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7 Mobile Persuasive Messages for Rural Maternal Health

Divya Ramachandran, University of California, Berkeley

Introduction

Throughout the world and particularly in resource poor settings, women are still dying due to preventable complications in pregnancy and childbirth, a problem almost entirely eradicated in the industrialized world. While conducting research for my dissertation in human computer interaction, I worked on addressing an aspect of this issue by providing a method for delivering clear, persuasive messages about pregnancy and delivery care to mothers-to-be. Specifically, I designed mobile tools to help poorly trained rural health workers establish credibility in their communities as health resources, empowering them to effectively persuade and convince pregnant women and their families to utilize maternal health services even when it conflicts with traditional customs.

Over three years as a graduate student, I conducted field work and iterative design in the poorest state in India, Orissa, which struggles to achieve targeted health outcomes. My particular focus was on Accredited Social Health Activists (ASHAs), who are employed in their own villages by the government to promote free services (like subsidies for institutional deliveries and prenatal care), as well as provide counseling on pregnancy care, family planning, breastfeeding, etc. Through interviews with ASHAs, their trainers, pregnant women and their families, I learned that while ASHAs are employed in most rural villages in India, their training, effectiveness, and acceptance within the village is minimal. ASHAs often spoke of traditional beliefs and rigid social structures that directly opposed the changes that they were tasked to promote.

I experimented with three types of audio-visual aids which could support ASHAs as they communicate with their pregnant clients during house visits and counseling sessions. The first was a series of testimonial videos, recorded by ASHAs themselves on camera phones, which depicted influential village personalities expressing their support of ASHAs. Secondly, I created persuasive videos which were essentially audio-visual versions of textual information found in health handbooks. I observed

ASHAs as they showed these videos to their clients, and found that it took considerable effort to train ASHAs to use the videos effectively by discussing the points in the video, and ensuring that their clients had understood the information. I created a third and final version of the videos which followed a dialogue-based structure, drawing from theories of persuasion, influence, and rhetoric. These videos directly addressed the prevalent myths and barriers which hindered the acceptance and utilization of information and services that ASHAs provided. The videos followed a scripted dialogue, with built-in pauses and questions which ASHAs quickly learned to follow and emulate. I observed a significant increase in the ASHAs' ability to provide effective and high-quality counseling, and considerable engagement from clients and their family members.

My designs were informed by a number of different concepts from theoretical frameworks for persuasion. Throughout the iterative design process, I developed a change model that I pieced together and adapted according to qualitative interviews, lessons from local stakeholders, and iterative field-testing. In this chapter, I describe the evolution of this change model, and the valuable lessons I learned in the process. Six guiding principles for designers of persuasive messages emerged: (1) focus the message on action items, not on broad topics of information, (2) address local myths and barriers, and provide convincing corrections and solutions respectively, (3) create opportunities for structured, persuasive dialogue between humans, keeping in mind that persuasion is a largely social phenomenon in rural communities, (4) include reminders about the positive rewards for changing behavior, paying close attention to local values, (5) capture the most persuasive local language and prosody style, even if it is counterintuitive, and (6) do not assume reactions are honest – persuasion takes time.

Background

Nearly half a million women die each year due to complications in pregnancy and childbirth in developing countries (World Health Organization, 2005). While poor medical facilities, limited transportation means, and scarcity of doctors are still major contributors to these fatalities, it is surprising to observe that barriers imposed by traditional beliefs and customs often prevent women from utilizing free medical services even when they are available. My dissertation research was in the state of Orissa in eastern India, which, as is typical of a number of economically disadvantaged states in India, struggles with improving health outcomes in spite of a number of government and nongovernment efforts.

To improve maternal health in India, the central government has established a National Rural Health Mission, which employs one woman from each village to serve as an Accredited Social Health Activist, or ASHA. ASHAs are charged with

promoting free government health services (like subsidies for institutional deliveries, immunizations, and prenatal care), as well as providing counseling on pregnancy care, family planning, breastfeeding, etc. In over two years of qualitative research with ASHAs, pregnant women, their families, and other key community players, I learned that although ASHAs are employed in most rural villages in India, their training, effectiveness, and acceptance within the village is still minimal. Traditional beliefs and rigid social structures limit the change which they promote.

