising that from 15 different CNs in that the support organisation helps to maintain, six have women network administrators. To foster local ownership the support organisation in Mexico only asks the assemblies to not to limit the participation to the male family heads and included women. Employees of the support organisation observed how some assemblies expect to speak only to male technicians, including about non-technical aspects of their CNs. They explained that some assembly members do not trust women in these roles and clearly expressed their perspectives on women's ability. A woman employee had been told that women would be unable to do installations and "*you will get tired, but no-one will carry your stuff*", while a man employee he had heard comments like "*A women on the top of the antennae might fall*". Norms permit a young unmarried woman to undertake the network administration role because the most visible everyday work is secretarial, such as registering subscribers and record keeping, rather than tasks that are perceived as engineering. Thus, while the network

administrator in the CN I studied was a young man he had been introduced to the role by its previous incumbent, who was a girl from his school. The network administrator role also involves teaching users to reset their phones to receive the signal when they come several times a week. However, it appears that users who come to the office are men, so this does not provide opportunities for young women network administrators to teach others. Nonetheless the roles do provide other opportunities develop technical skills, such as learning about electricity, meet others in different villages and, according to a woman employee in the support organisation, had fostered self-confidence in the women who had undertaken them.

Paid and Unpaid Labour

All three CNs manifested local norms and principles about collectivism, communality and solidarity. The right to own land involves community participation in the Mexican indigenous community and the community's autonomy depends on communal participation. Land is communally owned in the South African villages and, at least publicly, there are expectations about working together, while expectations for volunteer work also exist in Indonesian village, especially amongst women. The cases vary in terms of the nature of local paid occupations. Farmers in the Indonesian and Mexican villages sell mangoes and coffee respectively, however much of this livelihood is subsistence and undertaken by both men and women, additionally there are small local shops, owned by both men and women, and taxi services generally run by men. In the South African villages there are fewer local business opportunities and fewer paid roles in local administration. Local gendered power relations, however, often mean that women bear much of the volunteer labour, which conflates with valorisation of technical skills. Thus, men are more likely than women to undertake technical tasks in CNs and, since technical rather than other tasks are more often remunerated, men more likely to be financially remunerated. As I next explain this

might contribute to some women choosing alternative connectivity options to the CNs.

Communalist impulses featured amongst the motivations for the CNs and in participants' everyday support for others' connectivity. Many participants in Mexico referred to communal participation in setting up their CN, when many local people together erected the mast in the mountain, and some women specifically said they supported the CN because it enabled access to more disadvantaged inhabitants not because it enhanced their own access to telecommunications. All the elders in the cooperative overseeing the South African CN said that they sought for the CN to bring together local society and reduce local poverty; and even those unable to use the internet themselves still tried to help others connect to the WiFi. In fact participants in all CNs mentioned many examples of assisting others in communication and to access information, from helping to physically set up others' access, facilitating messages or a call for people without access, and using online services on others' behalf. Women in the Indonesian community voluntary organisation, for instance, explained that since few of them owned phones they communicated with each other by sending and receiving messages through neighbours.

While participants expressed values about helping others, all the CNs remunerated some work, and this was often gendered. When we asked a men's focus group in Mexico-1 whether it was only men who cleared the land for erecting an antenna, one man said, "*Some women helped carrying sand, water and alcohol. It was both community (voluntary) and paid work; the carpenter had paid work.*" The network administrator in Mexico receives a small stipend for his work, although the role had previously been held by a woman. A young woman is employed to manage subscriptions to the WiFi in the village enterprise office in Indonesia, although technical roles tend to be the preserve of men in the village offices many of who have higher education. In South Africa two local roles are paid through the support organisation's budget; one is purely technical managing the WiFi equipment and the internet

connection; the other interrelates technical issues to business management and local coordination. Both are performed by men.

Generating income can motivate involvement. Several members of the African CN's cooperative explained that "*people don't like to work without payment,*" and that part of their motivation for the CN was to provide themselves and their children with paid jobs. However, there were tensions around whether their own or their wives' attendance at meetings, decision-making, overseeing cell phone charging or selling subscriptions warranted remuneration. Two women in South Africa mentioned that women were expected to cook and serve dinner without payment during activities, even if they had a role in meetings.

