



RESEARCH ARTICLE

REVISED Getting health information to internally displaced youth in Afghanistan: can mobile phone technology bridge the gap? [version 2; peer review: 1 approved, 3 approved with reservations]

Results from a cross-sectional, formative study

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Abstract

Background: Afghanistan ranks among the most disadvantaged globally for many key reproductive, maternal, newborn and child health (RMNCH) indicators, despite important gains in the past decade. Youth (15 to 24 years) are a key audience for RMNCH information as they enter adulthood, marry and begin families; however, reaching Afghan youth with health information is challenging. Internally displaced persons (IDPs), including youth, experience additional challenges to obtaining health-related information and services. This study measured current and preferred RMNCH information channels to explore the feasibility of using mobile phone technology to provide RMNCH information to IDP youth in Afghanistan.

Methods: We conducted a sub-group analysis of survey data from a mixed-methods, cross-sectional, formative assessment to understand current access to RMNCH information. The target population for this analysis includes 15-25-year-old male and female IDP youth from three Afghan Provinces. Survey data were collected using a structured questionnaire administered through face-to-face interviews. Data were analyzed descriptively.

Results: A total of 450 IDP youth were surveyed in the three provinces (225 male and 225 female). Access to RMNCH information outside of health facilities was limited. Mobile phone ownership was nearly universal among male participants, yet considerably lower among females; nearly all participants without personal phones reported

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access to phones when needed. Although few participants spontaneously mentioned mobile phones as a preferred source of RMNCH information, most male and female respondents reported they would be very or somewhat likely to use a free, mobile-phone-based system to access such information if offered.

Conclusions: Given widespread access and considerable interest voiced by participants, mobile phones may be a viable way to reach IDP youth with important RMNCH health information in this fragile setting. Interventions should be designed and pilot-tested to identify the most appropriate platforms and information content and to further document feasibility and acceptability.

Keywords

Afghanistan, adolescents, mobile phone, information and communications technology for health, family planning, maternal health, child health, social and behavior change communication

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Any reports and responses or comments on the article can be found at the end of the article.

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REVISED Amendments from Version 1

We have revised this current version in response to questions and comments from reviewers. All changes are noted in the response to each reviewer. Most of the information requested by reviewers was in additional details for certain aspects of the manuscript, in particular: information on reasons for internal displacement for youth; details on the sample and the household sampling method; and mention of the source of the data. Additionally, we provide additional explanation for questions posed by the reviewers in terms of placing the findings from this research in a larger context of what is, and is not, known on the topic of mobile health interventions.

Any further responses from the reviewers can be found at the end of the article

Introduction

Despite improvements over the past two decades in reproductive, maternal, newborn and child health (RMNCH), Afghanistan continues to rank among the most disadvantaged countries globally for many health indicators^{1,2}. Child and maternal mortality remain critical public health issues, with higher rates in rural settings compared to urban³. Though some newborn and child health statistics have improved, immunization and nutrition indicators lag behind other countries regionally and vary markedly³⁻⁵ between provinces and urban and rural settings. Total fertility rate (TFR) among Afghan women, which contributes to maternal mortality, is also high at 5.3 children per woman, and age at first birth is low (median 20.1 years) with 12% of girls ages 15–19 years initiating childbearing³. Modern contraceptive method use to space or limit pregnancies has stagnated over the last decade, with only 20% of married women reporting modern method use³.

Afghanistan has a “youth bulge” with more than half of its population younger than 19 years; youth aged 15 to 24 years comprise 22.2% of the population⁶. As these youth enter adulthood, marry, and begin their families, they constitute a key target for RMNCH interventions aimed to improve health and reduce maternal and child mortality. They are also an important audience for health-related information, particularly around RMNCH. However, reaching Afghan youth with needed RMNCH information is challenging, as multiple barriers limit young peoples’ access to formal health services^{7,8}.

Internally displaced persons (IDPs), including youth, experience additional challenges to obtaining essential health-related information and services. Years of armed conflict, natural disasters like drought and flooding, and widespread poverty have led to large-scale migration of intact family units both within and from Afghanistan⁹⁻¹¹. As of 2018, nearly 2.6 million of the estimated 35.5 million people in Afghanistan were internally displaced^{9,10}. The factors that contribute to internal displacement also reduce health service access. A 2018 United Nations Refugee Agency (UNHCR) report documented that up to 42% of Afghan IDPs are unable to access health care, with those in urban areas having slightly better access than those in rural settings¹². Key reasons for limited health care access were high cost and perceived low quality of available healthcare¹².

More information is needed on alternative ways to reach displaced youth with health information, particularly in fragile settings. Several programs have succeeded in reaching various audiences with health information through platforms that use mobile phone technology across multiple global contexts¹³⁻¹⁷. The exponential growth of mobile phone technology has created opportunities to connect people with information at a scale previously unfathomable and Afghanistan is no exception. Mobile phone coverage is increasing within Afghanistan, in terms of number of users and use among target populations, including women and youth. In 2014, Afghanistan had an estimated 12 million mobile phone subscribers, and a 2018 estimate reported subscriptions at 22.0 million^{18,19}. A 2012 survey of Afghan women revealed that 80% had mobile phone access: 48% of women owned a mobile device and 32% could borrow one when needed²⁰.

To optimize exposure to RMNCH-related information and programming to create demand for health services, a greater understanding is needed of current exposure to and preferences for information channels and content among critical target audiences, such as IDP youth. The objective of this study was to measure current and preferred RMNCH information channels, content and media preferences, and to explore the feasibility of using mobile phone technology to reach IDP youth in Afghanistan with RMNCH information.

Methods**Study background**

We conducted a sub-group analysis of survey data collected in a mixed-methods, cross-sectional, formative assessment to inform programming for the United States Agency for International Development-funded Helping Mothers and Children Thrive in Afghanistan (HEMAYAT) project²¹. The assessment was designed to gather information from youth 15–25 years and adult men >25 years of age to identify health information and service gaps related to RMNCH outcomes and inform content and channel selection to segments of these populations, including IDPs, for targeted programming. For these analyses, we include data from a convenience sample of female and male IDP youth, ages 15 to 25 years. Youth who self-identified as IDP were recruited from households located in areas with large IDP populations in Kandahar, Nangarhar, and Takhar Provinces, selected based on their geographic and ethnic diversity. Survey data were collected March–July 2017 using a structured questionnaire administered through face-to-face interviews conducted by trained research assistants. Data used for these analyses include participant background information, household possession of media devices (i.e. television, radio and mobile phones), exposure to health information from various channels, desires for various types of health information and preferred channels of communication, as well as reported likelihood to use a free mobile phone-based system to receive health information.

Geographic areas were selected based on guidance from UNHCR, the Ministry of Refugees and Repatriation, and the Danish and the Norwegian Refugee Committees, who have pre-existing

relationships with IDP communities and their leaders. Households in these communities were sampled using a random walk technique²². The approach used for this random-walk sample involved selecting a central community landmark, such as a mosque, then selecting one house at random to be the starting point. From there households were approached at regular intervals (e.g. every 3rd). Household selection continued in each area until reaching the requisite sample size. Verbal informed consent was obtained from eligible youth interested in participating then a structured questionnaire was administered by sex-matched data collectors in a private setting within the house.

