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# **Extrinsic Motivation to Use mHealth Interventions in Maternal Healthcare in Rural Malawi**

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## **ABSTRACT**

mHealth interventions have the potential to address the inequalities in accessing health information. In maternal healthcare, mHealth interventions provide information to pregnant women on how they can stay healthy during pregnancy, as well as on the danger signs in pregnancy that can contribute to maternal mortality. In this study we posit that extrinsic motivation could promote trialability of mHealth interventions. We employed qualitative research methods to investigate extrinsic factors that motivate maternal healthcare clients in rural Malawi to use mHealth interventions. Self-determination theory was used as the theoretical lens for the study. Data was collected using secondary data sources and semi-structured interviews with maternal clients who used the mHealth intervention. The study found that maternal healthcare clients were extrinsically motivated by incentives and the ability of the technology to suppress social-cultural norms. The study informs mHealth implementers on what they may focus on to bring in beneficiaries to try the intervention which eventually could lead to the adoption and use of interventions.

## **Keywords**

Maternal healthcare, mHealth interventions, self-determination theory, extrinsic motivation.

## **INTRODUCTION**

Information and Communication Technologies for Development (ICT4D) interventions are often challenged with low adoption and usage by intended beneficiaries. One way to overcome these challenges is to understand factors which motivate the beneficiaries. Motivation is defined as the drive which pushes someone to do things in order to achieve a target. Motivation is categorised as extrinsic and intrinsic (Ryan & Deci, 2000). On one hand, extrinsic motivation refers to when a person performs "...an activity in order to attain some separable outcome" (Ryan & Deci, 2000, p. 71). In other words, extrinsic motivation refers to when one is motivated to perform a behaviour or engage an activity, simply because they want to gain a reward or to avoid punishment (Ryan & Deci, 2000). On the other hand, intrinsic motivation refers to "the inherent tendency to seek out novelty and challenges, to extend and exercise one's capacities, to explore, and to learn" (Ryan & Deci, 2000, p. 70). Here, intrinsically motivated people engage in behaviour, or perform an activity for its own sake, rather than due to some external reward. This study is focusing on factors motivating the use of mHealth in maternal health in rural areas. In many rural areas of developing countries maternal health is challenged with social-cultural norms, which may hinder the adoption and use of mHealth interventions (Duclos et al., 2017; Hamal et al., 2020).

Utilization of health facilities for pregnancy-related issues improves maternal outcomes. However, a lack of infrastructure such as health facilities and long distances to access maternal healthcare services in rural areas contribute to poor maternal outcomes (Blauvelt et al., 2018). Thus, many governments and development agencies implement mobile technology health (mHealth) intervention with the aim of reducing the maternal mortality ratio (MMR) to meet the Sustainable Development Goal 3.1 (Blauvelt et al., 2018; WHO, 2018). mHealth interventions have the potential to improve health-seeking behaviour, thereby increasing health facility usage.

Maternal mHealth interventions in rural areas of developing countries are bedeviled by a myriad of challenges *inter alia* low mobile phone ownership, especially amongst women (Duclos et al., 2017). Malawi, like other low-income countries, has a low penetration rate of mobile phones; currently standing at 45% (Kemp, 2020), and is even lower in rural areas (Maliwichi, et al., 2021a). In rural areas of Malawi, users of an mHealth intervention have to surmount several challenges to use an intervention. For example, some women who do not own a mobile phone use shared mobile phones to access the interventions (Blauvelt et al., 2018). It is therefore important to understand the extrinsic factors that motivate rural women to use maternal mHealth interventions.

Most studies dealing with motivation within the mHealth space have concentrated on motivating factors influencing health workers to use mHealth (Modi et al., 2017). However, there is a dearth of literature on motivating factors influencing healthcare beneficiaries to use mHealth interventions (Zinsser et al., 2020). This study is focusing on extrinsic motivation since mHealth implementers could manipulate these for the benefit of the project. We posit that extrinsic motivation could promote adoption and use of mHealth interventions. Consequently, the research question of this study is: what extrinsic factors motivate healthcare clients in rural Malawi to use maternal mHealth interventions?

