
Maternal Awareness for Low-Literate Expecting Parents via Voice-Based Telephone Services

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Abstract

This paper describes a speech-based service designed to improve maternal health awareness among expecting parents in Pakistan. The platform is being used to tackle the problem of high neonatal, infant, and maternal mortality in Pakistan which have either increased or remained stagnant in the recent past [1]. The concept was designed based on observations that our target audience is interested in information about cost saving as well as social connectivity. We propose *Suno Abbu* (directly translated as "listen father"), an IVR-based information service for low-literate, expecting parents with the aim of increasing awareness and birth preparedness to induce behavior change. Adapting to the local culture where mothers are often not the decision makers in the family structure, we plan

to target expecting fathers as the primary audience of *Suno Abbu*. This proposal has received seed funding, and we present our methodology for the pilot in this manuscript.

Author Keywords

Maternal awareness; expecting parents; birth preparedness; three delays; IVR, Integrated Voice Response; speech-based information service.; behavior change.

ACM Classification Keywords

H.5.2 Information Interfaces and Presentation (e.g., HCI);

Introduction

Pakistan loses 531 neonates every day [2]. Most of these deaths are from preventable and/or treatable causes [3]. Knowledge related to pregnancy and childbirth that is necessary for families is commonly packaged and taught as *birth preparedness*. Birth preparedness [4] includes: knowing the danger signs of complications during pregnancy, having a plan on where to give birth and under whose supervision, having arranged for transport to a healthcare facility, and knowing how to save money. In a developing country like Pakistan, there are two issues with the

dissemination of birth preparedness information: (1) such information is mostly accessible to literate and affluent families with technological means to access it, and (2) such information is often targeted towards women (mothers) who are often not the decision making authority in their family.

Adverse pregnancy outcomes primarily affect low-income and low-literate groups, and nine out of every 10 people in Pakistan are in the poor or low income tiers [5]. Pakistan also has one of the lowest literacy rates in the world [6]. The challenge is to effectively disseminate information to these population strata.

We took the following factors into consideration while selecting the mode of delivery: television and radio are not interactive; Personal Computers (PCs), in addition to being expensive, require literacy, internet and a reliable source of power; smartphone penetration is still relatively low; smart features often require intermittent internet access; and an SMS-based intervention would exclude 40% of the male population that is illiterate. Pakistan's tele-density as of January 2017 is 73.32% [7] so information dissemination via cellphones is viable. The last option is speech over feature phones. This is the pathway that we have selected to disseminate critical life-saving information among expecting and new parents. We propose a voice-based, telephone-based service available over simple and feature phones. This allows low-literate and non-tech savvy parents to benefit from the information as well.

As mentioned above, current interventions to increase birth preparedness focus on women, yet adoption and impact remain low. One major reason for this is women's lack of autonomy and decision-making power

at home. Studies find that women's decision-making power in Pakistan is significantly positively correlated with uptake of maternal health services, but after controlling for socio-economic factors and supply-side issues, the presence of an influential male has the opposite effect [8]. Several studies in developed and developing countries also suggest a positive relationship between men's involvement during pregnancy and improved birth outcomes [9, 10].

Therefore, we choose to target males (expecting fathers). The challenge then becomes incentivizing this sub-population to access information, a behavior that is against social norms. Through several interviews with expecting fathers in the field, it became apparent that their main concern is financing the delivery and any complications that may result from the pregnancy. Preliminary findings from the field reveal that low-income families pay catastrophic out-of-pocket payments, even at public facilities, for health care.

We hypothesize that if we frame health actions and inactions in terms of cost-benefit analyses for our target audience, fathers may be more interested in accessing information on the hotline.

Research Objectives

The short-term objectives of this research are:

1. To create content related to costs that is engaging for expecting fathers based on data from the field
2. To provide useful, actionable information on antenatal, perinatal, and postnatal care to expectant fathers and improve their health literacy
3. To generate high user uptake of the service

The long-term objectives of this research are:

4. To improve uptake of healthy behaviors by expecting mothers and fathers
5. To decrease neonatal, infant, and maternal mortality in Pakistan

Methodology and Service Design

We propose to develop and deploy a speech-based, interactive, informational service, *Suno Abbu*, to increase expecting fathers' participation in the caretaking of pregnant women. The design of *Suno Abbu* is explained below.

The design was inspired by Healthline [11], Polly [12], *Sangeet Swara* [13], and *Baang* (manuscript under review). All of these are voice-base telephone-services. Healthline was targeted towards information dissemination among Community Health Workers in rural Sindh, Pakistan. Polly employs entertainment to teach low-literate and non-tech savvy telephone users to navigate speech interfaces, to virally spread and to introduce its users to development-related useful information. *Sangeet Swara* and *Baang* are both voice-based social media services that lead to social connectivity among low-literate populations.

In *Suno Abbu*, the interaction starts when a user places a missed call to a local number. This prevents the burden of cost from falling on the user. During the interaction, the user will have the option of listening to doctor's tips (not framed in terms of cost), cost statements, and other parents' stories. These options are explained below in more detail:

The doctor's tips will be presented in the order of importance. These will be in the form of a list of standard advice that is given to women during pregnancy, modified in tone and script for a primarily male audience. The service will take on the persona of Dr. Saba, a female gynecologist who provides the information.

The cost-benefit analysis will provide an estimated break down of the major expenses that parents should expect throughout the duration of the pregnancy and especially at the time of delivery. We will also outline the potential costs that could arise if the standard recommendations are not followed. We hope that this will not only create more awareness regarding financial birth preparedness but may also lead to voluntary, family planning decisions.

Parents' stories are the component that we expect to be most popular among our users as this would allow parents to relate their experiences regarding child birth and pregnancy. We also plan to solicit stories around themes of tips regarding birth preparedness, dangers arising due to lack thereof, and interesting anecdotes. To prevent misinformation and rumors, we intend to carefully moderate this branch of *Suno Abbu*. We expect, based on previous research, that parents are more likely to be influenced by stories of others like themselves.

There are several structures of information and forms of engagement that may illicit stronger interest or a more positive user experience as compared to what we propose here. We will collect user feedback through surveys as well as through a self-selected feedback option on the hotline. The feedback will be used to

reiterate the service until it serves its primary purpose as well as generating interest among our target audience. We would also like to solicit feedback on the interface design for the service, for e.g. whether it

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- makes sense to intermingle doctors tips and parents' stories, or would that dilute the effect of the doctor's tips.