YEMEN: THE IMPACT OF WAR ON MATERNAL MORTALITY

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YEMEN

Master in International Health- September 10, 2018- September 05, 2019

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Vrije Universiteit Amsterdam

Word count: 12,722

Yemen: The Impact of War on Maternal Mortality

A thesis submitted in partial fulfilment of the requirement for the degree of Master in International Health

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Signature: 

Master in International Health

September 10, 2018 – September 05, 2019

KIT (Royal Tropical Institute)/ Vrije Universiteit Amsterdam

Amsterdam, The Netherlands

September 2019

Organised by:

KIT (Royal Tropical Institute) Health Unit Amsterdam,

The Netherlands

In co-operation with:

Vrije Universiteit Amsterdam/ Free University of Amsterdam (VU)

Amsterdam, The Netherlands

In co-operation with:

Vrije Universiteit Amsterdam/ Free University of Amsterdam (VU)

Amsterdam, The Netherlands

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List of Abbreviations

ANC	Ante-Natal Care
BPACR	Birth Preparedness and Complication Readiness
CBHWs	Community-Based Health Workers
DHO	District Health Offices
EmOC	Emergency Obstetric Care
HCs	Health Centres
HeRAMS	Health Services and Resources Availability Mapping System
HFs	Health Facilities
HUs	Health Units
HWs	Health Workers
LMICs	Low and Middle Income Countries
MCH	Maternal and Child Health
MDGs	Millennium Development Goals
MHVS	Maternal Health Voucher Scheme
MISP	Minimum Initial Service Package
MMR	Maternal Mortality Ratio
MoPHP	Ministry of Public Health and Population
MSI	Marie Stops International
MWH	Maternal Waiting Home
NGOs	Non-Governmental Organizations
PHC	Primary Health Care
PNC	Post-Natal Care
QoC	Quality of Care
RH	Reproductive Health
SBAs	Skilled Birth Attendants
TBAs	Traditional Birth Attendants
UNFPA	United Nations Population Funds
UNICEF	United Nations Children's Fund
UNOCHA	United Nations Office for the Coordination of Humanitarian Affairs
WHO	World Health Organization
YNHDS	Yemen National Health and Demographic Survey
YR	Yemeni Rial

Glossary

Birth Preparedness and Complication Readiness (BPACR): A list of behaviours and skills that addresses factors causing delay at various levels such as the individual, family, community, healthcare provider, health facilities and policy makers to effectively plan the delivery and make pregnancy and postpartum safe for mother and the baby (1).

Child Marriage: The marriage of a girl or boy before the age of 18 and refers to both formal marriages and informal unions in which children under the age of 18 live with a partner as if married. It affects both girls and boys, but it affects girls disproportionately (2).

Health Cluster: a platform for participating organizations to work together in partnership to harmonize efforts and use available resources efficiently within the framework of agreed objectives, priorities and strategies, for the benefit of the affected population(s). This includes avoiding gaps and/or overlap in the international humanitarian health response and resources (human and financial) (3).

Maternal Mortality Ratio (MMR): The number of maternal deaths per 100 000 live births (4).

Maternal Mortality: The death of women while pregnant or within 42 days of termination of pregnancy, irrespective of the duration and site of the pregnancy, from any cause related to or aggravated by the pregnancy or its management but not from accidental or incidental causes (4)(5)(6).

Maternity Waiting Home (MWH): A facility within easy reach of a hospital or Health Centre which provides emergency obstetric care. Women may stay in the MWH at the end of their pregnancy and await labour (7).

Millennium Development Goal 4 (MDG4): Reduce Child Mortality— sets a target to reduce the under-five mortality rate by two thirds by 2015 (4).

Millennium Development Goal 5 (MDG5): Improve Maternal Health—set a target of reducing maternal mortality by three-fourths by 2015 (4).

Signal Function of Emergency Obstetric Care: Key medical interventions that are used to treat the direct obstetric complications that cause the vast majority of maternal deaths around the globe (8).

Sustainable Development Goal 5 (SDG5): aims for global reduction of maternal mortality ratio (MMR) to less than 70 deaths per 100.000 live births (5).

Women of reproductive age: Refers to all women aged 15-49 years (4).

List of Figures and Tables

Acknowledgement

First and for most, praise to Allah the almighty and merciful for giving me the strength and the opportunity to pursue my dreams and undertake my master study and thesis research.

I am deeply indebted to my **thesis supervisor and my academic back stopper** for their continuous support, motivation and immense knowledge. Their patience and guidance helped me throughout my thesis research writing.

I would like to express my deepest appreciation to my friends **Hussien, Massimo, Samah, Farida, Hala, Nagween and Rehab** for being such great friends. Thank you for being always there and putting up with me in difficult times and keeping me go on to advance and follow my path to achieve my goals.

I cannot start expressing my thanks to my greatest source of strength and support, my parents. I would have not achieved anything in my life without their unlimited blessings, support and love. The blessings of my late father **Abdulbari Al-Qadasi** and his selfless love and faith in me, I would have not been who I am and where I am today without him. To my mother **Saleha Masood**, thank you for your unconditional love, care and sacrifices you did to shape my life and giving me the liberty to decide and pursue what I desired. To my Husband **Mario**, thanks for your continuous love and believe in me to follow my dreams.

I am also extremely grateful to my brothers, **Mohammed, Jamal, Yousef and Abdullah** and my sisters **Zainab and Balqees,** my solid rocks and my friends always. I would never be able to pay you back the love and support you showed me always.

A very special thanks to my nieces and nephews, specially my little friend my nephew **Akram**, your presence in my life fills my heart with comfort and tranquillity that are unparalleled in the world. Your innocent and unconditional friendship and absolute love for me do not compensate for anything.

Abstract

Background

War in Yemen has a great toll on the already weakened health system including maternity services. Women of reproductive age are among the biggest vulnerable groups and maternal mortality reverted since the eruption of the conflict in the country. Despite of the humanitarian interventions, there still is a huge gap between the needs and response.

Objectives

To analyse impact of the war on determinants of maternal mortality in Yemen, to provide recommendations for improvement to national policymakers and (inter)national organizations that participate in development and implementation of interventions in maternal health service delivery.

Methods

A literature review was done using existing peer reviewed studies and grey literatures. The three-delay model was used as framework to analyse the findings.

Findings

Phase 1: War deteriorated factors influencing women's health seeking behaviour (Socio-economic, cultural barriers, perceived poor quality of care, couples knowledge of danger signs and birth preparedness).
Phase 2: insecurity, long and bad condition of roads, delay at checkpoints and attack of ambulances worsen access to health facilities on time.
Phase 3: Damaged health facilities, health staff and resources shortage and poor maternity quality of care in primary health led to further delay for pregnant women to receive adequate and appropriate treatment.

Recommendations

In the current conflict, maternal health response needs a multi-sectorial approach by Ministry of Health and humanitarian partners. Evidence-based interventions during emergencies like maternity waiting home could be adopted and implemented to reduce the maternal mortality.

Keywords

Maternal mortality, Yemen war, three-delay model, interventions, humanitarian response

Introduction

Maternal mortality is a leading cause of death among women of reproductive age in Yemen. Over the last 15 years, Yemen has made progress towards reducing its national Maternal Mortality Ratio (MMR). Between 2003 and 2013, the MMR decreased from 365 to 148 deaths per 100.000 live births. In 2015 however, the MMR deteriorated again to 385 deaths per 100.000 live births, which is most likely due to the ongoing conflict in the country since March 2015 (9)(10). In crisis situations, "One in five women of childbearing age is likely to be pregnant" says the United Nations Population Fund (UNFPA 2017) (11). Women of childbearing age are among the most vulnerable groups in Yemen due to the war (12). In 2017 in Yemen, UNFPA estimated 2.2 million women and girls of reproductive age including 1.1 million malnourished pregnant women and 52.800 pregnant women are at risk of developing complications during childbirth (11). In Yemen the MMR is very high compared to countries in the region (Middle East) and is far from achieving the Sustainable Development Goal 5 (SDG5), which aims for the global reduction of MMR to less than 70 deaths per 100.000 live births (5). in 2017, the World Health Organization (WHO) reported that 50% of mortality in Yemen was due to communicable disease, maternal mortality (direct or indirect causes) and poor nutrition, while 39% of the mortality caused by non-communicable disease and the rest as a result of war casualties (13). In September 1981, the United Nations convention stated, "the elimination of all forms of discrimination against women". Access to comprehensive and high-quality reproductive health (RH) care for women is not an accessory but an essential and basic right (14).

From my experience as a humanitarian health worker in the past 6 years before joining Royal Tropical Institute (KIT), during and after the war in Yemen, I observed that women face challenges and barriers to access to health care services. This was either because of social, cultural and economic reasons or the scarcity of health facilities (HFs) and partial functionality of most of these health structures especially in the rural areas. I was involved in supporting and improving accessibility and quality of healthcare in Primary Health Care (PHC) structures including maternal and child health care (MCH) in rural and conflict affected areas and I have witnessed most of these challenges in the communities. Therefore, I am doing this research to shed light on the different factors that influence maternal mortality in my country, explore ways to overcome and mitigate these factors, to find possible evidence-based interventions implemented in similar countries that can be tailored to the situation in Yemen to improve the RH care services including maternity.

This literature review will be structured around three main areas. Firstly, to look into the factors influencing maternal mortality by using the three-delay model as a tool guide. Secondly, to explore applicable interventions or initiatives performed by organizations or the health system in Yemen or other countries with similar contexts and see the possibility of adopting some of these interventions to the situation in Yemen. Thirdly, to analyse and discuss the results. Based on these findings, recommendations will be made to national policymakers, international and national organizations and other health actors involved in health service provision in Yemen.

1. Chapter One

1.1 Geographical Background

Yemen is a barren country located in the Arabian Peninsula south west of Asia with an area of 527.970 km^2 and 2250 km coastline along the Aden gulf and Arab sea (15). It is composed of 22 governorates that are divided into 333 districts, 2210 sub-districts and 38.284 villages (16). It has borders with Saudi Arabia to the north and Oman from east, while its bordered by the Arabian sea from the south and the Red sea from the west (Figure1) (16)(17). Yemen landscape and climate varies between hot and humid coastlines, temperate plateaus, mountains highlands and desert areas. Before May 1990, the north and south were separated into Yemen Arab Republic in the north and the People's Democratic Republic of Yemen in the south. The country was unified in May 1990 and became the Republic of Yemen (18).