In each province, 150 IDP youth (75 male and 75 female) were recruited, resulting in 450 IDP youth across the three study provinces. Equal samples of male and female youth were selected to examine differences by sex. Sample sizes were calculated based on the ability to detect a minimum of a 20 percentage-point difference from a baseline of 40% in various indicators for each sub-population, assuming 90% power and an alpha of 0.05; further details on sample size calculations and sampling are available in the project report²¹. Data were analyzed descriptively and stratified by province and sex. Complete case analysis was conducted with numbers of missing data for each variable reported in tables.

Ethical approval

The study was approved by the Protection of Human Subjects Committee of FHI 360 (# 844213) and the Afghanistan Ministry of Public Health Institutional Review Board (#355310) prior to implementation.

Results

A total of 462 IDP youth were recruited to participate in the survey. Ten of the 462 declined participation (2.2%); one

person consented but refused to answer the remaining survey questions and data from one further participant was dropped because of incomplete interviews, leaving 450 total study participants from Kandahar, Nangarhar, and Takhar Provinces, including 225 male and 225 female youth. Characteristics of non-responders are not available as once a person declined to participate, no further information was recorded.

Just over half of female IDP youth were married, compared to 39% of their male counterparts (Table 1). Nearly all participants were born in Afghanistan. One-third of male and nearly half of female IDP youth reported currently living in their birth province. About two-thirds of male IDP youth had any formal education, compared to just under one-fifth of female youth; education levels varied markedly by province²².

Media access and exposure

Reported household radio and television ownership differed by province, but were similar by sex, with about half reporting a radio and one-fourth reporting a television in their households (Table 2); reported television ownership was largely concentrated in Kandahar (Table 2). Mobile phone ownership and access differed considerably by sex and province. Nearly all male IDP youth (94.0%-98.7%) reported mobile phone ownership but was considerably lower among female respondents overall and lowest in Nangarhar. Having a smartphone in the household and prior internet use were generally low, but lower for females than males.

Few IDP youth reported any exposure to print media or television, except for television in Kandahar (Table 3). Just over half of male IDP youth reported at least weekly radio exposure, compared to approximately one-quarter of female IDP youth, varying by province.

Table 1. Background characteristics of study participants, by sex and province, among IDP youth in Afghanistan, 2017.

Media	Kandahar		Nangarhar		Takhar	
	Men (n=75) %	Women (n=74) %	Men (n=75) %	Women (n=76) %	Men (n=75) %	Women (n=75) %
Age in years (mean)	20.3	21.6	20.1 ¹	22.1	22.7 ¹	21.6
Married	24.0	21.6	26.7	64.5	66.7	70.7
Highest level of education						
None	28.0	90.5	28.0	97.4	52.0	57.3
Primary	10.7	2.7	16.0	1.3	25.3	18.7
Secondary	14.7	1.4	14.7	1.3	13.3	8.0
Higher	45.3	5.4	40.0	0.0	6.7	16.0
Vocational	1.3	0.0	1.3	0.0	2.7	0.0
Able to read a full sentence	60.0	5.4	50.7	0.0	17.3	9.3
Born in Afghanistan	94.7	96.0	85.3	89.5	93.3	92.0
Living in province of birth	62.7	56.8	16.0	51.3	21.3	37.3
Received health care from medical provider in prior 6 months	46.7	50.0	36.0	77.6	28.0	46.7

¹ missing

Table 2. Access to media channels in household, by sex and province, among IDP youth in Afghanistan, 2017.

Media	Kandahar		Nangarhar		Takhar	
	Men (n=75) %	Women (n=74) %	Men (n=75) %	Women (n=76) %	Men (n=75) %	Women (n=75) %
Radio in household	68.0	60.8	68.0	59.2	21.3	18.7
Television in household	49.3	50.0	18.7	14.5	14.7	12.0
Basic mobile phone in household	80.0	35.1	70.7	31.6	89.3	94.7
Smartphone in household	49.3	8.1	16.0	10.5	9.3	17.3
Personally owns mobile phone	98.7	55.4	94.7	38.2	98.7	56.0
Able to use a mobile phone (own phone or one that belongs to another)	100.0	100.0	98.7	97.4	98.7	81.3
Ever accessed the internet	18.7	5.4	6.7	0.0	1.3	2.7

Table 3. Reported exposure to different media, by sex and province, among IDP youth in Afghanistan, 2017.

Media channel	Kandahar		Nangarhar		Takhar	
	Men (n=75) %	Women (n=74) %	Men (n=75) %	Women (n=76) %	Men (n=75) %	Women (n=75) %
Print (newspaper or magazine)						
None	69.3	94.6	81.3	97.4	92.0	100.0
Daily	1.3	0.0	2.7	0.0	1.3	0.0
Weekly	16.0	1.4	5.3	4.3	1.3	0.0
Less than weekly	13.3	4.1	10.7	1.3	5.3	0.0
Radio						
None	41.3	43.2	12.0	65.8	77.3	85.3
Daily	28.0	51.4	64.0	6.6	12.0	6.7
Weekly	28.0	2.7	22.7	14.5	9.3	5.3
Less than weekly	2.7	2.7	1.3	13.2	1.3	2.7
Television						
None	46.7	48.7	78.7	79.0	85.3	85.3
Daily	41.3	47.3	16.0	10.5	8.0	13.3
Weekly	12.0	4.1	4.0	7.9	6.7	1.3
Less than weekly	0.0	0.0	1.3	2.6	0.0	0.0

Few study participants recalled exposure to health-related information communicated through any channel in the 30 days prior to the survey (Table 4). Among those who recalled such information, immunization, family planning, hygiene and nutrition were the most frequently reported topics, though responses differed considerably by sex and channel. Few male and no female youth reported receiving health-related information by internet.

Health information and preferred information sources

Nearly all participants indicated a desire for more health information; health maintenance (e.g., exercise, nutrition) ranked highest among desired topics (Table 5). Other areas prioritized by male youth included smoking cessation (32.0%), accident prevention, and newborn care (18.2% each). Female youth prioritized depression and mental health issues (29.3%), stress reduction (24.9%), newborn care (22.2%) and

Table 4. Types of health information received in prior 30 days, by medium and topic, among those with reported receiving any health information by each channel and by sex, IDP youth in Afghanistan, 2017.

Health Topic ¹	Radio		Television		Internet	
	Male (n=59) %	Female (n=29) %	Male (n=46) %	Female (n=26) %	Male (n=27) %	Female (n=0) %
Immunization	72.9	69.0	67.4	53.9	44.4	--
Influenza	30.5	41.4	30.4	38.5	29.6	--
Family planning	22.0	6.9	50.0	26.9	22.2	--
Hygiene	37.3	37.9	65.2	19.2	44.4	--
Nutrition	25.4	20.7	52.2	15.4	44.4	--
High blood pressure	11.9	20.7	13.0	11.5	33.3	--
Smoking prevention	10.2	13.8	15.2	23.1	25.9	--

¹More than one response possible, percentages do not add to 100.

Table 5. Type of health information participants would like, by sex and province, among IDP youth in Afghanistan, 2017.

