Midwives with mobiles: A gender perspective of technology introduction in rural Indonesia

Arul Chib

Nanyang Technological University, Singapore

Vivian Hsueh-Hua Chen

Nanyang Technological University, Singapore

Abstract

Mobile phones were introduced to rural midwives in tsunami-affected Indonesia. The information and communication technologies for development (ICTD) program allowed remote community healthcare workers to contact medical experts, and communicate with patients. 92 interviews were conducted with midwives, coordinators, doctors, and village representatives.

This study applies a gender perspective to supplement the analytical frame of the ICT for healthcare development model (Author, 2008), by addressing the multi-dimensionality of benefits and barriers. The theory of dialectical tension (Baxter & Montgomery, 1996) situates the conceptual discussion around the struggles between autonomy and subordination within gender roles, personal growth versus technological competency, and issues of economic and resource control in traditional hierarchies.

Research findings indicate that midwives engage in legitimization strategies, develop peer support, and focus on strategic issues to develop the capacity for agency and autonomy, despite socio-organizational barriers. Specific recommendations are offered, focusing on the resourcefulness and desire of women.

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The unabated loss of life due to maternal and infant mortality is arguably one of the persisting tragedies of the 21st century. (WHO, 2007). The reproductive health issue, especially in those developing countries with rising maternal mortality rates, remains a serious concern . Providing effective reproductive care, in the form of trained medical personnel attending during pregnancy, and access to emergency facilities during delivery can save lives (Freedman et al., 2007; Romano & Lothian, 2008). However, in developing countries with the greatest need, the scarcity of skilled healthcare workers, such as doctors, nurses and remote community healthcare workers (CHWs), such as rural midwives, poses a crucial challenge (United Nations Foundation and Vodafone Foundation Technology Partnership, 2009). In response, attention has been called to improving the effectiveness of frontline CHWs. One mitigating strategy involves utilizing technologies for enhanced communication, knowledge-sharing, and capacity building.

Mobile phone use in healthcare

The role of information and communication technologies (ICT) in women's development, particularly in the domains of livelihoods (Huyer & Mitter, 2003; Jorge, 2002; Mijumbi, 2002), education (Paik, 2002), and social advancement (Richardson, Ramirez, & Haq, 2000), have been recognized in the context of the knowledge society (Gurumurthy, 2004). However, attention needs to be drawn to the rapidly emerging discipline of m-Health, wherein mobile phones have been used to improve hitherto inaccessible and inadequate healthcare services (Bali & Singh, 2007; Ganapathy & Ravindra, 2008; Olla & Tan, 2008).There are currently 4.01 billion mobile users worldwide, more than twice that of

internet users (1.54), with the majority located in developing countries. Here mobile penetration is increasingly growing not only in urban regions, but in those remote and rural areas with poor communication infrastructures (ITU, 2009, Mishra & Singh, 2008). In the healthcare domain, mobile phones have been used to improve maternal health in Egypt, and to provide HIV and TB treatment in South Africa (Atun & Sittampalam, 2005; Chetley, 2006; Maniam, Chin, & Chenapiah, 2007), improve functioning of the medical infrastructure (Angelidis, 2008; Malkary, 2006), enhance communication among health workers and the beneficiaries (Lanzi et al., 2007), and to improve rural women's knowledge in healthcare (UNDP, 2005). However, constraints to the effective use of ICTs remain, as in other aspects of social life, regarding gender equality.

Gender divide

Despite the scarcity of gender-disaggregated data about technology use in developing countries, scholars suggest that women are less likely to access and use ICTs (Hafkin & Huyer, 2007). Others have commented on the lack of a gender focus in both organic ICT diffusion and targeted ICTD programs (Morgan, Heeks & Arun, 2004). The role of gender remains largely unexplored in the ICT for healthcare literature, especially from the perspective of the healthcare provider (Author, in press; Hafkin, 2002).

Hence, this paper uses the framework of the ICT for healthcare (ICT4H) development model (Author, 2008) to delve into a gender analysis. The ICT4H model posits that mobile phones can improve productivity for healthcare workers, increasing their capacity and potential; facilitate social ties by strengthening communication links internally within the medical system, and externally with the beneficiary community, and both share existing

knowledge and generate critical new information for decision-making. The model suggests that certain barriers, consisting of infrastructural, economic, technological, and socio-cultural factors, occur simultaneously, and in conjunction with each other, at both individual and social levels. While the present context has been examined previously (Author, 2008; Author, in press), the focus here is an in-depth investigation of the benefits and barriers that arise from a gender perspective.

