Volume 33, Number 3
July–September 2021
ISSN: 1931-7611
INTERNATIONAL JOURNAL OF SEXUAL HEALTH
Official journal of the World Association for Sexual Health
WAS

Taylor & Francis
Taylor & Francis Group

International Journal of Sexual Health

ISSN: (Print) (Online) Journal homepage: https://www.tandfonline.com/loi/wijs20

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To cite this article: Paul Macharia, Antoni Pérez-Navarro, Irene Inwani, Ruth Nduati & Carme Carrion (2021) An Exploratory Study of Current Sources of Adolescent Sexual and Reproductive Health Information in Kenya and Their Limitations: Are Mobile Phone Technologies the Answer?, International Journal of Sexual Health, 33:3, 357-370, DOI: 10.1080/19317611.2021.1918311

To link to this article: https://doi.org/10.1080/19317611.2021.1918311

INTERNATIONAL JOURNAL OF SEXUAL HEALTH
2021, VOL. 33, NO. 3, 357–370
https://doi.org/10.1080/19317611.2021.1918311

An Exploratory Study of Current Sources of Adolescent Sexual and Reproductive Health Information in Kenya and Their Limitations: Are Mobile Phone Technologies the Answer?

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ABSTRACT

Purpose: The prevalence of pregnancy and sexually transmitted infections among adolescents in low and middle-income countries leads us to believe that sexual and reproductive health (SRH) information needs are still unmet. This paper investigates current sources and their limitations and then explores the role technology could play. *Methods:* In an exploratory qualitative study themes identified; (1) preferred sources of SRH information; (2) their limitations; (3) the role of technology in meeting their needs. *Results:* Mobile phone-based apps could improve awareness and provide information in a confidential way. *Conclusions:* Adolescents have an unmet need that vary by age and gender. Mobile phones could offer accessible, user-friendly platform.

ARTICLE HISTORY
Received 6 November 2020
Revised 7 April 2021
Accepted 10 April 2021

KEYWORDS
Adolescents; reproductive health; mobile phones

Introduction

In low and middle-income countries, almost 10% of girls become mothers by the age of 16, with the highest rates in Sub-Saharan Africa (Ahinkorah et al., 2019). A substantial proportion of sexually-active adolescents are not aware of any source of contraception, health facilities providing sexually transmitted infection (STI) treatment or how to access psychosocial support services (Ayehu et al., 2016; Newton-Levinson et al., 2016).

As lifelong wellbeing is highly dependent on positive sexual and reproductive health (SRH) outcomes, adolescence is a critical time to lay the foundations for positive and informed choices (de Castro et al., 2018; Denno et al., 2015). Many adolescents become sexually active without sufficient health information, particularly in relation to contraception (Darroch et al., 2017). The provision of evidence-based interventions that are effective and carefully adapted to local cultures and contexts is required to improve access to SRH information (Bilal et al., 2015).

Taboos surrounding discussions about adolescent SRH in most resource-limited settings create constraints and barriers to meeting adolescents' needs (Agbemenu et al., 2018). In these settings, attempts to prepare adolescents for healthy sex lives face unique challenges, and to some extent, are still contentious (Bankole & Malarcher, 2010). Digital media, including the internet, text messaging, and social media, have dramatically altered the landscape of communication, especially among adolescents. These technology-based modes of communication offer potential platforms to engage adolescents and improve their access to SRH information (Waldman & Stevens, 2015).

With growing adolescent demand for easily accessible, credible, trustworthy, and confidential SRH information, mobile phone technologies are

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Supplemental data for this article is available online at https://doi.org/10.1080/19317611.2021.1918311.

a viable option. Low-cost technologies, including short message services (SMS) and Telegram and WhatsApp (social networking applications), have been used to improve SRH knowledge and awareness in resource-limited settings. WhatsApp has been used to organize information seminars in SRH, answer questions from group members and dispel myths about sexuality and pregnancy prevention (Fletcher et al., 2018; Ipas, n.d.; Olsen et al., 2018; Shiferaw et al., 2018; Uddin et al., 2017).

The above examples, among others, demonstrate the potential of mobile phone technologies for conveniently providing health services. Mobile phone apps could offer on-demand information about SRH to adolescents in a discreet, confidential, anonymous, novel, convenient and accessible manner (Merrill et al., 2013; Peter et al., 2015). Nevertheless, smartphone-based technologies such as WhatsApp are only an option if the target population has access to smartphones with the capabilities to run this type of app. Thus, it is important to know and understand the technology available to a target population before developing interventions.

Mobile phone-based interventions in adolescent SRH in resource-limited settings are becoming more common as the user-friendliness of this technology has increased, and evidence shows that mobile phones are effective in delivering knowledge and realizing behavior change (Ippoliti & L'Engle, 2017). Mobile phones make it possible to develop demand-driven, culturally-relevant and user-friendly adolescent SRH content (Nuwamanya et al., 2018). Adolescents are more comfortable using interactive apps on mobile phones than text- or voice-based services to access SRH information, as noted by Alhassan et al. (2019).