Message content ¹	Kandahar		Nangarhar		Takhar	
	Men (n=75) %	Women (n=74) %	Men (n=75) %	Women (n=76) %	Men (n=75) %	Women (n=75) %
Health maintenance	49.3	52.7	53.3	39.5	58.7	73.3
Smoking cessation	42.7	18.9	22.7	11.8	30.7	1.3
Accident prevention	18.7	21.6	20.0	34.2	16.0	1.3
Stress reduction	28.0	46.0	5.3	19.7	17.3	9.3
Depression or other mental health issues	25.3	70.3	10.7	9.2	13.3	9.3
Antenatal care	9.3	10.8	4.0	2.6	30.7	10.7
Care during labor and delivery	10.7	12.2	9.3	14.5	21.3	14.7
Newborn care	20.0	24.3	14.7	10.5	20.0	32.0
Breastfeeding	13.3	89.5	8.0	10.5	6.7	0.0
Family nutrition	10.7	44.6	32.0	4.0	6.7	20.0
Birth spacing/FP methods	1.3	13.5	4.0	7.9	6.7	25.3

¹More than one response possible, percentages do not add to 100.

family nutrition (22.7%); these topics were mentioned most frequently in Kandahar. Important RMNCH topics including antenatal care, breastfeeding and birth spacing/family planning were lower priorities for both sexes, varying across provinces.

Youth across provinces strongly preferred health care providers as sources of health information, with home visits by community health workers (CHWs) a distant second (Table 6). Although few male IDP youth spontaneously mentioned mobile phones as a way to access RMNCH information, 16.4% of female IDPs youth were interested in having such information provided though a telephone hotline number, most markedly in Kandahar.

Mobile phones as a source of health information

IDP youth were asked how likely they would be to use a free mobile phone-based system to receive RMNCH information. Nearly all respondents, regardless of sex or province, said they would be somewhat or very interested in such a system (Figure 1).

Participants were further asked if the phone-based system should deliver information through recorded messages or if they would prefer to speak with a live person. Except for males in Kandahar who were evenly split on the options, most respondents stated a preference for speaking with a live person rather than hearing a recorded message (Table 7).

Table 6. Preferred sources of RMNCH information, by sex and province among IDP youth in Afghanistan, 2017.

Channel ¹	Kandahar		Nangarhar		Takhar	
	Men (n=75) %	Women (n=74) %	Men (n=75) %	Women (n=76) %	Men (n=75) %	Women (n=75) %
Health care provider	81.3	50.0	76.0	59.5	68.0	81.3
Home visit by CHW	29.3	21.5	26.7	38.2	40.0	28.0
Printed information	0.0	1.4	1.3	1.3	5.3	0.0
Television	12.0	6.8	13.3	4.0	6.7	6.7
Radio	12.0	17.6	14.7	5.3	5.3	1.3
Mobile phone voice call	4.0	9.5	1.3	2.6	5.3	6.7
Telephone hotline to call	0.0	24.3	0.0	14.5	0.0	10.7

¹More than one response possible, percentages do not add to 100.

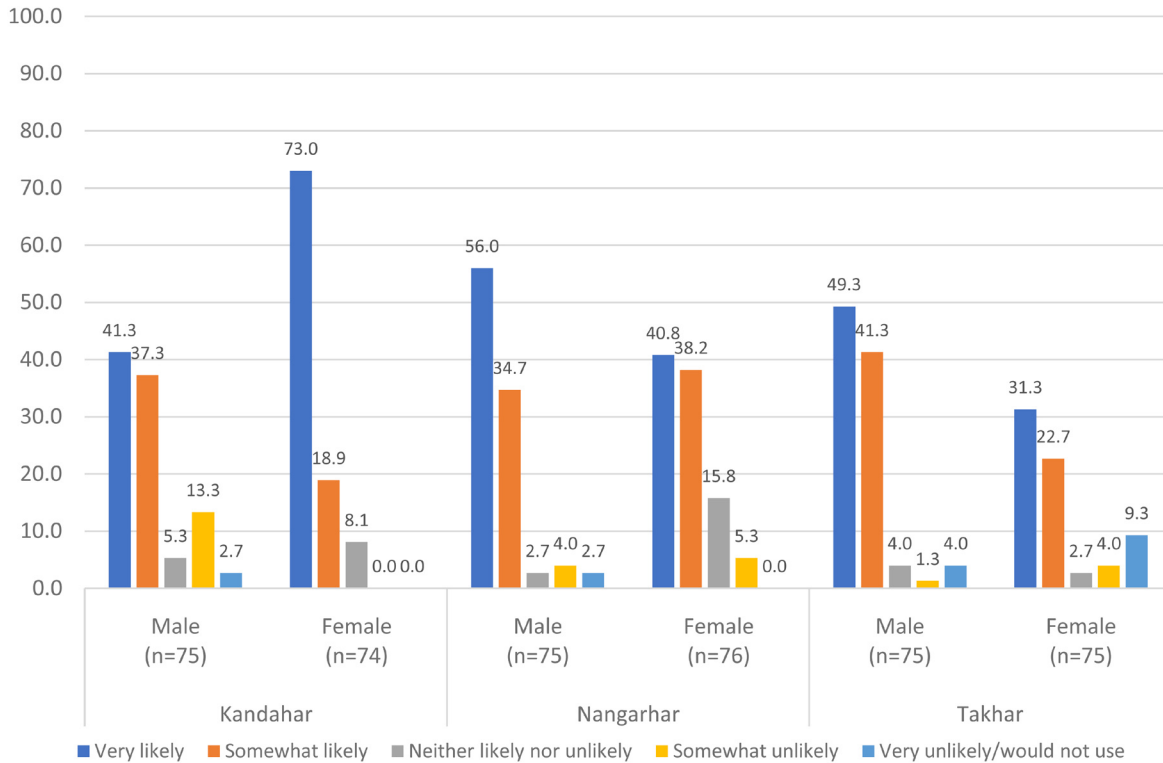


Figure 1. Likelihood of use of free mobile-phone based information on reproductive health among IDP youth, by sex and province, Afghanistan, 2017 (n=450).

Table 7. Preferred way to receive health information through a mobile phone-based system, by sex and province, IDP youth Afghanistan 2017.

Media	Kandahar		Nangarhar		Takhar	
	Men (n=75) %	Women (n=74) %	Men (n=75) %	Women (n=76) %	Men (n=75) %	Women (n=75) %
Hear a recorded message	52.0	12.2	16.0	1.3	12.0	17.3
Speak with a live person	48.0	82.4	80.0	90.8	85.3	73.3
Don't know	0.0	5.4	4.0	7.9	2.7	9.3

Discussion

Results from this study add to limited information on the potential use of mobile phone technology to disseminate health-related information in fragile settings like Afghanistan. To our knowledge, this study is among the first to explore this topic among IDP youth.

Providing accurate, concise RMNCH information is important to the health of young men and women and a key step to improving uptake of RMNCH interventions. Such information has been traditionally delivered through health providers, and more recently, through lay persons trained as CHWs, consistent with reports from participants in this study. A key challenge with health care providers being the primary RMNCH information channel is limited access to such providers experienced in many low- and middle-income countries, including Afghanistan. Even when services are available, costs and perceived low quality can impede health service uptake¹². Women in Afghanistan have the added challenge of needing permission and money for payment from male relatives to obtain health services³. These barriers can intensify for IDPs, particularly the recently-displaced, as they are unfamiliar with health facilities in their new location and some may fear discrimination based on IDP status²³.

