Original Research

DIGITAL HEALTH

Digital Health
Volume 8: 1–15

DOI: 10.1177/20552076221089801
journals.sagepub.com/home/dhj
SAGE

Analyzing program data and promotional approaches to inform best practices from a mobile phone-based reproductive health message program in Afghanistan

Lara Lorenzetti[1], Kate F. Plourde[1], Sayed Haroon Rastagar[2], Arzoo S. Afzali[2], Ahmad S. Sultani[2], Abdul Khaleq Khalil[3], Abdul Waheed Adeeb[2], Shafiqullah Hemat[4] and Catherine S. Todd[1]

Abstract

Objective: Digital health technologies have contributed to the adoption of beneficial reproductive, maternal, newborn, and child health (RMNCH) behaviors through social and behavior change programming, including in hard-to-reach settings. On-demand digital health interventions rely on promotions to build awareness and increase use among target audiences. There is little research on preferred content and use of promotional approaches for RMNCH digital health activities.

Methods: We conducted a retrospective descriptive analysis of Mobile for Reproductive Health (m4RH) data in Afghanistan to assess the use and changes in call volume via the 2-3-4 platform by promotional approaches over 23 months between October 2017 and August 2019.

Results: There were 103,859 completed messages (CM) heard. Most callers reporting demographics were under 18 years, with roughly even distribution by gender. The number of CMs listened to across all menus increased with time. The basic m4RH family planning menu was most popular, with callers most frequently selecting information on intrauterine contraceptive devices. Nine types of promotional approaches were implemented. Compared against call volume, SMS blast promotion was the most productive promotional approach, radio broadcasts had modest increases, and social media and interpersonal communication demonstrated no clear change.

Conclusions: m4RH use increased over time, particularly among younger people. The number of promotional approaches used does not appear as important as the type of approach used to generate program awareness. Mass media communications, including SMS blast promotions and radio broadcasts, may be the most effective strategies. Deeper program data analysis can guide tailoring of message content and promotional approaches to reach target audiences with the RMNCH content they most value.

Keywords

Mobile phone, contraception, social and behavior change communication, health promotion, digital health

Submission date: 25 February 2021; Acceptance date: 9 March 2022

Introduction

The steadily increasing rates of mobile phone use in Afghanistan expand the potential for improving access to critical maternal, newborn, and child health (MNCH) and family planning (FP) information through digital health programs. In 2019, 91.4% of Afghan households reported having at least one mobile phone.[1] As of 2013, 80% of

[1]Global Health, Population, & Nutrition Division, FHI 360, Durham, NC, USA
[2]FHI 360/HEMAYAT project, Kabul, Afghanistan
[3]Viamo, Kabul, Afghanistan
[4]Health Promotions Department, Ministry of Public Health, Islamic Republic of Afghanistan, Kabul, Afghanistan

Corresponding author:
Kate F. Plourde, Global Health, Population, & Nutrition Division, FHI 360, 359 Blackwell Street, Suite 200, Durham, NC 27701, USA.
Email: plourde.kate@gmail.com

Afghan women had access to a mobile phone.[2] Of those, approximately 48% of women owned their own phone, while the remainder had access to a family member or neighbor's phone.[2] Further, data suggest that women are interested in using mobile phones to access health information. Nearly all participants (87.1%) in a 2018 study in Nangarhar Province exploring women's perceptions of mobile phone use for MNCH promotion were open to receiving health information via mobile phones and 80.4% were willing to use a toll-free call-center or hotline to do so.[3]

Afghanistan has seen some improvements in maternal and newborn mortality across the last 15 years.[4] However, innovative approaches are essential to address the persistently low FP rate and high unmet need, thereby ensuring progress toward the 2030 Sustainable Development Goals and the FP2020 goals to which Afghanistan has committed for increasing contraceptive prevalence rates.[5,6] Digital technologies, including mobile phones, have demonstrated promise in supporting the uptake of FP and beneficial reproductive, and maternal health behaviors across many contexts.[7] Digital health programs have contributed to improved fertility awareness and contraceptive knowledge in India and Kenya and increased contraceptive uptake in Nigeria.[8–13] Digital health client education and behavior change programs have also been effective in improving antenatal and postnatal care use and increasing skilled birth attendance among users, improving maternal and newborn health.[14,15] Furthermore, digital health programming may help traditionally difficult-to-reach populations, such as youth and adolescent girls and young women, overcome specific barriers they face for accessing health information by providing relevant and engaging content discreetly and outside of the health facility setting.[13,16,17]

Despite increasing access to mobile phones in Afghanistan and evidence supporting their use as a communication channel to adopt healthy reproductive and maternal health behaviors in other contexts, few health programs in Afghanistan have incorporated mobile technology for social and behavior change (SBC) to date. Mobile for Reproductive Health (m4RH) is one such intervention, an on-demand digital reproductive health information system initially developed and implemented in Kenya and Tanzania to provide users with FP information.[11,13] Use of m4RH was associated with increased contraceptive knowledge; qualitative data suggest it may also improve partner communication about FP and contraceptive uptake.[10,11] m4RH was adapted for the Afghan context within the USAID-funded Helping Mothers and Children Thrive (HEMAYAT) project and implemented via the 2-3-4 platform operated by Viamo and Roshan Telecommunications.

On-demand digital health interventions rely on marketing and promotion to ensure target audiences are aware of and can access the intervention.[18] There has been little research on how different promotional approaches for digital health programs are linked to the uptake of reproductive and maternal health information. As such, we conducted a retrospective analysis of m4RH message activity via the 2-3-4 platform in Afghanistan to understand m4RH content preferences and the influence of promotional approaches on caller volume to improve m4RH utilization.

Methods

We analyzed program data from the m4RH 2-3-4 platform database and type, number, and timing of promotional approaches for m4RH specifically or the 2-3-4 platform generally between October 2017 and August 2019. Timing and distribution of promotional approaches were based on a review of program activity reports that specify the schedule of various radio advertisements, the initial televised launch, and general 2-3-4 short message service (SMS) and social media promotions. This assessment's protocol was reviewed by FHI 360's Office of International Research Ethics and was classified as non-research per U.S. regulations (45 CFR 46).

M4rh Afghanistan

In October 2017, a collaborative effort between the Afghanistan Ministry of Public Health (MoPH) and the USAID-funded HEMAYAT project implemented m4RH via the 2-3-4 platform. This platform is a partnership between Viamo and Roshan Telecommunications, in which public service and general interest messages (e.g. crop-specific agricultural tips, crop market values) may be accessed at no cost by network subscribers through a specific short code. After dialing 2-3-4, callers hear a welcome message providing a brief description of the service followed by menus with a choice of languages and topics (e.g. agriculture, health). Callers selecting the health menu are led to sub-menus for m4RH and maternal and newborn health high impact intervention (HII) content. Roshan network subscribers may access the menu through the 2-3-4 short code at no cost for the first five calls in a one-month period, while out-of-network subscribers may access the platform through a long number at standard call rates.