Background and literature review

A number of barriers to the provision of SRH information to adolescents exist. Lack of priority, societal, cultural and religious factors negatively impact the provision of SRH services that meet the adolescents needs (Morris & Rushwan, 2015). Research shows that there is a need to provide accurate, culturally appropriate and relevant SRH information to adolescents consistent with their values systems. Relevant policy is also required to ensure that SRH information is available and easily accessible to adolescents (Mosavi et al., 2014).

For girls, who seem to bear the heaviest burden, effective information, education, and communication (IEC) materials on SRH are needed. The role of the community as an enabler to making it easier for adolescents to access information on prevention of early pregnancies and the lasting impact of poor SRH outcomes cannot be over emphasized (Nash et al., 2019). Healthcare providers have an important role to play in the dissemination of SRH information to adolescents. Their nature of work offers the needed knowledge, skillset, and opportunities to deliver evidence-based SRH information to adolescents (Santa Maria et al., 2017).

In Kenya, adolescents comprise 24% of the country's population, this large population has great implications on health services provision in-country. Accessing adolescent SRH information faces a number of challenges. The National Adolescent Reproductive Health (ARH) policy (2015) estimates that approximately 18 percent of adolescents (15–19 years) have children. Most of the unplanned pregnancies are due to inaccessibility of adolescent reproductive healthcare information and services. Political, cultural and religious barriers negatively impact provision of adolescent SRH information and services. To address this, the ARH policy targets to "enhance equitable access to high quality, efficient and effective adolescent friendly SRH information and services." The national ARH policy also aims to enhance SRH status of adolescents, to increase access, the policy explores how to facilitate digital platforms increase access to SRH information (Ministry of Health, n.d.).

This underscores the need for adolescent-friendly, accessible and nonjudgmental provision of adolescent SRH services. Negative healthcare provider attitude, social cultural factors and lack of privacy and confidentially continue to negatively impact adolescent SRH seeking behavior (Mutea et al., 2020). Public health facilities in Kenya provide HIV testing, STI screening and treatment and health education to adolescents.

Family planning services are only offered to adolescents above 18 years (Robert et al., 2020).

Access to mobile phones and internet has expanded greatly in Kenya, there is also an increase access to internet broadband and low-priced smartphones (Ipas, n.d.); however, it's not possible to know how many adolescents have access to or own mobile phones. This is because purchasing a phone is closed linked to the purchase of a subscriber identification module (SIM) card sold only to adults 18 years and above with a national identification card. The use of mobile phone-based voice and SMS services is a common phenomenon by people who own mobile phones. It is estimated that 97% of internet users in Kenya access it on mobile devices. The use of mobile money is also common among mobile phone users (GeoPoll, n.d.).

The exploratory study is guided by the health brief model a widely used behavior change framework. The health brief model is incorporated into healthcare interventions to enable healthcare service consumers increase their knowledge leading to behavior change (Green et al., 2020). Behavior change is achieved if the proposed intervention is targeted and has potential benefits to the users (Jones et al., 2015). This study is intended to identify adolescents' current SRH information sources, existing information gaps and the role of technology in accessing this information. The main objective is to determine the mechanism for accessing SRH information that adolescents in Kenya prefer, addresses current barriers and is feasible. A secondary goal is to identify the main information that adolescents require.

Methodology

This study is exploratory research (Liu, 2008; Reiter, 2013) to identify current sources of SRH information for adolescents in Kenya, with particular focus on the role played by technology, including the internet, social media, television, and radio. This study will also identify more efficient mechanisms for sharing SRH information with adolescents.

A qualitative approach is taken, based on focus groups of adolescents between 15 and 19 years old. Specific elements of the methodology are discussed in the following sections.

Study site

The study was carried out in Kibra, a suburb in the city of Nairobi, Kenya. Kibra consists of formal housing estates and a large informal settlement organized into 12 villages. The informal settlements are often referred to as the largest slum in Africa (Kibera UK, n.d.), with approximately 2.5 million residents. Intervillage ethnic differences relating to the history of the area exist, and people migrating from rural areas prefer to settle close to their fellow tribespeople.

Kibra was a preferred study site due to a number of reasons; the population in Kibra is made up of most of the Kenyan ethnic groups. There are also cultural and religious differences in this suburb that would enable the research team better understand the barriers and challenges of accessing adolescent SRH information. A number of families in Kibra rely on low-paying jobs, which have a bearing to accessibility and availability of smartphones in the community. Thus, the situation in Kibra represents most peri-urban and rural settings in Kenya. In selecting Kibra as a study site, the study team would be able to identify feasible mobile phone technologies that can be leveraged on to provide SRH information to adolescents in most parts of Kenya.

Inclusion and exclusion criteria

The inclusion criteria were adolescents aged between 15 and 19 years and living in Kibra. Each adolescent was required to have the capability to fulfill the age-based assent and consent process.

