Research Article

Situation Analysis for Delivering Integrated Comprehensive Reproductive Health Services in Emergencies for Three Districts - Yemen: A Protocol Paper for a Mixed-Method Study

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Abstract

Yemen has witnessed one of the world's largest humanitarian crises in the past fifty years. The Yemen crisis started in 2011; however, the last five years of this conflict has led to the total collapse of the economy, basic social services, and the health care system. The general conditions for women and girls amid this crisis are in steep deterioration, further exacerbating the vulnerabilities of women and girls caused by conflict and displacement. WHO (through the Global Health Cluster and the Department of Sexual and Reproductive Health in close coordination with WHO Yemen) is undertaking a project to deliver integrated comprehensive RHR services in three acute protracted humanitarian crisis districts to meet the immediate RH needs of extremely vulnerable women and adolescent girls. This situation analysis assists this project by exploring barriers and facilitators to access to reproductive health (RH) services and meeting supply and demand needs. The results of this assessment are hoped to cater towards the provision of more responsive interventions to promote and improve RH services for women and adolescent girls in three selected districts of Yemen.

Methods and analysis: A mixed methods study design using both quantitative and qualitative methods will be employed. The quantitative assessment includes a household-based survey and health facility assessments. The qualitative component includes

an in-depth interview procedure, which involves key informant interviews, focus group discussions with stakeholders providing RH services, community leaders, and women and girls in each selected district who fall into the category of Internally Displaced Persons (IDPs), persons moved from their homes to somewhere else within their country as the result of conflict. The data from the household and health facility assessments will be analyzed using descriptive analysis, while thematic analysis will be used for the KIIs and FGDs. Ethical approval was obtained from Postgraduate Studies and Scientific Research, Faculty of Medicine and Health Sciences, University of Aden.

Dissemination: This situation analysis will be disseminated through workshops at a national level, presentations with stakeholders (especially RHIAWG), peer-reviewed publications, and a collaborative project report. Also, to share the results with other health organizations that are operational in Yemen and collaborate with government on RH services provision. It is hoped to inform a needs-based driven RH response to meet the RH priorities of adolescent girls and women in Yemen.

Strengths and limitations of this study

- This RH situation analysis will provide first-time data to help inform different national, regional, and global stakeholders on the reproductive health needs and priorities for adolescent girls and women aged 10-49 years in Yemen, nine years into the crisis. The results will provide an overview of the types, availability, and quality of RH services. It will also identify barriers and related challenges impeding access to RH services in the three assessment districts: AlSheikh Othman in Aden, Lawdar in Abian, and AlMaafer in Taiz.

- Utilizing a mixed-methods design, this situation analysis will allow assessment of the current situation, including related gaps and challenges, from the perspective of both the community on the demand side and facility readiness on the supply side for provision of RH services.

- This assessment will also allow us to grasp the current availability of services and quality of gender-based violence services among women and adolescent girls.

- This assessment is limited to Aden and two contested areas. Although it is not a national-based survey, the selection of these three sites is believed to provide a snapshot of the RH situation of Yemen given the three different contexts.

Introduction

Sexual and Reproductive Health and Rights (SRHR) are integral to achieving Sustainable Development Goals (SDGs), especially SDG 3.7, which calls for ensuring universal access to SRH care services by 2030 [1]. The reality is that armed conflicts will impede the realization of this target, through the displacement and forced migration that affect the lives of all Yemeni individuals, especially women and girls. Forced displacement and migration result in interruption of social networks and infrastructure, thus creating substantial barriers to access of basic services, which further intensifies the existing patterns of inequalities [2]. In such emergency settings, reproductive health services have been recognized as key to the survival of the population, but often remain under-prioritized. According to WHO, the essential SRH interventions in emergencies include: family planning (all methods-including long-term and permanent as well as emergency contraception), post-abortion care, pregnancy care, childbirth care (including emergency obstetric care), postnatal care (mother and newborn), prevention and management of sexually transmitted infections and HIV (including mother-to-child transmission of HIV and syphilis), and prevention and management of gender-

based violence [3].

Yemen was one of the poorest countries in the Middle East region even before the current crisis. According to the 2019 Human Development Index, Yemen ranked 177 out of 189 countries [4]. It has a total estimated population of 29,400,000, of which 34.8% are urban [5]. Yemen has experienced multiple conflicts that intensified around 2010 with large protests taking place in 2011. Following this, a series of internal conflicts took place in 2012-2014, and a civil war broke out on 26 March 2015 that continues to date, with significant escalations and continued fighting in multiple frontlines around the country. As a result of this war and specifically since 2014, poverty in Yemen has increased from 47% of the population to a projected 75% of the population by the end of 2019. A significant proportion of Yemenis have become dependent on humanitarian assistance and remittances [6]. As a result, an estimated total of 24 million people in Yemen, i.e., over 80% of the population, are in need of some kind of assistance, including 14.3 million who are in acute need [7].

