

Understanding community perception and acceptability of interactive voice response survey method: findings from formative research in Bangladesh.

Iqbal Ansary Khan¹, Shahanaj Shano¹, Khaleda Islam¹, Sabina Shahnaz¹, Gulam Muhammed Al Kibria^{2,*}, George Pariyo², Joseph Ali², Dustin G Gibson² and Mahmudur Rahman¹

¹Epidemiology Department, Institute of Epidemiology, Disease Control and Research, 44 Mohakhali, Dhaka 1212, Bangladesh

²Department of International Health, Bloomberg School of Public Health, Johns Hopkins University, Baltimore, MD, USA

*Correspondence address. Bloomberg School of Public Health, Johns Hopkins University, 615 N Wolfe Street, E8141 Baltimore, MD 21205, USA. Phone: 4434779403; Fax: 4434779403; E-mail: gkibria1@jhu.edu

Abstract

Mobile phone technology's expansion in Bangladesh has ushered in its use for rapid population-based data collection. This study was conducted to assess community perceptions on the acceptability, usability and challenges of participating in mobile phone surveys (MPS) on non-communicable disease risk factors through interactive voice response (IVR) in Bangladesh. Three user groups and seven focus group discussions with different communities, along with seven key informant interviews with relevant experts, were conducted in Bangla. Interviews were audio-recorded and analysed manually using thematic analysis. Participants indicated their unwillingness to receive calls during their busy hours. They suggested shorter duration calls and two sessions to complete longer duration surveys. They recommended that incentives can increase call completion, and previous notification through voice or text message might improve this further. Previous experience with scam calls and mobile balance depletion resulted in their hesitancy to receive calls from unknown numbers. Respondents showed concerns about sharing sensitive issues like alcohol consumption. Providing responses by key presses, less familiarity with smartphone use, availability and strength of mobile networks were identified as challenges for IVR surveys. The study emphasized careful consideration of survey duration and burden, trustworthiness, general and technical literacy and socio-cultural factors to increase MPS participation.

Keywords: interactive voice response, mobile phone survey, formative research, non-communicable disease, digital health, remote data collection

INTRODUCTION

The rapid increase in mobile phone technologies and their use have opened avenues to explore the feasibility of using the mobile phone to collect data and supplement household surveys [1, 2]. Such technologies have the potential to improve efficiencies in producing appropriate and affordable data within a short time to augment traditional health surveys [3, 4]. Mobile phone technology and its use in Bangladesh, a low- and middle-income country (LMIC) in South Asia, are rapidly advancing. The number of mobile phone subscribers reached 166 million by the end of January 2020, a significant increase from 85 million subscribers in 2017 [5]. According to the Bangladesh Telecommunication Regulatory Commission (BTRC), the number of internet users increased from 30 million in 2013 to 156 million in 2019 [6].

In the health sector, non-communicable diseases (NCDs) are a growing burden in LMICs [7, 8]. Bangladesh has been undergoing demographic and epidemiologic transitions, where NCDs are increasingly overtaking infectious diseases as leading causes of morbidity and mortality [9]. Effective prevention and control of NCDs depend on the decrease in exposure to major NCD risk fac-

tors, including tobacco use, unhealthy diets, insufficient physical activity and the harmful use of alcohol [2, 10]. Efficient monitoring and surveillance are cornerstones for tracking the progress of NCD burden, related risk factors and policy interventions. The systematic monitoring of risk factors to generate accurate and timely data is essential for a country's ability to prioritize essential resources and make sound policy decisions to address the growing NCD burden. Most efforts to obtain NCD risk factor information in LMICs rely on traditional face-to-face, pen-and-paper-based methods, which are time and resource demanding. As a consequence, these surveys are conducted once every several years [1, 11–13].

To address the high costs and time requirements associated with household surveys, higher-income countries have developed and employed phone-oriented surveys to estimate population health and demographics [14–16], whereas the use of such surveys is limited in LMICs [11, 17]. After the global increase in mobile phone ownership and access [18], opportunities exist to leverage mobile-health technologies and communication channels to advance the current methods of data collection

Received: May 23, 2023. Revised: July 21, 2023. Accepted: August 28, 2023

© The Author(s) 2023. Published by Oxford University Press.