In Afghanistan, m4RH FP-focused messages and a separate menu of maternal and newborn health HII messages were adapted to the local context. Messages were translated into the two national languages (Dari and Pashto) and pretested in four provinces for clarity and acceptability among separate focus groups of adult men and women. The messages were audio-recorded by female native speakers of each language. The recorded files were uploaded to the 2-3-4 platform[19] onto three health menus: 1) Basic m4RH, 2) m4RH+, and 3) HIIs. The m4RH+ menu offered additional content on user instructions, efficacy, and side effects for each of the basic FP options.

Table 1 lists the relevant topics for each menu. The basic m4RH menu was launched in October 2017, and the m4RH + and HII menus were available beginning February 2019; all health menus are currently available.

2-3-4 platform data measures. As with any call-in service, callers may not hear an entire message either due to loss of interest or connection. As such, the 2-3-4 platform database collects a variety of data points to describe the extent of caller interactions. The number of callers selecting a specific topic each month describes the topics callers chose from a discrete menu (e.g. daily pills from the basic m4RH menu). This number reflects the popularity of a given topic but does not capture whether the complete message (CM) was heard by callers. For this analysis, we use two additional, more conservative data points: number of callers hearing CM content and the number of unique callers. A message heard by subscribers was counted as a CM if 75% or more of the message was heard prior to call end. The health menu messages were all less than two minutes in length and all contained a stock statement at the end that the content was approved by MoPH. A unique caller is defined as a distinct phone number that called and listened to more than 75% of a selected CM.

Regarding caller demographics, each first-time caller must select a language preference before accessing 2-3-4 menus. Language preferences are only asked of first-time callers and cannot be changed, though callers can select more than one language. After hearing the selected content, each caller is asked about registering for platform services, at which time they can provide information on age and sex or opt out of providing this information.

Table 1. M4rh 2-3-4 list of menus and topics.

Basic m4RH
■ Condoms
■ Daily pills
■ Emergency contraceptive (EC)
■ Implants
■ Injectables
■ Intrauterine contraceptive devices (IUCD)
■ Lactational amenorrhea method (LAM)
■ Natural family planning (i.e. Standard Days Method)
m4RH +
For all topics listed under basic m4RH, additional content on:
■ User instructions
■ Duration of efficacy
■ Side effects
High Impact Interventions (HIIs)
■ Early and exclusive breastfeeding
• Importance of antenatal care and pregnancy warning signs
■ Misoprostol for postpartum hemorrhage (PPH) prevention
■ Chlorhexidine for umbilical cord care (CHX)
■ Newborn care and warning signs

Promotional methods. Various approaches were utilized to promote the 2-3-4 platform and, by the project, m4RH and HII content, including interpersonal communication (IPC), mass media communication, and social media. IPC engagement was continuous throughout the analysis period, consisting of various interactions where m4RH and HII information was shared, including an in-person launch ceremony that was also broadcast on television in October 2017. A primary IPC promotional approach included the distribution of print materials (April–December 2018), such as business cards with the 2-3-4 short code, brief description of program content, and access instructions. IPC also included m4RH promotional material distribution and verbal promotion by clinical mentors who publicized m4RH to facility-based providers and maternity patients during facility-based activities (April–December 2018, March–May 2019) and sharing of m4RH and HII information through community-based activities (January 2018–August 2019), such as during viewing sessions for tablet-based health videos shared by community health workers and ongoing community dialogue meetings.

Mass media communications included a single SMS blast promotion sent to Roshan subscribers in June 2018, radio advertisements, and social media promotion. Radio advertisements consisted of two pretested, recorded spots that separately targeted adult married male and female audiences by dramatizing a conversation between two women or two men, in which one mentioned the need for FP information and the other promoted the m4RH content on the 2-3-4 platform. These spots were aired on five provincial radio stations across regional centers of Balkh, Herat, Kabul, Kandahar, and Nangarhar provinces during June–July 2018 and April–May 2019. Finally, Roshan Telecommunication Company promoted the 2-3-4 platform generally via social media, including posts on Facebook and Instagram in Dari and Pashto. There were 12 Facebook posts between December 2017 and March

2019, garnering a total of 24,564 likes. By contrast, there were seven Instagram posts between February 2018 and March 2019, which earned 313 likes. The SMS blast and social media posts differed from previously mentioned promotional approaches as they advertised the 2-3-4 program overall rather than m4RH or HII content specifically.

Analysis

We used Viamo's system logs to extract data on program interactions for m4RH, m4RH+, and HII messages between the dates of October 1, 2017, and August 31, 2019. These include data on the number of unique system interactions (i.e. caller phone number); user age and gender based on caller registration information collected at the end of the 2-3-4 menu; specific menu and messages selected; language of information requested; and call date, time, and length. We conducted a descriptive analysis in Microsoft Excel mapping the total CMs by month and comparing them to the number and types of promotional approaches used. We also descriptively examined CMs listened to by callers and unique vs. repeat callers by month for the basic m4RH, m4RH+, and HII menus.

Table 2. Demographics of callers accessing the 2-3-4 platform for m4RH, m4RH+, and HII content in Afghanistan, October 2017–August 2019.

	n	%
Gender		
Male	20,412	30.1%
Female	16,571	24.4%
Unavailable	30,908	45.5%
Language*		
Dari	54,515	79.7%
Pashto	13,860	20.3%
Age		
Under 18	17,663	26.0%
18–24	11,534	17.0%
25–34	4298	6.3%
35–44	1812	2.7%
Over 44	1228	1.8%
Unavailable	31,355	46.2%

*Callers can select more than one language.

Results

Between October 2017 and August 2019, the 2-3-4 platform recorded 144,595 total interactions accessing m4RH, m4RH+, and High Impact Intervention (HII) content, which included 103,859 total CMs heard by callers across all three menus. The discrepancy between total interactions and total CMs represents hang-ups or dropped calls due to loss of caller interest or connectivity. Most callers accessed messages in Dari compared to Pashto (Table 2). Of callers for whom we have age information (54.5%), nearly half were under 18 years of age and an additional one-third were between 18 and 24 years. Available demographic data suggest that, among callers, slightly more men than women accessed the 2-3-4 platform. Discrepancies in total users by demographic category are a result of callers' choice to provide information, the ability to select more than one language, and system functions.

Completed messages listened to by callers

Of calls made to the 2-3-4 system selecting m4RH content, callers listened to 76,080 CMs for the basic m4RH menu over a 23-month period, averaging 3308 CMs per month. By comparison, callers listened to 12,865 CMs on m4RH+and 14,914 CMs on HII menus over the seven-month period of availability, which averaged 1838 and 2131 monthly CMs, respectively. Of CMs on basic m4RH, callers most frequently selected information on IUCDs, representing 15.6% of total CMs over the 23-month period (Figure 1).