The last five years of the conflict has led to the collapse of the economy and social services as well as the health care system, which was already functioning poorly. It was characterized by a

huge urban-rural gap in all health services, particularly maternal health services, due to the maldistribution of health manpower and other resources. A study of data collected during 2008-2009 in rural areas indicated that the most significant predicator of maternal health services utilization was high socioeconomic characteristics (wealthier and higher educational attainment) [8]. Currently, the health system in Yemen is severely fragile, where it has either been deeply disrupted or totally disrupted in some areas of the country. In parallel, all related basic services pertaining to water supply, sanitation, irrigation, and agriculture have been destroyed. These currently realities in Yemen are further worsening the health of the population, especially that of women and children. It is estimated that nearly half of the health facilities are not functioning or only partially functioning. Only one-third (37%) of the functioning health facilities provide reproductive health services [9] due to staff shortages, lack of supplies, inability to meet operational costs, or damage due to conflict; and equipment and medical supplies are inadequate or obsolete. For more than two years now, health workers either have not been paid or have been paid irregularly. This has led to severe shortages in the health care force in Yemen, as many have consequently left the country. The collapse of the local currency, lack of public sector salaries in some areas (such as the northern part of Yemen), unemployment, and the high price of food, fuel, and basic social services continue to converge to expand the poverty among the Yemeni population, pushing even more of Yemen's vulnerable residents deeper into poverty and often resulting in many Yemenis staying at home. Yemen has become a failed state with a total collapse of basic services and institutions.

Consequently, and not surprisingly, conditions for women and girls are severely exacerbated. An estimated four million people are currently displaced from their residence homes to other governorates within Yemen either living with their families or in refugee camps. About half of the displaced persons are women and 27% of them are below 18 years of age [10]. According to the United Nations Population Fund (UNFPA) in 2019, "an estimated six million women and girls of childbearing age (15 to 49 years) are in need of support. Rising food shortages have left more than one million pregnant and lactating women malnourished." In addition, 1.2 million new pregnancies were estimated in 2019. These rates were estimated to be compounded by 180,000 women likely to develop childbirth complications, 9,000 (5% as minimum) of deliveries would need surgical deliveries [11]. In a country with one of the highest maternal mortality ratios in the Arab region, 385 per 100,000 live births [12], the lack of food and poor nutrition combined with poverty and eroding health care and worsened by epidemics (such as cholera) and displacement can only be expected to lead to a further and parallel increase in maternal morbidity and mortality.

In crisis situations, one in five women of childbearing age is likely to become pregnant. Without access to reproductive health services, women face an increased risk of life-threatening complications. Many women also lose access to family planning, exposing them to unwanted pregnancies in hazardous conditions. Hence, a further estimated 75,000 pregnant Yemeni women are at risk of developing complications due to the dire state of health services in the country [11]. A systematic review of studies from eight countries with such conflict-affected situations, including Yemen, defined the determinants of maternal health service usage from both angles: the demand (community) angle included transportation, female education, autonomy, health awareness, and ability to pay, while the supply (health services) angle comprised service availability and quality, existence of community health workers, and costs and informal payment in health facilities [13]. In addition, more than three million Yemeni women and girls are estimated to be at risk of gender-based violence, and sixty thousand women are at risk of sexual violence, including rape [10]. Many cases of gender-based violence remain unreported, adding to an incomplete picture of the scale of violence against women. A 36% rise in visits to gender-based violence services was reported in 2017. This is percentage is extremely telling given the existent social norms, which often discourage reporting [14].

Compounded with the above-cited impacts, women are further challenged to step into roles that are traditionally filled by men. Conflict-related losses of male breadwinners among Yemeni families adds to the economic burdens women face. Women and girls are often and suddenly finding themselves responsible for providing for their families, when they themselves have been deprived of basic education or vocational training that would equip them for the labor market. In the absence of adequate empowerment and support, it is not surprising that women and girls will become even more vulnerable to negative coping strategies, such as child marriage, violence, etc. In light of the above, it can be adequately assumed that Yemeni women and girls are paying significant tolls in the current and long-standing war in Yemen.