Sample collection

Adolescents were contacted by two community mobilizers experienced in working with adolescents in Kibra. A targeted nonprobabilistic sampling methodology was used. Events or venues in the 12 villages of Kibra that attracted adolescents were identified, at which the community

mobilizers made contact with potential participants and briefly explained study procedures individually or in small groups of three to five adolescents.

A focus group discussion recruitment script (Supplementary Appendix 1A) was used to explain the study procedures to individuals aged between 15 and 17 years old. Those agreeing to participate were then requested to bring a parent or guardian to the study site on a given day for the study procedures to be explained in detail. If they still wished to participate, the consenting and assenting process was administered.

For adolescents 18 years and over, a focus group discussion recruitment script (Supplementary Appendix 1B) was used to explain their potential participation in the study. They were then referred to the study site location where study procedures were explained in detail and the consenting process administered.

Focus groups discussion

The focus group discussions were based on World Health Organization approved questions on adolescent SRH ("WHO | Asking young people about sexual and reproductive behaviours," 2014). Although Swahili and other local languages are commonly used in Kibra, all participants preferred to use English in the discussions. In total, 12 focus group discussions were held divided by gender and age group: three for females between 15 and 17 years old; three for males between 15 and 17 years old; three for 18- and 19-year-old females; and three for 18- and 19-year-old males. A focus group discussion guide (Supplementary Appendix 2A) was used by the moderator to guide discussions. An audio recording was made of each discussion.

Data management and analysis

Audio recordings of the discussions were transcribed. A total of three transcripts were generated from each age and gender group, then merged to form a single transcript. These final documents were uploaded to AtlasTi® version 7 for analysis. Themes and keywords were coded into the analysis process. A final report code with quotes in word processing and a spreadsheet document with quantitative outputs were generated from the AtlasTi® analysis. The qualitative and quantitative output was used to identify current adolescent SRH information sources and their limitations. Particular emphasis was given to the role played by technology in meeting information needs, especially the use of mobile phones. After merging the transcripts by age and gender, phrases relating to the identified themes were reviewed. The initial analysis report identified 479 quotations, and the phrases that best captured thoughts in each sub-theme were selected and analyzed. A number of these are included in this paper.

Ethical consideration

The study protocol was reviewed and approved in March 2019 by the Kenyatta National hospital/University of Nairobi Ethics committee. The approved study protocol number is P707/10/2018.

Limitations

Participants in this study were those who attended venues or events frequented by adolescents in Kibra, thus adolescents that do not patronize these places were excluded. The data also shows that one in every four participants came from the village of Kianda because of its proximity to the study site. Kibra is a low-income slum neighborhood with minimal access to and ownership of mobile phones. This points to the fact that the results may not generalizable or representative of adolescents throughout Kenya. Further research in other settings is needed to confirm these outcomes.

Results

A total of 133 participants were recruited into the study. They had a median age of 17 years, 54.0% (72) of the participants were female and 91.0% (121) of the participants were students, and 79.7% (106) were in secondary school (see Table 1). The recruitment process is shown in Figure 1. Each focus group discussion had between 9 and 12 participants. The focus group

discussions were carried out on the 8th, 10th, and 12th April 2019 and each moderator-guided session lasted 30–40 minutes.

Table 1. Participants demographic profile.

Variable	All % (*n*)	Male % (*n*)	Female % (*n*)
Participants	100 (133)	46 (61)	54 (72)
Median age (IQR)	17 (15–18)	17 (16–18)	17.5 (15–18)
Education			
None	0.7 (1)	1.6 (1)	0 (0)
Primary	12 (16)	1.6 (1)	20.8 (15)
Secondary	79.7 (106)	83.6 (51)	76.4 (55)
College	6 (8)	13.1 (8)	0 (0)
University	1.5 (2)	0 (0)	2.8 (2)
Village			
Kambi muru	5.2 (7)	1.6 (1)	8.3 (6)
Karanja	5.2 (7)	1.6 (1)	8.3 (6)
Katwekera	20.3 (27)	27.9 (17)	13.9 (10)
Kianda	25.6 (34)	32.8 (20)	19.4 (14)
Kisumu Ndogo	9.8 (13)	8.2 (5)	11.1 (8)
laini saba	0.8 (1)	0 (0)	1.4 (1)
Lindi	0.8 (1)	0 (0)	1.4 (1)
Makina	5.2 (7)	4.9 (3)	5.6 (4)
Olympic	12.8 (17)	9.8 (6)	15.3 (11)
Raila	5.2 (7)	6.6 (4)	4.2 (3)
Sarangombe	1.5 (2)	0 (0)	2.8 (2)
Soweto	7.5 (10)	6.6 (4)	8.3 (6)
Occupation			
None	3.0 (4)	1.6 (1)	4.2 (3)
Student	91.7 (122)	88.5 (54)	94.4 (68)
Self-employed	4.5 (6)	8.2 (5)	1.4 (1)
Employed	0.8 (1)	1.6 (1)	0 (0)

The main outputs and some of the most relevant comments made by participants are reviewed in the following paragraphs.