There were notable differences in topics of interest between basic m4RH and m4RH+menus. Over the seven-month period that m4RH+messages were available, callers most frequently heard CMs on condoms (17.6%), and similar to basic m4RH messages, CMs on daily oral contraceptives were selected least often (4.6%) (Figure 2). For HII callers, the CMs most frequently listened to were newborn care (30.0%), followed by misoprostol for PPH prevention (Figure 3).

Monthly unique & repeat listeners

We cross-referenced monthly CMs with the number of monthly unique callers to identify which menus and topics were accessed more than once by callers. Over the 23-month period that basic m4RH messages were available, 95% of CMs were listened to by unique callers (Table 3). Similarly, 96% of CMs on m4RH+and 97% of CMs on HII were heard by unique callers, respectively. This means that the majority of messages were listened to once by a unique caller rather than multiple times by the same caller.

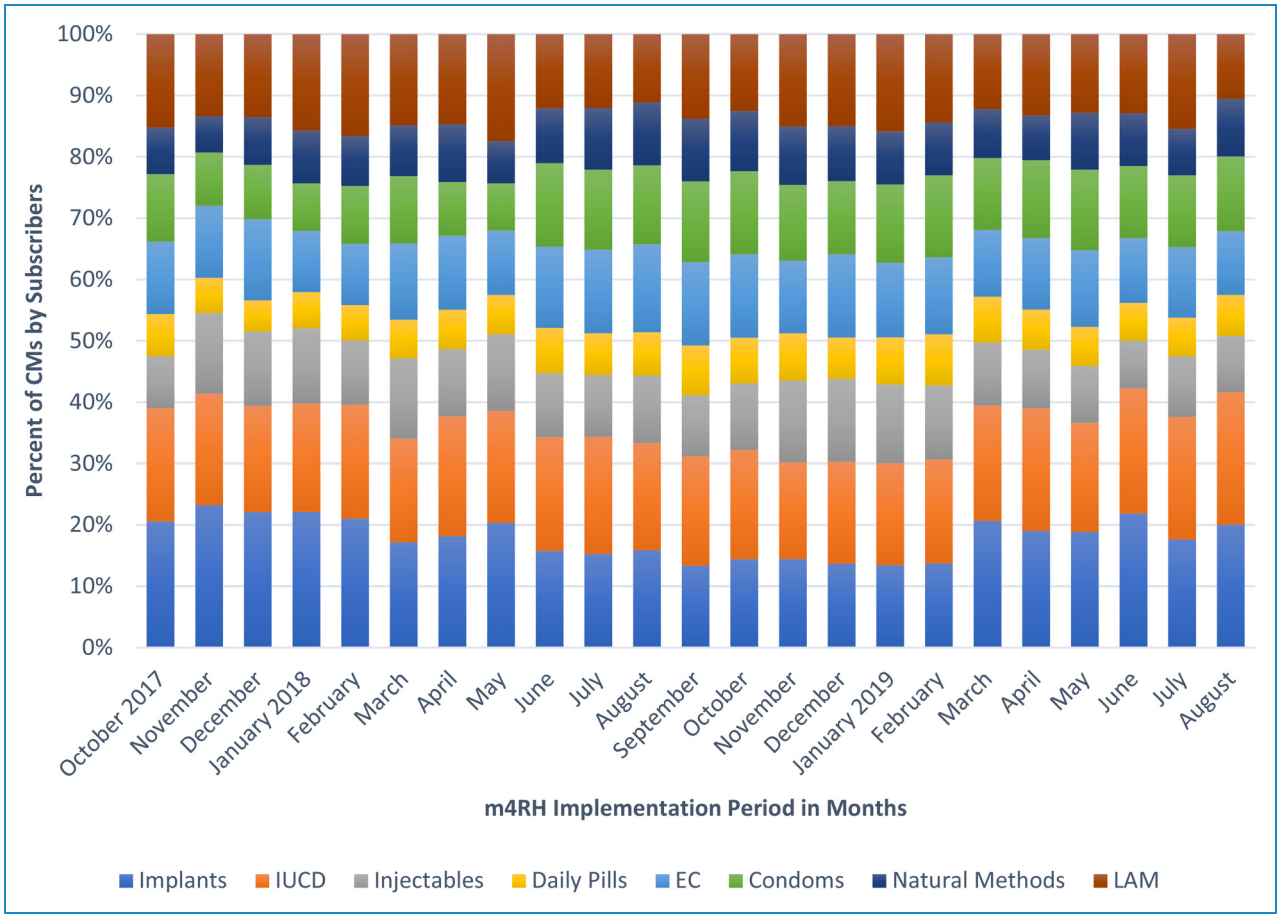

Figure 1. Total CMs for the basic FP menu listened to by subscribers by month, October 2017–August 2019.

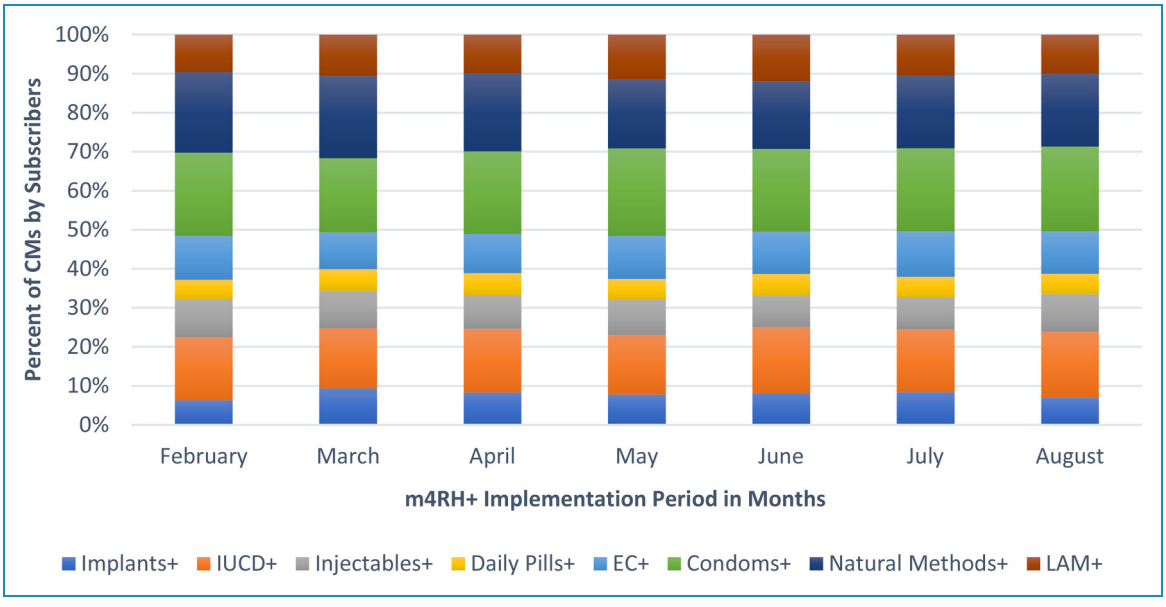

Figure 2. Total CMs for m4RH + listened to by subscribers by month, February–August 2019.