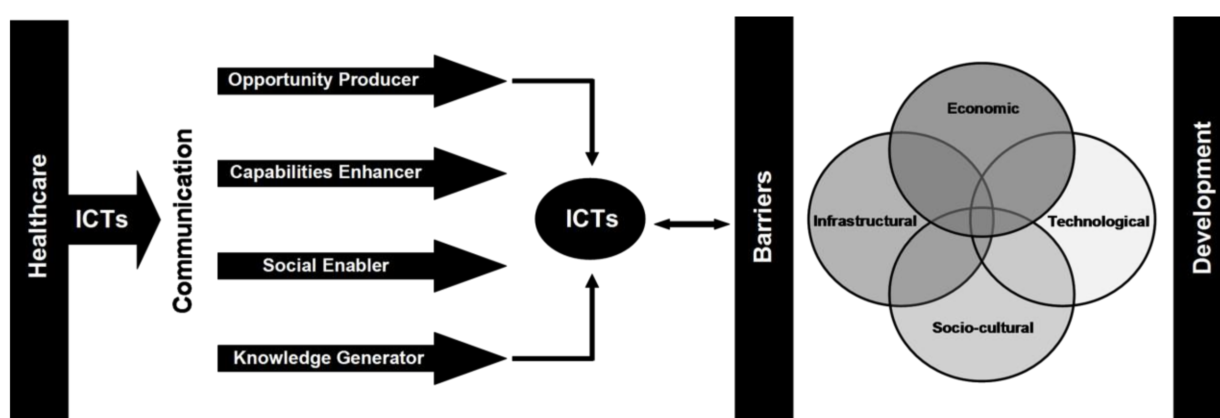

Figure 1. *ICTs for healthcare development model*

Benefits ICTs can be an effective tool in empowering women in numerous ways if impediments to access and efficient usage are isolated (Nath, 2001; Ng, 2005; Sharma, 2003). First, women's empowerment has been seen as a process in which women can be involved in consequential decision-making processes, particularly about their personal affairs; a process which can be catalyzed by the enhanced self-confidence gained through technology adoption (Huyer & Sikoska, 2003; Oxall & Baden, 1997). Extending the argument further, Mijumbi (2002) found that these women, in addition to gaining confidence, were better equipped to search for opportunities to reduce poverty. This, in turn, eventually led to greater autonomy in

the social structure.

Secondly, a crucial ingredient for personal growth was knowledge gained through ICT usage. Cases of women in ICT-based enterprises find enhanced capability to obtain information necessary to fulfill tasks and make better choices when dealing with tough situations, which too results in greater respect from the community (Duncombe et al., 2005). In addition, Henwood (1993) argues that women need to be producers of technology, as well as users, in order to regain control over male-dominated structures of creation and management (Ling, 1999; Thas, Ramilo, & Cinco, 2007).

Thirdly, ICTs entitle women to a larger share of the value-chain, formerly dominated by middle-men, thus transcending limitations imposed on women by class structures, location and culture (Davis, 2004). Such economic empowerment should improve the status of women through a process of psychological and social restructuring (Mehra, 1997). This process occurs both as a strengthening of internal self-esteem, as well as a more externally oriented weakening of traditional attitudes towards women (Hafkin, 2002; Gurumurthy, 2004).

Finally, scholars argue that ICTs can be used to “refine traditional gender roles” (Kelkar & Nathan, 2002, p. 433), towards greater equality (Drucker, 2001). Thus ICTs not only promote practical efficiency and effectiveness in particular domains of experience, but provide a tool for strategic social transformation (Reeves & Baden, 2000). Various viewpoints emphasize women’s appropriation of power that go beyond the existing hierarchical control in society, a stance often ignored in technology diffusion projects. In conclusion, we suggest that a gendered frame of reference into the impact of ICTs should look beyond traditional socio-structural issues into examining dimensions of agency and

autonomy in the negotiation of decision-making.

Constraints Within the context of predominantly male-dominated societies, gender issues tend to be inter-mingled with social and organizational hierarchies, limited economic and educational progress, as well as constraints on physical mobility (Dunn & Dunn, 2006; Hafkin & Taggart, 2001). Technology, not being gender-neutral by itself, cannot guarantee empowerment (Richardson, Ramirez & Haq, 2002). Women in developing countries suffer the double shackles arising from gender inequality and poverty. While the schism can be attributable partially to an absence of a gender lens in the design and implementation of ICTD projects, the reinforcing circle of deprivation and the technology divide poses significant problems. Further , some ICT projects, although targeted at women, not only do not bring gender equality (Boserup, 1970; Rosser, 2005; Wajcman, 1991), but reinforce existing gender divides entrenched in male-dominated socio-cultural structures (Maneja, 2002; Sciadas, 2005; Wood, 2001; World Bank, 2007).