Lay CHWs are an important health information source, particularly in more rural, remote settings, and findings from this study reflect the value participants place on CHWs as a RMNCH information channel. Notably, CHWs were named frequently in Kandahar, despite sampling most of the IDP youth from urban locations in that province, potentially reflecting individuals recently displaced from rural areas. However, persistent challenges such as competing demands and high turn-over among CHWs can limit their effectiveness to reach male and female youth in some settings²⁴. Moreover, for youth displaced to urban settings, CHWs are not a viable channel as the urban health system does not have a formal CHW cadre²⁴.

Mass media campaigns are another health information strategy with evidence for increasing health-related knowledge, attitudes, and to a lesser extent, health behaviors²⁵⁻²⁷. Regardless of effectiveness, use of media like print, radio and television requires reasonable access among the target audience. Our findings suggest that low literacy precludes using print media to disseminate health information, and RMNCH information delivered through radio and television would miss large numbers of youth in these IDP communities. Youth in Kandahar were more likely to report television use, likely reflecting the predominantly urban recruitment sites for this province and thus both access and acculturation to this channel among youth living in an urban location²⁸. Though we did not measure duration of displacement, anecdotal information indicated that some participants had been resettled for five years or more, potentially resulting in different norms around media use and health care access compare to those more recently displaced.

It is notable that some male youth reported need for RMNCH-related information, in some cases exceeding the proportion of female youth requesting the same information for

certain topics. We posit this difference may reflect limited reliable information sources accessible to young men coupled with their awareness of becoming the primary health decision-maker upon marriage³. Just under half of youth in this study were already married; thus, these topics are germane to this population. On-demand channels, as well as programming specifically targeting male IDP youth, are worthy of further investigation.

Although few participants spontaneously listed mobile phones as a preferred health information channel, most reported being likely to use a free mobile phone-based intervention. Given low literacy levels in Afghanistan, options for a mobile phone information system are limited to voice delivery, either through pre-recorded messages or speaking with a live person, with the latter strongly preferred by youth in this study^{20,29}. With high reported mobile phone access among participants, such a system seems potentially feasible and likely accessible to more youth than other communication channels.

There is limited reported evidence on the use of messaging strategies for mobile phones other than SMS, and to date, there is no published evidence on the use of mobile phone-based health promotion interventions in Afghanistan¹⁴. Authors of a 2017 systematic literature review on mHealth strategies in low- and middle-income countries found that most intervention strategies used SMS-based messaging, though a few incorporated social media apps, such as Facebook®, and one program in Papua New Guinea employed the use of voice messages and an interactive information hotline to promote youth-friendly sexual and reproductive health information for young people ages 15 to 24¹⁴. While studies and project reports have documented successful implementation of mobile health strategies, predominantly SMS messaging, a 2019 review notes a number of important barriers, including telecommunications infrastructures, costs, literacy and language barriers, among others, that will require careful consideration, planning and assessment as future interventions are developed and evaluated³⁰. Designing and implementing a mobile phone-based RMNCH information program targeting youth must also consider potential challenges to reaching young people, particularly female youth. It will also need to be tailored to the information needs of subpopulations, which differ by geography, with substantial differences in education and literacy, in particular, among male IDP youth across provinces. Although mobile phone access among Afghan women is high and growing, social norms that require women to seek permission to use phones and privacy concerns when phones are shared within families are important considerations²⁰.

Geography, ethnic diversity, limited transportation infrastructure and insecurity make conducting population-based research in Afghanistan challenging. While this study provides useful information on health information sources and preferences of youth from three provinces, several limitations require interpreting findings with caution. The youth in these analyses self-identified as IDP during enrollment; however, we did not collect information on reasons for displacement and length of time in current residence. Thus, this sample of youth may be quite heterogenous by displacement characteristics, although efforts were made through use of a random-walk method to

reduce sampling bias in this convenience sample, it remains a non-probability sample,³¹ the extent to which findings reflect the broader population of IDP youth in these provinces is unknown. Information collected on exposure to media and health-related information was gathered through self-report and are subject to problems with recall.

Although findings from this study are exploratory, we believe that mobile phone-based programming, if appropriately marketed, presents a promising channel to reach IDP youth. Further research is needed to more thoroughly document feasibility, as well as to understand the most cost-effective mobile phone platforms to use. It will also be important to refine content for various RMNCH topics and channel selection to target specific segments of these sub-populations. We recommend that mobile phone-based RMNCH programming be developed and tested specifically for youth, with purposive inclusion of IDP populations in multiple settings to ensure cultural congruence and acceptability. The resulting interventions should be rigorously tested for cost-effectiveness to help guide national policy for youth programming amidst budgetary limitations and increasing insecurity.

Data availability

Underlying data

Harvard Dataverse. Databases for Formative Assessment of Knowledge, Attitudes, and Preferred Media for Reproductive Health Engagement among Selected Groups of Youth and Men in Afghanistan. <https://doi.org/10.7910/DVN/QULMNN²¹>.

Underlying data are available in file “IDPYouthRMNCHMediaKAPSani_30APR19.tab”

Extended data

Harvard Dataverse. Databases for Formative Assessment of Knowledge, Attitudes, and Preferred Media for Reproductive Health Engagement among Selected Groups of Youth and Men in Afghanistan. <https://doi.org/10.7910/DVN/QULMNN²¹>.

The data collection instrument is attached to the final study report (file “AfghaM Male Youth Report_Final26MAR19.pdf”) as ANNEXE 2: IDP YOUTH MNCH COMMUNICATIONS SURVEY QUANTITATIVE COMPONENT.

Data are available under the terms of the [Creative Commons Zero “No rights reserved” data waiver](#) (CC0 1.0 Public domain dedication).

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Version 2

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Syed Jafar Raza Rizvi

Statistical Analyst, Johns Hopkins Centre for Communication Program, Baltimore, MD, USA

Tanvir Ahmed

Department of Oncology and Metabolism, Faculty Of Medicine, Dentistry and Health, The University of Sheffield, Sheffield, UK

Introduction

The introduction appeared to be lacking in building a coherent and logical argument. As the title reflects, the article is about understanding the scope of mobile phones in ensuring access to health information by the internally displaced youth in Afghanistan. The introduction should talk about two specific issues: firstly, about the access to health information by the internally displaced youth in Afghanistan. This should justify the breadth of the problem and the need for an intervention. And secondly, a snapshot of the evidence on the successful use of mobile phones to ensure access. This will justify the use of mobile phones for developing such intervention. Then the introduction should present the mobile phone landscape of Afghanistan and the internally displaced Afghani youth (at least the youth only) as the potential users. Once this is done, a final paragraph to knowledge gap (e.g. how much is known about the willingness and preference of the internally displaced Afghani youth regarding accessing health information through mobile phone) and then explain the aim/objective of the paper.

Method

I found the method section somewhat ambiguous. It appears that the study is a sub-group analysis of a bigger project called HEMAYAT. The main ambiguity is regarding sampling. It appears that the sampling technique was Systematic Random, yet the authors did not clarify that. Also, the reason(s) for the equal number of male and female in the sample was not clear. This is a very important dimension of health and technology research globally, gender divide. Therefore, how equal sampling represents the community needed to be clarified. The method section also needs to clarify the variables used in the analysis and the specific ethical approach (consent) in interviewing the minors.