This is an Open Access article distributed under the terms of the Creative Commons Attribution License (<https://creativecommons.org/licenses/by/4.0/>), which permits unrestricted reuse, distribution, and reproduction in any medium, provided the original work is properly cited.

in LMICs. Interactive voice response (IVR) is a unique phone-based system that can collect data from respondents over their personal mobile phones and can also be used to provide health-related behavioral intervention where prerecorded audio messages or instructions are given over the phone by a computer application [19, 20].

Because mobile phone surveys (MPS) in LMIC settings are relatively new, this study was conducted to qualitatively inform the acceptability, usability and feasibility of IVR surveys on NCDs such as hypertension, diabetes and risk factors that include tobacco and alcohol use, fruit and vegetable consumption and physical activities in Bangladesh. The optimization of phone surveys through enhanced response rates and country-specific adaptation will strengthen scientific rigor and the evidence base for future nationally administered MPS.

METHOD

Study design

This study used qualitative research methods, including key informant interviews (KIIs), focused group discussions (FGDs) and user groups (UGs), to assess the acceptability, usability and feasibility of MPS to collect NCD-related behavioral risk factor data and also to explore ways to improve IVR survey delivery. Three data collection tools were used with different groups of people, and the collected data were triangulated to ensure scientific rigor and validity [21].

Seven KIIs were conducted to better inform the design and adaptation of the MPS using an IVR platform. Participants were selected purposively among the government and other officials who were involved with NCD program implementation, policy formulation and the development of existing MPS platforms.

Seven FGDs were conducted to determine the acceptability, usability and feasibility of MPS using an IVR platform, the willingness to respond to an IVR survey and participants' opinions on the pairing of incentives (timing, amount and delivery) with survey completion. Each FGD had 6–11 members. The participants in FGDs were mobile phone users aged 18 years and older. They were also selected purposively from urban and rural communities and were homogenous with respect to gender. Trained qualitative researchers used thematic guidelines to conduct these FGDs. Three UGs, each with 8–10 selected mobile phone users, were formed to assess participants' comprehension of NCD questions administered via IVR, preference for the narrator's voice for IVR recordings and the introduction content of surveys, ability to successfully navigate and respond to an IVR platform, time and duration of surveys, delivery of incentives and overall experience in responding to an IVR platform. Participants were requested to bring their own mobile phones for administering an IVR survey involving NCD risk factors as a means to facilitate engagement.

Participant selection

Participants were selected with the intention of capturing variations in terms of geographic locations (i.e. rural–urban), representing both gender and different socio-economic statuses. Interviews were conducted with different groups until saturation was achieved. KIIs were conducted in the capital, Dhaka, with individuals involved in relevant policy and program implementation. Data collection activities for FGDs and UGs were performed in different areas of Dhaka City Corporation (i.e. urban area) and Nawabgonj sub-district (i.e. rural area). All participants were

selected with help from known local individuals in the community and relevant institutional authorities.

Data analysis

Interviews were conducted in the local language, Bangla, and were audio-recorded. Audio recordings were transcribed verbatim into Bangla and then translated into English. Then we coded the transcripts and analysed them manually using thematic analysis. We followed a hybrid approach by combining both deductive and inductive codes. Initially, we started the coding process by using deductive codes. The coding began with listing deductive codes based on topics in the data collection checklists (KII, FGD and UG). Next, each researcher went through interviews and manually identified as many inductive codes as possible. This resulted in the draft codebook, which was further developed in consultation with all research team members through an iterative process during the coding of interviews. A reliability assessment was made, and consensus was reached to ensure consistency and achieve investigator triangulation [21]. Once all interviews were coded, we looked for clusters of meaning or a group of codes that could be placed under a theme and/or concepts. From these clusters, we derived descriptions of experiences that were analytically organized into the section on results below.

Ethics consideration

Ethics approval was obtained from the institutional review board of the Institute of Epidemiology Disease Control and Research (IEDCR) and the Johns Hopkins Bloomberg School of Public Health. Participation in the study was voluntary. Before the discussion/interview, a detailed consent form was read out loud and also provided to participants. Informants were requested to sign or give a thumb impression on the form. Interviews and audio recordings were conducted only after consent was obtained. Among other things, all participants were told that they could refuse to answer any question or terminate the interview at any time if they had reservations.