Structural constraints inhibit the diffusion of technology in the first place. Developing countries face a paucity of basic telecommunication infrastructure, and even if available, facilities are concentrated in urban areas, while women tend more to live in rural areas compared to men. In addition, economic and physical restrictions limit women's travel to these ICT centers (Huyer & Mitter, 2003), thus aggravating the situation. With an inferior income and relatively few secure paid jobs (MDGs, 2008) women are less likely to own household possessions, particularly precious technology items (Hafkin, 2002), or access fee-paying centers (Hafkin & Taggart, 2001). Although wireless technologies can act as substitutes (Author, 2008b; Jorge, 2002), their effectiveness is restricted by traditional

hardware infrastructures. Socio-structural constraints begin early in a woman's life-cycle, with inadequate educational opportunities (Huyer & Mitter, 2003), manifesting in a lower understanding of English (Elnaggar, 2007; Hafkin & Taggart, 2001), the language predominately used on the internet; and in the absence of scientific or technological literacy required for the contextual use of technology (Heeks, 1999). The high incidence of poverty, in combination with structural barriers in basic and technical education, hampers the effective adoption of technology.

Socio-cultural barriers need not be external, often present and influential in family and community affairs. The multiple roles women have in society, including domestic, productive and community management responsibilities (Rakow & Navarro, 1993), reduce their leisure time and mobility to use public access facilities (Gurumurthy, 2004, Huyer & Sikoska, 2003). Social pressures and traditional cultural attitudes, based on gender biases, exist towards the female employment of technology in academic advancement (Quaisie, 1996), and professional practice (Hafkin & Huyer, 2006). Notions of gender segregation can extend to issues over access and control of ownership of resources. For example, the notion that girls are not as accomplished in science and technology as boys discourages academic advancement (Quaisie, 1996, Huyer & Mitter, 2003). Women are discouraged in professional practice, especially those married who struggle between domestic responsibilities and work responsibilities (Hafkin & Huyer, 2006). Some cultures discourage women's interaction with men in public, thus eliminating the potential of travel, as also the visiting of mixed-gender public access facilities), which in turn limits access to ICTs.

While such analysis may yield insights, further refinement of the model is possible. A

distinct conceptualization of benefits and constraints limits the understanding of resultant ICT effects because it fails to consider the agency of individuals. Besides considering the macro forces of infrastructure, economy, education and socio-culture, one needs to understand how individuals experience and react at a micro level. Since women are active agents, they will be able, even with their comparatively lesser power, to use strategies and resources to maneuver through these constraints to reap benefits from ICT use. Hence, the ICT4H model needs to factor in how women, from a psychological perspective, can affect the final results of ICT implementations. To explore the role of female agency and autonomy, we draw upon the theory of dialectical tension (Baxter & Montogmery, 1996), developed for the study of dichotomous pulls present within social life. This theory is well suited to guide understanding of the strategies and results of the benefit-constraints dialectic.

Theoretical framework:

The dialectical perspective is focused on uncovering the tensions that result from oppositional pulls within various facets of social life. Instead of viewing any issue as static, this perspective posits that conflicting issues are constantly being renegotiated and redefined between parties, and need to be understood (Rawlins, 1983).

In the dialectical perspective, contradiction refers to the "the dynamic interplay between unified oppositions" (Baxter & Montgomery, 1996, p. 8). These oppositions are unified in that they are defined in resistance to one another (e.g. fear-boldness), or that they coexist within a unified system. Although contradictions are usually viewed as negative, Baxter and Montgomery (1996) described contradictions as "inherent in social life and not evidence of failure or inadequacy in a person or a social system" (p. 7). As such,

contradictions describe a natural process of redefinition and renegotiation that occur within and between parties. Although usually applied to interpersonal relationships, contradictions are also evident within the use of ICT, in particular, with context to the female gender. ICTs, when introduced to women, produced tensions that pull them in opposition directions. As a woman attempts to incorporate the benefits of mobile phone use in daily life practices, she is faced with oppositional forces that act as a restraint. Through struggling with dialectical tensions produced by shifting power dynamics, however, the woman may arrive at a novel position quite different from where she began (Townsend, 1999). Hence, this perspective is useful in circumventing the totalizing ‘either benefits or constraints’ approach to female empowerment, and examining the issue in its multi-faceted, complex entirety.