To answer the research question, we used qualitative research methods and self-determination theory (SDT) as a theoretical lens. We used a case study of Chipatala Cha Pa Foni (CCPF) – which translates to Health Centre by Phone. CCPF is a maternal and child health intervention which was piloted in a poorly performing district in Malawi on maternal and child health. Malawi was an appropriate case study since the country has one of the highest MMR in southern Africa; at 349 per 100000 live births (NSO, 2019). Further, the country has a low mobile adoption rate. The findings of the study may inform implementers of mHealth interventions on what to focus on to extrinsically motivate potential beneficiaries to adopt and benefit from the intervention.

The rest of the paper is arranged as follows: the next section presents the theoretical framework used in this study. After that, the paper presents a case description. This section provides the overview of CCPF as well as its context. The subsequent section, the methodology, presents data collection and analysis used in the study. Further to this, the section presents the ethical considerations for the study. The methodology section is followed by the findings section, which presents the results of the study. The finding section is followed by the discussion section, which discusses the extrinsic factors that motivated maternal healthcare clients to use mHealth interventions in association with other literature. Lastly, limitations of the study and future research are presented.

## **THEORETICAL FRAMEWORK: SELF-DETERMINATION THEORY**

Theories in motivation are categorised as content theories and process theories. The former are concerned with *what* motivates individuals (Coccia, 2019) while the latter are concerned with the *process* of motivation and describes why and how human behaviour is activated and directed (Coccia, 2019). Two possible motivation theories are self-determination theory (SDT) (Ryan & Deci, 2000) and two-factor theory (Herzberg et al., 1959). The two-factor theory focuses on motivators and hygiene factors. On one hand, motivators may lead to positive attitudes towards the job and can encourage employees to work harder and increase job satisfaction (Ruthankoon & Ogunlana, 2003). On the other hand, hygiene factors would not encourage employees to work hard but will cause the employees to become unmotivated if they are not present (Ruthankoon & Ogunlana, 2003). The two-factor theory was not ideal for this study since it is a content theory and concentrates on what motivate individuals. This study is part of a bigger study which seeks to understand what motivates individuals and why they are motivated. SDT is both a content and process theory; hence, it is appropriate for this study. SDT is limited in the sense that it assumes that all individuals have the same basic psychological needs (Perera, 2020).