RESULTS

Socio-demographics

We conducted seven KIIs, seven FGDs and three UGs from February to July 2017. FGD and UG participants had no practical experience of answering questions over cell phones, and all participants indicated no previous experience in responding to an IVR survey. The KIIs were public health professionals working within communicable and NCD control programs, policy formulation and research in government and other organizations. One was an information technology (IT) specialist with experience in developing and using IVR platforms.

The sociodemographic characteristics of all participants (seven FGDs each with 6–11, three UGs each with 8–10 and seven KIIs) are given below in [Table 1](#).

The findings from the KIIs, UGs and FGDs were analysed under the following thematic domains ([Table 2](#)).

Survey timing and burden

According to participants, people may not be willing to receive a survey call during busy hours. The preferred time for taking an IVR call varied by group and it depended on their occupation, marital status, place of residence and seasonal workload. An urban male indicated 3 pm as their desired time to take the IVR call. Rural women preferred the afternoon and evening. On the other hand, the urban working women preferred the lunch hour, and the

Table 1. Sociodemographic characteristics of FGDs, UGs and KIIs

	Mean age (range, year)	Mean years of education (range, year)	Sex	Occupation
""Focus groups (n = 55)				
1. Urban (non-slum) mixed sex (n = 7)	31.9 (28–34)	16.7 (12–17)	Female—2; male—5	Service (7)
2. Urban (non-slum) mixed sex (n = 7)	38.4 (30–44)	3.4 (00–5)	Female—2; male—5	Service (7)
3. Urban (slum) young male (n = 6)	25.2 (21–28)	9.6 (8–12)	Male—6	Business (3), service (2), unemployed (1)
4. Urban (slum) young male (n = 11)	23.2 (18–32)	6.9 (3–12)	Male—11	Student (4), service (3), Day labor (2), rickshaw puller (1), unemployed (1)
5. Urban (non-slum) educated mixed sex (n = 7)	34.3 (29–44)	17 (17)	Female—2; male—5	Service (7)
6. Urban (non-slum) educated female (n = 7)	25.6 (19–30)	16 (12–17)	Female—7	Service (7)
7. Rural female (n = 10)	31.0 (20–48)	8.2 (5–11)	Female—10	Housewife (10)
User groups (n = 28)				
1. Rural female (n = 10)	31.3 (19–52)	8.2 (5–11)	Female—10	Housewife (10)
2. Urban (non-slum) male (n = 8)	39 (26–54)	1.5 (00–06)	Male—8	Day labor (4), rickshaw puller (3), service (1)
3. Rural male (n = 10)	44.1 (30–64)	6.7 (00–18)	Male—10	Service (3), labor (2), farmer (2), business (1), retired (1), unemployed (1)
Key informant interviews (n = 7)				
Key informants (n = 7)	57.71 (48–61)	19.6 (17–21)	Female—1; male—6	Service (7)

Table 2. Thematic summary of the findings

Theme	Sub-theme	Code clusters
Survey timing and burden		Survey time and duration SMS notification
Trustworthiness		Promotional calls Scam/fraud calls Call from unknown numbers Hidden charges
Technical challenges	General literacy Technical issues	Recognizing the numbers Mobile phone usability - smart phone vs feature phone Answering by pressing mobile keypad Inaudible sound Faulty speaker and keypad Mobile network and Internet connectivity
	Tools	Length of introduction and questions Instructions for completing questions Admissible response options User friendliness
Sharing private information	Software usability Private/sensitive question	Assuring confidentiality/non-disclosure and safety
Incentives	Data reliability Perceived appreciation and motivation	Inexact/incorrect information Positive and negative impact Time of incentive Type of incentive
Socio-cultural factors:		Challenged family relationship Preferred voice
Acceptability of survey method:		Willingness to participate Human vs automated voice

urban housewives indicated time after 10 am. One of the rural women said,

'Usually, we get free time after we finish cooking and the household chores, so the best time for spending 10-20 minutes for a call is in the afternoon.' (FGD, Rural Female).

Regarding the duration of the call, participants from FGDs in urban sites mentioned that an MPS on health should be of 5–15 minutes duration, whereas informants from rural settings opined the duration could range from 5 to 30 minutes.