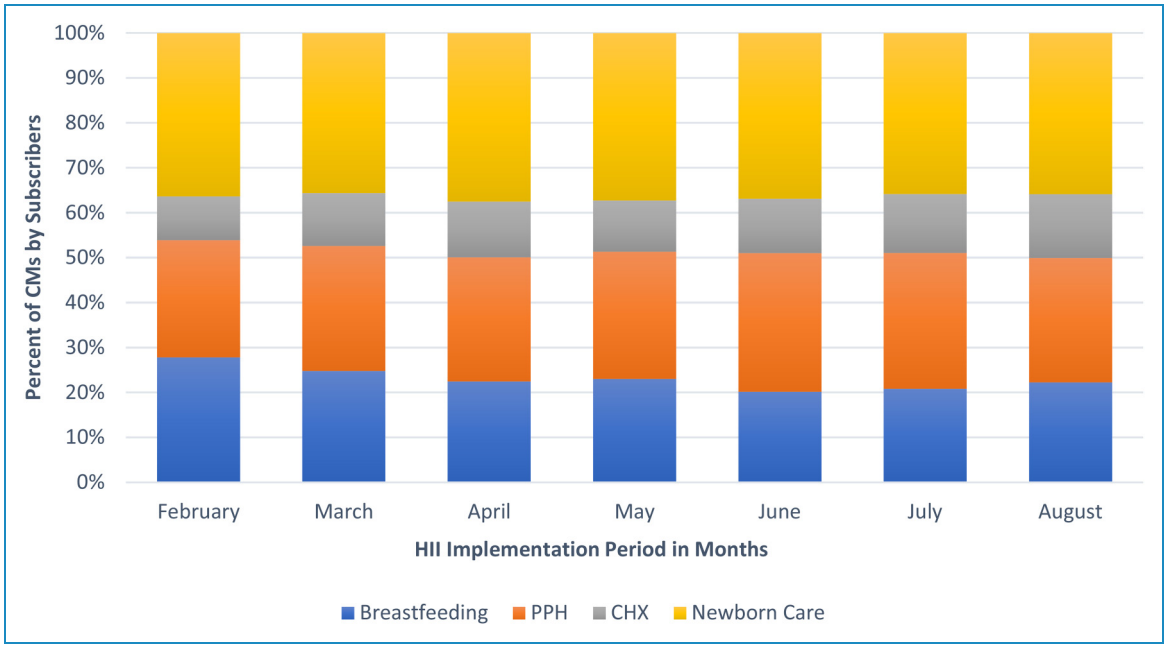

Figure 3. Total CMs for HII listened to by subscribers by month, February–August 2019.

Generally, the trend for repeat calling was higher in the initial months following platform launch and tapered over time (Figure 4). Natural methods received the greatest proportion of repeat calls, with an average of 6.3% of total CMs heard by repeat callers over 23 months. In November 2017, nearly 20% of CMs on natural methods were listened to by repeat callers, peaking again at 12.1% in February 2018. IUCD messages had the second-highest repeat call rates with 6.0% on average, peaking at 11.1% in February 2018. Lactational amenorrhea method (LAM) messages had the third-highest repeat call rate, with an average at 5.8%, though interest declined steadily over the remaining months. Daily pills received the least repeat calling, with 2.8% of CMs heard by repeat callers overall.

In the m4RH + menu, condoms + received the largest average proportion of repeat callers (8.8%) listening to CMs than any other topic, peaking at 11.9% in August 2019 (Figure 5). LAM + received the second-largest average proportion of repeat callers (4.6%), while injectables and implants received the lowest repeat call proportions on average.

Repeat calling was comparatively low for HII menu topics (Figure 6). Newborn care received the greatest proportion of CMs listened to by repeat callers at an average of 5.0% over seven months, while chlorhexidine (CHX) for umbilical cord care received the lowest at 1.7% of total CMs.

Promotional approaches

Various approaches were used to promote m4RH and HII content. Table 4 represents total CM volume each month across all three menus (Basic FP, FP+, HII) mapped against promotional approaches. The number of monthly CMs gradually increased over time, with call volume beginning below 1000 CMs per month during the first quarter. There was a dramatic increase to 22,920 CMs per month in June 2018, which then fell through October of that year. Call volume again gradually increased starting in November 2018, reaching the second highest peak of 9279 in March 2019, after which call volume gradually tapered off through the end of the analysis period. In examining the overall trends in call volume, we note that some peaks align with periods where specific promotional approaches were used.

We first examined whether the number of promotional approaches could be linked to a greater volume of CMs. The months with the lowest CM volume were October–December 2017, during and just after program launch. During that quarter, the only promotional approaches instituted were the televised 2-3-4 launch ceremony and one Facebook post promoting 2-3-4 generally. By contrast, in June 2018, the highest CM volume of any month occurred, representing 22.1% of all CMs heard across the 23-month period. During that month, seven different promotional approaches were used. However, it was also the only month when 2-3-4 was promoted by Roshan Telecommunications using an SMS blast. In examining data from months where four or more promotional approaches were used, we did not find a clear link between a total number of approaches and call volume. For example, in April 2018, five promotional approaches were used yet only 1.1% of total CMs were accessed during this period, whereas four promotional approaches were used in March and April 2019, the months

Table 3. Comparison of completed m4RH, m4RH +, and HII messages heard by unique callers on the 2-3-4 platform in Afghanistan, October 2017–August 2019.

		Basic m4RH			m4RH +			HII		
	Month	CMs	UC	Difference	CMs	UC	Difference	CMs	UC	Difference
2017	October	899	846	53	-	-	-	-	-	-
	November	715	653	62	-	-	-	-	-	-
	December	924	865	59	-	-	-	-	-	-
2018	January	1134	1048	86	-	-	-	-	-	-
	February	1313	1201	112	-	-	-	-	-	-
	March	1313	1219	94	-	-	-	-	-	-
	April	1157	1075	82	-	-	-	-	-	-
	May	1089	1009	80	-	-	-	-	-	-
	June	22,920	21,644	1276	-	-	-	-	-	-
	July	5515	5175	340	-	-	-	-	-	-
	August	2815	2666	149	-	-	-	-	-	-
	September	1876	1755	121	-	-	-	-	-	-
	October	2183	2066	117	-	-	-	-	-	-
	November	4631	4446	185	-	-	-	-	-	-
	December	4536	4346	190	-	-	-	-	-	-
2019	January	5830	5604	226	-	-	-	-	-	-
	February	6395	6145	250	605	577	28	770	752	18
	March	2751	2686	65	2768	2679	89	3760	3636	124
	April	2344	2290	54	2675	2590	85	3198	3092	106
	May	2035	1969	66	2257	2152	105	2521	2445	76
	June	1404	1362	42	1682	1605	77	1706	1648	58
	July	1287	1250	37	1605	1526	79	1667	1601	66
	August	1014	983	31	1273	1203	70	1292	1241	51
	Total	**76,080**	**72,303**	**3777**	**12,865**	**12,332**	**533**	**14,914**	**14,415**	**499**

CM: Number of completed messages listened to by month; UL: number of unique listeners by month; m4RH + and HII content were only available starting February 2019.