In Indonesia we observed women in the village's volunteer organisations spend all morning preparing elaborate lunches for ourselves and the workers in the chief's office administration who used the network. The women volunteer for twelve different village organisations, such as the Family Welfare group which monitors pregnant women and infants, and weekly feeding groups for low-income families. Twelve youth are also involved in the work of village's enterprise office, such as organising parking at the village's regular Sunday agritourism event, however, unlike in the women's volunteer organisations, workers share the profits and most are boys and young men. Two young women are amongst six interns and employee of the enterprise office, whose president explained that girls are not limited from the part-time work, yet it appears that fewer jobs are deemed suited to young women. Women in the volunteer organisations often related to each other such as sisters and sisters-in-law and aunts and niece, stated concerns that younger women were disengaging from communal work. A similar phenomenon was mentioned in Mexico, where an interpreter explained that young people in indigenous communities are reluctant to undertake unpaid community roles. Certainly, we observed only middle-aged women undertake Tekio work, tidying and picking up trash together on a Monday morning, which unlike the roles of president, vice-president, secretary and police officer which receive a stipend, is not remunerated.

The women of the Indonesian volunteer organisations attributed younger women's disengagement from communal activities to their use of cell phones connecting to mobile internet. There was certainly a difference between young women employee and intern in the enterprise office, who were watching YouTube on the office computer when I entered and the use of the WiFi by women volunteers. It is also notable that women operate three of the four local private internet cafes, that operate outside of the CN in Mexico. A middle-aged woman operator relied on her husband for technical support in one internet cafe, but another was entirely operated by a single mother in her mid-thirties. The single mother explained that when she returned to the village, after living in the US and large Mexican cities, her father, in his seventies, installed a computer and encouraged her to teach herself from YouTube tutorials. Interestingly she also serves as a police officer and is part of the group of women who undertake Tekio cleaning work but she does not use the CN's services and, while she teaches young children to use computers, she charges for her telecommunications services.

Intergenerational Discontinuities and the Sustainability of CNs

Engagement in CNs may offer opportunities to counter the social fragmentation that often accompanies increased use of technology. However, the cases I describe here suggest that gender inequalities in governance, paid and unpaid labour and the valorisation of technical skills can undermine the collectivist ethos that is necessary for CNs. Older people recognised the importance of internet connectivity to the education and employment of young people in their communities and this was often a motivation in setting up CNs. Cooperative members in South Africa who do not own phones that are able to access WiFi explained that the internet benefited their own and other local children. Meanwhile, operators and owners of the four internet Cafés Mexico, some of which also provide WiFi connectivity to homes, said that they

assist young people on computers, and we also observed young people use the slow free public WiFi in the plaza.

In Indonesia the secretary in the Chief's office teaches children about computers when they come to him and other participants explained that adults with younger children run out of mobile data quotas quickly, and young teens sometimes request more pocket money to buy extra data. A 20-year-old with access to the CN's WiFi both at home and as secretary of the village's business enterprise office said, that the communal approach in the village meant help would always be available, however many non-users of the CN suggested otherwise. In Indonesia and South Africa younger people often assist their parents and grandparents to facilitate online communication and information seeking but, at the same time, older people raised concerns about internet use by children and teens and described monitoring phone use within and outside of their homes. In Indonesia, eight men who did not access the WiFi, described the potential harm of "*negative content*", spending too much time online and limiting access to school work in homes, while a woman sells vouchers to access the internet in her small chicken noodle restaurant said that she does not allow children to use the WiFi when it is time for their Quran study. Some CNs had policies about youth access, for instance, the chief in Indonesia had limited youth's access to the WiFi after finding some downloading inappropriate content, while the support organisation in Mexico explained that some of the CNs had discussed age barriers on phones and sought to shut their network for three hours during traditional assemblies.

Arguably inclusion in using and operating is important to the sustainability of rural CNs both to perpetuate a collective ethos that sustains them and because relatively more older people and women reside in rural areas. However, women's access to CNs in ways that fit into their everyday lives is limited, which might amplify generational gaps amongst women in the context of communal work. Younger women frequently used alternatives to the CNs for connectivity and established their own enterprises to do so, sometimes with family support. Two women in Indonesia,

for instance, whose husbands subscribed to the WiFi ran small businesses at home by selling vouchers for internet access. Older women in particular were excluded when the location of the CNS did not fit into their everyday lives. Such divisive potential may be further exacerbated by masculine bias of priorities in global discourse on telecommunications technology and policy, which tends to emphasise certain concerns about access over concerns about power relations embedded in infrastructure.