In UGs, after hearing the IVR surveys with thirty questions, almost all informants thought that the duration of IVR calls may take too much time to complete in one sitting. Both the rural and urban informants recommended two sittings and the provision of incentives to complete the IVR call. One participant from an urban group said,

'It would be very tough to complete the survey in one sitting if the duration is 25 minutes or more. No one would give you that much time, it may take another sitting. If there is a provision of incentive, people may consider providing the time to complete the survey.' (FGD, Urban slum, young male).

Some KIs opined that response rates could decrease if the duration of the survey was longer than 15 minutes. To ensure participation, several participants suggested that a previous appointment could be made by sending a short message service (SMS) before sending the IVR survey. However, others disagreed with this suggestion due to literacy concerns and suggested prior voice messages to overcome this.

One urban FGD participant said,

'There are many people who cannot read or write text messages. So, I do not believe that sending any prior text message would make any difference to these people.' (FGD, urban mixed sex).

A small number of informants reported physical problems (e.g. headaches) caused by extended cell phone use and requested to keep such surveys shorter.

Trustworthiness

Participants from different groups raised the issue of communication-related disturbances, such as scams and promotional calls, that are commonly encountered and generally unwelcomed. It was suggested, in particular, that response rates may decrease if the survey comes from an unknown number, given concerns about fraud and the like. One participant stated,

'Nowadays people are facing problems with calls from unknown numbers. People get annoyed by such calls. People do not want to say anything due to fear when they receive calls from unknown numbers.' (FGD, rural female).

Study participants shared that, many within their communities would not receive the IVR calls if they were not notified earlier. They might think of the IVR call as one of those promotional calls. One rural female said in this regard,

'We receive many promotional calls from the mobile phone operators, when we receive thinking them as important, most of the time we find these types of calls are disappointing.' (FGD, rural female).

Participants also suggested that a unique number fixed by the government of Bangladesh could solve the unknown number issue.

'Before the survey, if the government advertises in the media that a phone survey is coming through a unique number and requests the people to participate, then people will receive the call and provide information.' (FGD, Urban slum, young male).

Most of the participants from all groups raised concerns that answering the survey by pressing phone buttons may be linked with hidden charges, resulting in depletion of mobile balance. Many reported previously losing mobile balance when they pressed keypad buttons as instructed by promotional callers. Most of the participants from different groups stated that they receive many promotional calls and consider these calls disturbing and time-consuming during their busy hours. There was also concern regarding accidental hanging up or disconnecting of calls, which may result in the inability to receive airtime credits, if provided.

Technical challenges

Some participants reported that for those who are not that familiar with mobile phone use and cannot recognize mobile keypad numbers, it would be difficult for them to respond to an IVR survey where they are asked to press different keypad numbers on a phone to respond to questions. Fading away of smartphone screen after some delay was pointed out as a problem because there may be delay in pressing buttons while listening, thinking and answering IVR survey questions. Regarding this issue, one of our participants from urban settings recommended,

'Since we are using smartphones, I think we may face difficulty answering the survey question by pressing a number. It would be better to choose mode of survey that gives options to answer by using one's own voice.' (FGD, educated mixed).

In addition, disruption of calls due to network problems and interrupted voice recordings may present challenges for survey completion. It was further identified that cell phone features may cause difficulty during IVR calls (e.g. low sound, faulty speaker and keypad button failure). One of the rural females offered,

'I took the survey two times and each time I could not answer much as a couple of my keypads are not working well and the voice was so interrupted that I could not hear the options for answering the question, and later the call was also disconnected.' (UG, rural female).

Participants from UGs informed that the survey's introductory message was too long, and they felt confused about the starting time, when the question would come and when to act. To resolve the confusion, they suggested shortening the text with important key information, particularly about the survey and instructions for answering the questions. One of the rural male participants said,

'There is so much information given at the very beginning, and I was confused. I was excited enough to start answering the survey question, but the question was not coming, and I was feeling discouraged to continue. The introduction needs to be interesting enough until we reach the main part of the survey.' (UG, rural male).