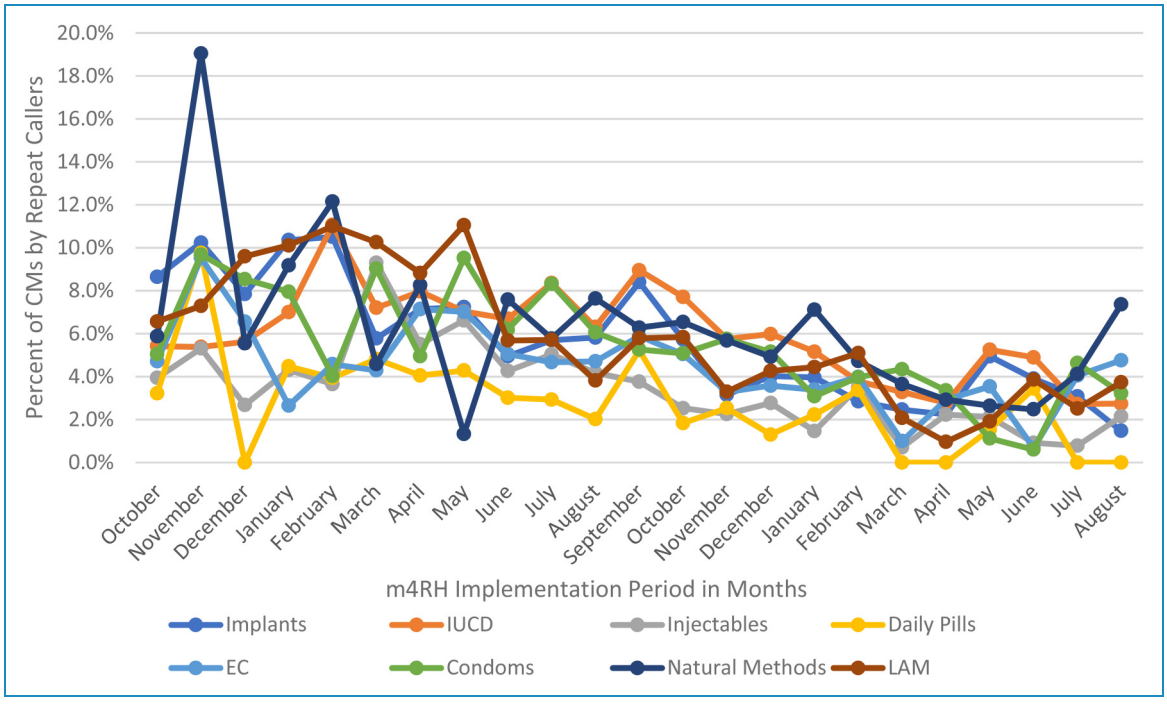

Figure 4. Percent of CMs listened to by repeat callers by month: basic FP menu, October 2017–August 2019.

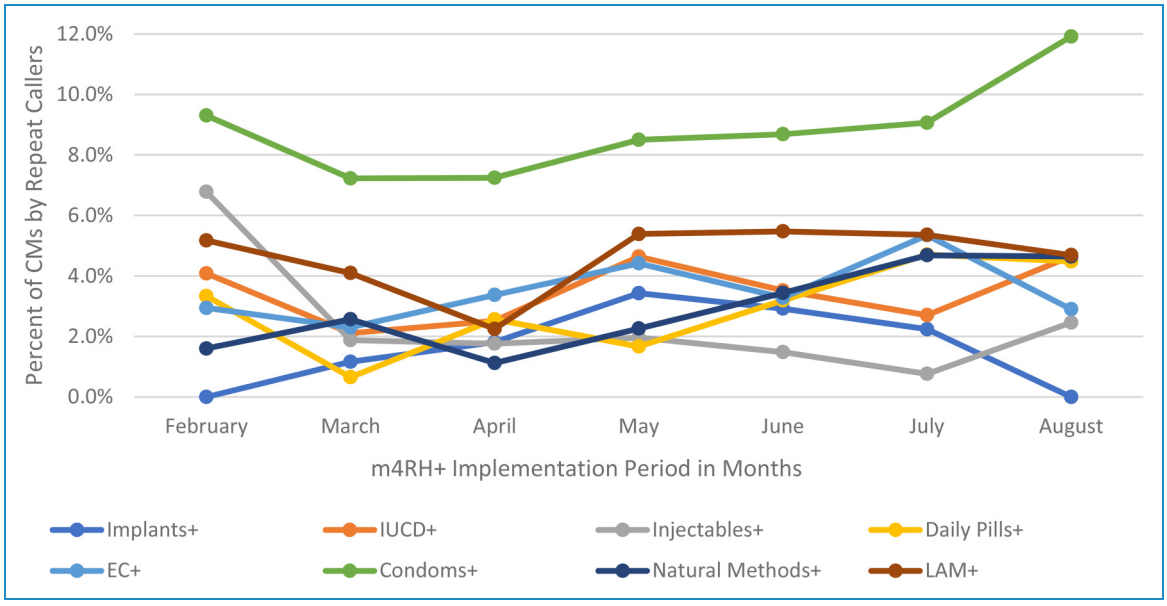

Figure 5. Percent of CMs listened to by repeat callers by month: FP + menu, February–August 2019.

reporting the second- and third-highest percentages of total CMs accessed. Moreover, January 2019 and June–August 2019 experienced a relatively high volume of CMs, yet only one promotional approach was used.

We then examined whether the type of promotional approach aligned with a greater volume of CMs and found that the SMS blast promotion in June 2018 was the approach linked to months with the highest CM volume, where the potential effect persisted into July 2018. Radio broadcasts also appeared linked to CM volume as they were used in four of the seven months with the highest percentage of CMs. The effect of social media promotions via Facebook and Instagram is unclear. During the period prior to the June 2018 peak CM volume, social media promotions