Given the fragmented governance structure, all relief and response efforts to the crisis are being undertaken solely by the humanitarian community. The governments in both the northern and southern parts of the country are no longer able to deliver basic services to people in need, including basic health care, RH and nutrition services, water and electricity supplies, and social safety-net services. The existing Health Cluster coordination mechanism for humanitarian health interventions includes the Reproductive Health Inter-Agency Working Group (RHIAWG) as the RH specific coordination group in both parts of the country (southern and northern). However, implementation of the required RH activities needs more efforts in planning, supervision, monitoring, and evaluation. Currently no data exists to comprehensively assess

the effects that the ongoing war in Yemen has had on reproductive health. The last nationwide health survey, the Demographic Health Survey (DHS), was conducted in 2013. Amid this context and given the lack of and need for data, we seek to implement a situation analysis to describe the current RH situation among Yemeni adolescent girls and women as well as describe the facilitators, barriers, and challenges on both the demand and supply sides in three districts: AlSheikh Othman, AlMaafer, and Lawdar within three governorates (Aden, Taiz, and Abian) in Yemen. This project is timely and needed. It is also aligned with ongoing WHO efforts to deliver, through the Health Cluster, integrated comprehensive reproductive health services to meet the immediate RH needs of women and adolescent girls in emergencies and to enhance Health Cluster partners' delivery of integrated RH services. It is hoped that the results of this situation analysis will help inform the different humanitarian partners to cater to better coordinated and needs-driven planning programs that respond to urgent RH needs and properly allocate resources. In this paper, we seek to describe the overall research protocol of the intended situation analysis.

Study Objectives

This situation analysis aims to assess the RH needs (on the demand and supply sides) impacting access to RH services by women and adolescent girls aged 10-49 years in three districts of three governorates in Yemen: AlSheikh Othman district in Aden governorate, AlMaafer district in Taiz governorate, and Lawdar district in Abian governorate. It also serves as baseline data for measuring progress.

Specific objectives

1. To assess the RH needs, access to RH services, and health care seeking behavior among women and adolescent girls (aged 10-49 years).

2. To conduct facility readiness assessments focused on exploring availability of resources (human resources and essential kits, drugs and supplies) and systems management (data, referral, providers' training and cost-sharing) for providing comprehensive RH packages.

3. To explore the challenges of both the supply and demand in seeking and providing RH services.

4. To determine the scope for improvement of the current RHR services and systems.

Methods and Analysis

Study Design and Population

This situation analysis will employ a mixed methods study design using both quantitative and qualitative methods. The quantitative assessment includes a household-based survey and health facility assessments. The household survey will target Yemeni women and adolescent girls aged 10-49 years living in each of the three selected districts. The healthy facility assessments will include one Comprehensive Emergency Obstetric & Newborn Care (CEmONC) hospital and three to four Basic Emergency Obstetric & Newborn Care (BEmONC) selected health centers in each of the three districts. The qualitative component will combine in-depth interviews with key informants and focus group discussions with community leaders and a broad range of stakeholders providing RH services, as well as Internal Displacement Person (IDP) women and girls in each of the selected districts. In particular, the key informant interviews will include international / national organization representatives and formal providers contributing to RH services, influential leaders, Yemeni not displaced males, and IDPs representing women and adolescent girls residing in the areas of the study in each selected district.

Study sites

As indicated, the assessments will be conducted in three districts of three governorates in Yemen: AlSheikh Othman district in Aden governorate, AlMaafer district in Taiz governorate, and Lawdar district in Abian governorate. These three sites have been purposively selected based on the following criteria: the district falls under 4-5 vulnerability matrix scoring according to the Health Cluster severity analysis, is geographically accessible without active fighting, has at least one functional CEmONC and four BEmONC facilities, has an available IDP population, and has a sizeable population with at least eight thousand women of reproductive age. The districts are:

a) **AlSheikh Othman District** is one of the 8 districts in Aden governorate. It is the largest populated district, with 177,151 inhabitants as estimated in 2019 (adjusted in July 2020, HNO) It has a high concentration of IDPs (especially from AlHudeida, Taiz, and Abian) and marginalized groups (AlMuhamasheen), who largely reside in slums and experience high rates of unemployment. These groups lack access to basic services due to social marginalization and mostly to being confined to menial jobs). The health facilities in Al Sheikh Othman are considered to be in relatively good physical condition and there is no shortage of health manpower in this district. According to 2019 Humanitarian Needs Overview, this district is characterized by a health emergency need severity index of major level (i.e., a score of 3).