Moreover, it was observed during the UG sessions, questions that had multiple options confused the participants, and they failed to recall the options. As instructed, some tried pressing the star button to repeat the question, and due to a system error, some survey calls were disrupted. To avoid such difficulties, KIs, who were experts in the telephone survey, recommended against providing more than two response options and suggested breaking down the questions into easy and simpler forms.

Sharing private information

One group of respondents stated that sensitive questions might disrupt the survey, given privacy concerns. Meanwhile, another group felt that asking such questions would not have any impact and would even feel comfortable answering because this is not a face-to-face survey where they might feel embarrassed.

Several participants thought people may not be truthful and feel uncomfortable in answering questions related to alcohol intake because alcohol consumption is restricted by law. Similarly, disclosure of information about smoking was thought by some to be potentially sensitive, given trends toward negative social perceptions of smokers. Because they would be providing private information, they wanted to be convinced that they would not face any problems in the future. One participant described,

'I have pressed 1, when they asked whether I drink alcohol or not. After a few seconds, I got confused about whether this information could drag me into any trouble later on. Since there is no option to go back and change my answer, I hung up.' (FGD, urban slum, young male).

Another participant commented that,

'...they (community people) will disclose information about smoking, but they would not tell anything about taking alcohol. Everybody has fear; why the government is trying to get information on these habits, people think that if the police get this information in any way then they might get arrested. Drinking alcohol is prohibited in our religion and laws.' (FGD, rural female).

Participants from different groups suggested that more information should be provided for sensitive questions, stating that the respondent would not face any trouble from any party (e.g. the government and police) if they disclosed sensitive information.

Incentives

Most participants from FGD and UGs informed that providing a small incentive would act as a token of appreciation and motivate people to complete the IVR survey. It was widely suggested that it was important to inform the respondent at the beginning of a survey that there would be some completion incentive.

Respondents were in favor of various types of incentives (e.g. free health service packages, providing mobile talk time, or providing cellular data packages).

Several participants expressed that these surveys can be a way to learn something new about health issues, and they even proposed adding health tips to increase the value and acceptability of the survey. One participant mentioned,

'Money is not everything, people can learn something through the survey; this would be great if we could learn about some health-related issues. Giving health tips could increase participation in the mobile phone survey.' (FGD, rural female).

However, most of the KIs were not very interested in providing financial incentives for the completion of an IVR survey. They also expressed their fear that setting a trend of incentives would cause constraints for other research and discourage voluntary participation in the future.

Socio-cultural factors

Several married female respondents opined that relations with spouses could be challenged if they were on the phone with an unknown caller for an extended time, in the presence of the spouse. One of the participants informed,

'If the call comes when my husband is at home, he might ask who is calling and why am I talking so long over the phone? This type of issue may lead to problems with relationships.' (FGD, rural female).

Participants perceived a female voice as trustworthy compared with a male voice. Again, some participants suggested using a male voice for male respondents and a female voice for female respondents. According to them, it would especially ease participants' disclosure of potentially sensitive information. One of the male participants explained,

'I think, no one would answer any sensitive question if asked directly because these issues are considered negative in our society. If these types of questions are asked by a female voice, then male informants will not provide the correct answer. A male voice for male respondents and female voice for female respondents may help overcome hesitation and discomfort.' (FGD, urban slum, young male).

Acceptability of survey method

Almost all participants thought that interactivity was key to a successful survey and expressed some concerns about participants' willingness to engage with IVR surveys. They indicated that interacting with a human operator may not have this type of problem; therefore, they preferred talking with a human caller rather than listening to an automated voice and answering by pressing numbers. One young male participant mentioned,

'Talking with a human is the better option because when a human is talking to you, a conversation becomes joyful due to human-to-human interaction. The thing is one cannot ignore a human voice, but an automated voice can be ignored.' (FGD, urban slum, young male).

Moreover, a number of participants felt comfortable with the face-to-face survey method. They reported that conversations through mobile phones may have the risk of not hearing the human or automated voice due to network problems, interrupting voices, poor voice recordings or any other technical problem. One participant said,

'A face-to-face survey is the best option. In this process, I can ask questions and get answers, I can even learn many things from them.' (FGD, rural female).