### ***Overview of Self-Determination Theory***

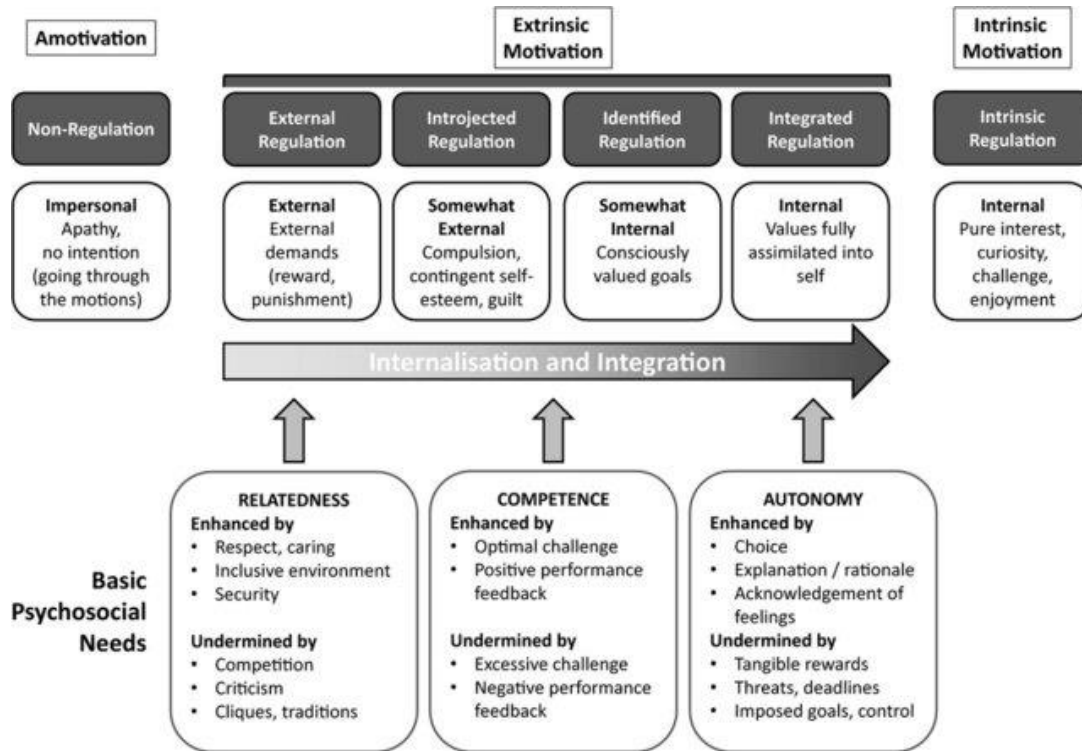
SDT by Ryan and Deci (2000) is a theory for motivation, development, and wellness. Self-determined is a widely used concept in psychology and it refers to a person's ability to make choices and manage their own life. The theory notes three types of motivations: amotivation (lack of motivation), extrinsic motivation and intrinsic motivation. Further, there are six regulatory styles. Table 1 summarizes the regulatory styles based on the type of motivation.

**Table 1**  
*Summary of regulatory styles based on the type of motivation*

<b>Type of motivation</b>	<b>Description</b>	<b>Regulatory styles</b>
Amotivation	Non-action or action without real intent	
	Failure to act or going through the motion	Non-regulatory
Extrinsic Motivation	Acting due to external force	
	Acting to gain reward	External
	Acting to avoid guilt or anxiety, or to enhance pride or self-esteem –regulation partially internalises	Introjected
	The external pressure has become personally important	Identified
	External influences are integrated with internal (intrinsic) interest	Integrated
Intrinsic Motivation	Naturally leaning toward assimilation, mastery, spontaneous interest, and exploration	
	Acting purely to satisfy ones interests or desire for mastery	Intrinsic

This study is not interested in amotivation, but rather extrinsic motivation, intrinsic motivation and basic psychological needs. However, this paper focuses only on extrinsic motivation. Figure 1 illustrates self-determination theory.

**Figure 1**  
*Self-determination theory - Source: Ryan & Deci (2000)*



### Extrinsic Motivation

Extrinsic motivation has four regulatory styles (see Table 1). Extrinsic motivation is associated with external regulations such as rewards or punishment. In addition, a regulation could be somewhat external (in the case of introjected and identified regulations) where one would do something to avoid guilt or it could be that the external pressure has become personally important. For example, extrinsically motivated maternal healthcare clients may deliver a child at a health facility, because they want to adhere to government regulations. Gradually, the maternal health client could start sensing the importance of using health facilities due to external pressure.

These regulatory styles vary according to the degree to which the external regulation has been internalised (taking in the value or regulation) and integrated (further transformation of that regulation into their own self). Gradually, the process of internalisation happens, and what was purely externally motivated slowly becomes internalised (internally regulated), until internal values are fully integrated into the self.

### CHIPATALA CHA PA FONI: MALAWI CASE STUDY

Malawi is a country in southern Africa with a population of about 17.5 million people. About 85.6% of the population resides in rural areas of the country (NSO, 2019). The majority of the population of Malawi lives more than 8km from the nearest health facility. Furthermore, the Ministry of Health faces shortage of health staff needed to provide minimum health services. For example, the doctor-patient ratio, is at 1 to 48000. This shortage of staff extends to other health professionals such as nurses (Lutala & Muula, 2022).