Figure 1: Yemen's Map (17)

Source: Yemen map and satellite image. Geology.com

1.2 Population

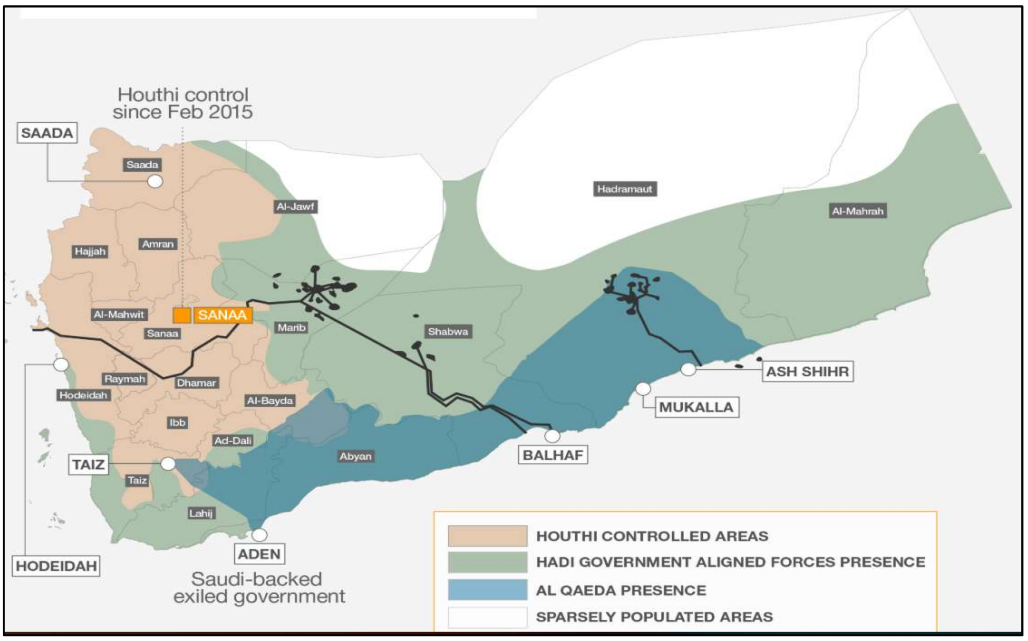
In 2017, Yemen had a total population of 28.25 million people, with 36.02% and 63.98% of the population living in urban and rural areas, respectively. There was a population density of 48.6 of people per m^2 (19)(20). The annual population growth rate is 2.4%, the fertility rate is 4 and the life expectancy of the individual is 65 years (17). Around 39% of the population is under the age of 15 and women of reproductive age are estimated of 25.1% of the total population (21).

1.3 Conflict in Yemen

In 25th of March 2015, a conflict erupted in Yemen after the government (represented at that time by Ali Abdullah Saleh, former Yemen president since 1978) failed to meet the expected peaceful political transition to the president deputy Mr. Abdurabbuh Mansour Hadi. This transition was supposed to bring peace and prosperity to Yemen after the uprising of Arab spring in 2011. The new president Hadi faced difficulties to tackle the wide range of challenging problems in the country, including Al-Qaida attacks, Southern independence movements and loyal tribal supporters of the former president (22).

In September 2014, the Huthis (Zaidi Shia group) with the support of military forces loyal to the former president (Ali Abdullah Saleh) took control of the capital city Sana'a and major areas of the northwest of Yemen and forced president Hadi to escape to Aden (15)(18). In March 2015, the Huthis moved towards Aden and the Southern governorate, the Southern independent movement and the popular resistance have fought against them and have gained momentum in their calls for the separation of the south from the Republic of Yemen (15). Saudi Arabia formed a coalition with other Arab allies' countries including the Gulf countries (supported by the USA and UK) and leading airstrikes in Yemen targeting Huthis in Sana'a and other parts of Yemen where the conflict is still ongoing (15)(18). In addition, the presence of Al-Qaida in Yemen and other Islamic affiliations increase the complexity of the situation in the country, which makes it a multifaceted local, regional and even international power conflict. Areas are controlled by many different political parties, which worsens the security situation and complicates the accessibility and movement of the population from one area to another in the country (figure 2) (23).

Figure 2: Political Parties' Areas of Control in Yemen (23)



Source: the crisis in Yemen. From www.arcgis.com

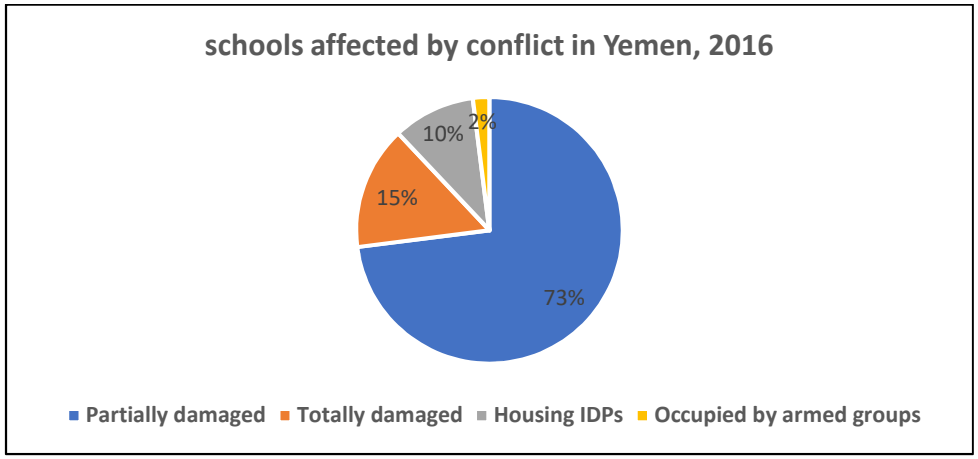
1.4 Economic Status

Yemen is classified amongst the poorest countries in the Middle East and worldwide (21). In 2018, it was ranked 178 out of 189 countries in the Human Development Index (HDI) with HDI value of 0.452 (24). In 2019, according to United Nations Office for the Coordination of Humanitarian Affairs (UNOCHA), 81% of the Yemeni population are living under the poverty line compared to 42% in 2014 (12)(25). And around 19% of the population is under the income line of 1.90 USD per day (26). The gross domestic product (GDP) per capita has decreased from 518 USD per person to 290 USD between 2014 and 2016. In addition, the GDP declined by 32.9% and the inflation rate increased by 30% (27). In January 2019, it was estimated that 67% and 53% of the total population are facing acute severe food insecurity in areas with humanitarian actors' intervention compared to areas without intervention, respectively (28). The economy has shrunk by 50% in the last 3 years and the employment and income opportunities intensely declined (12).

1.5 Education Status

Educational services in Yemen have shown some progression in the past decades. Between 1997 and 2013, the proportion of population aged 6 years and above with no education had declined from 67% to 43% and from 33% to 21% for females and males respectively (25). Unfortunately, this progression has been affected by the current situation and education services are lapsing. But even before the emerging conflict in 2015, 43% of females and 21% of males had never attended school and only 12% of females reached secondary school or higher compared to 23% of the males (25). An estimated 2 million children representing 27% of children at school age are out of schools (27). In 2016, about 1604 (27%) school structures in 20 governorates were either damaged or occupied by internally displaced people (IDP) or armed groups; resulting in 1 in 5 schools across the country that are not used anymore (figure 3) (25)(27)(29).

Figure 3: Schools Affected by Conflict in Yemen, 2016 (25)(29)

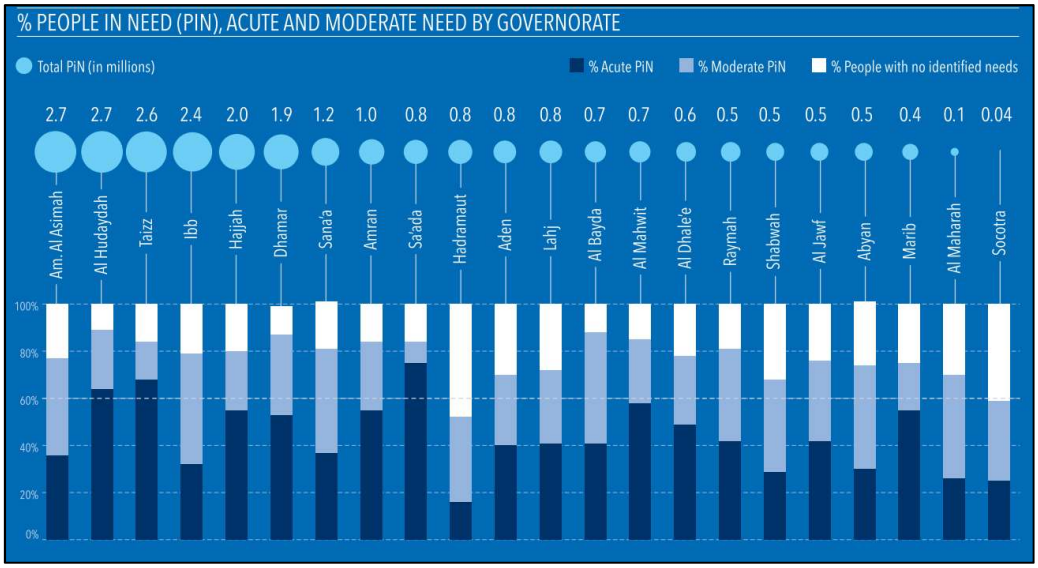


Source: Ministry of Planning and International Cooperation, 2016.

1.6 The Humanitarian Situation in Yemen

In Yemen, significant humanitarian needs existed even prior to the escalation of the war including health services, food and access to clean and safe water. The conflict exacerbated and worsened these humanitarian needs. It has been four years since the conflict started in Yemen and the humanitarian crisis is classified as the worst in the world pushing the country to the edge of famine. 20 out of 22 governorates have been affected by the conflict. The civilians tolerate the impact of the conflict and violence with an estimated 80% of the population (24.1 million people) in need of humanitarian assistance (figure 4), of which 14.3 million are urgent (12). 18 million lack access to adequate healthcare services. Two million children under 5 and one million pregnant and lactating women need treatment for acute malnutrition (12) (30)(31). 3.34 million IDPs and 17.8 million people are in need of water, sanitation and hygiene assistance.

Figure 4: Percentage of People in Need of Humanitarian Assistance (Acute and Moderate) by Governorate (12)



Source: Yemen Humanitarian Needs Overview UNOCHA, 2019

1.7 Health System in Yemen

Yemen has adopted the PHC approach in 1978 (Alma Ata conference) and in order to implement this approach it established a four-tier health delivery system (figure 5) based on the public health law No. 4 of 2009 and its mandate (32). In 2008, there were 3853 public HFs [2774 health units (HUs), 842 health centres (HCs) and 237 hospitals] distributed over the four key levels and 45% of the HFs provide prenatal care services (32). Generally, the health system in Yemen was weak prior to the conflict and faced many challenges such as poor quality and low efficiency of services, inequity in distribution of HFs and manpower and underutilization of the services. The emerging conflict led to deterioration of the health care system resulting in poor and low-quality health services and high morbidity and mortality rates.

In 2000, the Yemeni parliament adopted a local administration law decentralizing several governance functions giving the 22 governorates the autonomy to manage the health services by the governorate health offices (GHO). These managerial roles include; (a) allocation of resources and (b) human resources planning for the district health facilities, (c) monitoring and regulation of activities and outcome and (d) monitoring of referral system within the governorates (33). Therefore, the Ministry of Public Health and Population (MoPHP) focuses on planning, regulation and provision of public health and preventive services. At the district level the health services are administered by the district health offices (DHO). In the same year, the MoPHP adopted the health sector reform strategy aiming mainly to decrease the gaps addressed in the health system and strengthen the weaknesses through focusing on; decentralizing of the health system management to the governorate and district level, community co-management, redefining the public sector role enabling them to use their resources at the best for quality assurance, policy and regulation of the entire sector and encouraging the private sector and non-governmental organization participation (33). Health services in Yemen are provided through the following structures; (1) the public sector including MOPHP's facilities, Ministry of Interior's facilities, Ministry of Defence facilties and Aden Refineries, private health sector (profitable) and charitable health sector (non-profitable) (32).

Figure 5: Health System Levels in Yemen (32)

Source: Yemen National Health Strategy ,2013

- **First Level:**

It is the first contact and access of the population to health services. This level includes HUs and HCs that provide a basic package of preventive and curative health services for the served community. The number of these HUs and HCs has increased, but there are disparities in the distribution of the facilities, and some are not functional. The HCs and HUs are structured without clear and specific visions and not referring to the health sector strategies. In addition, the shortage of health workers, low community participation, geographic diversity and scarcity of resources hinder the accessibility to care and affect the Quality of Care (QoC) (32).