DISCUSSION

Along with the global expansion of affordable mobile technologies, its use in the health sector is gradually increasing for both communicable and NCD-related data collection to see the status, trends and also to provide services. MPS is gradually establishing

itself as a supplement to face-to-face large-scale household surveys. This study was undertaken to provide country-specific guidance to tailor the MPS platform for increased acceptability and usability among respondents, identify challenges and improve the quality of relevant data.

This qualitative study's findings in Bangladesh suggest that MPS are convenient to collect valuable data, raise understanding of health-related risk factors and encourage people to participate. To participate, preferences regarding the time of day to receive an IVR call varied according to demographics. Study participants across rural, urban and different professions suggested scheduling survey calls for specific times of the day and reducing the duration to 10–15 minutes for each interview. Relevant other studies also found that the shorter interviews using the IVR method had higher response rates [22–26]. Temporal factors, such as scheduling survey calls, selecting appropriate times of day to administer calls, call frequency and call duration, have been found to influence acceptance of IVR surveys in other low-income countries [25]. In addition, our participants suggested making a prior appointment with the respondent to increase the likelihood of a response, and advised that providing a reminder before the call may help. Other research has tested the usefulness of sending prior SMS notifications, which resulted in increased participation, response and completion rates [27]. Our study found that people face difficulties even recognizing the numbers on keypads to answer questions. Study participants from rural and urban slum areas opined that, due to the poor literacy rate, particularly in the older population, text messages will not be effective, and they suggested prior voice messages with instructions to get a better response. Studies attest that in a low-literacy population, voice messages are not a barrier to the IVR method because all instructions are prompted by an automated voice [22, 28].

In our study, we found that respondents failed to recall the options when the questions had multiple options. To hear the question again, in our IVR call demonstration, we provided an option to repeat the question by pressing the star button, which helped overcome the recall problem to some extent, but there were some resultant call disruptions as well. To avoid such difficulties, UG participants recommended limiting the number of response options, preferably to two.

About survey methods, interacting with human interviewers was preferred by almost all participants for easy two-way communications. Male participants from urban areas and female participants from rural areas in FGD preferred IVR for sharing sensitive and personal information (e.g. alcohol intake or smoking) due to the automated voice, as compared with the face-to-face interview and computer-assisted telephone interview (CATI). Participants opined that assuring privacy and confidentiality around the perceived sensitive questions will increase the acceptability of MPS. Findings from another study support the idea that IVR surveys may provide more opportunities to ensure the privacy and safety of research participants [29]. Studies in Uganda also reported similar findings [23, 30]. Study participants thought that calls from unknown numbers would create a barrier to receiving survey calls. Participants emphasized trust and reliability in the implementing entity as keys to increasing acceptability of MPS. Participants in urban FGD believed that prior government advertisement through print and electronic media describing the activity may increase faith and participation.

It was further revealed that incentives, such as airtime or an internet package, and health-related messages after completion may augment acceptability and motivate people to complete the survey. Other studies had similar findings, showing that offering

some financial and non-financial incentives can increase the acceptance of a new technology [31–33]. On a cautious note, participants also suggested further evaluation of incentives because this may have an impact on sustainability.

In terms of preferred survey narrator voice, participants thought that IVR surveys would be trustworthy when recorded female voices were used. However, to collect private and sensitive information effectively, a few participants suggested using male voices for male participants and female voices for female participants. A similar result was also reported in a study from Uganda [25].

Finally, issues such as non-working mobile phones, unstable networks, general and digital illiteracy and mitigating perceived fear of harassment or fraud, alongside other socio-cultural issues such as incentives, preference of IVR voice, gender sensitiveness and privacy when receiving calls from unknown numbers, were seen as important challenges. The lessons learned can help mitigate those challenges in the development and implementation of MPS globally.

LIMITATIONS

This study is not without any limitations. Firstly, due to small number of FGDs, UGs and KIIs, findings are not generalizable at the national level. However, we have achieved the saturation of our findings/data, which ensures the scientific rigor of our study. Secondly, we were unable to include people from excluded communities, such as disabled, indigenous people and transgenders. People from these groups would have added more nuances on the acceptability, usability and feasibility by their perspective. However, we offered dummy IVR survey only to the UGs participants; as a result, we missed the opinions of FGD and KII participants on this issue.