Identifying barriers

I identified a number of barriers to information dissemination and uptake in the communities. Firstly, the structure of the ASHA training programs does not support the acquisition of new knowledge and information. ASHAs attend a monthly sector meeting where they are trained on one new topic each time. In a particular meeting I attended, roughly half of the ASHAs employed in the sector were present. Moreover, the teaching method (formal lectures on a general topic) was not conducive to the ASHAs' education level and schooling experience (they rarely met the eighth grade completion requirement, and many were illiterate). Experienced trainers of health workers from successful NGOs suggested that rather than formal lectures, ASHAs would benefit more from information that is relevant to specific situations that their clients are in as well as instructions on how to effectively share this information with their clients. Secondly, I found that ASHAs had not received training in maintaining an effective work routine. For instance, client monitoring and counseling were aspects unfamiliar to the ASHAs. As a result, the local community did not find the ASHAs as valuable resources and the limited information they could offer was rarely accepted.

Given these challenges faced by ASHAs, I felt that they could be empowered by more effective tools to share health information with their clients. Considering the educational, language, and cultural barriers they needed to overcome, I identified videos on mobile phones as a potentially valuable tool to communicate to clients about what they needed to do in specific health situations. The mobile phone platform was portable, prevalent, and appropriate for ad hoc counseling visits to clients and their families. Videos could convey information comprehensively and consistently in an engaging way for low-literate audiences. Furthermore, as ASHAs shared videos with their clients, they themselves would have the opportunity to learn both factual information and effective counseling techniques over time.

Iterative design of persuasive mobile messages

I created two types of videos: testimonial and persuasive (Ramachandran, Canny, Das, and Cutrell, 2010a). Testimonial videos provided social proof of the ASHA's role

and importance. I trained a group of seven ASHAs to record videos using mobile phones and asked them to record messages from influential individuals in their own villages. Their videos featured village leaders, pregnant clients, and even street plays addressing topics including endorsements of the ASHA's role and importance, their own personal health experiences, and instructional messages. These videos provided persuasive social proof to clients that other villagers believed and followed the messages promoted by ASHAs. Persuasive videos were short informative segments about pregnancy-related health issues, which were selected based on prevalence in the target communities. I used relevant content from health handbooks (such as Hesperian Health Guides publications), and adapted these to health advice in line with the local resources and cultural practices with the help of local nurses. A local artist sketched some basic illustrations for the content, and staff at our partner NGO recorded local-language voiceovers. I strung each video together with panning and zooming to give it an animated feel. Each video lasted between thirty seconds and one minute.

I deployed these videos with the seven ASHAs for two months and observed ASHAs using these videos on house visits. Previously, when I had tried to observe ASHAs on house visits, they had been very confused as to what they should actually be doing and kept asking me for instructions. My initial observation when they were now armed with videos was that they provided ASHAs with a concrete example of the information that needed to be disseminated to the client and thus, helped them understand what to accomplish during house visits. However, the videos did not automatically foster conversation, like I had expected. Rather, the ASHA and her clients together watched the videos, and then again asked me for instructions. Therefore, ASHAs had to be trained extensively to use the videos. For instance, I encouraged them to pause the videos, discuss the topics depicted, and engage their clients in conversations about the videos. The effectiveness of the videos depended largely on each individual ASHA's ability to grasp this task of pausing and discussing each topic in the video. I observed that the videos did not seem to ensure any consistency in the quality of counseling.

This experience helped me design a second version of the videos with two important differences. The new version had a built-in dialogue to facilitate client engagement regardless of whether the ASHA was comfortable with this counseling style. The background voiceover asked questions that required yes/no input; the videos automatically paused at these points to facilitate responses and discussion. The second innovation was the use of a persuasive message architecture. I identified prevalent myths and barriers that stopped women from performing particular behaviors and addressed these directly by providing corrections and solutions, respectively.