Therefore our first research question examines the benefits and constraints that occur with mobile usage from a gendered perspective, whilst the second investigates how women negotiate the resultant dialectical tensions that emerge.

Method

Context The rural Indonesian province of Aceh, coupled with being a remote region recovering from a debilitating two-decades long civil conflict, suffered immeasurably from the devastating impact of the 2004 tsunami (Chalk & Rabasa, 2001). The inadequate health system lost a critical resource; the frontline CHWs, in the form of rural midwives (MWs). As a consequence standards of healthcare expertise on offer to scattered and remote rural communities deteriorated rapidly. An ICT4H intervention[1] was implemented using mobile phones. The pilot project aimed to utilize mobile communications technology to develop a

[1] The project was funded by the United Nations Children's Fund (UNICEF) the United Nations Population Fund (UNFPA), and World Vision, which was also the implementing agency.

more responsive healthcare system to support MWs servicing rural communities.

The entire health system, consisting of MWs, MW coordinators (MWCs), and doctors was linked via mobile phones, which transferred data via a Java applet to a internet-based database for handling information. Mobile use thus aimed to facilitate access to time-sensitive information by MWs, improve the quality of information accessible, create an information sharing system within their hierarchical and peer networks, and allow tracking and collection of critical health indicators.

Procedures The qualitative study was divided into three fieldwork phases conducted from September to December 2007. Focus group discussions (FGDs) and in-depth interviews were employed to gather data. Respondents were selected through multistage sampling, with health centers and villages randomly selected, from which different groups of participants were then randomly chosen.

Participants In addition the health system participants, as ultimate beneficiaries of the use of ICTs, patients and their families were also interviewed. For the FGDs, a total of thirty-five MWs, six MWCs, and nineteen villagers, were interviewed. For the in-depth interviews, seven MWs, four MWCs, six patients, and four villagers, were selected. Five doctors were interviewed to understand hierarchical issues. The primary respondents, MWs, were on average aged 29 years, and 43% had 6 years or less of experience. MWC ages ranged from 30-50 years old, while the patients and villagers ranged from 23-35 and 25-70 years old respectively.

All responses were recorded by audio, and in the case of the FGDs, with video (to ensure accurate attribution during transcription). Transcription took place locally, while

translation from Bahasa Indonesia was conducted twice, once by locals to capture slang in the vernacular, and then by Indonesian undergraduates at a Singaporean university for better rendering in English. All respondents received a gift hamper of basic foods as a mark of appreciation for participation.

Analysis Examination began with reading through all transcripts at least once. Following this, methods of constant-comparison were employed (Glaser & Strauss, 1967; Strauss & Corbin, 1990). Data was compared amongst the accounts of MWs, but also between social and professional others, including doctors, villagers, patients and husbands. To illustrate, viewpoints of different participants were reviewed through a gender perspective. Such a method unmasked certain gender specific issues that could have remained unobserved otherwise.

Special attention was paid to two areas, namely the specific benefits or constraints emerging from the MWs' gender position, along with their reaction to the change. During the process of analysis, researchers came together several times to discuss and identify themes that contradicted or opposed one another. This process, guided by the ICT4H model and dialectical theory, yielded a picture of how MWs experienced, and behaved towards, these dialectical tensions. Respondent comments are provided to highlight the analysis; however, individual names have been withheld to protect identities.

Findings

Midwives' mobile phone use is found within the negotiation of the benefit-constraint dialectic. Dialectical tensions were observed in the internal and external struggles experienced by the women, which were then categorized into psychological and social

dimensions, respectively. First, the psychological standpoint refers to the internalized norms a woman has in realizing the full benefits of the ICTs. Second, social hierarchy refers to the external societal pressure women face when using ICTs.

Psychological standpoint

Most participants demonstrated that gender inequality was deeply ingrained into their psyche. In particular, women were caught in the struggle between autonomy and subordination; personal growth and limited technological competency.

Autonomy vs. Subordination In general, there was widespread lack of consciousness about female subordination when it came to technology use (Richardson, Ramirez & Haq, 2002). Nonetheless, mobile phones allowed MWs to catch a glimpse of their autonomous potential. Realizing this, MWs utilized new strategies to enjoy autonomy by managing their fears of the perceived challenge of patriarchal control.