## ***CCPF Case Study***

CCPF was introduced in 2011 as an intervention aimed to decrease maternal and child deaths (VillageReach, 2018). The main objective of CCPF project was to maximize healthcare access and utilisation by remote maternal healthcare clients facing the many significant challenges, such as walking long distances to access a health facility, resulting in delays in seeking care and unnecessary expenditures.

### ***Components of CCPF System***

At first, CCPF had two main components: i) toll-free case management hotline (which is available on an Airtel Malawi mobile line) and ii) tips and reminders. These components were designed to work on any mobile phone.

#### **Case Management Hotline**

The toll-free case management hotline was stationed at the district hospital and was managed by qualified hotline workers (HLWs). The HLWs were trained on maternal and child health community case management; this is a training which is also provided to CHWs. The maternal healthcare clients were told about their expected date of delivery (EDD), the current stage of pregnancy and HLW could answer any pregnancy related question.

#### **Tips and Reminders**

Tips were personalized messages according to the stage of the pregnancy. Reminders were messages for antenatal appointments, medication and supplements during pregnancy. The messages were in two vernacular languages which are widely spoken in the district. Initially, tips and reminders were either text messages or voice messages.

The project started as a pilot, then scaled-up and handed over to the Government of Malawi in 2018 (VillageReach, 2018). CCPF is now available in all districts of Malawi 24/7. The tips and reminders component has been replaced with pre-recorded voice messages and everyone can access them using an Interactive Voice Response (IVR) system when they call the toll-free number. The callers choose whether they want to talk to a hotline worker or listen to the voice messages.

### ***Community Volunteers for CCPF***

The implementing agency recruited about 400 community volunteers across the four catchment areas and each village was assigned a community volunteer. The volunteers were not Health Surveillance Assistants (HSAs) (in Malawi HSAs are CHWs employed by the government). Their role was to provide maternal healthcare clients with access to a mobile phone for the intervention and demonstrate how to use the system. Other maternal healthcare clients were using their own mobile phones, other community members or family members' mobile phones. This was so since CCPF is available for free on one mobile operator (Airtel Malawi), so maternal healthcare clients who have mobile numbers for other mobile operators had to find someone with an Airtel line to call the toll-free number or listen to the messages.

## **METHODOLOGY**

The study employed a qualitative research methodology. Even though, SDT has benefited from experimental studies which are quantitative in nature. SDT can be used to test hypothesis even using traditional approaches such as qualitative research methods (Ryan & Deci, 2020). For example, SDT was applied using realist approach to enhance the explanatory nature of evaluations (Visser et al., 2019). SDT was used since it is an explanatory study and seeks to understand why maternal healthcare clients were motivated to use mHealth interventions. The study used a single case study. This study looked at a group of women within an environment where there were poor maternal health outcomes.