THEME I: Preferred sources of adolescent sexual and reproductive health information

Subtheme I: Healthcare settings

There are a number of adolescent-friendly facilities in the community and adolescents do access these services. Healthcare settings as a source of information were more often referred to by older adolescents. Below are a few comments on this source of information:

> There are some organizations … some girls working in those organizations, for example at Carolina for Kibra [adolescent-friendly health service provider] you can just go and get information. (Female, 18 years)

> Such information can be gotten from healthcare facilities, when you go to Voluntary Counselling and Testing (VCT) for a test [HIV test], you will be counselled depending on your sexual reproductive health needs. (Male, 18 years)

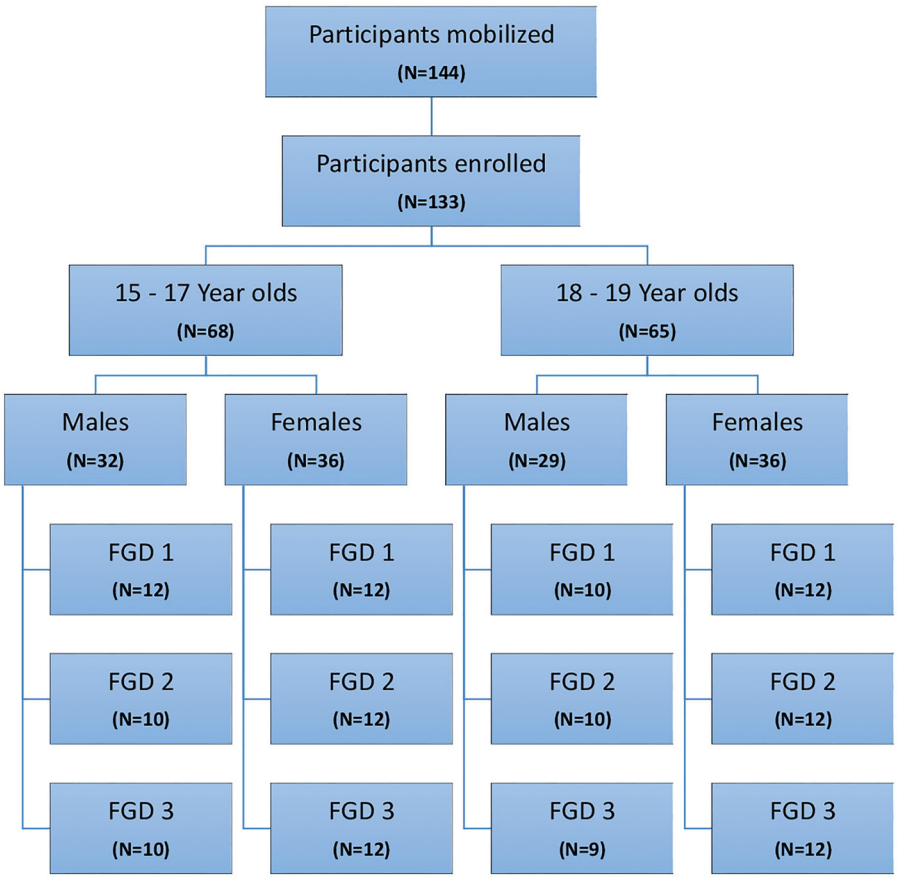

Figure 1. Study flow chart.

The adolescent participants indicated that they were able to access SRH information and services in adolescent-friendly health facilities in their community. It can also be seen that the adolescent-friendly facilities were known to the adolescents' due the awareness activities in the community by the healthcare providers.

Subtheme II: Parents

The participants, particularly younger adolescents, rely on their parents to provide SRH information. However, a few felt their parents avoided certain topics or did not provide enough detail. Below are quotes from the adolescents on this source of information:

> As adolescents, there are some things that our parents don't tell us and if they did, it was not directly but in a coded way. (Male, 15 years)

> Parents are a reliable source of sexual reproductive health information, because they care about us in a lot of things. (Female, 16, years)

> When parents want to talk to you on sexual reproductive health and realized you are not comfortable; they may not tell you what they want to tell you. So such information I don't think is accessible from parents. (Male, 19 years)

> I will go to my mum, she is very understanding; she explains to me slowly and in a way that I understand. (Female, 18 years)

> Because, our parents are shy so h/she doesn't provide all the information. (Female, 15 years)

A number of adolescents rely on their parents to provide SRH information because they trust them and believe they have their best interest at heart. However, the adolescent participants felt that their parents shy away from sensitive SRH topics which make the adolescents look for the information elsewhere.