The needs of women in Acehnese society were often subordinate to the needs of men. Many MWs did not own a personal mobile phone, outside of the program. A MWC said, "I use my son's mobile phone. (Patients) used to ask for the number…in case she fell sick in the middle of the night." In another interview, a MW wanted a mobile phone but later admitted, "Let my sons have it." Like many other participants, she experienced a struggle between admitting and suppressing her own desires. An internalized normative system induced her to deny her own needs, leading to a contradiction in her feelings about the issue. Lack of ownership and possession was rationalized because MWs regarded mobile phones as familial objects, with their own personal needs secondary. However, this view is problematic at two levels. First, patients explained that reaching the MWs through their husbands' or sons'

mobile phones felt “uncomfortable”. Second, as one participant explained, the men were often “not at home”, leading to uncertainty in obtaining urgent medical care. Even so, legitimization of inequality via justification of male ownership was common.

On another note, midwives did express acquiring some autonomy through the use of mobile phones. Previously, many MWs were limited by the lack of knowledge in handling complicated deliveries, with “problematic cases” referred to hospitals because “they (MWs) are too scared to handle it”. Having mobile phones allowed MWs to contact doctors or coordinators for directions to help patients (Huyer & Sikoska, 2003). Midwives explained that mobile phones made them “calm”, “confident” and “relaxed”, giving them the boldness to make certain decisions which they did not dare to before. A midwife narrated how the mobile phone served a critical role:

> I had a patient. When I came, the openings were almost completed and the water had turned green. It was a high risk delivery. I couldn’t refer her anymore. I called Ms X (senior MW). When the baby came out, he didn’t cry; he had asphyxia. We thought he was already dead. The blood was all over my phone. I kept holding onto it. I called an ambulance.

For MWs, the mobile phone increased proficiency of their healthcare skills, translating to respect from the community (Duncombe et al., 2005). As one described it, “We’ve become like opinion leaders, we sometimes feel embarrassed because we are still young, yet people respect us. Kids call us ‘Ma’am’; so do the elderly.” As MWs realized this new found respect, they utilized strategies to incorporate, instead of challenge, the instilled subordinate position of women. The professional role of being a CHW diffused a part of the

tension that arose from possessing mobile phones. Relegating the mobile phone use to professional work, rather than a form of personal ownership, was one legitimization strategy for their newly obtained possession.

Other common legitimization strategies included sharing or hiding their project mobile phones. Some MWs lent their mobile phones to others, even to the extent that it took up all the airtime credits, because they did not want to look “arrogant”. Such sharing of personal devices motivated by social acceptance lies in contrast with the cost-driven strategies observed by Chipchase (2006) in Uganda. Another MW hid her mobile phone when patients came to her house because “if I have a mobile phone but they don’t, it’s not nice.” Myriad strategies were employed to enjoy the newly found autonomy while circumventing possible social repercussions.

Personal growth vs. Limited technological competency Education and knowledge gain are key components of female empowerment. For Acehnese MWs, who often do not receive much higher education or formalized training, mobile phones became a crucial channel for personal growth. For instance, World Vision project managers periodically transmitted basic healthcare knowledge through short message service (SMS) broadcasts. More importantly, mobile phone were an important tool in bridging physical distance and informal hierarchies, allowing MWs of different knowledge levels to connect. As one MW described it, “I will call my fellow colleagues who has a lot of experiences in baby delivery so we can discuss things”. An MWC shared that, “if I have a case, I want to install a spiral (a contraception method), then I will call, ‘There is this case, if you want to learn then come.’ Then they (MWs) will come”.

However, knowledge-building practices could be impaired by a lack of technological competency. At the outset, MWs were able to use only the basic call functions of the mobile phone. Despite having undergone training, MWs expressed an inability to use the application functions of the mobile phones. At first glance, this may be attributed to a high learning curve, as some confessed that they "forgot" the training. Delving deeper, however, it is evident that gender played a part in the slow uptake of competency.

Midwives' domestic and professional roles took a considerable part of their time, making it difficult for some of them to attend formalized training sessions (Hafkin & Huyer, 2006). When one woman was asked whether she wished to attend such training sessions, she replied, "No, not yet, because I still have to take care of my child." A lack of access also limited gain of technological competencies. The gender inequality in technology use and ownership meant that most women would have access to technologies slower than men, and this impaired women from learning the use of these technologies (Hafkin, 2002). A MWC described how she was "scared" to operate the computers due to the fear of damaging them, with the associated ramifications to her job status. Many MWs echoed such fears, where the lack of exposure to technologies made them wary of manhandling them.