b) **Lawdar District** is one of the 12 districts of Abian governorate. It was occupied and controlled by terrorists (al-Qaeda in the Arabian Peninsula) in 2012 and is characterized with instability. Lawdar is a mountainous area; however, its population prefer live in the valleys. It borders Albeidha city (north Yemen). The population of Lawdar is estimated at 119,074 in 2019 (adjusted in July 2020, HNO), among which 5,569 are IDPs, mostly displaced from Abian

and Albeidha districts. The district has four health centres (3 of them provide RH services), 24 primary health care units lack RH services, and one district hospital located in Lawdar city. Lawdar suffers from shortages in health manpower, particularly females. In the Lawdar hospital, there exists only one obstetrician (Russian nationality), 14 midwives (3 of them are working without salary), and four 4 female nurses (one of them is working without salary). The hospital completely lacks any female GPs. According to the 2019 Humanitarian Needs Overview, this district is characterized by a health emergency need severity index of critical level (i.e., score 5).

c) **AlMaafer District** is one of the 23 districts of Taiz governorate. This district is mountainous, and its population are scattered all over the different mountains whose roads are unpaved and inter-disconnected. It has an estimated total of 151,729 inhabitants in 2019 (adjusted in July 2020, HNO), among which 37,0000 IDPs who were displaced from other districts: Taiz, Ibb, Amran, and Saada. These IDPs are living with host families in mostly the rural areas of AlMaafer district, in rented places and scattered shelters of very bad living conditions. This district has only one hospital. The hospital provides CEmOC services. It has one male surgeon for surgical deliveries, three midwives, but no female GP. The district has, in addition, six health centres (5 of which provide RH services) and 11 primary health care units which lack RH services. There are 21 midwives (9 of which are contracted) and 61 female nurses (51 of which are contracted) and 1 female GP working in distributed across the health centre. According to the 2019 Humanitarian Needs Overview, this district is characterized by a health emergency need severity index of critical level (score 5).

Data collection

The implementation of the three arms of this situation analysis are described in Figure 1.
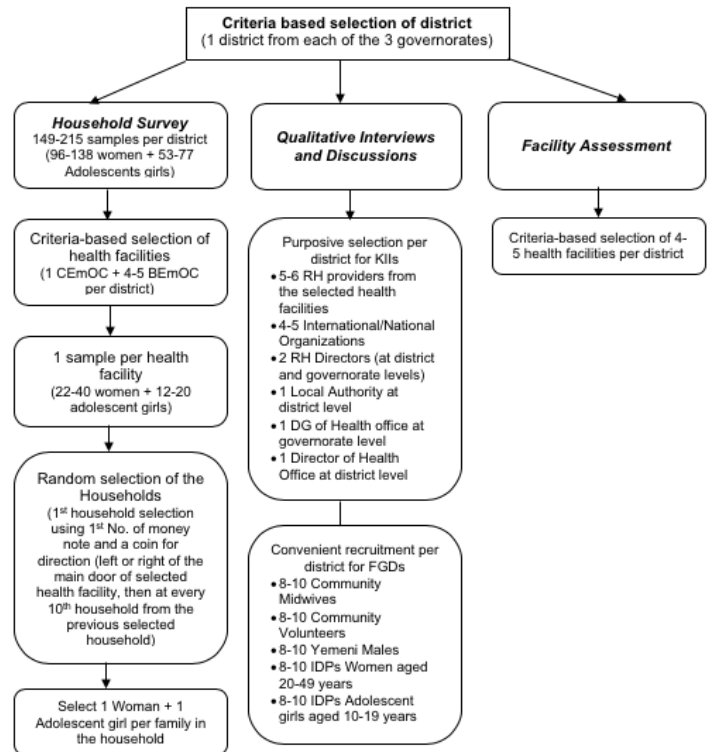
Figure 1: Sampling techniques to conduct the situation analysis. DG, director general; FGDs, focus group discussions; KIIs, key informant interviews; IDPs, internally displaced people.

Household survey

A household survey will be conducted among adolescent girls and women (aged 10-49 years) to understand:

1) their RH needs, accessibility, cost, barriers, and health care seeking behaviors. The survey will collect information around

various reproductive health issues pertaining to menstrual health, pregnancy and delivery care, postnatal care, family planning services use, post-abortion care, and sexually transmitted diseases;

2) RH service use; and

3) satisfaction, barriers, and challenges related to accessing RH services. This will help explore the gaps impacting availability, barriers, and utilization of RH services.