For example, anemia is a serious problem among rural women, and is the direct cause of one fifth of all maternal deaths (International Institute for Population Sciences and Macro International, 2007). ASHAs distribute free iron tablets to all pregnant women, but many women believe that taking these tablets causes the baby to get too big to deliver normally. A typical lecture-style video modeled off of textual information might present an explanation of iron-deficiency, the risks of anemia and then suggest some actions such as improving diet and taking iron tablets. However, our dialogue-based video opened directly with a question, ‘Do you believe that taking iron tablets will cause your baby to get too big, leading to complications during delivery?’ This was then followed with a correction, ‘That is not true – in fact, iron tablets will give you more strength to get through a normal delivery’, and so on. The value of such a dialogic approach was that women immediately related to the topic of the video, and began to discuss this widely believed myth with either the ASHA or others present, and each expressed her opinions on whether it was true. This increased relevance of the message to the client empowered the ASHA to communicate more effectively.

I found that the quality of the counseling session was significantly improved when ASHAs used the new versions of the videos (Ramachandran, Goswami and Canny, 2010b). ASHAs spent more time discussing various aspects of the message, and also elaborated on the message more frequently. From our observations, we found that clients showed more interest and were more attentive when the health worker used the phone messages compared with providing the information orally without the use of videos on the mobile phone.

Identifying the behavior change problem

Early on in my field research, I learned two very important lessons. The first was that I needed to look beyond information access to enable health behavioral changes, and that I should strengthen the persuasive ability of human intermediaries, rather than try to replace them. I elaborate on both these lessons here.

I originally envisioned that the main role of technology would be to enable health information access for rural women. But I found that in all of my interviews with health trainers at NGOs and government health departments, the community health worker model was repeatedly mentioned. Community health workers (like ASHAs) were employed all over the country by various organizations to fill the exact need which I felt technology could address. The question arose as to why the problems were still so prevalent? Rural women had access to all types of information through the health workers, who were, it appeared, trusted, known community members. It was this that prompted my investigation into how ASHAs were actually operating in

the field. Upon identifying the many barriers to efficacy they faced, I came to realize that a standalone technology solution did not stand a chance for success in such a complex context. Therefore, I decided to focus my design on **strengthening the existing relationship between the ASHAs and their clients**.

The first thing ASHAs needed, I believed, was access to a pool of correct, relevant health information. At first glance, it appeared that ASHAs already had this. The government was producing pamphlets, handbooks, and flipcharts, and conducting monthly training sessions. As I delved into understanding why the ASHA training program was still producing such inconsistent results, I interviewed a number of freelance or NGO-based health worker trainers, who worked to supplement the broken government training program. It was then that I learned the important lesson that **information access alone is not a solution**, from a seasoned health worker trainer, who explained:

Just making information available to health workers by no means motivates them to use it. They need to know why to use it, how to use it, why it's personally relevant, and where to utilize it. Only then will it be of any use to them.

This made me realize that I was trying to tackle a twofold behavior change problem. There is a need both to improve the counseling behavior of the ASHAs and to change the health behaviors of their clients. Thus, based on these two important lessons that I learned, I designed the mobile video messages with the belief that a single solution that empowered the ASHAs to become better counselors could improve the health behaviors of their clients.

A mosaic model for behavior change

Upon reflection, it is clear that the change model which I applied for this twofold behavior change problem is a dynamic combination of theoretical principles and empirical evidence. It has evolved greatly, and necessarily so, as throughout this research process, I have had to change and re-evaluate my assumptions. The following is a detailed, chronological, retrospective account of the creation and evolution of my change model.

Mobile solution design

I began with a heavily theoretical approach to persuasion. I studied a number of various theories of persuasion and motivation, such as the theory of planned behavior (Ajzen, 1985), self-efficacy (Bandura, 2006), social influence (Cialdini, 2007), and the Elaboration Likelihood Model (Petty and Cacioppo, 1986). It was

unclear which of these (if any) would actually be relevant in the context of rural maternal health. During my in-depth field research, as I interviewed and observed ASHAs, their clients, families, and other stakeholders in the health decision-making process, I looked for signs of relevance of some of these factors. The relevant ones later influenced my design decisions.