Conclusion

In the South African case there appears to be increased emphasis on involving men and women and people of different ages in workshops to install equipment, and in the Mexican case the woman Presidenta was a one of a few indigenous representatives responsible for changing the law about licenses for spectrum. Close to the end of my stay in Indonesia, the women in the volunteer organisations, the Chief and the ICT support organisation and I gathered again to say goodbye. The support organisation explained that they would now run workshops for older women to generate content about their interests, recipes, cooking skills and crafts. I hope that recognising the value of these women's labour by providing support for their internet use might bridge the generation gap.

References

- BAIG, R.; ROCA, R.; FREITAG, F.; NAVARRO, L. *guifi.net, A Crowdsourced Network Infrastructure Held In Common*. Computer Networks, 2015, pp.150-165.
- BANERJEE BELUR, Sarbani; KHATURIA, Meghna; RAO, NANDITHA, P. *Community-led Networks for Sustainable Rural Broadband in India: the Case of Gram Marg*. CNS: the Internet by the People, for the People, 2017, pp.193.

- BIDWELL, N.J. (2016) Moving the Centre to Design Social Media for Rural Africa. *AI&Soc: Journal of Culture, Communication & Knowledge*, 31(1), 2016, pp.51-77. Springer.
- BIDWELL, N.J., SIYA, M., MARSDEN, G., TUCKER, WD., TSHEMESE, M., GAVEN, N., NTLANGANO, S., EGLINTON, KA ROBINSON, S. Walking and the Social Life of Solar Charging in Rural Africa. *ACM Transactions on Computer-Human Interaction (TOCHI)* 20, 4, 2013, pp.1-33.
- BRU, Janick. *Why are there no community networks in the seychelles?* 2018.
- Buchmüller, Sandra et al. *Bridging the gender and generation gap by ICT applying a participatory design process*. Personal and Ubiquitous Computing 15.7, 2011, pp.743-758.
- DADA, John. *Fantsuam Foundation. The rehabilitation of a rural community network in war-torn northern Nigeria*. Global Information Society Watch 2018, Community Networks, APC, 2018.
- DECLARATION ON COMMUNITY CONNECTIVITY WAS DEVELOPED AT THE INTERNET GOVERNANCE FORUM, Guadalajara, Mexico, December 2016, and the GAIA Workshop, Cambridge, England, January 2017 [https://www.intgovforum.org/multilingual/index.php?q=filedepot_download/4189/174 Available November 2020].
- DUNBAR-HESTER, Christina. Beyond “dudecore”? Challenging gendered and “raced” technologies through media activism. *Journal of Broadcasting & Electronic Media* 54.1, 2010, pp.121-135. DOI: 10.1080/08838150903550451. Available November 2020.
- FOX, S. Feminist hackerspaces as sites for feminist design. In: *Proc. ACS SIGCHI Conference on Creativity and Cognition*. ACM, 2015, pp.341-42.
- GLOBAL INFORMATION SOCIETY WATCH 2018: Community Networks. APC ISBN 978-92-95113-06-0. Available November 2020.
- INTERNATIONAL TELECOMMUNICATIONS UNION. 2018 Gender equality data 2018 [www.itu.int/en/action/genderequality/data/Pages/ie.aspx?/en/action/gender-equality/data/Pages/default.aspx. Available November 2019].