Sample size and sampling techniques

Sample size: Taking into consideration the available data from PopulationPyramid.net, which draws upon data from the 2019 *Revision of the World Population Prospects* the age breakdown of Yemeni females for 2019 shows that women and adolescent girls of reproductive age (10-49 years old) constitute 31.3% of the total Yemeni female population. Among them, women aged 20-49 years represent 20.1%, while adolescent girls aged 10-19 years make up 11.2%. Using the dataset of the United Nations Office for the Coordination of Humanitarian Affairs (UN OCHA) Yemen demographic information on the general population for each district, [15] the total number of Yemeni adolescent girls

and women (aged 10-49 years) in the three districts is estimated at 135,298, of which 48,437 are adolescent girls aged 10-19 years and 86,861 are women aged 20-49 years. According to the Yemen Demographic Health Survey 2013, [16] 30% of pregnant women of reproductive age (15-49 years) gave birth at health facilities. Considering this as the overall prevalence rate with a 95% confidence interval (CI), 5% margin of error, and 1.5 design effect, the estimated sample size needed for this household survey is a minimum of 484. Allowing for a 10% non-response rate, the total sample size that will be used is set at 532 women and adolescent girls (aged 10-49 years).

The formula used for sample size calculation is described below:

$$n = \frac{z^2 p(1-p)}{d^2} \times deff$$

Among the study population of 135,298, 35.8% (48,437) are estimated to be adolescent girls aged 10-19 years and 64.2% (86,861) are women aged 20-49 years. The sample size distribution across the three districts and proportionally among the two groups of study population is illustrated in Table 1.

Study population	Total number of individuals	Percentage (%)	Sample size
Adolescent girls aged 10-19 years	48,437	35.8	190
Women aged 20-49 years	86,861	64.2	342
Total number of women and adolescent girls aged 12-49 years	135,298	100	532

Table 1: Distribution of sample size for household survey by study population.

Sampling techniques

A stratified systematic sampling will be used to recruit the study population: adolescent girls and women aged 10-49 years. The sampling design will follow a three-stage design:

***Stage I*:** The sample size in each district will be divided nearly equally among the catchment areas of each selected health facility in each of the three selected districts, as illustrated in in Table 2.

District / governorate	Health facility name	Selected study population	
		Adolescent girls aged 10-19 years	Women aged 20-49 years
Al Sheik Othman / Aden **Total 149** **(53 girls + 96 women)**	Al-Sadaqa hospital	14	24
	Al-Mahareeq HC	13	24
	Mujama AlSheikh Othman HC	13	24
	Al-Memdarah HC	13	24
AlMaafer / Taiz **Total 215** **(77 girls + 138 women)**	AlNashama Hospital	17	30
	22 May HC	15	27
	AlKhiami HC	15	27
	AlHiab HC	15	27
	AlSina HC	15	27
Lawdar / Abian **Total 168** **(60 girls + 108 women)**	Mahnaf Lawdar Hospital	15	27
	AlHadhen HC	15	27
	Amagel HC	15	27
	Amsera HC	15	27

Table 2: Distribution of sample size by districts and selected health facility areas.

Stage II: The interviews of the targeted population will be conducted in their households. The first house will be selected randomly by tossing a coin to determine the direction either to the left or the right-hand side. The first right number on the money note given to the team supervisor will be used as the first house near the health facility. The direction of selection of consecutive households will also be determined randomly. These sampling strategies will be employed because of the lack of numbering of households in the area. Following the first household, the sampling interval will be every tenth household, until the desired number of respondents are interviewed.

Stage III: One woman aged 20-49 years who has been married and/or one adolescent girl aged 10-19 years irrespective of her marital and pregnancy history will be selected from each family in the household. If more than one woman lives in the in a family, only one will be randomly selected, based on availability and her consent to be interviewed. The same applies if more than one adolescent girl lives in the family of a household. It will be ensured to the maximum extent possible that the interview in the household is conducted privately and confidentially, keeping in mind that households in Yemen, especially in rural areas, usually consist of more than one family.

Data collection methods and tools

Data collection will triangulate both quantitative and qualitative data. It will include face-to-face household interviews, key informant interviews, and focus group discussions, as well as facility assessments. Each of these is described below.

Quantitative survey

A structured questionnaire will be used. The questionnaire was adapted based on the Reproductive Health Assessment Toolkit for Conflict-Affected Women. The questionnaire will be modeled on the questionnaire used by the same project study conducted among Rohingya refugees in Cox's Bazar, Bangladesh. This questionnaire will be adapted and validated by the World Health Organization Lead Research Project Director to check if the questionnaire has captured the investigated topics effectively, and be pretested during the data collection training workshop before initiating data collection. Data will be collected using a structured pre-coded questionnaire, which will combine a mix of open-ended and close-ended questions. The questionnaire will be translated to Arabic from English. Local dialects will be used in the questions for clarity of our study objective-related topics (local Arabic language). Specifically, the questionnaire will collect information around: 1) various reproductive health issues pertaining to menstrual health, pregnancy and delivery care, postnatal care, family planning service use, post-abortion care, reproductive tract infections, and gender based violence. In addition, the questionnaire will include questions to understand 2) RH service use, as well as 3) satisfaction, barriers, and challenges related to access to RH services. Local female interviewers who are living in the same district and know the community Arabic dialect will be recruited for data collection. The interviewers of the same district will be assigned to site area different from their residence area to avoid interviews of their relative respondents. Extensive training sessions over a period of one week (seven