Despite such constraints, MWs were enthusiastic about learning new skills. They, for instance, volunteered to learn computing skills, despite being outside their job scope. MWs need for being directly responsible for their patients led them to overcome their resistance to technology training. However, the dialectical tensions between their desire to learn and the constraints to learning caused constant frustrations. Unable to tear themselves from their domestic tasks, MWs attempted to solve the problem by suggesting that "time constraints"

could be circumvented through flexible training sessions.

Furthermore, MWs picked up competencies through a set of informal learning networks. Some MWs who were more versed in technology use became informal ‘consultants’. For instance, a particular midwife became the go-to person for questions about mobile phone use, and for assorted technical tasks, such as the typing of reports. Through this, she achieved prominence, and the hub of an informal learning network that became self-sustaining, allowing MWs to learn from each other and develop their competencies.

Social hierarchy

Social, cultural and economic factors influenced the diffusion of ICTs amongst women. Midwives engaged in negotiating independence by over-riding economic considerations with personal satisfaction, and in appropriating power from the entrenched hierarchy.

Economic independence vs. Constrained earning capacity The lack of economic independence of women places them in a position of dependence, limiting their role during daily decision making and investment in personal growth. One MW said, “Husbands are the decision makers of the family because midwives get money from their husbands”. The lack of financial independence also prevented her from acquiring further education. When asked if they wished to become doctors, MWs answered in the positive, but later expressed that this would only remain a dream because they “did not have enough money”.

Despite the increased efficiency made possible by mobile phones, MWs do not experience a corresponding monetary increase. Most experienced stagnant monthly pay, despite participation in the program. It is possible that this finding is colored by the fact that

MWs found it difficult to increase fees for private consultation, as Acehnese suffered economically in the tsunami aftermath. According to a MW, “patients are mostly poor. If we want to charge them more, we can’t. We also pity the patients.”

Constraints on earning capabilities are also influenced by gender. From a social perspective, being desirous of greater economic earnings could also be perceived as a threat to the male-dominated economic hierarchy in the family structure. From a professional perspective though specialized in female medical treatment, being female prevented MWs from getting the same pay as other healthcare practitioners. One respondent bemoaned, “Some people think that it’s free to go to a midwife for check-up. Sometimes people are shy to say they want it free so they owe first, they will pay later or maybe 10 years later.”

While the constraints in earning capabilities were a source of frustration, MWs did not struggle between the dialectical poles as much as accept them as facts of life. Although MWs desired increased incomes, they appeared nonchalant in achieving economic independence. Instead, helping others with their specialized skills gave them a feeling of joy and satisfaction and bestowed upon them the dignity and respect of their profession. Many respondents indicated that their profession was not centered around financial gain but about protecting and securing life, “We only get Rupiah 700,000 (~US$ 65) a month, but when we help people, we think about their life, and we hope to obtain merit from Allah”. This is rewarding for MWs because, they “feel close to the villagers”.

While MWs may not have been able to increase their incomes in the short-term, there is the potential for gain in the long-run. As efficiency improves, MWs may be able to attract greater patients, while charging them increased fees; this could translated into increased

earning power. However, whether MWs would actively pursue economic strategies that, in effect, could threaten existing social hierarchies is debatable. Instead, greater evidence of negotiating power within the healthcare system was observed. Alternatively, it is likely that, given their subordinate positions in the existing social hierarchy, MWs would adopt legitimatization strategies to compensate for economic advancement.

Appropriation of power vs. Hierarchical control The use of mobile phones allowed MWs to appropriate power from doctors, by accessing informed advice. For example, many Acehnese villagers believed that immunization jabs, being immediately followed by a fever, could be a threat to children's health. However, after the MWs obtained information from doctors, families readily accepted the explanation. This indicates that power flowed down vertically, empowering women to influence decisions (Huyer & Sikoska, 2003). Furthermore, village men recognized MWs connectivity to a hitherto inaccessible knowledge source. A villager said that if he contacted the doctor, his "call would probably be ignored". By using the midwife's mobile phone, however, the doctor could "recognize the number" and pick the call up.