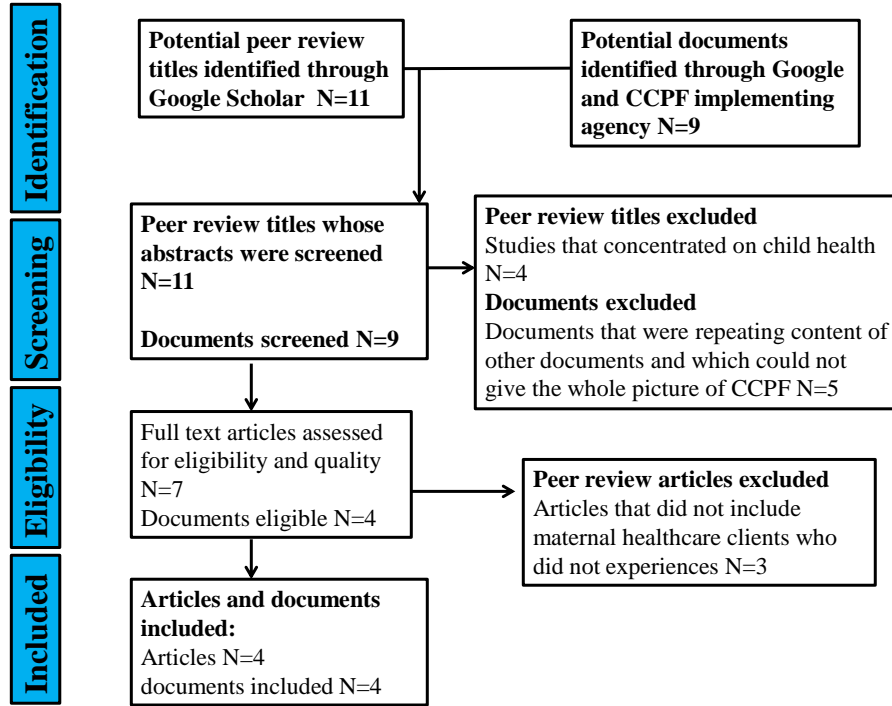
### ***Data Collection Methods***

Data was collected using secondary data sources on CCPF and semi-structured interviews with maternal healthcare clients in 2019. Secondary data relating to the project were collected from the internet, as well as accessed directly from the project, and peer-review research outputs. Figure 2 shows the PRISMA diagram which summarises the step used to collect secondary data.

### **Figure 2**

*PRISMA diagram showing steps used to collect secondary data*





We conducted semi-structured interviews with the maternal healthcare clients. The sample had 20 maternal healthcare clients. Table 2 summarized the demographic characteristics of the maternal clients.

**Table 2**

*Demographic characteristics of the maternal healthcare clients*

Characteristic	No of Clients
<b>Age range</b>	
15-19	2
20-25	6
26-35	8
36-45	4
<b>Educational level</b>	
Primary	17
Junior Secondary	3
<b>No of pregnancy used CCPF</b>	
1	13
2	4
3	3
<b>Months started ANC</b>	

2	7
3	13
<b>No of ANC visits</b>	
4	9
5	11

All the maternal healthcare clients had attended the minimum required antenatal visits and had all delivered at the health facility. We used the following procedure to access the respondents:

- The project team queried the Caller Database for CCPF for the period of August 2017 to December 2018 to obtain mobile numbers for maternal healthcare clients who called or registered for CCPF in Balaka district using their own mobile phones or borrowed mobile phones. We chose this period to find more active mobile numbers. We identified “hotspots” (areas which made more calls from the caller’s database) in Balaka district. We were aware of the ethical and privacy issues involved when using mobile numbers from the callers database. Hence, when the call connects to the potential participants, we introduced ourselves as researchers studying CCPF and we are calling people randomly to know if they know CCPF. If they know about CCPF, we proceeded as described in ethical consideration section.
- In the case where a maternal healthcare client used a borrowed mobile phone, we asked the mobile phone owner about CCPF and if they know anyone who has used their mobile phone for CCPF. Since, CCPF was initially launched as a maternal and child health intervention in the district, it was easy for the mobile phone owner to identify the maternal healthcare clients who had used their mobile phone for CCPF.

The interviews took 20 to 30 minutes each. The interviews were conducted in Chichewa; Chichewa is a national local language of Malawi, so all respondents understood the language. For each interview, the researcher took notes and recorded the calls using CallX mobile application.

***Data Analysis***

We conducted data analysis in two phases. The first phase focused on document analysis and the second phase focused on empirical data collected using semi-structured interviews. The audio-recordings were transcribed and coded using qualitative research software (Nvivo 12). We employed a thematic analysis to analyze the data. Several phases, as stipulated by Braun & Clarke (2006), guided the analysis process. Table 3 summarises the steps we took in data analysis.