Result

The main observation regarding the result section is:

- The reported frequencies (numbers and percentages) are simple frequencies. The authors could have easily performed nonparametric tests to measure the significance of the differences by gender or geography etc. It is unclear why they didn't do it. Also, results would have been more presentable if each table included three more columns (cumulative for all locations): all, male and female. And then went on to present the gender dichotomy by locations.
- In the first paragraph of the subhead 'Health information and preferred information sources,' I could not find the percentages reported in Table 5. Which table does this refer to? Also, there seems to be an effort to report ranking based on multiple responses (MR) variables. This needs to be corrected.
- The preference part (2nd paragraph under the subhead 'Health information and preferred information source') was very interesting. It is not clear what measures were taken to triangulate or probe the respondents' preferences. Generally, without such an approach, the scope of any reported preference is very limited and sometimes unacceptable. The authors can look at 'Contingent Valuation (CV)' as one of such method for reference. This approach is based on game theory and is widely accepted for reporting preferences. Also, I could not find the 16.4% in Table 6 or anywhere.

Discussion

I found the discussion is very unrelated to the reported result. It seems to be driven by literature review solely and assumptions. As a result, there is no central flow towards a central message. Also, the discussion section needs to refer back to the aim/objective of the paper to show the relevance of the findings or how much it has been achieved. In my opinion, the authors should rewrite the discussion as:

- Starting with a paragraph of the summary of the result and its relevance to the objective of the paper.
- Describe the context of young people and health through technology in Afghanistan in light of global evidence.
- Explain the limitation and what should be done to minimize.

As this flow was lacking, I did not understand how the authors were recommending developing the mobile phone-based intervention. In reality, this paper should have embarked on more rigour research on the demand, supply and technique of technology-based health information dissemination especially in geographically and resource-constrained contexts like Afghanistan.

Is the work clearly and accurately presented and does it cite the current literature?

Partly

Is the study design appropriate and is the work technically sound?

Partly

Are sufficient details of methods and analysis provided to allow replication by others?

No

If applicable, is the statistical analysis and its interpretation appropriate?

Partly

Are all the source data underlying the results available to ensure full reproducibility?

No

Are the conclusions drawn adequately supported by the results?

No

Competing Interests: No competing interests were disclosed.

Reviewer Expertise: Health System Research, Health and Technology, Maternal and Child Health, Healthcare Financing, Health Service Research, Complex Adaptive Systems, Mixed-Method Research etc.

We confirm that we have read this submission and believe that we have an appropriate level of expertise to confirm that it is of an acceptable scientific standard, however we have significant reservations, as outlined above.

Reviewer Report 27 August 2020

<https://doi.org/10.21956/gatesopenres.14222.r29363>

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Lianne Gonsalves 

Department of Sexual and Reproductive Health and Research including UNDP/UNFPA/UNICEF/WHO/World Bank Special Programme of Research, World Health Organization, Geneva, Switzerland

This is a very interesting read and covers phone access versus ownership among young people (an area where data is sorely needed). The study being conducted in Afghanistan makes it valuable as well, given (as the authors acknowledge) there is a lack of digital health-related literature from this country.

I applaud the authors for presenting results that aren't particularly promising with relation to digital access and appreciate that they do not attempt to overstate their findings (or push digital too hard). My comments are minor and mostly relate to how the Methods are presented.

Introduction: consider including a definition of IDP, for those not as familiar with it.

Methods:

[Overarching comment]:

My understanding is that the data presented are youth-specific data collected as part of a larger cross-sectional formative survey of the general(?) population of youth and adult males (rather than

just the IDP population). However, the Methods section, as currently presented, makes it appear as though there was different data collection methods for the general population, IDP-related population, youth-related parts of the IDP population.

Example: the geographic areas that were selected, was this *only* for the IDP-related participants? Or was this part of the general sampling? Did random walk sampling only happen for IDP related participants or the broader sample?

Following the first sentence of the Methods section, I would suggest reworking the rest of the section to begin with the relevant parts of the broad survey (e.g. when data was collected, how data was collected, the subject matter of the survey), including where it took place, and how many people were recruited. Subsequent paragraphs can narrow to the pieces specific to this sub-group analysis. At the very least, specify which pieces are specific to which populations, for example 'In order to identify IDP participants specifically, in each province we conducted additional sampling using a random walk technique.' (it's currently difficult to tell whether the whole survey used random walk or just the IDP sub-sample).

[Additional specific comments]:

Consider including how many people were participating in the entire survey.

Results:

In general, please consider indicating for each section whether respondents were given options to choose from or asked to name things spontaneously – this is an important piece of context for interpreting the results (especially given that so few young people 'spontaneously' mentioned being interested in phones as sources of health information).

Table 2: please clarify what is meant by 'access'. Is this talking about whether the channel *is available* in the household, or whether the respondent perceived that they themselves could access it? My assumption is the latter, otherwise why would women respondents be in households (which many of which presumably also include men, given marriage numbers) that have significantly fewer phones than men respondents. (If this is actually the case, it's worth commenting on).

Discussion:

The authors acknowledge that cost is a concern for client-targeted digital interventions in general (and in relation to platform selection), but not specifically to the channels they propose either voice (which in many countries can be an expensive channel), or live hotline (which, apart from being an expensive channel also includes the human resource costs of having someone on the other end). It's worth reflecting on this, possibly in the fourth paragraph from the end.

[This is my personal perspective, which the authors are not obliged to incorporate if they disagree with]:

Finally, I disagree with the authors' final conclusions. My personal take is that the lack of phone access (and equity of access, for women in particular), and lack of spontaneous enthusiasm for a phone-based intervention (questions resulting in data presented in Figure 1 tend to be quite leading) means that digital *alone* may *not* be the most effective channel (in terms of cost, coverage, and/or uptake) to reach an already hard-to-reach population that does not have consistent access to any one channel. Having a campaign available through several channels (radio, CHW sensitization, in addition to digital, for example) and/or tied to existing health programming could help the authors avoid the pitfalls of stand-alone youth-targeted digital

health interventions that others have fallen into.

Is the work clearly and accurately presented and does it cite the current literature?

Yes

Is the study design appropriate and is the work technically sound?

Yes

Are sufficient details of methods and analysis provided to allow replication by others?

Partly

If applicable, is the statistical analysis and its interpretation appropriate?

Yes

Are all the source data underlying the results available to ensure full reproducibility?

Yes

Are the conclusions drawn adequately supported by the results?

Partly

Competing Interests: No competing interests were disclosed.

Reviewer Expertise: Digital health, adolescent sexual and reproductive health

I confirm that I have read this submission and believe that I have an appropriate level of expertise to confirm that it is of an acceptable scientific standard, however I have significant reservations, as outlined above.

Reviewer Report 12 November 2019

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George C. Patton

Department of Paediatrics, University of Melbourne, Melbourne, Victoria, Australia

The authors have responded to my comments with as much information as they are able to provide. I don't think they could do much more given the data they have available.

The paper makes a useful contribution to a topic about which we have known very little.