- **Second Level:**

This level includes health services provided by the hospitals at the level of the districts and governorates. There is a total of 235 hospitals, of which 53 are governorate hospitals and 182 district hospitals and they manage patients that couldn't receive the appropriate treatment in the PHC (32).

- **Third Level:**

These are the referral hospitals that provide specialized interventions and there are only two of them in the capital. The hospitals at this level deal with the referred complicated cases from the second level, but they are not eligible or have the capacity to treat all the referred cases to them. Some of these cases require special treatment in highly specialized institutions, which is sometimes abroad (32).

- **Fourth Level:**

The fourth institutions offer specialized interventions; cancer centres, cardiology or dialysis centre, blood bank and rehabilitation centre. They are mainly present in the capitals (Sana'a and Aden governorates) (32).

1.7.1 Yemen RH Care Policy

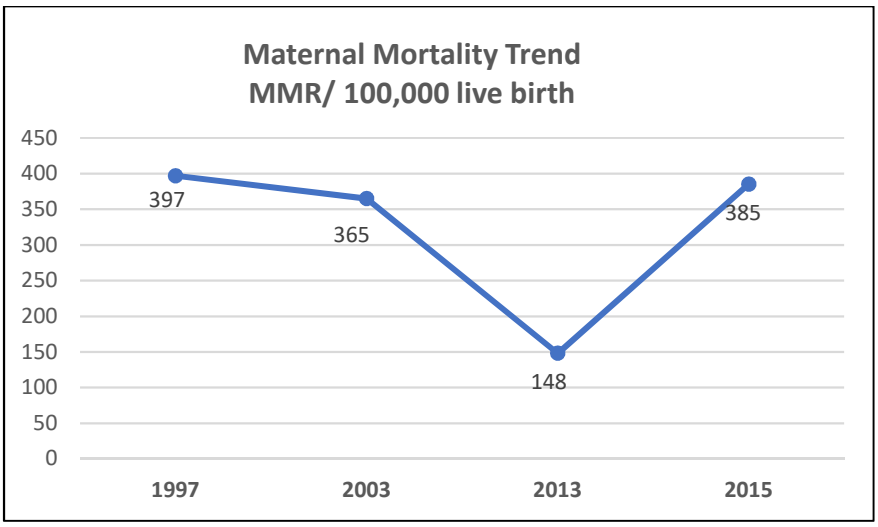
To achieve the goal of providing comprehensive and integrated RH care services; the RH strategy was established in 2001. Between 2001-2010, the focus was on the integration of services for mother and newborn health including the following six RH components; (1) Maternal and Neonatal Health, (2) Family planning including infertility, (3) Sexually Transmitted Infections and HIV/AIDS, (4) Adolescence and Youth RH, (5) Early detection of breast cancer & cervical cancer and (6) Management of menopause and menopausal-related disorders (34).

In the most recent RH strategy (2011-2015), the main mission was to accelerate the progress towards achieving the RH targets for the MDGs 4 and 5. The main objectives were to increase the utilization of maternal and neonatal health services including the Emergency Obstetric Care (EmOC), family planning and modern contraception (34).

1.8 Maternal Mortality Situation in Yemen

Maternal mortality in Yemen is among the highest ranks 30th out of 181 countries worldwide (35). The trend of maternal mortality showed a decline between 2003 and 2013 but relapsed again in 2015 due to the conflict (figure 6) (9)(10). In 2016, according to the United Nations Children's Fund (UNICEF), in Yemen 1 in every 370 women died during pregnancy, childbirth or postpartum compared to 1 in 909 in the Middle East and north Africa region (36). In developed countries the lifetime risk of maternal death is 1 in 4900 comparing to 1 in 60 in Yemen (37)(38).

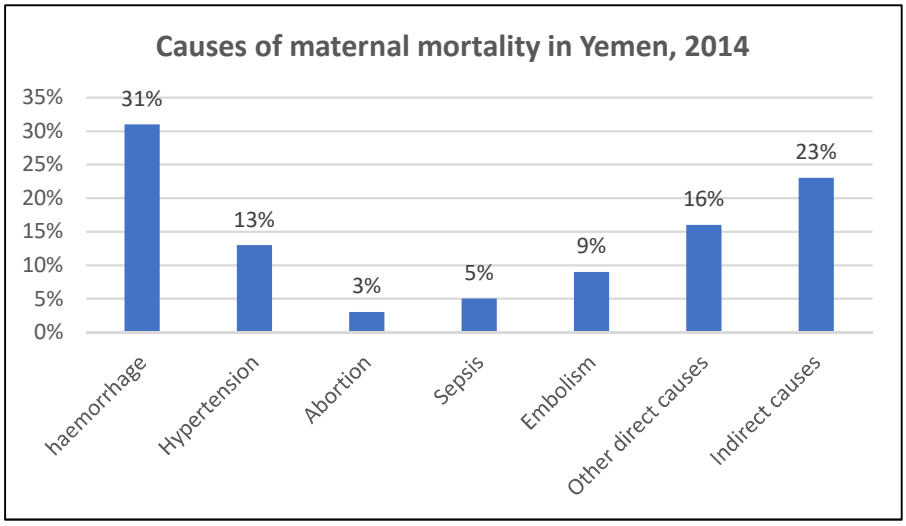
Figure 6: Trend of Maternal Mortality in Yemen (1997-2015) (9)(10).



Source: Yemen National Health and Demographic Survey, 2013 and S. Othman, T. Al Mahbashi and A.Alabed et al, 2017

According to WHO in the country cooperation strategy for 2008-2013, low ante-natal care (ANC) coverage, low rates of births attended by a skilled health professional and poor knowledge and illiteracy of the community contributes to maternal mortality (39). In addition, the political situation worsens the status of the health services availability and functionality as well, knowing that the health system was already struggling even before the war in 2015. Looking at the causes of maternal mortality in Yemen, they are similar to global causes mainly; haemorrhage 31%, hypertensive disorders 13%, abortion 3%, sepsis 5%, embolism 9% and other direct causes 16% and indirect causes 23% (figure 7) (40).

Figure 7: Causes of Maternal Mortality in Yemen (2014) (40)



Source: Maternal, Neonatal and Child Survival, 2018

2. Chapter Two

2.1 Problem Statement and Study Justification

Globally, maternal mortality has drawn attention in the last few decades. Efforts were made towards decreasing maternal mortality starting from the international conference for population and development in Cairo 1994; which was the first step to acknowledge the importance of women's RH rights and set the goal of universal access for RH services by 2015 (41). Similar goals were highlighted in the fourth world conference held in Beijing 1995 and which stressed the profound impact of lack of access to sexual and RH services (42). In September 2000, at the world millennium summit, the Millennium Development Goals (MDGs) were launched, including improving maternal health in the MDG 5 (5)(43). MDG 5 called for a 75% reduction of MMR globally from 1990 to 2015 and universal access to RH services by 2015 (43).

Regardless of the global reduction and progress towards achieving the MDG5, disparities are still there between the developed and developing countries, where 99% of maternal mortality occurred in developing countries (1). Almost 80% of pregnancy-related maternal mortality is preventable and evidence has shown that this is possible if women have access to basic and essential maternity health care services (44). Despite the scarcity of information regarding the impact of the conflict on maternal mortality, it is observed from the available resources that the crumbling health system is significantly affected by the war; including availability and accessibility to maternal healthcare and EmOC (45)(46). In Yemen, between 2013-2018, maternal mortality increased from 5 to 12 maternal deaths per day due to the escalated conflict and lack of accessibility to services (47). There are only less than half of the HFs fully functional with a shortage in staff, medication, and equipment (13)(48). In 2018, only 18% of HFs provide maternal and newborn healthcare services, which indicates the severity of the situation (45). Improvement is possible by ensuring well-trained staff, availability of equipment, drugs and emergency services (44).

2.2 Research Objective

2.2.1 Overall objective

To analyse how the war influences the determinants of maternal mortality in Yemen including the implementation of RH care strategies and policies, to provide recommendations to national policymakers, (inter) national organizations that participate in development and implementation of interventions in maternal health service delivery.

2.2.2 Specific Objectives

1. To explore the impact of war on the determinants of maternal mortality in Yemen.
2. To review safe motherhood strategies and policies practiced in Yemen and find the implementation challenges and opportunities and the influence of war.
3. To review safe motherhood evidence-based interventions by the MoPHP and Non-Governmental Organizations (NGOs) in Yemen and other countries with similar contexts.
4. To make recommendations to policymakers, public health professionals, local and international organizations to adopt the suited strategies and interventions found in the literature.

2.3 Methods

2.3.1 Research Method

This literature review is based on the available published studies found; peer reviewed, grey literature and reports from reliable sources (MoPHP and NGOs).

Table 1: Research Strategy

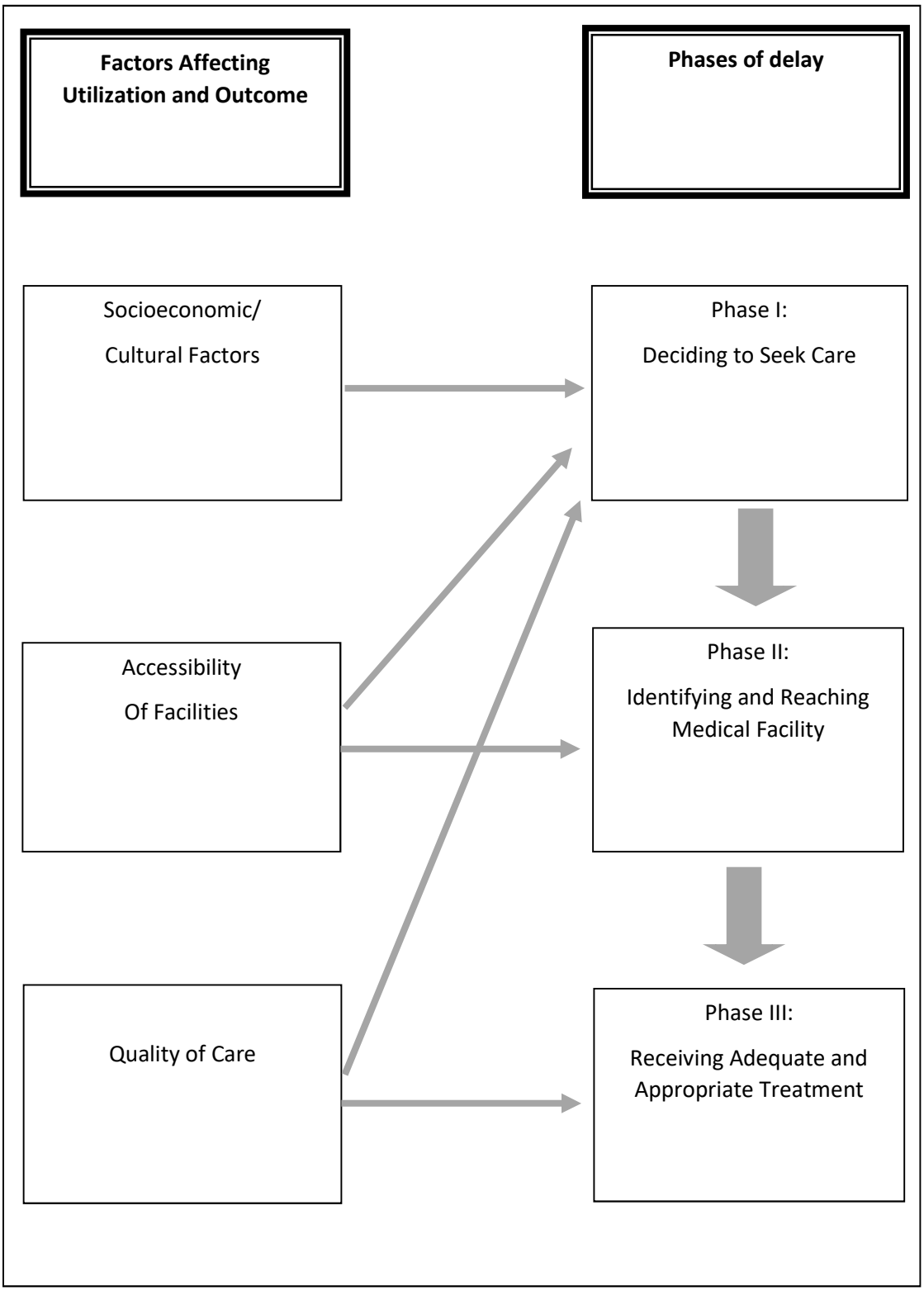
Type of study	Sources	Keywords
Published peer reviewed studies	Google scholar, VU library, research gate, journals, Pubmed	Safe motherhood, emergency obstetric and war, conflict in Yemen, EmOC interventions, socio-economic, cultural factors, determinants, maternal mortality in Yemen, gender inequality, humanitarian response, human resource, health system, distance, cost of service, decision-making, autonomy,
Reports and grey literature	NGOs and MoPHP reports, google, institutional and journal news release website	