For example, it was immediately clear that authorities – in the home, and in the village – had great influence over whether pregnant women utilized the services of ASHAs. That people are more likely to be persuaded by authorities is a factor of social influence, according to the work of Cialdini (Cialdini, 2007). Since authorities varied from village to village, I decided to ask ASHAs to record videos of whomsoever they believed to be authoritative figures in their communities, so that ASHAs could demonstrate the support of these influential persons. Another prevalent factor was the influence of peers, who were also captured in many videos.

I found self-efficacy theory helpful for understanding how to design tools that could motivate ASHAs to become better counselors. Self-efficacy theory revolves around an individual's perception of her own effectiveness with respect to a task (Bandura, 2006). When perceived self-efficacy is high, she will perform tasks well, persisting in the face of obstacles. When it is low, performance is weaker, and she may give up easily in the face of obstacles or acquire avoidance behaviors. Bandura cites the following sources of self-efficacy:

- **Enactive Mastery** is when the subject has a personal experience where she performs a task well, her perceived self-efficacy for that task will improve.
- **Vicarious Experience** is when the subject sees another person have positive outcomes on a task, her perceived self-efficacy will improve.
- **Verbal Persuasion** occurs when an individual hears from another that her performance is good (such as a testimonial), and self-efficacy will improve.

In discussions with ASHAs and their trainers, we identified self-efficacy as a potential problem because the ASHA's environment has many negatives with respect to these three factors. First of all, inadequate training is likely to lead to situations in which ASHAs are unprepared. As quoted earlier, ASHAs also had a hard time assimilating information about situations they had not encountered. Vicarious experience is likely to be poor because ASHAs are quite isolated in their villages. And positive verbal feedback may be rare, while instead the ASHAs receive negative comments since they are regarded as low-status nonexperts by many villagers. I introduced the idea of video testimonials to serve as a form of verbal

persuasion, and I designed persuasive videos to provide scaffolding for ASHAs so that counseling would become a concrete task through which ASHAs could demonstrate their expertise in maternal health.

Persuasive message design

Although these theories played a part in guiding my big-picture design ideas, it was not until I started evaluating the videos in the field that I started to understand minor nuances that play an important role in conveying a message persuasively. The design slowly evolved from a one-way standard video, to a structured, dialogic message. In this section, I describe the theoretical underpinnings that guided this evolution, as well as the field experiences.

The science of persuasion through dialogue dates back to Aristotle's classical rhetoric (Lawson-Tancred, 1991). Particularly relevant are his writings on *logos*, or the persuasive power of a speech based on its ability to prove a truth, or apparent truth, through practical arguments. Rather than rely on logic, logos-based arguments appeal to the listener's practical reasoning, presenting the desired action as a direct implication of the listener's own salient beliefs. I also reviewed some common practices in the field of public health and their underlying models for designing health messages (Maibach and Parrot, 1995).

Health messages should:

- 1 Appeal to the listener's self-efficacy, or perceived ability to perform an action by recommending simple and achievable actions (Bandura, 2006);
- 2 Induce behavior change by addressing the underlying set of salient beliefs that cause a specific behavior (Ajzen, 1985);
- 3 Maximize involvement of and personal relevance to the listener to encourage more lasting attitude change, according to the elaboration likelihood model of persuasion, this happens through central processing of the message (Petty and Cacioppo, 1986), and
- 4 Use positive effective appeals to arouse more positive feelings and acceptance toward the recommended action (Maibach and Parrot, 1995).

With some initial ideas from these theories, I designed dialogic messages and iterated on them in the field. The following features of the messages proved to be critical. Under each feature, I have referenced the relevant theory above. For simplicity, I use the example iron-deficiency anemia as the main issue to be addressed.