**Table 3**

*Summary of data analysis steps*

Phases of thematic data analysis	Activities done
Familiarisation	Translated and transcribed the audio interviews from Chichewa into English. The raw transcribed data (including the notes) was then imported into Nvivo 12 for analysis.
Theme development and coding	Author 1 used the concepts from SDT to create themes and subthemes (nodes and sub-nodes) in Nvivo 12. Data from secondary sources and empirical data was then coded in Nvivo 12. Using the whole data set, the researcher finalised coding the data
Reviewing themes	Author 2 reviewed the coded data extracts, where collated data extract of each theme were read to see if the current theme make a coherent pattern. If the data extract does not fit, they were moved to themes where they fit.  The validity of individual themes in relation to the entire data set was also checked. Using Nvivo 12, both authors developed a thematic diagram to see if it accurately reflects the whole data set's meaning based of SDT.
Defining and naming	Defining and refining the themes that are going to be present in the findings chapter. We identified what is of interest in the data set and why, and the story that each theme tells ( <i>see Table 4</i> ).
Writing up	The findings section of this study present the results and the interpretation of the analysed data.

### ***Ethical Considerations***

Before data collection, we obtained permission to use CCPF as a case study from the implementing agency of CCPF, Malawi Ministry of Health and Balaka District Health Office. Furthermore, we obtained ethical clearance from the National Health Sciences Research Committee (Malawi).

Consent was sought before interviews started and issues of privacy and confidentiality of the data collected were discussed. For maternal healthcare clients who do not own mobile phones, we had to seek consent to interview them through the mobile phone owners before they could come forward for the interviews. We were aware of the risks of interviewing pregnant women: there could be an emergency during interviews or women could recall traumatic experiences related to the pregnancy. To mitigate against this risk, our sample was limited to mothers who were not pregnant at the time of data collection; they were all women who had previously used the system. Further, we informed the respondents that participation of the study was voluntary and they could withdraw from the study any time. For the analysis, we anonymized the maternal healthcare clients as Client x.

## FINDINGS

The findings of this study suggest that several extrinsic factors were identified as motivating maternal healthcare clients to use maternal mHealth interventions and these were: receiving of incentives; technology masked socially unacceptable pregnancies; convenience of the mHealth service; and privacy offered by the intervention. Table 4 summarises the themes and their associated sample codes.

**Table 4**

*Summary of themes and their associated sample codes*

<b>Main theme</b>	<b>Sub-theme</b>	<b>Sample code</b>
Extrinsic motivation	Receiving of incentives	<i>-In the early days of the project, we used to receive mosquito nets when we registered for CCPF. However, we no longer receive the mosquito nets [Client 6]</i>
	Technology masked socially unacceptable pregnancies	<i>-I was shy to go to the hospital to ask certain things when I was pregnant because I was not yet married, so when I heard of this toll-free number that we can call and ask questions, I decided to register [Client 2]</i>  <i>-I remember starting ANC at 6 months because I was not married and I was shy to go to the hospital. But when CCPF came, I was called CCPF and they encouraged me to register and start ANC immediately [Client 4]</i>
	Convenience of the mHealth service	<i>-We live far away from the health centre. Transport cost using a bicycle to the health centre is K1000 and to the district hospital is K1500 [Client 3]</i>  <i>-We save time and money by just calling CCPF while doing other things at home [Client 7]</i>
	Privacy offered by the intervention	<i>-My husband was shy to accompany me at the antenatal clinic. However, nowadays we call CCPF together, and ask questions that we could not ask in the presence of other people at the clinic [Client 8]</i>  <i>-My husband and I plan to call CCPF at night to ask sensitive questions [Client 2]</i>

### ***Receiving Of Incentives***

During the pilot phase of the project, the project incentivised the maternal healthcare clients to register for the intervention by providing them with mosquito nets. Mosquito nets are valued in most parts of Malawi due to high prevalence rate of malaria. After the pilot phase, the project implementers' stopped distributing the mosquito nets. However, maternal healthcare clients were expecting to be given mosquito nets as a compensation for using CCPF mHealth intervention.