2.3.2 Conceptual Framework

The Thaddeus and Maine three-delays framework is used to structure and analyse the research findings (figure 8) (49). This model was chosen because it helps to explore the different influential factors that contribute to maternal mortality in different levels of the delays, which impacts maternal health and can lead to maternal mortality knowing that most of these causes are preventable if they are intervened in an adequately and timely manner. The study also analyses most aspects of maternal mortality determinants influenced by the war and compare the situation before and after the war. The three-delay model composed of three phases of delays (49):

1. **Phase 1 delay:** delay in decision-making to seek care at the level of the individual, family or both. This delay is influenced by many factors including; people involved in the decision making (spouse, relative or family member), the financial burden, the distance from health facility, health status of the woman and the perceived QoC (49).
2. **Phase 2 delay:** delay in reaching an adequate health care facility. This is affected by factors like availability and affordability of means of transportation, the distance from home to the health facility, the condition of the roads and the distribution of the HFs in the area (49).
3. **Phase 3 delay:** this is the delay in receiving adequate care at the level of the health facility. Many factors are involved at this stage such as; shortage in health personnel, availability of well trained and competent health professional, lack of equipment and shortage of medications and supplies (49).

Figure 8: Three Delays Framework (Thaddeus and Maine, 1994) (49)



3. Chapter Three: Research Findings

In this chapter the different determinants that influence women's autonomy for making decision to seek health care during pregnancy, delivery and postpartum care are presented following the three-delays model.

3.1 Phase One: Decision to Seek Care

In this phase, the barriers that influence the decision-making to seek health care are represented in three main categories:

- The socio-economic and cultural factors (autonomy of decision- making and women's status, educational status and knowledge of illness, and economic status),
- The accessibility factors (cost and transportation)
- The QoC and its acceptability by the community and the women.

3.1.1 Socio-Economic Factors

3.1.1.1 Autonomy in Decision-Making and Women's Status

A qualitative and quantitative study done in four districts in Sana'a has shown an obvious inadequacy of women self-decision-making capacity related to RH care (including pregnancy and delivery care) and men preference of having decisions of RH related issues (50). Another study in Sana'a showed that 3.9% of the women did not return to the health facility to continue ANC follow up because of their husbands' refusal to let them go (51). Due to the ongoing conflict, the decision making has even become more dominated by men at the community level due to the insecurity (52). Men are the dominant household decision-makers and mainly women's lives and health are in the hands of their spouses or male family member (53). Women's decisions regarding their health needs is controlled by the men who has the financial and decision-making power, and this has even worsen by the current conflict, because women became more vulnerable and dependent on them (52). A study conducted in four districts in Sana'a city about the RH seeking behaviour of the women; more men said, "the husband is the decision maker as he is more aware of the preferable type of care and the HFs compared to his wife" (50). In the same study, men said that women can't attend HFs located in remote areas without being accompanied by a man, which shows that norms and cultural beliefs and values also have an influential effect on the women's ability and power to decide (50)(54). Women's status in the family and in the community is another important factor that influences her decision-making to access and utilize health care services timely. In Yemen National Health and Demographic Survey (YNHDS), 80% of the women indicated their feeling "not want to go alone" as a common factor impeding them from accessing the health care services (9). Women still tend to seek health care that is chosen by their husbands who determine type of care and the facility to visit (55).

3.1.1.2 Women and Men's Knowledge of Illness Factors and Preparedness for Safe Delivery

Several studies showed evidence that implementation of birth preparedness and complication readiness (BPACR) has improved the knowledge of pregnant women on the danger signs of pregnancy-related complications and planning for safe delivery under skilled health personnel and avoiding delay of seeking care (56)(57)(58). During my work as a doctor in hospital and in the humanitarian field in interventions involved maternal health, I observed that lack of BPACR including ANC visits and health education to couples were the most common reasons of complicated deliveries and late arrival and/or referring to HFs. There are not many evidence-based studies from Yemen on this

subject. But studies in similar context of Low and Middle Income Countries (LMICs) like Tanzania, Ethiopia and India showed low BPACR of pregnant women influenced their seeking behaviour for safe delivery. In Bengaluru in India, less than half of the pregnant women who participated in the study were not well prepared for delivery (1). Aspects of BPACR such as; saving money, arranging mode of transportation and a companion for pregnant women varied between studies. In Bengaluru India, more than half of the women saved money for delivery expenses and identified mode of transportation, while another study in Tigray region in Ethiopia showed that less than half of the families saved money or arranged transportation for emergency preparedness (1). Knowledge and early detection of danger signs related to pregnancy influence BPACR and improve health care seeking behaviour (1). A cross-sectional community-based study in Sana'a city showed that out of the 460 mothers participated in the study, 60% of them didn't know about pregnancy-related danger signs and the mentioned signs known by the mothers were bleeding and hypertension 63.8% and 31.9% respectively (51). While another cross-sectional study in Mukalla city showed that about two third of the participated women were educated about the danger signs of pregnancy in the HFs (55). In a cross-sectional study conducted in Tanzania, more than half of the women and men could not remember any of the danger signs of pregnancy-related complications (59). The difference in knowledge about danger signs was significant between pregnant women and their partners, which may indicate limited male involvement in maternal health services (59). Another BPACR study among rural mothers in India showed that women gained the BPACR knowledge from their previous experiences. The same study found the readiness and preparedness was lower among the Muslim mothers compared to the Hindu mothers which was explained to be a result of their conservative attitude for outdoors exposure (60).

Many factors affect the husband's involvement in BPACR. The most common ones are their knowledge about BPACR, health and facility services, communication problems and cultural factors (61)(62). Many studies explored male involvement in maternal health in Kenya, Ghana, Malawi and Uganda (63)(64)(65)(66). In Uganda, the study showed that male partners who had more knowledge and information about the importance of ANC were more likely to accompany their wives during the visits and those women were more likely to utilize Skilled Birth Attendants (SBAs) (66). Qualitative studies in rural western Kenya and in Ghana showed that male involvement in maternal health was limited unless the women had a complication. Main barriers identified for male involvement in these studies were firstly believing that pregnancy support is a female role and the male is the breadwinner. Secondly, negative unfriendly attitudes from health workers (HWs) towards male participation which demotivate them to join their spouses during the visits. Thirdly, unfavourable opening hours for the men when they might be working. Fourthly, lack of space to accommodate male partners which is challenging for husbands to feel comfortable going to the HF. Fifthly, social barriers such as perceiving male partners who accompany their wives to be dominated by their wives (63)(64). Other studies in Ghana showed that even though women could recognize the benefits of male involvement in their maternal health, they still had negative attitude towards it. Their main reasons were firstly to avoid the social negative stereotyping of dominant wife which is perceived as witchcraft practice. Secondly, pregnancy and childbearing are a women's business and men are the providers, so no need for the men to be involved in it. And thirdly, their fears that men involvement would turn HFs from a secure space to an insecure one. Women see the visits to the HFs as a space for gathering and meeting other women and have their own private time away from their men (67). In Ghana, many initiatives involving men in RH programs were carried out, but these initiatives focused more on family planning, sexual behaviours and had limited attention on the importance of male

participation in supporting their spouses to seek care during pregnancy and childbirth (68)(69)(70).

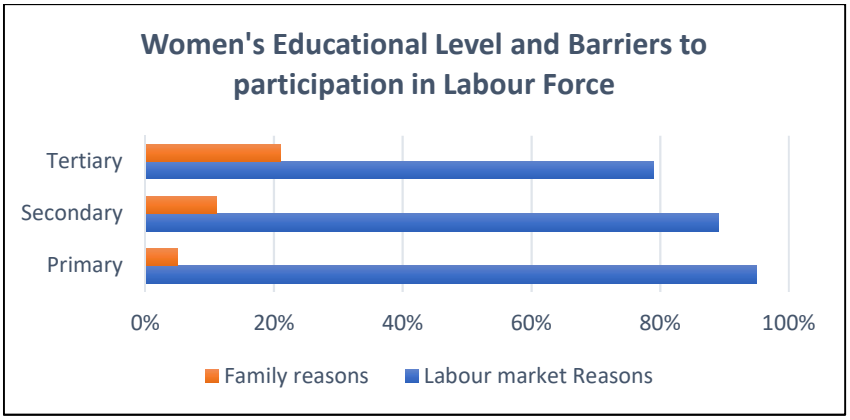
3.1.1.3 Health Workers' Knowledge of Illness Factors and Provision of Counselling to Expecting Mothers

The knowledge of health providers such as community-based midwives is important, because they are involved in the awareness and education of pregnant women. A cross-sectional study among Yemeni community-based midwives in four governorates showed overall 72% of the midwives had medium knowledge and only 5.9% had high knowledge about the maternal continuum of care (ANC, normal delivery, newborn care, postpartum care and management of complications) (71). Nevertheless, a systematic review for 11 LMICs in resource-limited settings indicated that high recognition of high risk symptoms related to pregnancy doesn't always result in high care seeking behaviour (72). A study in Nepal found that more than one third of the HWs had insufficient knowledge of MCH including ANC, delivery and postnatal (PNC) care and this may affect female awareness and health seeking behaviour (73). A study of "counselling and knowledge of danger signs of pregnancy complications in Haiti, Malawi and Senegal" showed that the level of counselling provided by the HWs on the danger signs were insufficient taking into account the importance of pregnant women to recognize the danger signs to seek health care on time (74). Only about half of the women in Haiti and Malawi received counselling on the pregnancy-related danger signs and one third in the Senegal (74). The same study showed significant relation between receiving the counselling services and increasing the number of danger signs pregnant women knew (74). Several studies reported low levels of counselling and women's knowledge of pregnancy-related danger signs (75)(76)(77)(78). A study in Eastern Sudan showed 88.1% of the women didn't know any of the danger signs and most of them claimed that they spent five minutes or less with the health providers during their ANC visits (75). A cross-sectional study in Gambia showed that despite the large proportion of women attending ANC visits they didn't benefit so much from their visits as they weren't sufficiently informed or educated on the important symptoms and signs related to pregnancy complications (76). Only 40% could recall being informed of BPACR factors such as place of birth or education on nutrition and less than 20% were informed of birth preparedness and actions in case of complication occurred (76).