- DE LANEROLLE; WALTON, Marion; SCHOON, Alette. *Izolo: Mobile Diaries Of The Less Connected*. Making All Voices Count Research Report. Brighton, IDS, 2017
[\[https://opendocs.ids.ac.uk/opendocs/bitstream/handle/123456789/13348/RRReport_LessConnected_FINAL.pdf\]](https://opendocs.ids.ac.uk/opendocs/bitstream/handle/123456789/13348/RRReport_LessConnected_FINAL.pdf). Available November 2020].
- KANCHANASUT, Kanchana et al. *Building Last-Metre Community Networks In Thailand*. Global Information Society Watch 2018, Community Networks, APC, 2018.
- MCCONNELL, Christopher; STRAUBHAAR, Joseph. Contextualizing Open WiFi Network Use with Multiple Capitals. *Communication and Information Technologies Annual*. Emerald Group Publishing Limited, 2015, pp.205-232.
- MUDLIAR, Pretty. 2018. *Public WiFi is for Men and Mobile Internet is for Women* Proceedings of the ACM on Human-Computer Interaction, vol. 2, CSCW, 126.
- MWEETWA F.; VAN STAM, G. Global Information Society Watch 2018. *Community Networks*, APC, 2018.
- OREGLIA, Elisa. ICT and (personal) development in rural China. *Information Technologies & International Development* 10.3, 19, 2014.
- PICCO-SCHWENDENER, Anna; REINHOLD, H. Jost; CANTONI, Lorenzo. Usage Practices and User Types of a Municipal WiFi Network: the Case of WiFi Lugano. Proceedings of the *10th International Conference on Theory and Practice of Electronic Governance*. ACM, 2017.
- REAGLE J. Free as in sexist?" Free culture and the gender gap. *First Monday* 18(1), 2013.
- REY-MORENO, C., BLIGNAUT, R., TUCKER, W.D.; MAY, J. An in-depth study of the ICT ecosystem in a South African rural community: unveiling expenditure and communication patterns. *Information Technology for Development* 22, 2016, pp.101-120.
- REY-MORENO, Carlos; SABIESCU, Amalia G., SIYA, Masbulele Jay. Towards self-sustaining community networks in rural areas of developing countries: Understanding local ownership. *Proceedings of*

the 8th International Development Informatics Association Conference, 2014.

- SAVIC, Selena; WUSCHITZ, Stefanie. Feminist Hackerspace as a Place of Infrastructure Production. *ADA, A journal of gender, new media and technology*, 2018 [<https://adanewmedia.org/2018/05/issue13-savic-wuschitz/>]. Available November 2020].
- SCHEERDER, Anique J.; Alexander JAM van Deursen; VAN DIJK, Jan AGM. Internet use in the home: Digital inequality from a domestication perspective. *New Media & Society*: 21, n. 10, 2019, pp.2099-2118 [<https://doi.org/10.1177/1461444819844299> Available November 2020].
- SHEWARGA-HUSSEN, Tigist N.J. et al. Gender and Participation: Critical Reflection on Zenzeleni Networks. *Proc. of AfriCHI'16 African Conference for Human Computer Interaction*. Nairobi, Kenya, ACM Press, 2016.
- SIOCHRÚ, S.Ó.; GIRARD, B. Community-based Networks and Innovative Technologies. United Nations Development Programme, 2005.
- SONG, S. et al. The rise and fall and rise of community networks. *Global Information Society Watch* 2018, Community Networks, 7, 9. APC, 2018.
- SONG, Stephen et al. *Innovations in Spectrum Management. Enabling CNs and small operators to connect the unconnected*. The Internet Society, 2019 [<https://www.internetsociety.org/resources/doc/2019/innovations-in-spectrum-management/> Available November 2020].
- TAREQ, Rashid. *Inclusive capitalism and bottom of the pyramid approaches to development: The case of information and communication technologies fostering 'inclusion' in developing countries*. 2017 [https://ruor.uottawa.ca/bitstream/10393/36599/3/Rashid_Ahmed_Tareq_2017_thesis.pdf#page=89 Available November 2020].
- TERRELL, Josh et al. Gender differences and bias in open source: Pull request acceptance of women versus men. *PeerJ Computer Science* 3 e111, 2017.

- VICENTIN, D. J. Internet Governance, Infrastructure and Resistance. 2017 [lavits.org/wp-content/uploads/2017/08/P8_Vicentin.pdf Available November 2020].
- WALLACE, Chigona et al. Domestication of free WiFi amongst people living in disadvantaged communities in the Western Cape province of South Africa. In: *Proceedings of the Annual Conference of the South African Institute of Computer Scientists and Information Technologists*. ACM, 2016.
- UNITED NATIONS DEVELOPMENT PROGRAMME UNDP 2018 *Human Development Reports Gender Inequality Index (GII)* <http://hdr.undp.org/en/content/gender-inequality-index-gii> Available December 2019].
- ZANOLLI, Bruna; JANCZ, Carla Gonzalez; SANTOS, Cristiana Daiane Araujo dos; PRADO, Débora. *Feminist infrastructure and Community Networks*. Global Information Society Watch 2018, Community Networks, APC, 2018.