*“In the early days of the project, we used to receive mosquito nets when we registered for CCPF. However, we no longer receive the mosquito nets ...”* [Client 6].

This finding shows that the maternal healthcare clients might be disappointed after realising that the mosquito net were no longer available. However, despite the incentive being removed at the clinics in Balaka, maternal healthcare clients continued to use CCPF, because they saw its importance.

### ***Technology masked socially unacceptable pregnancies***

The maternal healthcare clients in this study were motivated to use the mHealth intervention, since no one would judge their pregnancy. This finding was common among unmarried pregnant women, as well as teenage girls who were pregnant out-of-wedlock. It could be the case that in a rural setting, society stigmatise pregnancies of unmarried women or teenage girls. The mHealth intervention provided the teenage healthcare clients an avenue where they could get information about pregnancy and what they are supposed to do during the pregnancy without judgment.

*“I was shy to go to the hospital to ask certain things when I was pregnant because I was not yet married, so when I heard of this toll-free number that we can call and ask questions, I decided to register”* [Client 2].

mHealth intervention has the potential to unlock access of maternal healthcare information to maternal healthcare clients whose pregnancies are socially unacceptable. For example, in settings where religious as well as cultural traditions are important, pregnant women who could not conform to these religious or cultural and tradition norms could be potentially excluded from accessing proper maternal healthcare services due to shame.

### ***Convenience of the mHealth service***

The maternal healthcare clients in this study could use the hotline of CCPF at anytime of the day since CCPF is available around the clock. Maternal healthcare clients could call the hotline anytime while at home. *“It is a quick hospital service, they help us quickly”* [Client 2]. Furthermore, the maternal healthcare clients save time and money when using the service and this motivate them to use CCPF. Instead of wasting transport money to visit the health centre just for advice, they just call CCPF while doing other things at home.

*“We live far away from the health centre. Transport cost using a bicycle to the health centre is K1000 and to the district hospital is K1500” [Client 3].*

This finding shows that the mHealth intervention reduced the burden of walking long distances just to ask for maternal health information. In addition, the maternal healthcare clients saved financial resources that they may require simply to travel to access maternal health information. The maternal healthcare clients could invest this time in other productive ventures.

### ***Privacy offered by the intervention***

The mHealth intervention provided a private space for maternal healthcare clients and their husbands to ask sensitive questions that they cannot ask at the antenatal clinic. Furthermore, the mHealth intervention motivated the husbands to participate in maternal-related issues.

*“My husband was shy to accompany me at the antenatal clinic. However, nowadays we call CCPF together, and ask questions that we could not ask in the presence of other people at the clinic” [Client 8].*

This shows that the hotline service of CCPF provided the maternal healthcare clients and their spouses a private space to discuss maternal-related issues with health professional whilst at home. Most of the maternal healthcare clients participated in this study had low literacy levels. This could mean that these maternal healthcare clients had knowledge deficiency on maternal-related information. Hence, they were extrinsically motivated with the privacy offered by mHealth intervention.

## **DISCUSSION**

The findings of this study suggest that maternal healthcare clients were extrinsically motivated to use CCPF due to: incentives and the ability of the technology to suppress social-cultural norms.

### ***Culture Of Providing Material Incentives***

In poor-resource settings, communities get resources through donor agencies, who brings resources in these communities such as food (soya flour and peanut butter) for children under the age of five in healthcare facilities (Park, 2019). Mothers of under-five children take their children for immunisation or attend antenatal clinic, expecting a gift for their attendance. The findings of this study suggest that the *culture of gifts* to coax maternal healthcare clients to use mHealth interventions could in this case have extrinsically motivated the maternal healthcare clients to use the mHealth intervention. Other studies found that extrinsic compensation motivated university teacher’s continuous intention to use flipped teaching (Lai et al., 2018). Furthermore, Muguongo (2015) found that compensation is one of the drivers that motivate people. For this reason, the expectation to be compensated may motivate beneficiaries of interventions to use them.