3.1.1.4 Economic Status

In many countries worldwide, the social, cultural and economic status of the women influence their decision and impede their access to health care services. In Yemen, there is gender inequality when it comes to the social, economic, cultural and political powers division leaving the women more prone to the burden of poverty especially in rural areas (79). A Yemen labour force survey (2013-2014) showed that the unemployment rate was higher among women and their salaries were less compared to the men (26.1%-12.3% and 40.000 YR-53.000 YR), respectively (80). According to YNHDS, only 10% of the married women are employed and this may be influenced by their marital status (9). Below (figure 9) shows that 79%-95% of women with any form of education (primary to tertiary) indicates personal and family reasons as barriers to participation in the labour force (80).

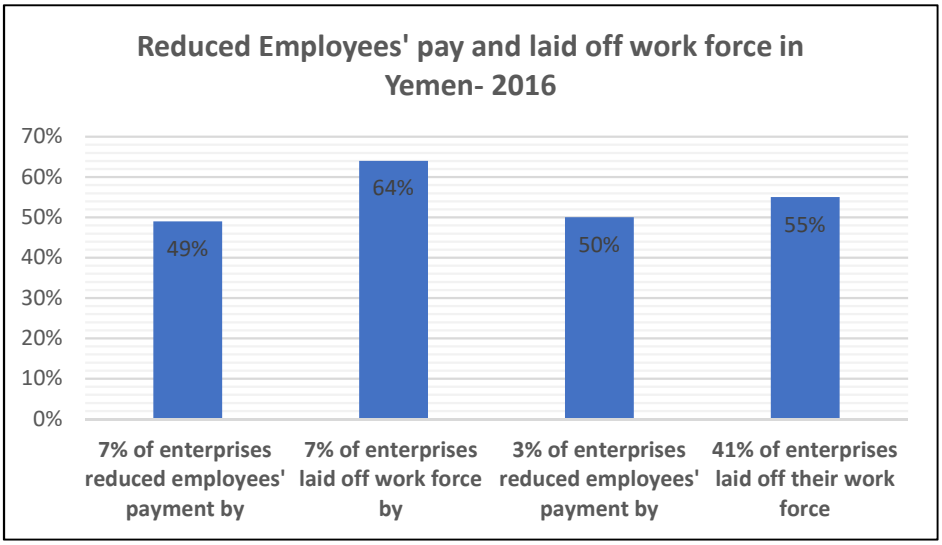
Figure 9: Women's Education Level and Barriers to Participation in Labour Force (2014) (80)



Source: Yemen Labour Force Survey 2013-14

Agriculture accounts for 29% of the total employment and 51% of women work in this field, which is greatly affected and constrained by the conflict because of insecurity, displacement, damaged irrigation systems and costly farming tools (12)(80). The conflict has exacerbated the socio-economic and political inequalities in Yemen, women and girls (especially female headed households) are the most vulnerable group and this affects their mobility and access to health care services (12)(25). In 2018, Yemen ranked 149 out of 149 countries in the world economic forum of global gender gap index, stating that Yemeni women occupies only 7% of the managerial positions and only 6.3% participate in the labour force (81). In 2016, 1.25 million employees in the public sector and their families were deprived of their main source of income (27). Due to the conflict 41% of companies laid off 55% of their work force and others reduced their employees' salaries (figure 10) (27). The economy has shrunk by 50% in the last 3 years and the employment and income opportunities dramatically declined (12). The lay off from work and loss of household income can affect women's decision to seek care due to the family financial constraints.

Figure 10: Reduced Employees' Pay and Work Force Laid off (Yemen 2016) (27)



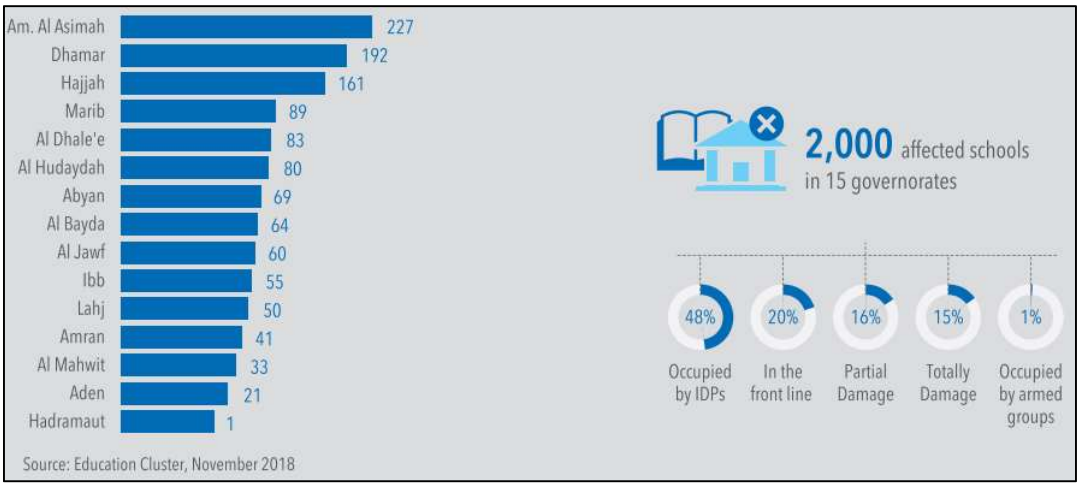
Source: Ministry of Planning and International Cooperation, 2016.

3.1.1.5 Educational Status

In Yemen, well educated women have better socio-economic status, better chances to access health care services and health information and have decision-making autonomy compared to women with a lower educational level who are less privileged to have all of that (53)(50)(54). According to YNHDS in 2013, 80% of maternal mortality occurred in women with no educational background compared to 20% with formal education (9). A study in Mukalla city showed that women with higher level of education had shown better ANC seeking behaviour, higher preference to deliver in health facility and high attended rate of birth by skilled health personnel (55). Similarly, a study in "utilization of antenatal care services" in Sana'a city stated that there was strong association between the educational level of the mothers and the ANC visits (51). A systematic review of "maternal and neonatal service usage in fragile and conflict affected countries in Asia and middle east" showed the increasing in SBAs and higher usage of facility based delivery was associated with education of mothers (82). A sample study conducted by Marie Stops International (MSI) in three governorates (Sana'a, Taiz and Ibb) on "the knowledge and attitudes about RH services" stated that level of education showed a significant correlation to the level of knowledge about RH and access to information (83). Women with a higher level of education have a 43% chance of being employed compared to a 7-9% chance for the less educated women (9). Increasing chances for education and employment may have an influence on better access to RH care due to financial independency and better family income in general.

The education system has been disrupted by the conflict (figure 11) with over 2000 schools totally or partially damaged and others occupied by the IDPs in 15 out of 22 governorates (12). Displaced families with limited resources deprioritize their needs and girls are more likely to lose access to education. 36% of the girls are out of the education system compared to 24% of the boys, this could be due to the family prioritization of boys' education over the girls (12). Also, child marriage has increased three fold between 2017 and 2018 (12). The limitation of girls' access to education due to the recent situation may negatively impact on their decision-making and health seeking behaviour in the future.

Figure 11: Affected Schools by Governorate and Status (UNOCHA, 2019) (12)



Source: Yemen Humanitarian Needs Overview UNOCHA, 2019

3.1.2 Perceived Quality of Care (QoC)

The perception of QoC including; health system infrastructure, availability of drugs and essential materials and health care provider attitudes and behaviour are key determinants in decision making whether to seek health care or not (84)(85). Generally, the service delivery and quality of health care was poor in Yemen even before the conflict and it was perceived like that by the community (86)(30). In many cases women prefer giving birth at home because of their family support, lack of friendly environment at the HFs and long distance to HFs (54)(87). In a study conducted in Mukalla city, 61% of women indicated their preference to deliver at home for privacy reasons and comfort that was lacking in the HFs (55). A study conducted in Sana'a has shown that women didn't go for professional consultations, because of rudeness of the health care providers and perceived high cost of care (23.8% and 41%) respectively (88). Another study in Sana'a showed that mistreatment of the disease and long waiting hours were another reasons not to return to the HFs (51). Other reasons mentioned by the women were their perception of poor communication, interaction and listening skills of midwives and birth attendants trained staff (53). There is scarcity of data of QoC in Yemen specially related to patient perception, but a study in Mukalla PHCs has shown an overall QoC rating of less 50% in the population (89).

3.1.3 Accessibility Factors

3.1.3.1 Distance and Other Barriers

Disparities of the location of HFs in remote areas are main challenges for women and affects their health seeking behaviour. In a mixed qualitative/quantitative study about women's RH seeking behaviour, most of the participating women said that a nearby HF would encourage them to use it (50). Three in five women (59%) mentioned the distance as a barrier for them to take a decision to seek care and access the HFs (9). Studies in Sana'a city showed that around 6% of the women didn't return to the HF for ANC because of the cost of transportation and distance of the facilities, while around 32% of women go to the facility by foot (51)(50). The longer the distance and the worse the condition of the roads the higher the cost of transportation. In addition to the cost of transportation, the insecurity in the country makes the condition worse (25). In a similar context in Somalia, logistical obstacles (long distance and lack of transportation means) and the financial burdens were addressed as barriers of decision-making and access

EmOC services for the rural and nomadic population (90). The number of functional HFs reduced as a result of the attacks and damages into the infrastructure (30). So increasingly, families are less advantaged and motivated to seek health care due to the decreased number of facilities, long distance, high cost of transportation and insecurity imposed by the ongoing conflict (25)(12). From my observation during my work in the conflict time, there are other influential factors that contribute to first phase delay, such as unawareness of the health providers or the patients on functional HFs available in the area and lack of proper communication between the HFs staff for facilitate patients' access.