CONCLUSION

In conclusion, this study identified several key aspects related to acceptability, usability, feasibility and communities' willingness to participate in IVR surveys involving NCD risk factors in Bangladesh. It identified both challenges and potential ways of improving them. The thematic analysis revealed several key or challenging themes that include short informative introductory messages on study purpose that serve the common good of public health common good, reliable implementing institutions, simple and understandable questions, the duration and timing of surveys, addressing perceived fear, privacy, trustworthiness and general and technical literacy. These issues should be accounted for while designing and implementing future MPS.

STUDY FUNDING

The study was funded by Bloomberg Philanthropies. The funding agency had no role in preparation of this manuscript.

CONFLICT OF INTEREST

The authors declare that they have no competing interest to disclose.

AUTHORS' CONTRIBUTION

I.A.K. led conceptualization, conduction, analysis, review and editing. S.S. (Shahana) analysed and developed the original draft

of the manuscript. K.I. led the conceptualization, conduction, review and editing. S.S. (Sabina) contributed to the conduction, data curation, review and editing. G.K. contributed to review and editing. G.P. contributed to conceptualization. J.A. contributed to review and editing. D.G. led the study conceptualization, review and editing. M.R. led the study conceptualization and contributed to review and editing.

DATA AVAILABILITY

This was a qualitative study. There are no new data associated with this article.

ACKNOWLEDGEMENTS

This study was a collaborative one between the Institute of Epidemiology, Disease Control and Research of Bangladesh and Johns Hopkins University, USA. We acknowledge the voluntary participation of the respondents for their valuable time and opinions. We are thankful to the reviewers for their valuable comments for further refinement of the manuscript.