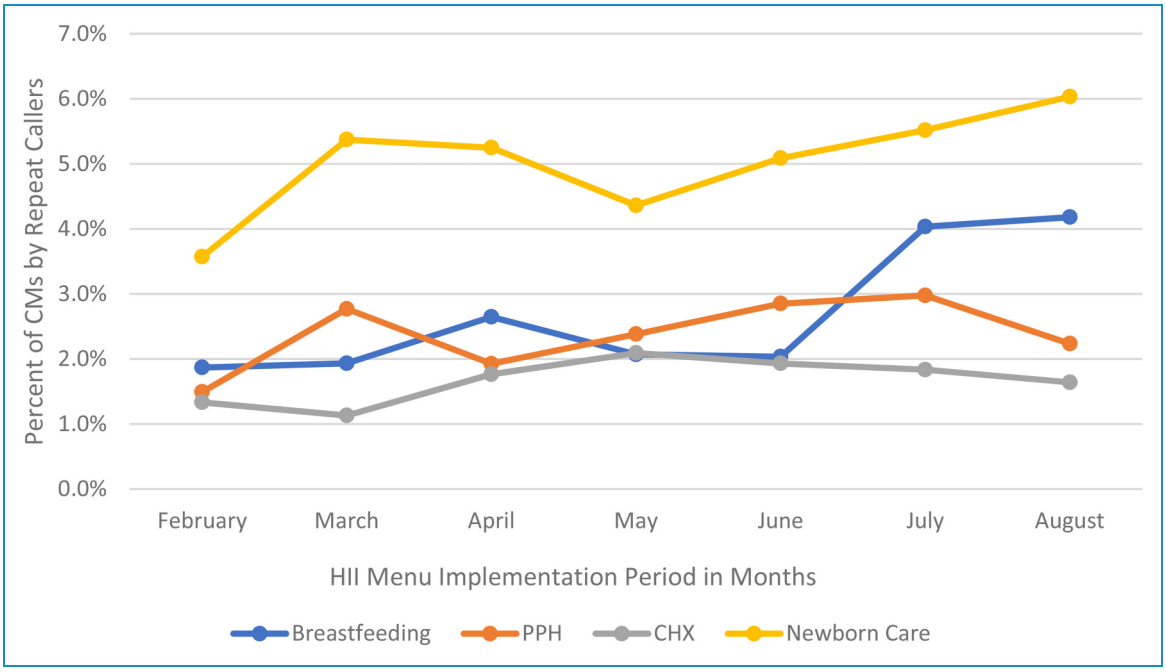

Figure 6. Percent of CMs listened to by repeat callers by month: HII menu, February–August 2019.

coincided with a slight increase in total CMs, though the percent of total CMs accessed remained relatively low during these months. Social media promotion also occurred during the high call volume period of February–May 2019, particularly in March 2019 where the high call volume that month may be attributed, in large part, to this promotion channel.

Some form of IPC was utilized in all but two months. There was no discernible pattern between print media distribution via clinical mentoring through the period of April–December 2018 and CM volume, with some months reporting lower CM volume (i.e. September 2018 at 1.8%) and others reporting higher volume (i.e. November 2018 at 4.5%).

Discussion

This assessment demonstrates that program data can be a useful tool for examining RMNCH information accessed through digital health interventions. We found that the basic m4RH FP menu was accessed more frequently, on average, than the m4RH + and HII menus. Across the basic m4RH, m4RH +, and HII menus, callers most frequently accessed content on IUCDs, male condoms, and newborn care, respectively. We also found that the number of promotional approaches used does not seem linked to increased CM volume; instead, the type of promotional approach may be more important. Mass media communications, including SMS blast promotions and radio broadcasts, may be the most effective strategies for reaching m4RH and HII clients, whereas IPC strategies did not measurably drive CM volume.

On average, basic m4RH messages were more commonly heard than m4RH + and HII content. This likely reflects the duration of exposure to the content (i.e. 23 vs. 7 months), as well as the intensity of exposure reinforced through promotional approaches. Moreover, the content of the promotions themselves could have impacted either the users who accessed the service or the types of information they selected. Broadly, there may have been greater interest in basic FP information due to social proscriptions surrounding the open discussion of the content and, in the radio and print promotions materials, the information was advertised as approved by the Ministry of Public Health. This latter point likely provided reassurance to potential callers that the information was accurate and could counter potential misconceptions heard from peers. The ability to listen to these messages anonymously and in privacy at a caller's convenience was mentioned in radio advertisements and likely added to the attractiveness of the program, particularly for youth. When callers engaged with the 2-3-4 platform, they were most interested in CMs on long-acting methods, including the IUCD and implants, and there was comparatively little interest in oral contraceptive messages on both m4RH menus. This skew may be because more than 80% of men and women were already aware of oral contraceptives, reported as the most commonly used contraceptive method in 2015.[4] Despite relatively high awareness of male condoms,[4] condoms were of great interest in the m4RH + menu,

Table 4. Number of completed messages listened to compared by promotional materials utilized.

					Interpersonal communication				Mass communication			Social media	
Year	**Month**	**Total CMs/ month**	**% total CMs accessed overall**	**Total promotions**	**CBA**	**Print media**	**Launch ceremony**	**Clinical mentoring**	**Televised launch**	**Radio**	**SMS blast**	**Facebook**	**Instagram**
2017	October	899	0.9%	2			X		X				
	November	715	0.7%	0									
	December	924	0.9%	1								X	
2018	January	1134	1.1%	1	X								
	February	1313	1.3%	3	X							X	X
	March	1313	1.3%	3	X							X	X
	April	1157	1.1%	5	X	X		X				X	X
	May	1089	1.0%	3	X	X		X					
	June	22,920	22.1%	7	X	X		X		X	X	X	X
	July	5515	5.3%	4	X	X		X		X			
	August	2815	2.7%	4	X	X		X				X	
	September	1876	1.8%	3	X	X		X					
	October	2183	2.1%	3	X	X		X					
	November	4631	4.5%	3	X	X		X					
	December	4536	4.4%	3	X	X		X					
2019	January	5830	5.6%	1	X								
	February	7770	7.5%	2	X							X	
	March	9279	8.9%	4	X			X				X	X

(continued)

Table 4. Continued.

					Interpersonal communication				Mass communication			Social media	
Year	**Month**	**Total CMs/ month**	**% total CMs accessed overall**	**Total promotions**	**CBA**	**Print media**	**Launch ceremony**	**Clinical mentoring**	**Televised launch**	**Radio**	**SMS blast**	**Facebook**	**Instagram**
	April	8217	7.9%	4	X			X		X			X
	May	6813	6.6%	4	X			X		X		X	
	June	4792	4.6%	1	X								
	July	4559	4.4%	1	X								
	August	3579	3.4%	1	X								
	Total	**103,859**	100.0%										

indicating a need for information on the correct use and efficacy for this ubiquitous method. The high call volume for IUCD information may indicate caller interest in learning about methods that are more effective or reflect facility-based programming to integrate postpartum IUCD counseling and provision among health care workers, where pregnant women and their families may have first learned of IUCDs. In the case of male condoms, there may have been greater caller interest stimulated by methods known to be more readily available. There was also early interest in or confusing messaging related to LAM, as indicated by repeat callers as well as number of CMs. For the HII content, users were most interested in general information on newborn care and least interested in chlorhexidine for umbilical cord care.

On a monthly basis, repeat calls accounted for, on average, 5% or less of health menu traffic. The trend for repeat calling was higher in the initial months and tapered over time. There are multiple possible reasons that a caller might access the same CM more than once. Repeat calls may indicate the relative importance/popularity of topic, which are highlighted during or as a direct result of phone sharing, or they could indicate difficulty in understanding the content. For example, repeat calls on long-acting methods could reflect an interest in side effects, while those for natural methods that require consistent correct use could reflect the importance of reminders. Qualitative work with program users could offer more insight into the motivations for repeat caller behavior.