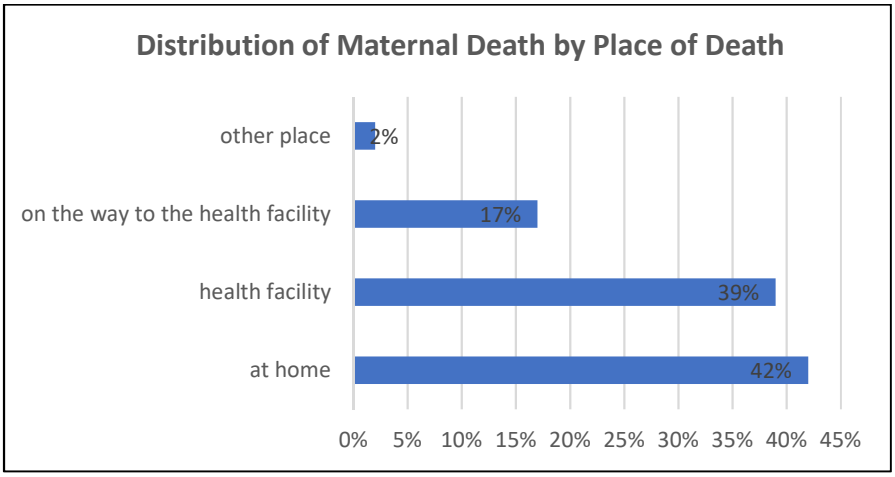
3.1.3.2 Cost of Services

Yemen had adopted fee exemption for RH services including maternity, but this strategy doesn't ensure any financial compensation to the HFs (34). So in reality the free services are not free, patients are charged a basic service fee for some of the free services to cover the running costs of the health facility and this results in low uptake of the RH services and may provoke the 1st and 3rd delay (34). Around 98% of women of childbearing age do not have health insurance and most of the out of pocket charge is a flat-rate in public and private health sectors as well as inpatient and outpatient services (9)(30). From my personal observation, the normal delivery in public facility costs 5000 to 7000 Yemeni Rial (YR) and can reach up to 20.000 YR with laboratory tests and medication and the caesarean section costs around 30.000 YR. While in the private sector the normal delivery costs between 50.000 to 100.000 YR and the caesarean section costs ranges between 200.000 to 400.000 YR. There is a disparity in the delivery cost between the public and private sectors. The private hospitals increased the prices significantly to compensate for the currency difference and their profits. In Yemen, 70% of HFs are operated by the private sector, this has an impact on the women's accessibility to health care even before the war and worsen afterwards (91). In a study about the "effects of reproductive morbidity on women's lives and cost of accessing treatment in Yemen" half of the participating women indicated cost as a main barrier for seeking health care, because they still have to pay for the laboratory tests and medications (92). Furthermore, one quarter of the decisions to deliver at home were influenced by the cost factor (9). Another study showed that 35% of female preference to deliver at home was related to the less cost (55). Most of the women considered the ANC and delivery care in public sectors expensive compared to the family planning services (50). In Somalia, user fees were also addressed as one of the barriers to access RH services, where the normal delivery cost USD 10-15 (5.000-8.000 YR) and CS between USD 160-450 (80.000-225.000 YR) (90). The unstable situation in Yemen has driven up the cost of health services and medications, because of the increasing inflation rate, dropping currency value and difficulties to import the medications (12)(90).

3.2 Phase Two: Identifying and Reaching Medical Facility

The bad condition of the roads, the distance to HFs and lack of transportation means are challenging factors to reach adequate HF. According to the YNHDS 42% and 17% of maternal deaths occur at home and on the way to the health facility, respectively (figure 12)(9). The high percentage of maternal death on the way to the HF suggests the logistical barriers issue as a main cause. Prior to the conflict, there was about 58.000 km non-urban roads in Yemen of which only 14.000 km were paved, and the roads condition may have become even worse due to the conflict (93). Since the beginning of the conflict in 2015, different conflict parties set many checkpoints and roadblocks across the cities which severely hinder the people's movement and challenge delivery of services to affected populations (36). In 2018, the International Rescue Committee reported around 70 checkpoints in 300 miles distance between Sana'a and Aden city only (94). Some of the checkpoints even ask for illegal fees often a percentage of the cargo to allow vehicles to pass (95). Similarly In Somalia, poor accessibility to EmOC centres due to long distance, insecurity and lack of transportation were addressed (93). In addition, in some areas controlled by armed groups women can't travel alone without a male companion which is a cultural obligation. These movement restrictions may lead to women's reluctance to take the decision to go or fear of being denied access to health care especially in rural areas and this provokes more delay in first and second delays (25).

Figure 12: Distribution of Maternal Death by Place of Death (YNHDS, 2013) (9)



Source: Yemen National Health and Demographic Survey, 2013

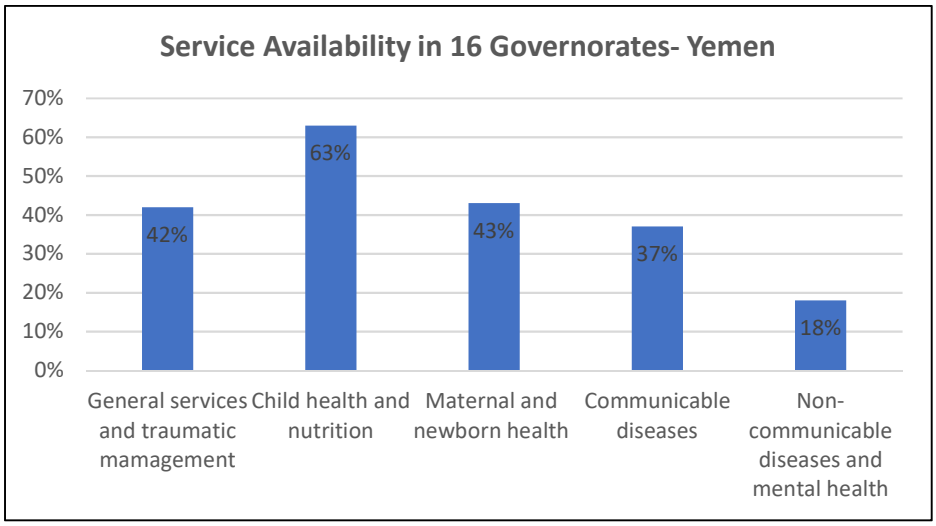
A systematic review of fragile and conflict-affected countries including Yemen indicated that ensuring transportation services during acute crisis is one of the crucial factors to limit maternal and neonatal deaths (82). In Yemen, prior the conflict the distance to HFs was a problem as indicated by three out of five women in YNHDS (9). The average of time travelling to health facility ranged between fifteen minutes to one hour in a study in Sana'a city, while it was estimated to take an average of one and a half hours in the YNHDS (9) (50). The ongoing conflict has exacerbated the situation where even areas with available HFs are not accessible because of the instability and ongoing fighting (96).

Ambulances for referral between the different health system levels were very limited and/ or non-existent before the conflict and most of referred patients managed their own transportation. With the ongoing conflict the situation got even worse, ambulances were directly targeted, stolen, stopped at checkpoints for long security check or did not have fuel (95). And this has a great impact on referring the patient to other facilities for

urgent interventions (96). In Somalia, the referral system between the HFs is impractical where the referral can take up to 4 hours' drive to reach proper functional EmOC centre, which increases the risk of complications (90).

According to UNICEF report, 1 out of 260 women die in pregnancy or during childbirth and only 3 out of 10 births take place in HF (97). In Yemen, 36.02% of the population lives in urban areas and 63.98% in the rural areas (20). Distribution of HFs appropriately plays an important role in increasing population equality in accessibility and utilization of health services. This is unfortunately not the case in Yemen, where there is a big disparity in the distribution of HFs. In 2013, according to YNHDS strategy only 66% of the population had access to public HFs, because some of these HFs were built in areas with no need whereas areas with high population density were deprived (32). Similarly, the private sector which operates around 70% of the HFs are in the urban areas and capital cities (91). In 2015, the health service coverage including RH services in urban areas reached 80% and only 25% in rural areas, whereas, 61% of the pregnant women in urban areas got health care compared to only 27% in the rural areas (79). Figure 13 below shows the overall health services availability in 16 governorates out of 22 governorates including those affected by the ongoing conflict (98). The long distance to HF and lacking affordable means of transportation are aggravated by the conflict and hamper accessibility of health services in all levels, particularly in rural areas (12). According to UNOCHA's latest report 2019, women of childbearing age have no or very limited access to MCH services including; ANC, safe delivery, emergency obstetric and newborn care, family planning and PNC care (12).

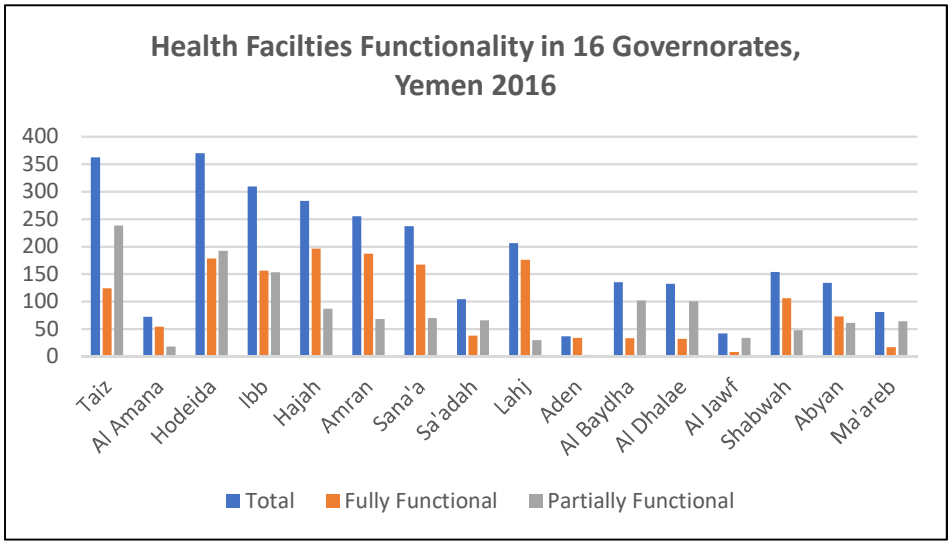
Figure 13: Service Availability in 16 Governorates in Yemen (98)



Source: WHO & Ministry of Public Health & Population, 2016

Functionality of HFs in 16 governorates directly or indirectly affected by the conflict (Figure 14), 45% 0f the HFs are fully functional, 38% partially functional and 17% not functional, with 205 and 69 HFs partially and completely damaged, respectively (98).

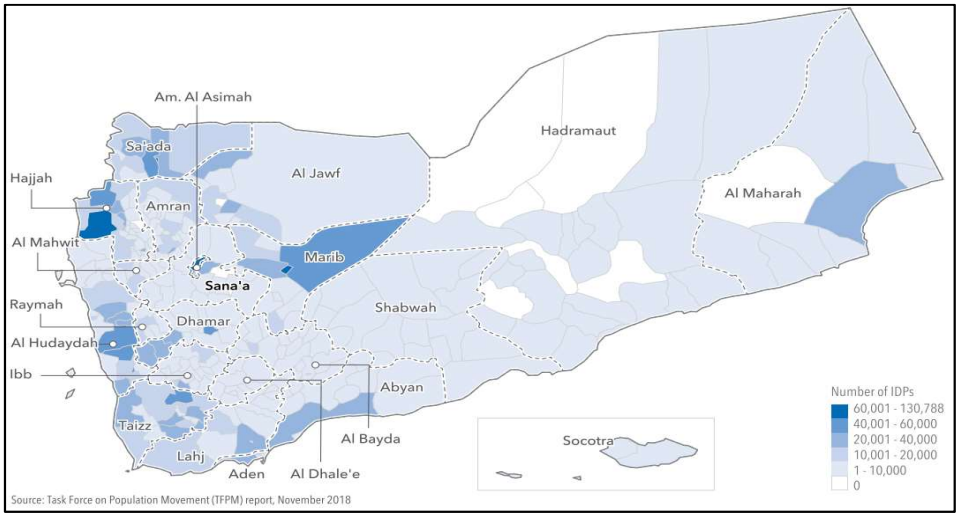
Figure 14: HFs Functionality in 16 Governorates (HeRAMS, 2016) (98)



Source: WHO & Ministry of Public Health & Population, 2016

The conflict has greatly affected and increased the gap of inequality of accessing health care services (12)(96). Internally displaced people (IDPs) are more likely predisposed to socio-economic burdens and accessibility barriers to health services. In 2019, an estimate of 3.3 million people remained displaced (figure 15) with more than half of them living in the northern part of the country where the conflict is still ongoing (12). About 83% of the IDPs is living in hosting sites across the country and lack access to healthcare services (12).