working days) will be conducted to orient and train them regarding the study objective, confidentiality, selection of samples, and tools. The interviewers will be monitored by two supervisors at different levels: a team supervisor in each area to check the completed household questionnaires daily and give feedback, and a district supervisor to check the completed questionnaires for each area completed and give feedback. Each area's team supervisor will submit daily reports on the fieldwork to the district supervisor. Monitoring visits will also be carried out by the main supervisor for each district for quality control. SPSS (the Statistical Package for Social Sciences software V25) will be used for data entry, management, cleaning, and analysis.

Data analysis

Data analysis will revolve around univariate, bivariate, and multivariate analysis. Univariate descriptive analysis will revolve around describing the socioeconomic and demographic characteristics of the sample, understanding the needs as well as the types and availability of the different RH services, including gender-based violence (GBV), RH care seeking behavior, utilization, cost and barriers to access RH services, challenges faced on the basis of distance and waiting time at health facilities, and suggestions to improve the RH services. Statistical analysis will be performed per each district as well as combined, with a similar analysis for the younger and older women. Bivariate analysis using a Chi square($x2$) test will be performed to measure the association between sociodemographic characteristics and their impact on various RH issues, such as menstrual health, pregnancy and delivery care, family planning use, post-abortion care, sexually transmitted diseases, gender-based violence, and patterns of health seeking behavior for RH care. Multivariable regression analysis will be used if significant associations are found at the bivariate analysis levels.

Health Facility Assessment

The facility assessments aim to assess facilities' readiness for RH services and to understand facilities' challenges (from the supply side) on the basis of service provision, infrastructure, availability of human resources and their training, supply of equipment, kits and drugs for providing RH services, and availability of health systems including data collection.

Sample size and sampling techniques

A purposive sampling of health facilities will be selected based on the following criteria: one functional CEmONC hospital, usually only one hospital available in each district, and at least four BEmONC health centers based on criteria that can be easily supported and renovated to be made functional. Hence in total, 13 health facilities will be selected. These are listed in Table 2 above.

Data collection methods and tools

A structured coded questionnaire will be used to carry out the health facility assessments. The questionnaire will be conducted in Arabic, following translation and adaptation. Two local researchers will be recruited from the nearby locality in each district. Additionally, retrospective data will be incorporated for data collection. Two methods will be employed during the facility assessments: the first is objective observation and discussion, including a facility walk-through to observe facility RH services' infrastructure; and the second is interviews with facility directors to explore available services, staff, systems, and supplies as well as the review of records.

Data analysis

Descriptive analysis of the health facilities' assessments will be performed to understand the facilities' readiness and challenges. The SPSS package will be used for data entry, management, cleaning, and analysis. Data consistency will be checked using univariate analysis. The data will be analyzed for hospitals and health centers separately to capture the gaps at both levels in service provision and availability, service utilization and cost-sharing, human resources and their training, infrastructure, supply of equipment and drugs, and management of referral systems.

Qualitative interviews and group discussions

The quantitative data will be triangulated with a series of key informant interviews (KIIs) and focus group discussions (FGDs).

Key informant interviews (KIIs): 14-15 KIIs will be conducted in each district, with a total of 44-45 KIIs for the three districts. In order to achieve the complete picture of the RH issues, the target population for these KIIs will include governorate and district health directors, RH focal persons at both governorate and district levels, local authorities, RH providers at selected health facilities, and international partners and national associations supporting any of the selected health facilities or any health issues in the district. During the training of data collectors, all KIIs in each district will be identified based on their titles as required. These KIIs aim to provide a contextual understanding of the main and prevailing RH problems and the facilitators, challenges, and barriers impacting service availability and utilization as well as access to RH services and GBV services for women and adolescent girls. They will also provide an overview of the existent RH service delivery and management challenges from the supply-side perspective.