Is the work clearly and accurately presented and does it cite the current literature?

Partly

Is the study design appropriate and is the work technically sound?

Partly

Are sufficient details of methods and analysis provided to allow replication by others?

Partly

If applicable, is the statistical analysis and its interpretation appropriate?

Partly

Are all the source data underlying the results available to ensure full reproducibility?

Partly

Are the conclusions drawn adequately supported by the results?

Partly

Competing Interests: No competing interests were disclosed.

I confirm that I have read this submission and believe that I have an appropriate level of expertise to confirm that it is of an acceptable scientific standard.

Version 1

Reviewer Report 15 July 2019

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Nichole Stetten

College of Public Health and Health Professions, University of Florida, Gainesville, FL, USA

This study highlights the need for reproductive, maternal, newborn and child health (RMNCH) interventions in Afghanistan. There is a need for RMNCH interventions to be targeted towards youth, aged 15 to 25 years old, which make up more than half of the Afghani population. Internally displaced persons (IDPs) within this population have even greater barriers to access maternal and child health care. Due to IDPs being a unique population and harder to reach, mobile technology could be used to bridge the access gap in health care. The study aimed to measure the current and preferred RMNCH information channels with an emphasis on exploring the feasibility of using mobile phone technology to reach the IDP youth population.

The results of this study are important to the field especially as it covers a hard to reach population. Other strengths of the study are its large sample size over three provinces, with almost equal male and female participants within each province. Additionally, the methods show

great cultural competency, which is crucial when conducting a research study within a community.

Current recommendations to the authors are listed below:

- Brief mention of where the survey data comes from is needed and the purpose of the overall project should be added. Looking at the references within this section, the data seems to come from the United States Agency for International Development (USAID)-funded Helping Mothers and Children Thrive in Afghanistan (HEMAYAT) project. Further explanation of this project would strengthen the paper and deepen understanding.
- Formative research is primarily used for developing intervention strategies, materials and instruments. Commonly formative research approaches are developed using a theoretical framework. Methods should be expanded to include how this formative approach was developed.
- The random walk technique used for sampling should be explained in further detail, including why this method was chosen over other methods. How does this method reduce bias?
- In the methods the authors state that they were specifically targeting youth and adult men, but when looking in the recruitment section it appears, they are targeting men and women equally.
- Looking at the demographics of the study it looks as if there are significant differences in men in the Takhar province than the other two. While women were similar in demographics across the three provinces, men in the Takhar province had lower levels of educational attainment and low levels of literacy. This difference should be noted within the paper. Noting these differences not only with demographics but in the other sections of the analysis is important as certain provinces may have different wants/needs. If these populations are significantly different from each other then they may also have different needs within an intervention.
- The authors conclude that an RMNCH intervention is “potentially feasible” and “likely accessible to more IDP youth” than other forms of communication. The results appear to show low feasibility for this type of intervention, due to low literacy rates, smart phones being owned and controlled predominantly by males, and overall preferred sources of RMNCH coming directly from health care providers. Although many IDP youth own mobile phones there would be many barriers to overcome to implement a successful mobile intervention. A majority of participants reported being “likely to use a free mobile phone-based intervention,” this high rate of “intention to use” does not always translate into a behavior change. Actual feasibility conclusions should be drawn from a pilot study using an RMNCH intervention.

Is the work clearly and accurately presented and does it cite the current literature?

Yes

Is the study design appropriate and is the work technically sound?

Yes

Are sufficient details of methods and analysis provided to allow replication by others?

Partly

If applicable, is the statistical analysis and its interpretation appropriate?

Not applicable

Are all the source data underlying the results available to ensure full reproducibility?

Yes

Are the conclusions drawn adequately supported by the results?

Partly

Competing Interests: No competing interests were disclosed.

Reviewer Expertise: PhD in Public Health - Behavioral Science and Community Health

I confirm that I have read this submission and believe that I have an appropriate level of expertise to confirm that it is of an acceptable scientific standard, however I have significant reservations, as outlined above.

Author Response 21 Oct 2019

Lisa Dulli, FHI 360, Durham, USA

Thank you for your thoughtful and detailed review. We've tried to address each concern separately below (reviewer comments in italics, responses in normal text):

This study highlights the need for reproductive, maternal, newborn and child health (RMNCH) interventions in Afghanistan. There is a need for RMNCH interventions to be targeted towards youth, aged 15 to 25 years old, which make up more than half of the Afghani population. Internally displaced persons (IDPs) within this population have even greater barriers to access maternal and child health care. Due to IDPs being a unique population and harder to reach, mobile technology could be used to bridge the access gap in health care. The study aimed to measure the current and preferred RMNCH information channels with an emphasis on exploring the feasibility of using mobile phone technology to reach the IDP youth population.

The results of this study are important to the field especially as it covers a hard to reach population. Other strengths of the study are its large sample size over three provinces, with almost equal male and female participants within each province. Additionally, the methods show great cultural competency, which is crucial when conducting a research study within a community.

Current recommendations to the authors are listed below:

- o Brief mention of where the survey data comes from is needed and the purpose of the overall project should be added. Looking at the references within this section, the data*

seems to come from the United States Agency for International Development (USAID)-funded Helping Mothers and Children Thrive in Afghanistan (HEMAYAT) project. Further explanation of this project would strengthen the paper and deepen understanding.

Information on the project is added to the first sentence of the methods section with new content in italicized font on pp. 2-3:

“We conducted a sub-group analysis of survey data collected in a mixed-methods, cross-sectional, formative assessment to inform programming for the United States Agency for International Development-funded Helping Mothers and Children Thrive in Afghanistan project.”²¹

The assessment was designed to gather information from youth 15-25 years and adult men > 25 years of age to identify health information and service gaps related to RMNCH outcomes and inform content and channel selection to segments of these populations, including IDPs, for targeted programming. For these analyses, we include data from a convenience sample of female and male IDP youth, ages 15 to 25 years. Youth who self-identified as IDP were recruited from households located in areas with large IDP populations in Kandahar, Nangarhar, and Takhar Provinces, selected based on their geographic and ethnic diversity. Survey data were collected March-July 2017 using a structured questionnaire administered through face-to-face interviews conducted by trained research assistants. Data used for these analyses include participant background information, household possession of media devices (i.e. television, radio and mobile phones), exposure to health information from various channels, desires for various types of health information and preferred channels of communication, as well as likelihood to use a free mobile phone-based system to receive health information.”

- *Formative research is primarily used for developing intervention strategies, materials and instruments. Commonly formative research approaches are developed using a theoretical framework. Methods should be expanded to include how this formative approach was developed.*

While we agree that formative research can be driven by theory, it can also be driven by empirical evidence (or both) or practical need in the absence of empirical evidence. In this case, the project had a number of predetermined objectives (based on project design) and this assessment was used to identify gaps that needed to be addressed for those objectives in order to target interventions to improve health outcomes. We have added this content on pp. 2-3:

“We conducted a sub-group analysis of survey data collected in a mixed-methods, cross-sectional, formative assessment to inform programming for the United States Agency for International Development-funded Helping Mothers and Children Thrive in Afghanistan project. The assessment was designed to gather information from youth 15-25 years and adult men > 25 years of age to identify health information and service gaps related to RMNCH outcomes and inform content and channel selection to segments of these populations, including IDPs, for targeted programming.”