Actions as Key Takeaways: The first video messages I designed were based directly on text, and so they were focused on a particular topic or subheading of

a chapter (for example anemia). But I observed that when pregnant women and ASHAs watched video messages based directly off of text, they could only recall concrete actions, and not specific details, especially when the messages contained multiple conditional statements. Therefore, the new messages were focused mainly on the desired action (such as take iron pills), with an explicit *action* described in simple steps to improve self-efficacy. The action was repeated multiple times in each message.

Culturally Relevant Arguments: Through discussions with ASHAs and pregnant women, I learned that women do not take their iron tablets for a number of reasons, many of which are based on traditional myths (for example, the baby will get too big to deliver normally), or social barriers (for example mother-in-law does not allow her to take extra vitamins). I categorized the arguments used by women against these actions into the two types: **myths** and **barriers**. Addressing these specific relevant arguments was critical for an effective persuasive message, according to the theory of planned behavior.

I constructed the argument using a simple formula. For each action, there are a number of associated myths and barriers. They are first presented in this way:

- **[Myth-Correction-Action]** A widely believed *myth* is introduced and immediately followed by a *correction* to that myth. This is followed by a recommended *action*.
- **[Barrier-Solution-Action]** A relevant *barrier* is addressed, followed by a *solution* for dealing with that barrier, followed by a recommended *action*.

Dialogic Structure: Keeping the basic content constant, I designed the messages in two styles, building on my previous research (Ramachandran and Canny, 2008) and the elaboration likelihood model (Petty and Cacioppo, 1986). I hypothesized that audio-visual messages that require direct response from the user are more persuasive than longer lecture-style recitations of information (as is often used when moving from text to audio-based presentation). In order to enforce user responses in the dialogic version, we inserted *rhetorical question tags* after each piece of information, which elicited a ‘yes’ or ‘no’ response from the user. Our message architecture differentiates between lecture and dialogic style messages. The figure below shows how myths and barriers are presented in both styles.

In a study which compared the use of the lecture style and the dialogic, I found that the dialogic messages provided more scaffolding for the health workers, resulting in more consistent, high-quality counseling behavior (Ramachandran *et al.*, 2010b). Specifically, I measured a statistically significant difference ($p < 0.001$)

	Lecture	Example	Dialogic	Example
Myth	General Statement	<i>Many women believe that <myth>.</i>	Question about personal beliefs	<i>Do you believe that <myth>?</i>
Correction	Explanation	<i><myth> is not true; in fact, <correction>.</i>	Explanation with rhetorical question tags	<i><myth> is not true; in fact, <correction>, did you know that?</i>
Action	Instruction	<i>You should <action>.</i>	Request for personal commitment	<i>Will you <action>?</i>
Barrier	General Statement	<i>Many women face <barrier>.</i>	Question about personal beliefs experience	<i>Do you ever face <barrier>?</i>
Solution	Suggestion	<i>If you ever face <barrier>, you can <solution>.</i>	Instruction with rhetorical question tags	<i>If you ever face <barrier>, you can <solution>, okay?</i>
Action	General Instruction	<i>You should <action>.</i>	Request for personal commitment	<i>Will you <action>?</i>

Figure 7.1 Lecture and dialogic approaches

Note: Table reprinted from Ramachandran *et al.*, 2010b; copyright held by Authors.

in the quality of counseling, measured by the time spent in discussions of the message between the ASHA, her client and bystanders, as well as the frequency of explanations by the ASHAs during breaks and pauses. However, as is discussed later, I have not yet successfully measured the impact of this improved quality on health behaviors.

Positive Rewards: After presenting corrections and solutions to all the relevant myths and barriers, I included a short message that reminded the listener of the positive rewards of performing the action. In this case, taking iron pills would make the baby stronger, and the mother would have a happy, healthy child. I found during my interviews that focusing on the health of the baby, rather than the health of the mother was more effective, especially with other influential family members like the mother-in-law of the pregnant woman.

Local Language and Prosody: I selected a tribal site for evaluating these messages, and felt initially that messages should be in the local tribal language, Kui, rather than the common local language, Oriya. However, I found that many of the ASHAs were not tribal, and therefore could not speak or understand Kui and only spoke Oriya. Therefore, I recorded the messages in both languages (by the same speaker), and implemented a language toggle button so that both ASHAs and their tribal clients could understand the message.