In addition to the KIIs, five FGDs in each district will be conducted by focusing on five main target populations (with a total of 15 FGDs across the three selected districts): one for males and two for IDPs (one for women aged 20-49 years and one for adolescent girls aged 10-19 years). Similarly, these FGDs aim

to identify their RH problems, experiences, and challenges in utilizing services and their perspectives from the demand side. The remaining two of the five FGDs in each district will comprise one FGD with community midwives and one with community health volunteers to understand the available services in the community and the participants' experience of the communities' challenges in utilizing services from the supply-side perspective. The decision on the number and distribution of FGDs was made to give maximum information on RH problems faced women and adolescent girls.

Sample size and sampling techniques

For qualitative interviews, four to five areas will be selected in each district where household surveys and facility assessments will be conducted. The sampling strategy for all interviews and discussions is purposive sampling. Potential respondents will be identified to be key informants in the community who can give insights regarding service availability and utilization as well as the barriers and facilitators to accessing RH services for the community members. So, the planned total of KIIs will be 14-15 interviews in each district with a total of 45 KIIs in the three selected districts. However, if it is found that more saturation is needed, then more than 15 KIIs will be conducted in each district. The study team leader and local supervisor will communicate with the General Director of Health at the governorate level to gain his cooperation and facilitation for all identified key informants. Following this, all identified KIs will be contacted to set an appropriate date and place for interview through the study's local supervisor. The selection process for FGD participants will be in accordance with defined specific characteristics, and the FGDs will represent the district within the selected health facilities' catchment areas.

Data collection methods and tools

Separate guideline tools with consent forms will be developed for KIIs and FGDs. All tools will be translated to Arabic and will be finalized after pretesting in role-play during the data collectors' training. Qualitative interviews will be conducted by a local team in each setting, made of up of two team members (a moderator and a note-taker). Training sessions will be conducted to orient and train the team members on study objectives and qualitative tools prior to interviewing. A local supervisor will be employed in each district. The supervisor will lead the access to communities, while program leaders facilitate study recruitment for each of the intended target populations for the FGDs and KIIs. During the FGDs and KIIs, careful attention will be paid in order to ensure respect of cultural etiquette and prevailing social norms. (See Supplementary Annexes for all research assessment tools that will be pretested and then scale up for use during this assessment 1-9).

Data analysis

Prior to the KIIs and FGDs, consent for recording and note-taking will be sought. Thematic analysis will be conducted following transcription and coding. The note-taking report will be incorporated for verification and use in case of denial recording. Brief direct quotations from the transcripts will also be used to support the patterns emerging from the data.

Specific COVID-19 measures that will be safe guarded during the different stages of the data collection

In Yemen, the first case of coronavirus was identified and reported on April 10, 2020 in Hadramout Governorate. It was further followed by five cases identified in Aden. On April 20, a month after the field work of this assessment was completed ie end of March 2020, the MOPHP in Aden imposed lockdown measures to control the spread of the COVID-19 pandemic in the country. These lockdowns also restricted movement and transportation among governorates. Fears of COVID-19 transmission was spread among the population, including the health providers across the country. The capacity to provide routine health services in the majority of health facilities was severely impacted due to the lack of adequate PPEs among health care providers. With all these impacts in mind, all standard primary precaution and prevention measures in terms of wearing of masks, physical distancing and conducting interviews and/or FGDs outside the household in the open air will be ensured, whenever possible. All data collectors will be trained on safeguarding these measures prior to data collection and will also be screened to rule out COVID-19 on a weekly basis, through out the data collection phase.

Ethics

This study bears no more than minimal risk to subjects. All household surveys, KIIs, FGDs, and health facility assessments, including approval for tape recording, will be preceded by verbal consent for both quantitative and qualitative survey due to high illiteracy rate among the population at the same time to unify the consent system. The consent process will explain that participation in the interview is completely voluntary and that participants can withdraw from the interviews at any time, even after giving consent verbally since the illiteracy rate is very high in Yemen. The consent for interviewing the adolescent (aged 10-19 years) will be obtained from the adolescent girl's parents first followed by her own consent. All observations, interviews, and notes will be stored with team leaders in secure key-locked facilities and password encrypted computers. All collected data will be assigned a unique identification number, and all data will be de-identified upon entry into the database. All other data forms will be kept in locked storage by team leaders and then transferred to WHO after

the completion of the final report of the assessment. In reports, only aggregated information will be presented; no individual information will be reported. Ethical approval to conduct this study was obtained from the Research and Ethics committee at the Faculty of Medicine and Health Sciences at the University of Aden, on September 12, 2019 (REC-63-2019). It should be noted that the safety of the field team will be safeguarded during the data collection phase. Data collection will be paused in the cases of severe and abrupt surges of armed violence or unrest. To protect the confidentially of the collected information, only the research team will have full and complete access to the data. The collected individual data will not be shared with any third party.