Subtheme III: Non-governmental organizations

Community-based non-governmental organizations provide SRH information for adolescents in Kibra. The organizations are not necessarily healthcare facilities, but "safe" spaces where adolescents can meet and interact with counselors providing health information. At times, those peer mentor counselors also visit adolescents in the community. Some of the comments on this source of information are listed below:

> There are community-based organizations, you can visit their facilities if you have any questions on adolescent reproductive health you will be able to get answers. (Female, 18 years)

> I would say the most important source are the non-governmental organization (NGO) seminars, they get adolescents from the village and start to talk to them on many topics on sexual reproductive health issues. It is not like our parents who choose what they want to tell us, in the NGO seminars, they say things as they are…. (Male, 16 years)

Kibra being an informal setting, the number of NGOs is high. The NGOs provide many services including healthcare. The NGO's are an important source of SRH information in Kibra, their staff conduct community outreaches offering adolescents information in a way the adolescents find friendly and well detailed. The SRH information provided is relevant to both, male and female adolescents.

Subtheme IV: Internet

A number of the participants rely on the internet for SRH information, most often to compliment other sources of information. A number of illuminating comments by the adolescents are listed below:

> I rely on a health counselor to get sexual reproductive health information, when I feel that the information given is not enough; I do research on Google. (Male, 19 years)

> As for me, I will get the information from social media where I have to search because I am sure I will get everything I need. (Female, 19 years)

> With internet as a source of sexual reproductive health information, let us say you are suspecting you have a sexually transmitted infection, you search on the internet; you search for the matching symptoms to know if you have it or you don't. (Male, 19 years)

Adolescent participants indicated that they rely on the internet as a source of SRH information, due to the huge amount of SRH information available in internet. Search engines make it easier to search for SRH information, the search results also include images on symptoms of sexually transmitted infections that adolescents can easily understand.

THEME II: Limitations of current sexual reproductive health information sources

Subtheme I: Adequacy of current information sources

The adolescents feel their current sources of SRH information do not adequately meet their needs. Issues include not being able to access information on-demand, a lack of facts to assess the accuracy of information and a general lack of provision for boys. Below are some of the adolescents' comments on the inadequacy of reproductive health information:

> We should now start dealing with boys and fewer issues of girls, girls are getting more services and information on sexual reproductive health. Chances of the girls being raped will be reduced because the boys will be empowered and knowledgeable. (Male, 16 years)

> [when we visit healthcare facilities] the time spent is never enough to explain sexual reproductive health matters and even when they explain, one does not understand. (Male, 17 years)

> Not all the social media information is true, the best thing to do is just look for a health organization providing reproductive health services. (Female, 18 years)

> Some of us don't get information because many of our peers' cheat you and so we prefer going to get it ourselves. (Female, 16 years)

> For me it is No, most of the youth-friendly healthcare centers have sexual reproductive health services that are fit for girls and nothing motivating for the boys. (Male, 19 years)

A number of male study participants feel that available adolescent SRH information and services target females. The SRH service providers need to look into the best way to attract male adolescents and meet their expectations. The adolescents also have to contend with sources of SRH information they find not to be trustworthy, like their peers and social media.

Subtheme II: Confidentiality and privacy concerns

Adolescents want their SRH information needs to be met, but have concerns about their privacy being breached; they are also afraid of being "judged" based on their information requests or needs. Below are some of the adolescents' comments and concerns:

> You see sometimes if you are afraid and you have harsh parents you will not go and ask them some questions so you will go to the internet, because sometimes if you ask them, some parents will punish you. (Female, 19 years)

> When we are looking for sexual reproductive health information on the internet, this remains between you and the internet and no one will know of it. (Female, 18 years)

> Yeah, like there are some questions you cannot ask a parent, like they are private and you can't talk, so when you Google you just find answers directly. (Female, 18 years)

> For example going to the chief's place [adolescent-friendly health facility in a government building], there we even fear. What if we got a place where one can ask questions and get answer without physically meeting the person answering you. Like a hotline? (Male, 19 years)

Confidentiality is a determinant of how adolescents will seek and access SRH information. Adolescents fear being "judged" by their parents or other community members when they access a health facility to seek SRH information or services. Privacy and confidentiality seem to be the reason adolescent look for SRH information on the internet.

Subtheme III: Abstinence, unwanted pregnancies, STIs and drugs

Younger adolescents, especially girls, often wish to abstain from sex due to the negative impact of teenage pregnancy, or be empowered with information on available contraceptive options to reduce the risk of early pregnancy and STIs. The adolescents would also like more information on STIs, such as HIV. Drug use and how this could negatively impact their reproductive health outcomes is also concerns.