Other studies have found that the *culture of gifts* is problematic, especially when the donor withdraws from the community (Park, 2019). This could de-motivate certain beneficiaries. However, the fact that these beneficiaries had a chance to adopt the intervention has a chance to experience the benefits of the interventions, and could eventually be intrinsically motivated to use the intervention. For this reason, it is beneficial for implementers of interventions to practice the culture of gifting, which promotes the initial adoption of interventions.

### ***The Technology Suppressed Social-cultural Norms***

The findings of this study suggest that the mHealth intervention suppressed social-cultural norms that would not allow pregnant women with socially unacceptable pregnancies to seek maternal-related information and help, or seek help from males and young CHWs and community members (Duclos et al., 2017; Larsen-cooper et al., 2015). The mHealth intervention enabled pregnant women whose pregnancies were not socially accepted to access necessary maternal healthcare information. These pregnant women could have been potentially excluded from benefiting from the mHealth intervention. Such a dilemma is common among unmarried teenage pregnant girls, who are normally shy to ask fellow women about maternal related information. Other studies have found that teenage girls and unmarried women who do own mobile phones could not use shared phones from infomediaries since their pregnancies were socially unacceptable (Maliwichi & Chigona, 2022). Others have stated that even when they attend antenatal clinics in person, they are not comfortable to ask questions (Hackett et al., 2019).

In addition, the mHealth intervention also masked the gender and age of the service provider. This was the case since the maternal healthcare clients would not know whether the health worker was young, and when the health worker was male, due to the anonymity of the service. This enabled the pregnant women to ask maternal-related advice from hotline workers without the risk of being in conflict with the social norms. This means that the mHealth intervention offers a *faceless* interaction, which assisted to overcome societal taboo (Sowon et al., 2022). Moreover, faceless interaction with mHealth intervention assist in building trust with the intervention, which in turn promotes usage (Sowon & Chigona, 2020). Furthermore, faceless interactions provided the privacy that maternal healthcare clients and their husband need to ask sensitive questions, which could have been shameful to ask publically at antenatal clinic due to social-cultural norms.

## **CONCLUSION**

Pregnant women in rural areas are challenged with long distances to health facilities for health information and advice. In such context mHealth interventions have the potential to bridge the gap. However, the use of mHealth intervention is low. Therefore, there is a need to understand what motivates the healthcare clients to use mHealth interventions. In this study we found that the maternal healthcare beneficiaries were motivated by incentives and the ability of the technology to suppress social-cultural norms. The maternal healthcare clients in this study could have been extrinsically motivated by external regulation such as receiving of incentives. However, gradually the initial usage of the intervention allowed the beneficiaries to see the benefits of the intervention.

We recommend implementers of interventions to use extrinsic motivation (such as giving incentives) to promote trialability of the technology. This could bring in beneficiaries to try the intervention which eventually could lead to intrinsic motivation; which promotes adoption and use of interventions. In addition, mHealth implementers ought to identify the systems of sharing in communities and encouraging them.

The study may inform mHealth implementers on what to focus on to motivate beneficiaries of interventions. Furthermore, the study may inform mHealth implementers on the choice of intermediaries so that beneficiaries who do not own mobile phones and pregnancies which are socially unacceptable to be motivated to use them. Theoretically, the study may inform researchers on how to use SDT.

## **STUDY LIMITATIONS AND FUTURE RESEARCH**

The study was based on one case study in one district in Malawi, and we only interviewed 20 participants. This may not be enough to generalize the results to all mHealth interventions in the country. Therefore, future research may replicate the study in a broader context. In addition, future research may test all the constructs of SDT.

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