References

- Gibson DG, Farrenkopf BA, Pereira A et al. The development of an interactive voice response survey for noncommunicable disease risk factor estimation: technical assessment and cognitive testing. *J Med Internet Res* 2017;**19**:e112
- Gibson DG, Pariyo GW, Wosu AC et al. Evaluation of mechanisms to improve performance of mobile phone surveys in low- and middle-income countries: research protocol. *JMIR Res Protoc* 2017;**6**:e7534
- Porter G, Hampshire K, Milner J et al. Mobile phones and education in sub-Saharan Africa: from youth practice to public policy. *J Int Dev* 2016;**28**:22–39
- Link MW, Murphy J, Schober MF et al. Mobile technologies for conducting, augmenting and potentially replacing surveys: executive summary of the AAPOR task force on emerging technologies in public opinion research. *Public Opin Q* 2014;**78**:779–87
- BTRC, *Mobile Phone Subscribers in Bangladesh*. 2020. Retrieved from <http://www.btrc.gov.bd/telco/mobile>.
- Kader R. *The Mobile And Internet Penetration Growth Continues, Internet's Deployment Phase*. Future Startup, 2019
- Global Burden of Disease Cancer Collaboration. Global, regional, and national cancer incidence, mortality, years of life lost, years lived with disability, and disability-adjusted life-years for 32 cancer groups, 1990 to 2015: a systematic analysis for the global burden of disease study. *JAMA Oncol* 2017;**3**:524–48
- World Health Organization. *Global Action Plan for the Prevention and Control of Noncommunicable Diseases 2013-2020*. Geneva, Switzerland: World Health Organization, 2013
- Bleich SN, Koehlmoos TLP, Rashid M et al. Noncommunicable chronic disease in Bangladesh: overview of existing programs and priorities going forward. *Health Policy* 2011;**100**:282–9
- World Health Organization. *The World Health Report 2002: Reducing Risks, Promoting Healthy Life*. Geneva, Switzerland: World Health Organization, 2002
- Gibson DG, Pereira A, Farrenkopf BA et al. Mobile phone surveys for collecting population-level estimates in low- and middle-income countries: a literature review. *J Med Internet Res* 2017;**19**:e139
- Mwaka E, Nakigudde J, Ali J et al. Consent for mobile phone surveys of non-communicable disease risk factors in low-resource settings: an exploratory qualitative study in Uganda. *Mhealth* 2019;**5**:26
- Labrique A, Blynn E, Ahmed S et al. Health surveys using mobile phones in developing countries: automated active strata monitoring and other statistical considerations for improving precision and reducing biases. *J Med Internet Res* 2017;**19**:e121
- Barr ML, van Ritten JJ, Steel DG et al. Inclusion of mobile phone numbers into an ongoing population health survey in New South Wales, Australia: design, methods, call outcomes, costs and sample representativeness. *BMC Med Res Methodol* 2012;**12**:1–8
- Liu B, Brotherton JML, Shellard D et al. Mobile phones are a viable option for surveying young Australian women: a comparison of two telephone survey methods. *BMC Med Res Methodol* 2011;**11**:1–5
- Barr ML, Ferguson RA, Steel DG. Inclusion of mobile telephone numbers into an ongoing population health survey in New South Wales, Australia, using an overlapping dual-frame design: impact on the time series. *BMC Res Notes* 2014;**7**:1–10
- Ellis LA, Collin P, Davenport TA et al. Young men, mental health, and technology: implications for service design and delivery in the digital age. *J Med Internet Res* 2012;**14**:e160
- Pariyo GW, Greenleaf AR, Gibson DG et al. Does mobile phone survey method matter? Reliability of computer-assisted telephone interviews and interactive voice response non-communicable diseases risk factor surveys in low and middle income countries. *PLoS One* 2019;**14**:e0214450
- Ruikar V. Interactive voice/web response system in clinical research. *Perspect Clin Res* 2016;**7**:15–20
- Swendeman D, Jana S, Ray P et al. Development and pilot testing of daily interactive voice response (IVR) calls to support antiretroviral adherence in India: a mixed-methods pilot study. *AIDS Behav* 2015;**19**:142–55
- Adams J, Bateman B, Becker F et al. Effectiveness and acceptability of parental financial incentives and quasi-mandatory schemes for increasing uptake of vaccinations in preschool children: systematic review, qualitative study and discrete choice experiment. *Health Technol Assess* 2015;**19**:1–176
- Estabrooks PA, Smith-Ray RL. Piloting a behavioral intervention delivered through interactive voice response telephone messages to promote weight loss in a pre-diabetic population. *Patient Educ Couns* 2008;**72**:34–41
- Abu-Hasaballah K, James A, Asetline RH Jr. Lessons and pitfalls of interactive voice response in medical research. *Contemp Clin Trials* 2007;**28**:593–602
- Andersson C, Danielsson S, Silfverberg-Dymling G et al. Evaluation of interactive voice response (IVR) and postal survey in follow-up of children and adolescents discharged from psychiatric outpatient treatment: a randomized controlled trial. *Springerplus* 2014;**3**:1–3
- Ssemugabo C, Rutebemberwa E, Kajungu D et al. Acceptability and use of interactive voice response mobile phone surveys for noncommunicable disease behavioral risk factor surveillance in rural Uganda: qualitative study. *JMIR Form Res* 2019;**3**:e15000
- Torres-Quintero A, Vega A, Gibson DG et al. Adaptation of a mobile phone health survey for risk factors for noncommunicable diseases in Colombia: a qualitative study. *Glob Health Action* 2020;**13**:1809841
- Dal Grande E, Chittleborough CR, Campostrini S et al. Pre-survey text messages (SMS) improve participation rate in an Australian mobile telephone survey: an experimental study. *PLoS One* 2016;**11**:e0150231

28. Kazi AM, Jafri LA. The use of mobile phones in polio eradication. *Bull World Health Organ* 2016;**94**:153–4
29. Arora S, Yttri J, Nilsen W. Privacy and security in mobile health (mHealth) research. *Alcohol Res-Curr Rev* 2014;**36**:143–51
30. Kunutsor S, Walley J, Katabira E et al. Using mobile phones to improve clinic attendance amongst an antiretroviral treatment cohort in rural Uganda: a cross-sectional and prospective study. *AIDS Behav* 2010;**14**:1347–52
31. Roumani Y, Nwankpa JK, Roumani YF. The impact of incentives on the intention to try a new technology. *Tech Anal Strat Manag* 2015;**27**:126–41
32. Jones LR et al. The effect of incentives and technology on the adoption of electric motorcycles: a stated choice experiment in Vietnam. *Transp Res A Policy Pract* 2013;**57**:1–11
33. Hoffman V. *Market Incentives for Technology Adoption: Experimental Evidence From Kenyan Maize Farmers*, 2018