The gradually increasing use of the 2-3-4 platform for basic m4RH, m4RH+, and HII messaging over the 23-month analysis period may reflect demand for RMNCH information among Afghans (particularly those under 18 years of age), the growing awareness of the platform as a result of promotional efforts, and the importance of ensuring that accessible information is available to meet that demand. The finding that users tended to be younger was similar to m4RH implementation in Kenya and Tanzania.[11,13] This finding is noteworthy within the Afghan context where marriage and childbearing at a young age are normative. The popularity of the 2-3-4 platform among young people suggests that it may also be an ideal channel for communicating other youth-targeted messages.

Although information was made available in both local languages, more users chose to access information in Dari. This may suggest greater uptake among urban centers where Dari is predominantly spoken, except for Kandahar and Nangarhar, or it may reflect lower circulation of and consequent exposure to promotional methods among target audiences in Pashto-speaking areas. More callers were classified as male; however, these findings may underestimate the number of messages reaching women. Since women in Afghanistan may use a family member or neighbor's phones, particularly in rural areas,[2,20] women may not have been in a position to register for Viamo's services and therefore did not provide demographic information. Despite the high level of mobile phone access among women, even in rural areas, it is important to recognize that cost and pervasive social and gender norms dictating women's communication and asset ownership remain the two largest barriers to mobile phone use for women.[2] Similar to language selection, the 2-3-4 platform could be adapted to request data on sex to ensure selections more accurately reflect caller demographics to guide program content and promotional approaches.

Findings regarding promotional approach use can be used by program implementers to drive call volume. Our finding that using more types of promotional approaches does not necessarily yield greater CM volume is important. Implementers can focus their financial and human resources on developing promotional approaches with greater reach. For example, although print media may be a relatively low-cost approach, months of distributing brochures and business cards introducing m4RH was not as effective as one month of a general 2-3-4 SMS blast promotion. In general, IPC approaches may have been useful for informing potential callers about the service, but it is unclear to what extent that translated into actual callers.

Peaks in unique call volume were linked to mass media communications (i.e. the SMS blast and radio broadcasts) rather than IPC (i.e. print media and clinical mentoring). Similarly, mass media communications have been successful in driving call volume to smoking cessation hotlines[21,22] and a telephone-based service supporting exercise and lifestyle changes[23] in other contexts. Although more research is needed to understand exactly why mass media approaches drive call volume, we postulate that they are more effective because they provide a direct visual or audio cue during callers' leisure time when phones are readily available, translating into more immediate contact with the 2-3-4 platform. Recent research has found text messaging, in particular, to be an effective way to quickly engage with women for collecting real-time data with high response rates.[24] In contrast with these more direct approaches, if given 2-3-4 information during a clinic visit or community dialogue, potential users would need to retain the information and access the platform at another time. This could create a lag of days or even weeks between when the information was provided and when the call was made, if made at all. Moreover, relying on busy clinicians or community health workers to disseminate information via IPC or print media may not yield adequate follow-through, as this mode of communication is dependent on both provider and client comfort and confidence in discussing potentially sensitive topics. In Kenya, users reported a major benefit of m4RH was that it allowed them to avoid uncomfortable discussions with providers, who some perceived to be judgmental.[13]

The relative anonymity provided by radio advertisements and SMS blasts can empower potential callers to

use the service. This may be important in certain contexts or communities within Afghanistan where religious or social proscriptions exist for FP use.[25] Radio advertisements remain an appealing option for direct contact with potential users in rural areas and of lower literacy or socioeconomic status. Given the high CM volumes following SMS blast in this assessment, this approach must also be considered, and potentially expanded to a voice blast message to reach low-literacy populations. Radio, SMS, and social media–based promotional approaches may also be important for efforts to increase male engagement in FP as men are less likely to be health service consumers and tend not to be a target audience for RMNCH programming in Afghanistan[25–27] and other contexts.

Social media, which is appealing for quickly disseminating essential information at no cost, may also empower potential callers. Recent research on access to FP information among youths in Africa, Asia, Latin America and the Caribbean, Europe, and North America found that the internet, social media, and social media personalities were among key influencers of FP use.[28] In Afghanistan, mass media exposure has most recently been measured in terms of newspapers, television, and radio,[4] but current data on exposure to information via social media and the internet more broadly is lacking. In 2013, only 14% of women who owned mobile phones utilized them for internet access,[2] though numbers have likely grown in the past decade. Internet access via smartphones is more common in urban settings and for women of higher socioeconomic status.[2] In this assessment, we did not find a strong indication that social media was linked to CM volume. However, Roshan's social media content was not directly promoting the m4RH service but rather the overall 2-3-4 platform, and the performance of social media promotions can vary widely depending on how they are targeted and implemented. Although social media did not seem to have a notable influence as a promotional approach in this assessment, a different type of social media strategy may be more effective.

We acknowledge that promotional approaches not measured in this analysis, including word-of-mouth referrals, may have influenced m4RH and HII content access. The relatively high number of unique listeners toward the end of 2018 and into 2019, when fewer approaches were used, may be skewed by such promotions via social networks. This increase may also reflect a greater interest in and engagement with new content menus by experienced 2-3-4 users. Our data emphasize the importance of the strategic use of varying promotional approaches to target different audience segments.

Limitations

No direct data linking unique callers or overall number of people exposed to specific promotional approaches were available for this analysis. As such, we described the timing of known promotional methods and the total CM volume in the month that a specific promotional method was implemented. It is possible that various promotional activities may have had a residual effect that was not captured by our analysis (e.g. a Facebook advertisement posted in March could have motivated calls in early April). We acknowledge these limitations with this descriptive analysis. Moreover, there is a legal barrier to accessing caller location, which limits our ability to analyze data by geographic location as well as to understand drivers of language selection and/or how to better adjust promotional approaches in different settings. Due to these limitations, age, sex, and location data could not be tied to a specific CM accessed; as such, we were unable to conduct a more segmented analysis.

Conclusions

m4RH has a broad reach in Afghanistan, especially with a younger audience. Our analysis suggests that promotional approaches accessible via mobile phones or internet, and that utilize radio, may be more appealing than in-person approaches. Such approaches eliminate confidentiality concerns and may also reach potential callers when their phones are already accessible or at times convenient to the target audience. Radio advertisements remain an important promotional approach for potential users in rural and lower literacy contexts. As mobile and smartphone ownership and use continue to grow in Afghanistan, so does the possibility of reaching users with essential RMNCH information.

In the digital health field, understanding of the unique benefits and challenges to monitoring digital interventions for behavior change communication is growing.[29,30] The type and volume of data available to digital health program implementers is a distinct characteristic of this field. However, information about how to best utilize these data for monitoring and evaluation purposes has not been widely disseminated. This research demonstrates how evaluating programmatic data can guide tailoring content to meet target audience needs and refine promotional activities to ensure the program reaches the greatest number of potential users. The collection of more detailed audience segmentation data would further improve the utility of this analysis approach.