> Because I need to know more …. being told to abstain you, are not explaining how to do it. (Female, 16 years)

> Because if one is not taught about abstinence, you will not know, where to abstain and how to abstain. (Female, 15 years)

> Peer mentors [from community-based non-governmental organizations] visit us in the village and teach us sexual reproductive health issues, as you teach us we understand, as we understand we abstain from sex. (Female, 17 years)

> I went to see a healthcare provider [in an adolescent-friendly clinic], they told me if you don't want to abstain from your girlfriend, then use protection. (Male, 19 years)

> For us to avoid this sexually transmitted infections, as adolescent girls, we need to abstain because there is time for everything. (Female, 18 years)

> When adolescents hear an advert about a HIV meeting, they all go there and pay attention. (Male, 18 years)

> In school, teachers taught us and explained to us something about the effects of drugs and how this could affect our judgement, then we all understand. (Male, 15 years)

Because of the fear of unwanted pregnancies and sexually transmitted infections, a number of adolescent participants are interested in information that would enable them abstain from sex. The adolescents are also concerned about drug use and its effects to the adolescent's SRH outcomes.

THEME III: Technology's role in meeting reproductive health information needs

Subtheme I: Convenient, on-demand and confidential

Technology, including internet search engines, social media and mobile phones, have been useful tools in meeting the adolescents' SRH information requirements. These technology options are convenient, can be used whenever needed and enhance confidentiality. Below are some of the adolescents' comments on the role played by technology in meeting their information needs:

> The internet is good to look for adolescent reproductive health information because it showcases images of, let's say, the features of sexually transmitted infections if you have then you can know which ones. (Male, 19 years)

> When using mobile phones to access sexually reproductive health information, one will receive information relatively in good time. (Male, 15 years)

> Yes mobile phone can improve access, if I have a problem and do not want anyone to know about, I will text, for example, if I have a sexually transmitted infection, I will type a text 'what is wrong?' then the text response will help me. (Female, 16 years)

> If you have a sexual reproductive health problem and used your phone to access information no other person will know and it's good because it is private. (Female, 15 years)

> If I use a mobile app, I will be able to get sexual reproductive health information, then I don't need to visit any place to get the information. Without a mobile app, I need to go looking for the information. (Male, 16 years)

> You cannot visit adolescent friendly healthcare facilities at night, you just have to use the mobile app phone [proposed intervention]. (Male, 19 years)

Because of the user-friendliness of mobile phone technologies, a number of adolescents feel that SRH information made available via mobile phones could improve access. The adolescents can easily access on-demand SRH information when needed without breaching their confidentiality.

Subtheme II: Unstructured Supplementary Service Data (USSD) technology preference

A number of mobile phone technology options were discussed by the focus groups. Most participants favored a USSD-based mobile app, due perhaps to not being able to afford a smartphone or not having a phone of their own. Users feel USSD is more capable of preserving privacy. Below are some of the adolescents' comments that captured key points:

> I think I will prefer to use USSD, because for example, I don't have a smartphone and I can use USSD on this phone. (Male, 18 years)

> I will consider the USSD option [the user doesn't need to install anything] because my phone does not have space, and I want to keep my space for WhatsApp because it helps me reach many people. (Male, 19 years)

> [Using USSD] One can borrow a phone, use and return to the owner and the owner will not trace what you were doing with his phone. (Male, 15 years)

> It will be okay to use USSD, because of its confidentiality as it does not keep any trace of what you were searching and return to the phone owner. (Male, 16 years)

> That will be very good because even if I don't have a phone, I can get from my friend and ask my questions. So that will boost my access to information and no one will know who asked the questions. (Female, 15 years)

> It will be convenient to access sexual reproductive health information at home rather than visiting the