- *The random walk technique used for sampling should be explained in further detail, including why this method was chosen over other methods. How does this method reduce bias?*

The method was selected as an attempt to reduce sampling bias as compared to simple convenience sampling, although we acknowledge that it does not necessarily do so to a measurable extent; thus, we describe and treat these data as a convenience sample.

Community mapping to generate a true probability sample is a time-intensive and costly endeavor, one that the project was unable to afford. Therefore, the option to enroll a convenience sample was chosen. However, random-walk sampling can help to reduce (though we do not know to what extent) sampling bias introduced by a non-random sampling method. Reference is given to the primary source that describes the method and we have provided further details on p. 3:

“Households in these communities were sampled using a random walk technique.²² The approach used for this random-walk sample involved selecting a central community landmark, such as a mosque, then selecting one house at random to be the starting point. From there households were approached at regular intervals (e.g. every 3rd) Household selection continued in each area until reaching the requisite sample size.”

< >*In the methods the authors state that they were specifically targeting youth and adult men, but when looking in the recruitment section it appears, they are targeting men and women equally.* Looking at the demographics of the study it looks as if there are significant differences in men in the Takhar province than the other two. While women were similar in demographics across the three provinces, men in the Takhar province had lower levels of educational attainment and low levels of literacy. This difference should be noted within the paper. Noting these differences not only with demographics but in the other sections of the analysis is important as certain provinces may have different wants/needs. If these populations are significantly different from each other then they may also have different needs within an intervention. *The authors conclude that an RMNCH intervention is “potentially feasible” and “likely accessible to more IDP youth” than other forms of communication. The results appear to show low feasibility for this type of intervention, due to low literacy rates, smart phones being owned and controlled predominantly by males, and overall preferred sources of RMNCH coming directly from health care providers. Although many IDP youth own mobile phones there would be many barriers to overcome to implement a successful mobile intervention. A majority of participants reported being “likely to use a free mobile phone-based intervention,” this high rate of “intention to use” does not always translate into a behavior change. Actual feasibility conclusions should be drawn from a pilot study using an RMNCH intervention.*

We appreciate the reviewer’s comments; however, as noted in the discussion, if the intervention used voice messaging (either through live persons or voice recordings) then the literacy challenge would be addressed. Smartphones would not be needed for either a voice- or a text-based intervention, and we hope we have not given the impression that they would be required.

We agree that face-to-face client-provider interactions are ideal based on the preferred source of health information for most participants; however, access to such interactions is limited, for multiple reasons, which is why alternative, complementary strategies are required.

In terms of self-reported likelihood to use a hypothetical intervention, we absolutely agree. We’ve revised the text in the last paragraph to more explicitly support the need for documenting the actual feasibility of the approach on p. 9:

“Although findings from this study *are* exploratory, we believe that mobile phone-based programming, if appropriately marketed, presents a promising channel to reach IDP youth. Further research is needed to *more thoroughly document feasibility, as well as to understand*

the most cost-effective mobile phone platforms to use. It will also be important to refine content for various RMNCH topics and channel selection to target specific segments of these sub-populations. We recommend that mobile phone-based RMNCH programming be developed and tested specifically for youth, with purposive inclusion of IDP populations in multiple settings to ensure cultural congruence and acceptability. The resulting interventions should be rigorously tested for cost-effectiveness to help guide national policy for youth programming amidst budgetary limitations and increasing insecurity.”

Competing Interests: No competing interests were disclosed.

Reviewer Report 02 July 2019

<https://doi.org/10.21956/gatesopenres.14116.r27302>

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George C. Patton

Department of Paediatrics, University of Melbourne, Melbourne, Victoria, Australia

This cross-sectional survey reports on a topic and youth group that has had very little attention in the literature. Certainly I've seen no similar report and as the authors rightly conclude, displaced youth in places like Afghanistan have been little studied. This population also poses quite a few challenges in surveys of this kind, as the authors again point out.

The paper is generally well-written and the tables/figure are straightforward and clear. Inevitably there are methodological limitations, many of which the authors to flag. Some remained significant.

1. The sampling methods are not clear enough. Given the relatively small numbers, I am assuming this is not aspiring to be a representative sample of the target population. However, it isn't clear how these participants were selected. No details are given of response rates, including characteristics of non-responders. These details are important.
2. One problem in interpreting the findings is the definition of internally displaced. The authors do mention this in the discussion as a limitation but it seems that these groups are actually young people living in areas where there are high levels of internal displacement? I was clear if they were displaced themselves – if not perhaps the title of the paper should be changed?
3. It would be very good if the authors could elaborate on reasons for internal displacement of youth in Afghanistan. I'm assuming that conflict and unrest is one factor but there are a range of others that are very significant: marriage in girls; employment in boys; and there may be a range of other reasons as well e.g. access to education. This is important for the reader to understand.

4. The conclusion that the authors draw is that there would be scope for communicating with males and to a lesser extent females through mobile phones to provide health information. Given youth preferences, this would ideally be a system with a real person at the other end of the phone line. Could the authors provide some examples of where this has been rolled out, ideally with information on coverage and costings, with some discussion as to whether this might be affordable and scalable in the context of Afghanistan?
5. The researchers seemed quite dismissive of mass media strategies for providing information to youth. Yet there are some very good examples of using mass media and low and middle income countries to provide information on sexual and reproductive health. It would be good if the authors could go back and re-examine this literature as mass media do provide an alternative platform for delivery of information at scale – the costs of doing so are likely to be quite a lot lower than individualised manning of telephone lines.

Is the work clearly and accurately presented and does it cite the current literature?

Partly

Is the study design appropriate and is the work technically sound?

Partly

Are sufficient details of methods and analysis provided to allow replication by others?

No

If applicable, is the statistical analysis and its interpretation appropriate?

Yes

Are all the source data underlying the results available to ensure full reproducibility?

Yes

Are the conclusions drawn adequately supported by the results?

Partly

Competing Interests: No competing interests were disclosed.

Reviewer Expertise: Developmental Epidemiology

I confirm that I have read this submission and believe that I have an appropriate level of expertise to confirm that it is of an acceptable scientific standard, however I have significant reservations, as outlined above.

Author Response 21 Oct 2019

Lisa Dulli, FHI 360, Durham, USA

We thank the reviewer for his constructive feedback on this manuscript and submit the revised version along with responses to critiques.

Reviewer input is in italicized font and we provide our response and the relevant changes after each critique.

This cross-sectional survey reports on a topic and youth group that has had very little attention in the literature. Certainly, I've seen no similar report and as the authors rightly conclude, displaced youth in places like Afghanistan have been little studied. This population also poses quite a few challenges in surveys of this kind, as the authors again point out. The paper is generally well-written and the tables/figure are straightforward and clear. Inevitably there are methodological limitations, many of which the authors to flag. Some remained significant.

1) The sampling methods are not clear enough. Given the relatively small numbers, I am assuming this is not aspiring to be a representative sample of the target population. However, it isn't clear how these participants were selected. No details are given of response rates, including characteristics of non-responders. These details are important.