Figure 15: Number of IDPs by District in Yemen (12)



Source: Yemen Humanitarian Needs Overview UNOCHA, 2019

3.3 Phase Three Delay: Receiving Adequate and Appropriate Treatment

This delay relates to receiving adequate care and treatment at the level of the facility, which has significant correlation with reduction of maternal mortality (8)(49). This is influenced by the QoC delivered when the HFs are reached. According to the latest data from YNHDS 2013, the maternal death at the level of health facility raised from 24% to 39% between 2003 and 2013 (9). Even though there was no clear explanation from YNHDS, but this increase may relate to many factors including late arrival to the HF, shortage of skilled health staff and/or lack of materials and essential drugs. According to the WHO monitoring EmOC handbook, the capacity of any HF to manage obstetric and newborn emergencies are measured by the "Signal functions of EmOC" indicators for both basic and comprehensive services (Table 2) (8).

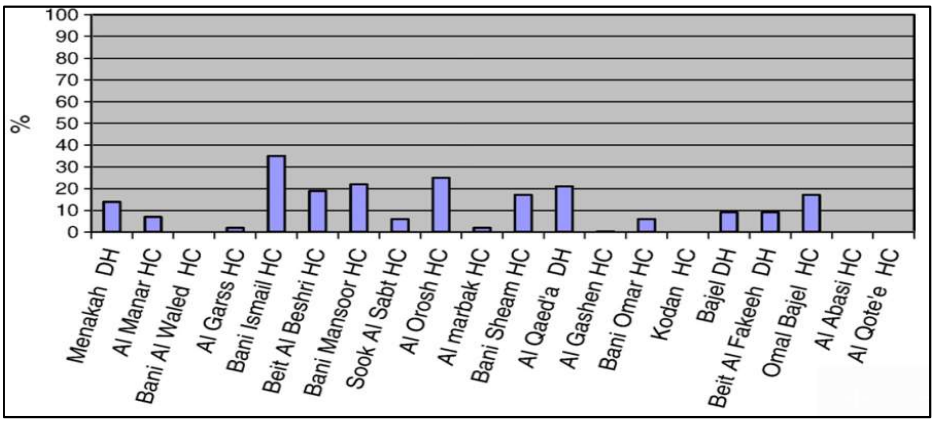
Table 2: Signal Function of EmOC- WHO Standard (8)

Basic services	Comprehensive services
(1) Administer parenteral[1] antibiotics	Perform signal functions 1–7, plus:
(2) Administer uterotonic drugs[2] (i.e. parenteral oxytocin)	(8) Perform surgery (e.g. caesarean section)
(3) Administer parenteral anticonvulsants for pre-eclampsia and eclampsia (i.e. magnesium sulfate).	(9) Perform blood transfusion
(4) Manually remove the placenta	
(5) Remove retained products (e.g. manual vacuum extraction, dilation and curettage)	
6) Perform assisted vaginal delivery (e.g. vacuum extraction, forceps delivery)	
(7) Perform basic neonatal resuscitation (e.g. with bag and mask)	
A basic emergency obstetric care facility is one in which all functions 1–7 are performed. A comprehensive emergency obstetric care facility is one in which all functions 1–9 are performed.	

Source: McCarthy et al, Monitoring EmOC

A survey study conducted in 3 governorates in Yemen (Sana'a, Al Hudaydah and Ibb) included 5 district hospitals and 17 HCs in 8 districts showed most of the HFs performed low signal functions of EmOC due to shortage of health staff, equipment, medication and inconsistency of services availability 24/7 (99). The study showed that people do not have access or receive QoC. Less than 30% of the HFs had 24/7 on site services, the other HF services were not available or only during the working hours or on call. The medication availability was either very irregular or not available in most of the HFs and none had life-saving magnesium sulfate (figure 16) (99).

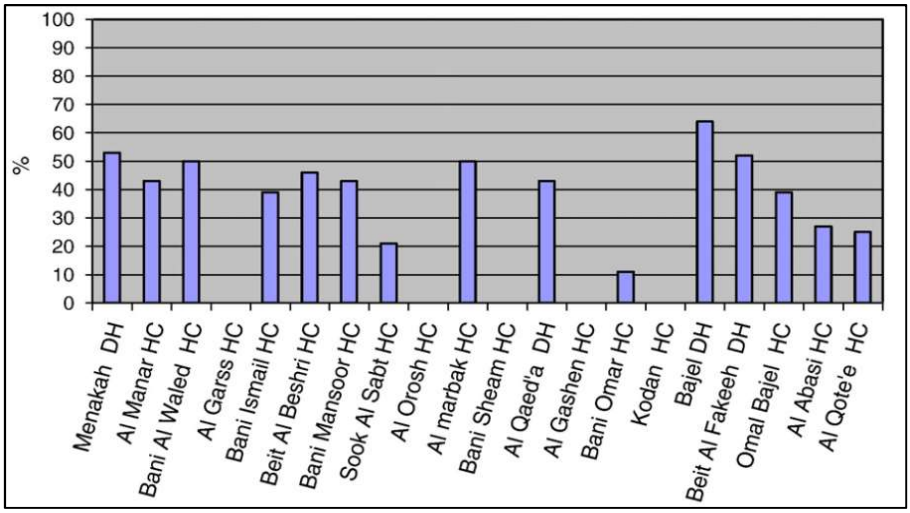
Figure 16: Availability of EmOC Essential Drugs per HF in 3 Governorates (99)



Source: Al Serouri et al, 2009

In 2017, the full blockade of all Yemen ports including the biggest "Al Hudaydah port" restricted the entrance of humanitarian aid including life-saving medications and equipment to the country depriving people from needed assistance and exacerbating the humanitarian crisis (100)(101). Most of the HFs lack basic equipment (stethoscope, sphygmomanometer and scale) and 5 out of the 20 HFs did not even have a labour room (figure 17) (99). The Yemen National and RH Strategy (2011-2015) stated that only 60% of the HFs provide RH services. Around 26% of the HFs lacked drugs, 24% lacked equipment, 17% lacked an operational budget and 7% lacked health staff (34). The ongoing conflict since 2015 imposed a great toll on the health system and the health system is overstretched (12)(45).

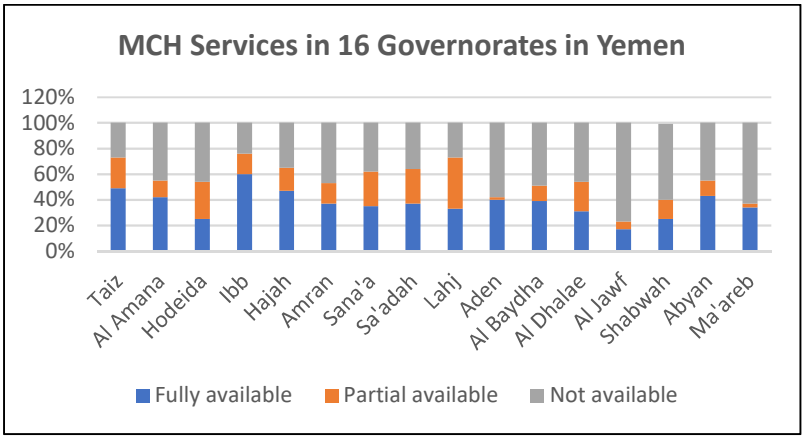
Figure 17: Availability of EmOC Equipment by HF in 3 Governorates (99)



Source: Al Serouri et al, 2009

Health system infrastructure is severely damaged with less than half of the HFs functional and 70% with erratic medical supplies (12)(98)(102). In 2016, the WHO and MoPHP conducted an assessment 3506 HFs in 16 out of 22 governorates including the affected ones (structural damage or resource limitation) by the conflict using "Health Services and Resources Availability Mapping System (HeRAMS)". Maternal and newborn health services are affected (figure 18) (98).

Figure 18: MCH Services in 16 Governorates (HeRAMS, 2016) (98)



Source: WHO & Ministry of Public Health & Population, 2016

Shortage of staff is another contributing factor to receiving inappropriate health services in Yemen. Health staff capacity was a challenge even before the war and the ongoing conflict increased the problem. According to the HeRAMS assessment in 16 affected governorates, they found a total of 33.312 health workers (figure 17) divided as, medical specialist 1.912 (6%), general practitioner 1.999 (6%), assistant doctor 2.693 (8%), certified nurse 9.358 (28%), midwives 3.919 (12%) and others 13.536 (40%) (figure 17) (98). There is great disparity and inequality in distribution of medical doctors, nurses and midwives and this may contribute to underserving and poor QoC (91). About 75% of the HWs are in the cities serving 25% of the total population. There is also gender imbalance in staffing with 73% male dominance, knowing that male HWs mostly not involved in obstetric care (91). A similar picture was reflected in a situational analysis of RH in Somalia where there was a shortage of qualified health staff and variation of their distribution between the regions highly clustering in the urban areas (90). In the study in Somalia, a survey conducted in one of the rural areas showed, 45% of deliveries were attended by Traditional Birth Attendants (TBAs) compared to only 1.6% by doctors and 16.5% by nurses and midwives (90).

In studies conducted in Somalia and South Sudan, low salaries, non-financial incentives and dual work of the health staff were indicated as demotivating factors leading to absenteeism, low performance and provision of poor QoC (90). The lack of equitable geographical distribution, low remuneration and incentives affects the deployment and retention of health staff in rural and underserved areas and affects their productivity and ethical commitment to provide QoC (91). Although the MoPHP has identified the health sector as a priority for the emergency response, the MoPHP fell short to allocate the required budget to deliver assistance. Humanitarian NGOs and health partners stepped in to bridge the gap mainly in the primary and secondary health care level (36)(45)(103). The low and inconsistent funding of the humanitarian assistance hampers the emergency response (36)(104).

4. Chapter Four: Interventions implemented to Reduce Maternal Mortality in Yemen and Other Similar Contexts

To reduce maternal mortality, a comprehensive approach is required as single interventions cannot overcome all the different challenges (105)(106). This chapter will review interventions implemented in Yemen and in other fragile and conflict affected countries with similar contexts.

4.1 Minimum Initial Service Package (MISP) for RH in Emergencies

The MISP is a package designed for a comprehensive RH response during crisis and emergency situations including to reduce maternal and neonatal mortality and morbidity (107). The MISP is provided at the level of the HFs aiming to reduce the delay in receiving adequate health services. In Yemen, some humanitarian agencies with the lead of UNFPA are providing the MISP as an emergency response for sexual and RH in some areas in the country and have trained health personnel on it (45)(108). In 2016, UNFPA supported 133 hospitals with EmOC equipment benefiting about 37% of the total population and 130.000 women benefited from RH kits (table 3) (108)(109). The MISP is one of the implemented interventions in countries affected by conflict. For example, the MISP was provided to the Syrian refugees in Zaatri and Irbid camps in Jordan to minimize the third delay and ensure receiving adequate treatment on time (110). The trained HWs, availability of funding and MISP supplies in place facilitated the implementation of this intervention for Syrian refugees and contribute to reduction of third delay (108). In South Sudan, UNFPA and other partners scaled up their interventions in regard to RH including implementation of the MISP since conflict erupted in December 2013 (111). A similar intervention was implemented for Sudanese refugees in Kule and Tierkidi camps in Ethiopia including training health staff on the MISP (86).