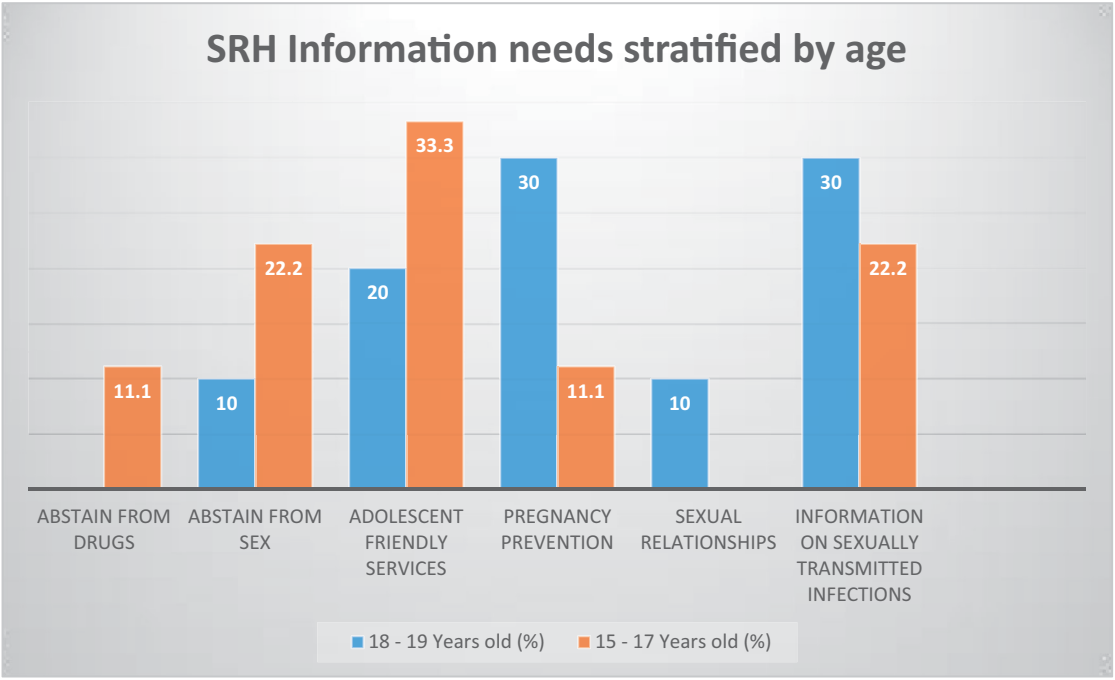

Figure 2. SRH information needs stratified by age.

adolescent friendly organizations situated in different parts of Kibra. (Female, 18 years)

Because of the convenience and ease-of-use of the USSD technology, most of the adolescents preferred USSD to provide SRH information. The USSD technology is interactive, can be provided without charge to the adolescents and works on both, feature phones and smartphones.

Sexual reproductive health information needs

The adolescent participants identified five SRH topics of interest about which they would need information segmented by gender. Information on abstinence, pregnancy prevention, sexual relationships, sexually transmitted infections and adolescent-friendly health services is needed. Stratified by age, the adolescents need up-to-date information on how to find adolescent-friendly services (33.3%), pregnancy prevention (30.0%) and sexually transmitted infections (30.0%) as shown on Figure 2.

The adolescents' information needs varied slightly by age and age. Girls above 18 years greatest need is information on sexual relationships, whereas girls 15–17 years old need information on how to abstain from sex. Boys above 18 years need information on sexually transmitted infections, whereas boys 15−17 years old need information on adolescent-friendly health services as shown on Figure 3.

Discussion

In this study we have documented current SRH information sources used by adolescents in Kibra, existing information gaps and how technology, including the internet, social media and mobile apps, provide access to information. This research was designed to determine adolescents' perspectives, the information they need and the challenges they face in accessing information.

It can be seen from our results that significant sources of adolescent SRH information were healthcare providers, parents, non-governmental organizations and the internet. The information sources accessed varied by age.

Healthcare providers are an important source of adolescent SRH information (Dittus et al., 2018). Although healthcare providers are considered knowledgeable and trustworthy, there are a number of barriers. Social norms, a taboo on adolescent SRH, concerns about confidentiality and the possibility of judgmental attitudes appear to hinder access to this source.

Parents are an important source of information for younger adolescents but this role diminishes with age when peers and others become preferred

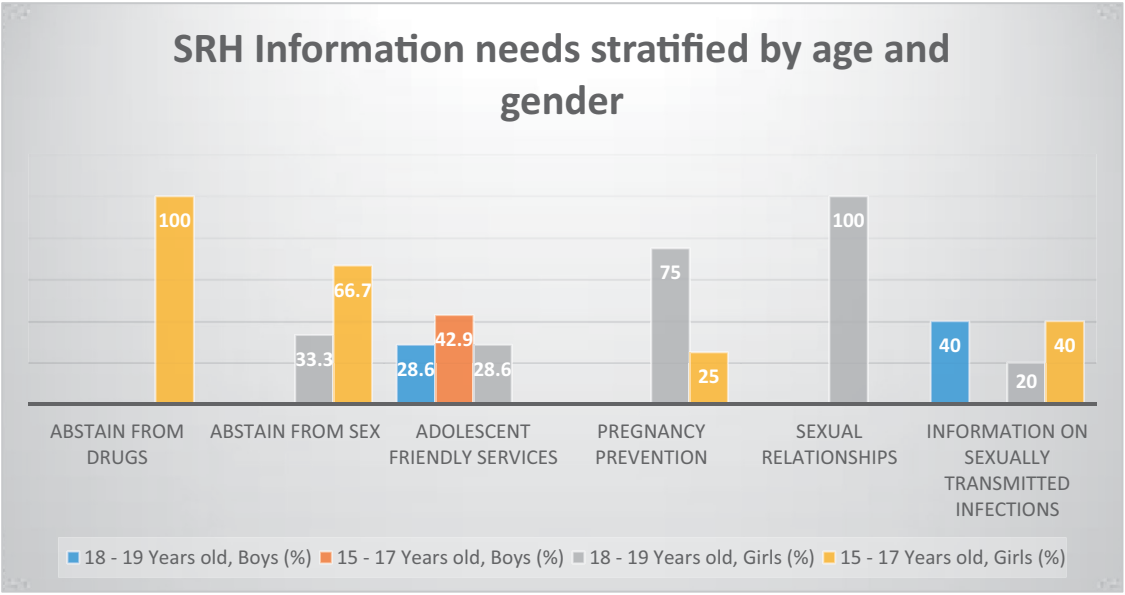

Figure 3. SRH information needs stratified by age and gender.

sources, as was determined in the study by Muhwezi et al (Muhwezi et al., 2015). Older adolescents have less communication about SRH issues with their parents, possibly due to decreasing levels of parental connectedness (Kusheta et al., 2019). Research shows that older adolescents prefer other sources of information, perhaps feeling their parents may not be as knowledgeable or detailed as alternative sources (Dessie et al., 2015).