Having access to doctors may, however, only provide a facade of power; a superficial gain easily removed with the termination of the mobile phone program. In reality, even gaining temporary access to power at the top was challenging. One MW said, "I consult with other midwives, but not directly with specialist. Sometimes the doctor takes a long time to pick up my call. I have to call a few times before they pick up." Sometimes these calls were ignored not because the doctors were busy, but because they simply could not bother to pick up MW calls. Even when doctors did answer, some of them may have replied in irritation. A

senior MW described how she preferred talking to her “colleagues first” because doctors sometimes provided “unsatisfying answers”, including “confusing” remarks, making no attempt to help these MWs along in diagnosis or treatment application. Due to this, many MWs spoke only to peers, limiting the potential appropriation of power. Similar peer-to-peer communication, limiting hierarchical conversations, has been observed in other organizations with strict chain-of-commands, for example, with police (Manning, 1996).

Indeed, some doctors demonstrated negative attitudes towards these MWs. Although doctors acknowledged that MWs fulfilled important needs in communities, some remarks devalued their contribution, instead emphasizing their flaws. One doctor went into lengthy exposition about how MWs were covering up for each other’s laziness and that by “using the phone, sometimes she (the midwife) can lie about things. For example she lies about the blood pressure measurement because she hasn’t done it yet.” Another doctor even ridiculed the MWs’ use of mobile phones, saying that “maybe she contacts her boyfriend.” Project donors too were concerned about inappropriate personal usage of the mobile resource, and instituted a system with an airtime ceiling, yet such abuse was rarely found.

Although MWs struggle, largely unsuccessfully, to negotiate power within the healthcare infrastructure, the struggle itself produced a new form of internalized power. Self-empowerment is a form of power generated within the individual himself and describes the “capacity of women to increase their own self-reliance and internal strength” (Moser, 1989, pp. 107-108). Having a mobile phone provided assurance that MWs could receive and provide help. This gave them the courage to handle difficult pregnancy cases. When successfully handled, MWs realized their own capability to help out in these difficult

situations. As such, many MWs commented felt more "confident" after receiving the mobile phones. One participant described heightened self-awareness that she could take on much more difficult tasks as a junior midwife, saying, "I'm still a junior, but they (the family) contact me and say patient is delivering. But delivery is usually handled by the seniors. I feel that patients trust me so I need to be confident." MWs directly benefited from the increased trust by the community, as their self-confidence increased. Over time, MWs self-empowerment should lead to empowerment within other domains as well.

Discussion

The use of the dialectical perspective provided insight into two areas. First, it highlights how benefits and constraints may interact and cause struggles in women's lives. As the introduction of ICTs gradually make women aware of their capability and potential (Townsend, 1999), they simultaneously become increasingly conscious of gender-specific obstacles (Dunn & Dunn, 2006; Hafkin & Taggart, 2001). These opposing forces cause struggles within their minds and manifest in their speech and behavior. Second, due to the struggles, outcomes from ICT implementation usually emerge in the middle ground, between the opposites of benefits and constraints, and are negotiated to a point of resolution. Table 1 summarizes the dialectical struggle women faced.

Table 1 about here.

Women's Struggle with ICT use

The findings revealed that gender inequalities can remain masked until gradually

revealed by ICT implementation. Consistent with previous findings, MWs gained self-confidence through the use of mobile phones (Huyer & Sikoska, 2003; Oxall & Baden, 1997). They came to realize that not only do mobile phones improve professional efficiency (Mijumbi, 2002), they help garner respect within local communities (Duncombe et al., 2005). However, with the rising consciousness of potential capabilities, prevailing gender-specific forces resisting such improvements have also become more evident. Although ICTs may allow for social transformation (Huyer & Sikoska, 2003; Morgan, Heeks, & Arun, 2004; Reeves & Baden, 2000), prevailing social forces continue to resist and limit such possibilities.

The meeting of oppositional forces resulted in frustrations and concerns. While some women exposed their frustrations at dealing with gender prejudice, others devised strategies to alleviate concerns at upsetting the prevailing male-dominated hierarchy. Reactions, therefore, happen at two levels. While some confronted gender prejudice, others attempted to assimilate their new-found power into existing social hierarchies (Patel & Parmentier, 2005).

Hence, researchers and policy-makers need to be aware of the real tensions that could arise out of ICT projects. As noted in the paper, empowerment in women is not only wholly beneficial or constrained, but also results in frustrations and tensions across multiple levels. These tensions, while uncomfortable at first, may be an important first step in transforming traditional gender roles (Townsend, 1999).