This is not a representative sample, as noted in the limitations of the original manuscript. We have provided additional details on sampling strategy on pp. 2-3 (italicized text below): "We conducted a sub-group analysis of survey data collected in a mixed-methods, cross-sectional, formative assessment *to inform programming for the United States Agency for International Development-funded Helping Mothers and Children Thrive in Afghanistan project.*"²¹ The assessment was designed to gather information from youth 15-25 years and adult men > 25 years of age to identify health information and service gaps related to RMNCH outcomes and inform content and channel selection to segments of these populations, including IDPs, for targeted programming. For these analyses, we include data from a convenience sample of female and male IDP youth, ages 15 to 25 years. Youth who self-identified as IDP were recruited from households located in areas with large IDP populations in Kandahar, Nangarhar, and Takhar Provinces, selected based on their geographic and ethnic diversity. Survey data were collected March-July 2017 using a structured questionnaire administered through face-to-face interviews conducted by trained research assistants. Data used for these analyses include participant background information, household possession of media devices (i.e. television, radio and mobile phones), exposure to health information from various channels, desires for various types of health information and preferred channels of communication, as well as likelihood to use a free mobile phone-based system to receive health information.

Geographic areas were selected based on guidance from UNHCR, the Ministry of Refugees and Repatriation, and the Danish and the Norwegian Refugee Committees, who have pre-existing relationships with IDP communities and their leaders. Households in these communities were sampled using a random walk technique.²² Household selection continued in each area until reaching the requisite sample size. Verbal informed consent was obtained from eligible youth interested in participating then a structured questionnaire was administered by sex-matched data collectors in a private setting within the house." and response rates on p. 4:

"A total of 462 IDP youth were recruited to participate in the survey. Ten of the 462 declined participation (2.2%); one person consented, but refused to answer the remaining survey questions and data from one further participant was dropped because of incomplete interview, leaving 450 total study participants in Kandahar, Nangarhar, and Takhar Provinces including 225 male

and 225 female youth. *Characteristics of non-responders are not available as once a person declined to participate, no further information was recorded.*"

2) One problem in interpreting the findings is the definition of internally displaced. The authors do mention this in the discussion as a limitation, but it seems that these groups are actually young people living in areas where there are high levels of internal displacement? I was clear if they were displaced themselves – if not perhaps the title of the paper should be changed?

Although we did not collect additional information on displacement characteristics, eligibility was constrained to youth who self-identified as IDPs. Data collectors asked the youth if they were internally displaced before proceeding to the informed consent process. This information has been added to the manuscript on p. 3:

"For these analyses, we include data from a convenience sample of female and male IDP youth, ages 15 to 25 years. Youth who self-identified as IDP were recruited from households located in areas with large IDP populations in Kandahar, Nangarhar, and Takhar Provinces, selected based on their geographic and ethnic diversity."

3) It would be very good if the authors could elaborate on reasons for internal displacement of youth in Afghanistan. I'm assuming that conflict and unrest is one factor but there are a range of others that are very significant: marriage in girls; employment in boys; and there may be a range of other reasons as well e.g. access to education. This is important for the reader to understand.

As noted by UNESCO, "Guiding Principles on Internal Displacement set by of Office for the United Nations High Commissioner for Refugees (UNHCR) holds internally displaced persons to be "persons or groups of persons who have been forced to flee, or leave, their homes or places of habitual residence as a result of armed conflict, internal strife, and habitual violations of human rights, as well as natural or man-made disasters involving one or more of these elements, and who have not crossed an internationally recognised state border." (<http://www.unesco.org/new/en/social-and-human-sciences/themes/international-migration/glossary/displaced-person-displacement/>). However, it could certainly be argued that the line between forced and unforced migration can be blurry.

We noted in the discussion section, a limitation of the study is that we did not collect information from participants on reasons for displacement. We do, however, report in the second paragraph of the background section, main drivers for internal displacement (forced migration) in Afghanistan, which include conflict, natural disasters and poverty, as documented through other research; youth move with their families as the family unit tends to stay intact in situations resulting in displacement. We did not explore reasons for voluntary migration in detail.

Please see the text on p. 1:

"Years of armed conflict, natural disasters like drought and flooding, and widespread poverty have led to large-scale migration of intact family units both within and from Afghanistan.⁹⁻¹¹"

4) The conclusion that the authors draw is that there would be scope for communicating with

males, and to a lesser extent, females through mobile phones to provide health information. Given youth preferences, this would ideally be a system with a real person at the other end of the phone line. Could the authors provide some examples of where this has been rolled out, ideally with information on coverage and costings, with some discussion as to whether this might be affordable and scalable in the context of Afghanistan?

To date, there is no published evidence on the use of mobile phones for health promotion interventions in Afghanistan. Based on a search of the current literature, only one study has been published on the topic from Afghanistan - a descriptive study exploring women's perceptions around using mobile phones to promote maternal and child health. There is very little in the published literature on the effectiveness of health promotion programs that employ voice messaging or live interactive phone calls in LMIC, and even less on costs. Many programs are currently being implemented, but the evidence lags behind. A number of protocols examining similar interventions have been published, but studies have not yet been completed. Of note, the HEMAYAT project, which led this formative research, is currently piloting a voice messaging intervention to promote RMNCH among pregnant and postpartum women. However, as with many of these interventions, the work is still underway. These limitations in the current literature are noted on p. 8:

"There is limited reported evidence on the use of messaging strategies for mobile phones other than SMS, and to date, there is no published evidence on the use of mobile phones in health promotion interventions in Afghanistan.¹⁴ Authors of a 2017 systematic literature review on mHealth strategies in low- and middle-income countries found that most intervention strategies used SMS-based messaging, though a few incorporated social media apps, such as Facebook, and one program in Papua New Guinea employed the use of voice messages and an interactive information hotline to promote youth-friendly sexual and reproductive health information for young people ages 15 to 24.¹⁴ Although studies and project reports have documented successful implementation of mobile health strategies, SMS messaging predominately, a 2019 review notes a number of important barriers, including telecommunications infrastructures, costs, literacy and language barriers, among others, that will require careful consideration, planning and assessment as future interventions are developed and evaluated.³⁰"

5) The researchers seemed quite dismissive of mass media strategies for providing information to youth. Yet there are some very good examples of using mass media and low- and middle-income countries to provide information on sexual and reproductive health. It would be good if the authors could go back and re-examine this literature as mass media do provide an alternative platform for delivery of information at scale – the costs of doing so are likely to be quite a lot lower than individualised manning of telephone lines.

Our aim was not to be dismissive of mass media, but rather it was to place our findings in the context of what is known about reaching youth with health information in this particular setting. There are indeed examples of mass media to influence health-related knowledge and attitudes, and to a lesser extent, health-related behaviors in other countries. We have revised our summary on p. 8 to read

"Mass media campaigns are another health information strategy with some evidence for increasing health-related knowledge and attitudes, and to a lesser extent, health-related

behaviors, service use, though the evidence is weak, and effectiveness for changing health behaviors is not well documented.”

However, our findings indicate that access to traditional mass media channels (e.g. radio and television) is limited among our study participants and varies considerably across provinces. In Takhar, for example, fewer than one in four of men and women had access to either radio or television, thus limiting their potential effectiveness, hence the need to identify other communication channels.

Competing Interests: No competing interests were disclosed.