There was no way I could record the messages by a professional voice actress, as it would be impossible to find one who could speak Kui. I found a young school teacher who spoke both Kui and Oriya, but I felt her style sounded too rehearsed, and lacked emotion. I kept trying to push a more natural prosody, as I felt that would be more persuasive. My local contacts insisted on the simpler style. I came to realize that what they were suggesting was simply more culturally appropriate, and observed the immense impact of the messages when I piloted them. As one NGO staff remarked, ‘Tribals are simple people: they don’t need emotion, they just need a clear message’. This was a very important and unexpected lesson.

Response Behavior: I had imagined that the dialogic message structure would enable a very effective feature – to branch to relevant messages based on the response of the pregnant woman (for example, if a woman said she did not believe a particular myth, the correction would be skipped, and next myth or barrier would be introduced). However, during my initial pilots, I realized that responses were not always honest; they did not always admit to believing a myth or facing a barrier. For example, one participant insisted after every message element that none of them applied to her and that she took iron pills daily. However, when the ASHA asked her to show her the pills, the participant could not find them. One interpretation is that she was trying to present herself as socially acceptable, as reported by other researchers who studied survey responses that were directed to a health worker with a mobile device (Cheng, Ernesto and Truong, 2008). Therefore, I decided that regardless of the response, no messages should be skipped.

Measuring persuasion

All too often in the mHealth space, it seems that technology solutions are designed with little or no evaluation of their impact on health. Specifically in the area of health information, few evaluations exist still seem to measure increased knowledge, rather than behavior change. This is not surprising, since knowledge is much easier to measure. But this is not a metric for behavior change, but one for information access, and these two must be distinguished from each other.

As mentioned earlier, in my evaluation of dialogic mobile messages, I was unable to statistically prove that women changed their behaviors due to the improved efficacy of ASHAs. There are a number of reasons why I believe that I could not, and these are detailed in another publication (Ramachandran *et al.*, 2010b). First of all, I was limited by the logistics of accessing and recruiting a sufficient number of ASHAs because they are vastly spread out in rural areas. This resulted in a great variability among the ASHAs, where some were extremely sincere, and others less motivated. Second, even with these few ASHAs, it appeared that the community (caste) from which they hailed might have influenced their persuasive power. This demonstrates the sensitivity of the measure of persuasion to various factors in the environment, be they social, cultural, or political. Finally, I was limited in the amount of time I could spend in the field, but persuasion takes time. I strongly believe that some effect could be measured if I had the resources (time, manpower, and money) to run a longer-term study with more participants. Surprisingly, even with so much interest and investment in mHealth, very little of it is being spent on evaluation. I believe we have reached a stage where we really need to be producing proof that these investments are in fact affecting health behaviors and outcomes.

Guidelines for creating persuasive messages

Despite having studied a number of different theoretical frameworks, I found that no single one perfectly fit in the context in which I was working. What worked best for me was a sort of mosaic model, which pieced together different proven principles, with some tweaks to adapt the concepts appropriately to the context, and which I adapted and developed over time in response to what I observed in the field. My change model has evolved with my designs, but has been an integral part of them; I believe some mix of theory, practice, and intuition is necessary for creating an appropriate behavior change model in any context, as there are a number of factors that can influence the persuasive power of any interaction, be it human-to-human, or human-to-machine.

As a summary for anyone skimming through this chapter, the following are the important lessons that I learned, that I feel would be valuable for anyone designing persuasive messages for promoting healthy behaviors:

- Focus the message on action items, not on broad topics of information.
- Address local myths and barriers, and provide convincing corrections and solutions, respectively.
- Create opportunities for structured, persuasive dialogue between humans, keeping in mind that persuasion is still a largely social phenomenon in rural communities.

- Include reminders about the positive rewards for changing behavior, paying close attention to local values.
- Capture the most persuasive local language and prosody style, even if it is counterintuitive.
- Do not assume reactions are honest; persuasion takes time.

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