Process of Resolution

The outcomes of ICT implementations never exist as pure benefits or constraints. To advance the ICT4H model, it is argued that a process of resolution needs to be considered. To

understand and predict ICT implementation results better, one has to take into account how the participants themselves, in this case, MWs, can influence outcomes (Townsend, 1999; Baxter & Montgomery, 1996). The findings lead us to conclude that at least two areas must be considered during the resolution process: the resourcefulness and the desires of women.

Resourcefulness of Subjects. Resourcefulness refers to the ability and willingness of women to devise interesting means in overcoming constraints. The analysis found that MWs were active agents capable of dealing with the difficulties presented by their gender. This does not mean that access to mobile phones gives women the power to resist the gendered constraints in their society. Women did not wield major control over their societal constraints, but they utilized resources to find solutions to their problems. For instance, when faced with societal norms limiting their use of mobile phones, MWs devised excuses and strategies to legitimize their continued usage of mobile phones (Patel & Parmentier, 2005), particularly within their professional roles. To do so, these women utilized their social networks and understanding of social norms. These two resources were of importance in generating deviant solutions to their problems. While the constraints were not directly confronted, resourcefulness allowed individuals to maneuver around problems and absorb benefits. However, we note that a broader generalization of the negotiation process is problematic, as handset use was legitimatized for professional usage. Whether this would occur for all females, in the absence of a specialist role, requires further investigation.

Desires of Subjects. To understand the outcomes of ICT implementation, one also needs to value the desires of the subjects (Townsend, 1999). In some cases, the aims of researchers and policy-makers may not coincide with their subjects, or beneficiaries, leading to

alternative outcomes. For instance, one measure of the project was to foster greater financial independence. Since financial independence could improve the dignity of women, as well as their profession, this was thought to be a clear indicator of empowerment. However, the analysis reveals that understanding of female dignity was based not on an economic indicator, but rather, the humanitarian services rendered to their own communities.

In another instance, MWs did not appropriate power from doctors partly because they did not see themselves as needing to express power over the men. Instead, their concerns were more practical: they wanted to feel competent so that they could handle difficult childbirths better (Duncombe et al., 2005). Thus, even though MWs did not appropriate hierarchical power, the inner empowerment developed left them highly satisfied.

We need to be careful, however, in relying on the internal self-empowerment process as a means of achieving sustainable social change. So, while one can call for the need for gender reform in conservative societies, we need to recognize that women as independent entities have to confront ingrained subordination for empowerment to be realized. To achieve real gender equality, policy-makers, such as local government, and practitioners, in the form of NGOs and civil society, not only need to fight for more equal conditions for women's technology use, but equally importantly, to educate women in gender-consciousness.

Project designers have to integrate women's practical needs with strategic concerns to transform the existing social hierarchy, as well as successfully conduct gender-neutral projects. By considering the negotiation process, one can better taper expectations and predictions about ICT implementation. A possible area of study would be to consider whether influencing the negotiation process could facilitate ICT implementation. Instead of seeing

constraints as obstacles needing to be directly confronted and overcome, a preliminary step of an ICT project may first see them as problems to be maneuvered around. For instance, if learning presents a problem due to the lack of training, communities could be encouraged to recruit competent ICT users, within the participant female networks, to act as peer-tutors. Further, more effort can be spent to convince women that the ICT implementation program is a worthwhile venture, not merely from the narrow development objective of the donor, but as a tool for social-transformation. This would, in turn, spur them to tap into the resources present in their communities. The negotiation process of gender empowerment, hence, could be targeted as a component in a holistic ICTD program.

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Table 1 Summary of the Benefits, Constraints and the Resolution of the Dialectical Struggle

Themes	Benefits	Constraints	Resolution
Autonomy vs. Subordination	– Opportunity to make decisions – Realization of usefulness of mobile phones	– Denial of women's needs – Masked inequalities	– Used strategies to legitimatize benefits and acknowledge constraints
Personal growth vs. Limited technological competency	– Mobile phones provide learning material – Discuss and share knowledge	– Domestic role limits time for training – Low access to technology – Fear to speak up	– Attempted to work around the limitations of time – Used informal learning groups
Economic independence vs. Constraints earning capabilities	– Increased efficiency in profession	– Generalized poverty – Lack of appreciation for profession by outsiders – Increased expenditure	– Potential long term gains – Economic gain put aside for gain in dignity and self-respect
Appropriation of power vs. Hierarchical control	– Access to power at top – Recognition of power by outsiders	– Difficulty to appropriate power – Reluctance to even out hierarchical power	– Self-empowerment