Data triangulation

Given the multiple methodologies of data collection (the quantitative, using the household survey and facility assessments, and the qualitative, using FGDs and KIIs) triangulation will be employed in order to understand the overall RH needs, demands, and challenges and barriers to accessing RH services for Yemeni adolescent girls and women aged 10-49 years. This will be done separately for each district and compiled by all three districts per each data collection method as well as triangulated.

Data quality

In order to ensure data quality, the research team will employ various quality control measures throughout the study process. The following strategies will be used to monitor and preserve data quality standards: 1) pretesting of study instruments to ensure relevance and validity; 2) computer validation programs to check the logical consistency of data; 3) training and assessment of fieldworkers prior to actual data collection; 4) close supervision of fieldworkers (one supervisor will oversee five data collectors); 5) organization of daily debriefing meetings for all field staff to share experiences, lessons learned, and challenges; 6) accuracy, consistency, and completion will be conducted for both quantitative and qualitative data at the end of each day; 7) analysis of the completeness of information as well as identification of outliers during data cleaning and data analysis. Qualitative data will be transcribed and translated into Arabic and English prior to analysis.

Data availability statement

At the end of this study, the approved report and datasets will be posted on the WHO website (www.who.int). We will provide a request form to access the data.

Patient and public involvement

The research questions and outcome measures of this study were chosen based on a standardized approach within a broader assessment project carried out by WHO in three countries facing different humanitarian crises, which in addition to Yemen include

Bangladesh (among the Rohingya refugees) and the Democratic Republic of Congo (among the internally displaced).

Dissemination

The findings from this situation analysis will be the first to provide baseline data to inform a better-grounded understanding of adolescent girls' and women's RH demands and needs in the selected three districts in Yemen. The results will be disseminated at national, regional, and global levels to inform appropriate SRH service delivery and response. The analysis results will be fully coordinated and consulted with WHO, specifically with the WHO country office in Yemen, the Department of Sexual and Reproductive Health, and the Global Health Cluster. This coordination aims to engage all relevant and concerned stakeholders, such as RHIAWG and other health cluster partners, to inform service delivery based on identified RH needs from both the demand and the supply sides. Strategies that could be explored as driven by the analysis of this assessment include: updating and standardizing training packages for RH service providers, coupled with respective capacity building of the health workforce at different levels to improve the management and delivery of integrated RH services; strengthening GBV programs; and building effective referral health systems in order to improve the availability, distribution, and update of RH kits, etc.

Other dissemination forms will include publications in journals and presentations in international scientific forums. Regional and international audiences will be reached through conferences and symposiums.

Expected challenges

The most important challenge in this study is protecting the safety of researchers due to the existing war and shooting that can escalate suddenly. There is risk to participants participating as well as researchers. In order to mitigate these impacts, local researchers and teams will be recruited from each district to carry out the respective data collection in their districts. This is believed to serve as the optimal protection scenario for their safety, since they will know their local context best and are more likely to be trusted among their local communities during data collection. Another challenge is the sensitivity of certain RH topics that will be addressed during data collection, such as gender-based violence. To try to mitigate this challenge, the data collection teams will be carefully trained on how to interview respondents in private settings and maintain confidentiality, respect cultural and prevailing social norms, and avoid and deal with conflict if it arises. Another equally important challenge is that in some communities, such as in the Lawdar district in the Abian governorate, women are not allowed to leave their homes without the company of a male relative. Hence it will be essential to recruit qualified and trusted males in this study in such communities, especially during the data collection with

men. Access to the records at health facilities could be difficult to obtain. To overcome this challenge, the research team will initiate introductory meetings with governorate and district health office directors to seek their approval and facilitation in implementing the research as well as to engage higher authorities beforehand. Further, the selection criteria of districts and health facilities could mean that the results may not apply to districts and sites that do not meet those criteria. However, the three districts were purposively chosen as described above, mainly to try overcoming this challenge as much as possible. Finally, a major challenge could be faced when access is restricted to certain locations because data collection will need to be paused due to sudden armed conflict.

Declaration of interests

The authors have declared that no competing interests exist. The authors alone are responsible for the views expressed in this article and they do not necessarily represent the views, decisions, or policies of the funding bodies or institutions with which the authors are affiliated. The funders had no role in the study design, data collection and analysis, decision to publish, or preparation of the manuscript.

Authorship contributions

NA, LK, and MB conceptualized the study. NA designed the study and LK revised the designed study and the manuscript critically for important intellectual content. NM and the team RHR cluster project in Yemen revised the design of the study and contributed in selection of target areas. All authors read, edited, and approved the final manuscript.

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