A cross-sectional study by Dessie et al. has shown that delaying sex can improve adolescent sexual health outcomes (Eggers et al., 2017). Our study shows that adolescent girls are keen to abstain from sex to minimize the risk of sexually transmitted infections, early pregnancies and other effects of risky sexual behavior. Long-Middleton et al. have shown that reasons for abstinence vary from fear and lack of opportunity to beliefs and values (Long-Middleton et al., 2013). Alhassan and Dodoo found that fear of STIs and pregnancy can motivate adolescents to abstain from sex, as can religious conviction. Parental guidance is also an important factor in sexual abstinence (Alhassan & Dodoo, 2020).

Mirroring the findings of Kaneshiro and Salcedo (2015), the older adolescents in our study are keen to access services to prevent teenage pregnancies, which are mostly unwanted and unplanned, and negatively impact adolescents' lives (Kaneshiro & Salcedo, 2015). Knowledge and awareness of contraceptives among adolescents is affected by social norms and cultural gender roles (Capurchande et al., 2016). It is highly important to increase awareness and knowledge of available contraceptive options and services (Ganle et al., 2019), and contraceptive interventions need to be adapted to local culture and context (Lopez et al., 2016).

As this study shows, technology plays a role as a source of SRH information. Participants currently use the internet and social media but the adolescents felt that mobile phone technologies could improve access to accurate, reliable and on-demand information. USSD was the preferred mobile phone technology for disseminating information. This is a low-cost option that allows two-way communication. The mobile phone user dials a three to seven digit code based on the provider's service, which then connects to a two-way interactive communication referred to as a "session" (Google Patents, n.d.).

It is important to note that USSD is the only technology capable of operating in both feature phones and smartphones: WhatsApp, Facebook and Instagram, which could have broader penetration in other settings, only work on smartphones. The preference for USSD shows that many of the target population do not own a smartphone (Ipas, n.d.). A number of adolescents

in the study also indicated their devices did not have the space to install new phone apps.

USSD technology has already been used in a number of settings to provide and support healthcare interventions (Barjis et al., 2013; Osae-Larbi, 2016; Wang et al., 2008) and to provide public health information in resource-limited settings (Amoakoh et al., 2019). The technology enables a user to access an interactive user interface that is simple, user-driven and user-friendly. The content can also be customized to each setting and context.

Adolescents have an unmet need of adolescent-friendly healthcare facilities providing SRH services and information. This agrees with the findings by Ayehu et al. (2016) and Mutea et al. (2020), fear of being judged, breach of privacy and the taboo associated with adolescents seeking SRH services still persist. Information on pregnancy prevention is also needed by both, girls 15–17 years old and girls above 18 years. Our findings agree with those of Nash et al. (2019) regarding a higher burden on girls due to unplanned or unwanted pregnancies, girls need information on contraceptives or abstinence.

Adolescents, and especially girls 15–17 years, need information on how to abstain from drugs. None of the previously cited studies seem to have identified this need. The study participants felt that use of drugs seem to impair their judgment on SRH issues leading to bad outcomes. The adolescents requested to be provided with information on how identify drug use problems and provide referral pathway for any identified problems.

A technical paper by UNESCO in 2019 (UNESCO Brief, n.d.), found that adolescents aged 15–24 years searched online for SRH information on sexually transmitted infectious and sexual relationships among other related topics. These findings agree with our finding that information on sexually transmitted infections is needed by adolescents in this age group by both, boys and girls.

Conclusions

Healthcare providers and parents are important sources of information. Adolescents view healthcare providers as knowledgeable and expect them to offer user-friendly services. These services need constant review and improvement to meet adolescents' expectations. Parents need to continue to provide factual SRH information, as adolescents expect their parents to be able to offer reliable and trustworthy information to guide their decision making.

Interventions to increase awareness among adolescents about dangers relating to unprotected sex and drug use should be provided. User-friendly, on-demand information provided in an anonymous way could improve awareness and empower adolescents to make informed decisions, thereby improving their reproductive health outcomes. According to our participants, mobile phone apps have the potential to provide SRH information to adolescents.

Most of our participants favored the use of USSD. This technology works on any mobile phone, no installation is needed and no audit trail is left on the device, thereby enhancing confidentiality. The USSD service can be provided as a pre-paid service, which enables adolescents to access information without cost.

Acknowledgments

We would like to acknowledge the adolescent participants, their parents and guardians and the community mobilization team for their role in making the research a success.

Conflict of interest statement

The authors report no conflicts of interest. The authors alone are responsible for the content and writing of the paper.

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