Acknowledgments: The authors thank colleagues at Viamo, within the HEMAYAT project, and at Roshan Telecommunications for their effort in providing call database numbers and promotional approach dates. We also thank Matthew Avery, Imteaz Mannan, and Trinity Zan for collegial review. Last, this assessment was supported as part of the HEMAYAT project by the United States Agency for International Development Afghanistan FP/MNCH Project (AID-306-A-15-00002). The contents of this manuscript

are the responsibility of the authors and do not necessarily reflect the views of the funder.

Authors' Note: This publication has been made possible by the generous support of the American people through the United States Agency for International Development (USAID). The contents are the responsibility of the HEMAYAT Project/the Jhpiego Corporation and do not necessarily reflect the views of USAID or the United States Government.

Conflict of interest: The authors have no conflicts of interest to declare.

Ethical approval: Not applicable, because this article does not contain any studies with human or animal subjects.

Funding: The authors disclosed receipt of the following financial support for the research, authorship, and/or publication of this article: This work was supported by the United States Agency for International Development.

ORCID iD: Kate F. Plourde https://orcid.org/0000-0002-2209-7662

References

1. Asia Foundation. *A survey of the Afghan people: Afghanistan in 2018*. San Francisco, CA: The Asia Foundation, 2018.
2. USAID. Connecting to opportunity: A survey of Afghan women's access to mobile technology. Office of Afghanistan and Pakistan Affairs, 2013.
3. Yamin F, Kaewkungwal J, Singhasivanon P, et al. Women's perceptions of using Mobile phones for maternal and child health support in Afghanistan: Cross-sectional survey. *JMIR Mhealth Uhealth* 2018; 6: 76.
4. Ministry of Public Health, Central Statistics Office and ICF International. Afghanistan Demographic and Health Survey 2015. 2017.
5. Rasooly MH, Ali MM, Brown NJ, et al. Uptake and predictors of contraceptive use in Afghan women. *BMC Womens Health* 2015; 15: 9.
6. FP2020. Family Planning 2020 Countries 2019.
7. High-Impact Practices in Family Planning (HIPs). *Digital health for social and behavior change: New technologies, new ways to reach people*. Washington, DC: USAID, 2018.
8. Ashcroft N, Shelus V, Garg H, et al. Implementation of CycleTel Family Advice: An SMS-based service to provide family planning and fertility awareness information in India. *Mhealth* 2017; 3: 20.
9. Babalola S, Akiode A, Oyenubi O, et al. *Evaluation of the effects of smart client digital health tool in Kaduna, Nigeria*. Baltimore, MD: Health Communication Capacity Collaborative (HC3), 2017.
10. Johnson D, Juras R, Riley P, et al. A randomized controlled trial of the impact of a family planning mHealth service on knowledge and use of contraception. *Contraception* 2017; 95: 90–97.
11. L'Engle KL, Vahdat HL, Ndakidemi E, et al. Evaluating feasibility, reach and potential impact of a text message family planning information service in Tanzania. *Contraception* 2013; 87: 251–256.
12. Smith C, Vannak U, Sokhey L, et al. Mobile Technology for Improved Family Planning (MOTIF): The development of a mobile phone-based (mHealth) intervention to support post-abortion family planning (PAFP) in Cambodia. *Reprod Health* 2016; 13: 1.
13. Vahdat HL, L'Engle KL, Plourde KF, et al. There are some questions you may not ask in a clinic: Providing contraception information to young people in Kenya using SMS. *Int J Gynaecol Obstet* 2013; 123: e2–e6.
14. Feroz A, Perveen S and Aftab W. Role of mHealth applications for improving antenatal and postnatal care in low and middle income countries: A systematic review. *BMC Health Serv Res* 2017; 17: 704.
15. Sondaal SF, Browne JL, Amoakoh-Coleman M, et al. Assessing the effect of mHealth interventions in improving maternal and neonatal care in low- and middle-income countries: a systematic review. *PLoS One* 2016; 11: e0154664.
16. Ippoliti NB and L'Engle K. Meet us on the phone: Mobile phone programs for adolescent sexual and reproductive health in low-to-middle income countries. *Reprod Health* 2017; 14: 11.
17. Yankah E, Mohamed O, Wringe A, et al. Feasibility and acceptability of mobile phone platforms to deliver interventions to address gender-based violence among Syrian adolescent girls and young women in Izmir, Turkey. *Vulnerable Child Youth Stud* 2019; 15(2): 133–143.
18. Gibson DG, Tamrat T and Mehl G. The state of digital interventions for demand generation in low- and middle-income countries: Considerations, emerging approaches, and research gaps. *Glob Health Sci Pract* 2018; 6(Suppl 1): S49–S60.
19. Viamo. 2-3-4 Platform.
20. Echavez CR, Mosawi S and Pilongo LW. *The other side of gender inequality: Men and masculinities in Afghanistan*. Kabul: Afghanistan Research and Evaluation Unit, 2016.
21. Haghpanahan H, Mackay DF, Pell JP, et al. The impact of TV mass media campaigns on calls to a National Quitline and the use of prescribed nicotine replacement therapy: A structural vector autoregression analysis. *Addiction* 2017; 112: 1229–1237.
22. Park J-J, Minh LN, Oh J-K, et al. Influence of recent tobacco control policies and campaigns on Quitline call volume in Korea. *Tob Induc Dis* 2019; 17(March): 21.
23. O'Hara BJ, Bauman AE and Phongsavan P. Using mass-media communications to increase population usage of Australia's Get Healthy Information and Coaching Service®. *BMC Public Health* 2012; 12: 762.
24. Friedlander EB, Soon R, Salcedo J, et al. Text message link to online survey: A new highly effective method of longitudinal data collection. *Contraception* 2020; 101: 244–248.
25. Shafiqullah H, Morita A, Nakamura K, et al. The family planning conundrum in Afghanistan. *Health Promot Int* 2018; 33: 311–317.
26. Packer C, Rastagar SH, Chen M, et al. Factors associated with reported modern contraceptive use among married men in Afghanistan. *BMC Reproductive Health*. 2020; 17(1): 64.

27. Haider S, Todd C, Ahmadzai M, et al. Childbearing and contraceptive decision making amongst Afghan men and women: A qualitative analysis. *Health Care Women Int* 2009; 30: 935–953.
28. Cartwright AF, Otai J, Maytan-Joneydi A, et al. Access to family planning for youth: Perspectives of young family planning leaders from 40 countries. *Gates open research* 2019; 3: 1513.
29. Michie S, Yardley L, West R, et al. Developing and evaluating digital interventions to promote behavior change in health and health care: Recommendations resulting from an international workshop. *J Med Internet Res* 2017; 19: e232.
30. Yardley L, Choudhury T, Patrick K, et al. Current issues and future directions for research into digital behavior change interventions. *Am J Prev Med* 2016; 51: 814–815.