Table 3: Content of RH Kit for Crisis Situations (UNFPA, 2011) (109)

Kits Serving the Needs of 10.000 People for 3 Months	
Kit 0	Administration/training supplies
Kit 1	Condoms: Part A (male condoms) and Part B (female condoms)
Kit 2	Clean delivery, individual: Part A (for mothers) and Part B (for attendants)
Kit 3	Post rape treatment
Kit 4	Oral and injectable contraception
Kit 5	Treatment of sexually transmitted infections

Source: UNFPA Inter-Agency Reproductive Health Kits for Crisis Situations Manual, 2011

4.2 Demand-Side Maternal Health Voucher Scheme (MHVS)

In Yemen, the Yamaan foundation with support of the German government through the German development bank implemented a safe motherhood voucher project in Lahj and Ibb governorates (2012-2016) (112)(113). The vouchers were highly subsidized (200 YR) to facilitate decision-taking to seek health services and included free transportation and contribution to cost of food and accommodation for the woman's chaperone and free service at the HF during delivery (112). In Lahj governorate, 70% of the women used their vouchers to access health care despite of the security situation in the country (112). 37.000 safe motherhood vouchers were used out of 57.529 distributed between

2012 and 2016 (113). The vouchers targeted the three-delays, because it is believed that by boosting patients purchasing power for services and ensuring consistent reimbursement of the health system providers will increase utilization of RH services and receipt of adequate and timely services. Another study review of "family planning and RH services voucher programs" involved MSI in 11 countries in Asia and Africa targeted mainly poor and rural women, showed overall increasing in uptake of services and improved QoC (114).

The Advanced Development and Relief Agency (ADRA) is implementing an emergency medical assistance program including reproductive and EmOC interventions for clinics in several governorates in Yemen (Marib, Hudaydah, Hajjah and Saada) (115). The program aimed to provide life-saving health services and decrease the delays to access and receive RH services. In Bangladesh, a maternal health vouchers scheme (pilot project) was adopted by the Ministry of Health and Family Welfare to overcome mainly the first and third delay (the financial barriers to utilize the maternal health services and accessibility of needed EmOC services) by the poor women (116). An assessment conducted after two years of implementing this pilot project stated that the vouchers created significant purchasing power among women even though most of them were illiterate and it appeared to be a promising project (116). Even though Bangladesh is not a country affected by conflict, there is a similarity with Yemen regarding socio-economic level, which is one of the contributing factors to health services underutilization.

4.3 Supporting Health System and RH Services in Areas Affected by Conflict

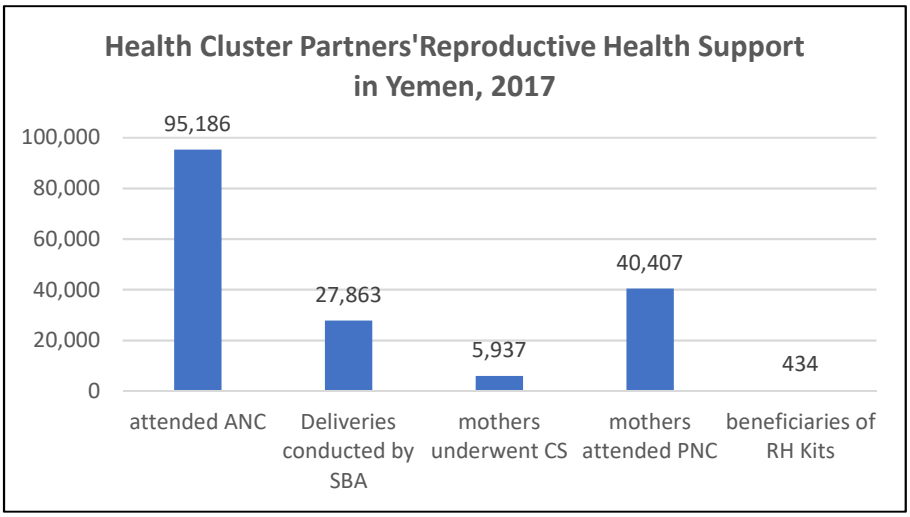
Now with the current conflict in Yemen, the Health Cluster led by the WHO uses different communication channels to promote, support and improve health services in Yemen. The cluster is composed of many (inter) national organizations, 2 governmental entities, UN agencies and private bodies (117). UNFPA is one of the partners in the health cluster that leads the provision of RH interventions in Yemen during the conflict (108). UNFPA supports 214 HFs all over Yemen providing essential RH services for women and girls. In 2018, UNFPA expanded and supported the maternity unit in Al Thawra hospital in Al Hudaydah city, which is the only referral hospital that provides maternal and neonatal services in the area with up to 500 deliveries per month. The hospital was affected by escalated fighting, so to prevent the third delay UNFPA established a maternity ward of 300 meter square and provided required equipment, medication and paid incentives for the staff to ensure continuation of RH services including deliveries for the women (118).

in 2016, UNFPA supported 6 hospitals and 10 HFs in Ibb governorate with EmOC equipment to reduce the impact of the third delay and meet the needs of 250.000 women of reproductive age and helping to avert nearly 100 maternal deaths within a period of 9 months (104). Additionally, two mobile RH clinics and two fixed clinics continue the provision of RH services such as ANC, PNC care and awareness of pregnancy-related complications signs in Sa'ada governorate with the distribution of RH supplies and medicines to other remote hospitals to decrease the first and third delay factors (104). Between 2016 and 2017, UNFPA had supported hospitals and health clinics to provide RH including EmOC services (108)(119). They provided EmOC equipment to 133 hospitals to minimize the impact of third delay in the HFs. UNFPA also reached 120.000 and 78.495 beneficiaries through their mobile clinics between 2016 and 2017, respectively. the mobile clinics targeted to minimize first delay by delivering ANC, PNC and providing pregnancy-related danger signs information to pregnant women (108)(119)

In 2017, the Health Cluster Partners scaled up their response and supported a total of 2.596 HFs (18 Governorate Hospitals, 122 District Hospitals, 69 General Hospitals, 22

Specialized Hospitals, 712 HCs and 1.653 HUs) including RH, where a total of 95.186 mothers attended ANC service; 27.863 normal deliveries were conducted by SBAs; 5.937 mothers underwent caesarean section while 40.407 mothers attended PNC care services and 434 benefited of RH kits (figure 22) (13).

Figure 22: Health Cluster Partners Support RH in Yemen Results (2017) (13)



Source: WHO, Yemen annual report-2017

In 2018, the health cluster partners provided 12 million people with health services through 2.200 supported HFs. More than 1 million women received ANC services, 85% of the targeted pregnant women deliveries were assisted by SBAs, 13.000 health staff trained on the MISP and 2.042 midwives were trained on safe motherhood (120). In April 2019, the UNFPA Humanitarian Hub supported HFs that provide EmOC services in Al Hudaydah, Ibb, Sana'a, Aden and Sa'ada which are the most conflict affected governorates to improve QoC and ensure availability of EmOC services (121).

In Somalia, between July 2011 and February 2015, a project called "A continuum of care approach to SRH" was implemented in 14 EmOC centres and 4 referral hospitals to improve access to integrated RH services. An end of project evaluation showed a 40% increase in ANC services and 400% increase in HF based delivery compared to the year 2011 due to capacity building, investment in infrastructure, provision of medical supplies, sensitization of 24/7 service coverage and community awareness (122). During the project lifetime 76 community-based health workers (CBHWs) and 456 midwives and nurses were trained on basic EmOC, MCH and referral services (122).

A systematic review of "maternal health interventions in limited resource settings countries" showed that integrated interventions programs such as; supporting infrastructure, providing equipment, training staff on EmOC has bigger impact than single interventions. A significant reduction in MMR was reported in 55% of the programs and an increase of 71-75% of the births in EmOC facilities (105). In Somalia, 222 HWs were trained in EmOC between 2007 and 2009. A before and after study was conducted to evaluate their knowledge and skills, QoC and HFs functionality. The study showed that the HFs provided 100% of basic and comprehensive EmOC signal functions compared to 43% and 56% before the intervention respectively, and 50% improvement in their knowledge and 100% in skills modules (123). During the conflict in Burundi and northern Uganda, TBAs played a significant role in childbirth assistance during the conflict due to the insecurity and limited access to HFs. The NGOs and the Ministry of Health have embraced the TBAs; they have been identified, trained and provided basic kits to assist

deliveries as an alternative to SBAs. Post-conflict in Burundi TBAs were even integrated within the PHC system especially in the rural areas (124). Studies exploring TBAs role in maternity health and childbirth have been reported in other conflict affected settings such as Angola, Mozambique, Sierra Leone and refuge settings in Tanzania and Kenya (125)(126)(127)(128). During the conflict in Angola, the International Medical Corps developed an educational training program to train TBAs to attend deliveries to reduce maternal deaths and it was observed that maternal mortality reduced among the women managed by the trained TBAs (125). In refugee camps in Tanzania and Kenya, the majority of deliveries were attended by trained TBAs who were supervised and assisted by skilled health professionals when complications occurred and there was also functional referral system in place (128).

4.4 Maternity Waiting Home and Improving EmOC Services

Maternity waiting homes (MWH) are an intervention that aims to improve the accessibility of skilled delivery care to reduce the impact of the second delay on the maternal and child morbidity and mortality. High risk pregnant women near term stay in a facility close to a HC or hospital that provide EmOC services (7). In Somalia, there is around 34 such facilities providing a range of RH services to overcome the challenges of geographical barriers, poorly equipped HFs in rural areas and improve the chances of survival for the women and their children (90)(129). In 2015, the MWH in Somalia performed a consultation of 30.000 women, about 17.000 women delivered in the MWH and 1.300 complicated pregnancies were identified and referred for further management (129). There is no strong evidence shows the impact of MWH in reducing maternal mortality, but a study review of some low income countries showed an overall increase in accessibility of services and improvement or at least no worsening of outcomes (7).

Between 2000-2005, the RH response in conflict consortium (supported by the Colombian University) averting maternal and disability program implemented 12 EmOC programs in 9 conflict-affected countries (130). This project increased the availability of basic and comprehensive EmOC services and its utilization in supported HFs, increasing deliveries in EmOC HFs and increased institutionalization of EmOC services among agencies working in conflict areas. In Myanmar, a pilot mobile obstetric maternal health worker (MOM) project was implemented for the IDPs in Eastern Burma through establishing a three-tiered collaborative network of CBHWs (131). All the MOM interventions are in areas affected by ongoing conflict. The aim of the project was to improve access of IDPs to EmOC services by developing the capacity of maternal HWs to provide more comprehensive EmOC services. The project focused on capacity building, task-shifting and community empowerment. 33 facility HWs were trained practically in basic EmOC and blood transfusion and in turn they trained local HWs and TBAs to promote acceptance and coverage of maternity services (131)(132). There was substantial increase in the maternity health coverage and higher level of care at birth during the project period (132).

5. Chapter Five: Discussion

This study sought to explore the impact of war on the determinants of maternal mortality in Yemen and the three-delay model was used to analyse determinants that could contribute to maternal mortality. Also, evidence-based interventions in Yemen and other similar contexts were explored to find best practices to improve access to RH services and reduce maternal mortality during conflict. The well-known Yemen saying on the maternal mortality in postpartum period (textbox 1) is used as a justification for her death at any moment of her pregnancy, delivery or postpartum period. Even though it is a myth it is rooted in the culture and beliefs of communities which may indirectly influence family's actions toward effective BPACR.

Textbox 1: Yemeni saying

المرأة النفاس قبرها مفتوح أربعين يوم

A woman in the postpartum period her grave is open for 40 days

This study showed a strong relation between the various determinants in the three-delays, the conflict in the country and fragile health system. Looking at the influential factors in the first delay, it was observed that a wide range of determinants influence a woman's ability to take a decision to seek health care at the level of the community leading to the first delay. Gender inequity and inequality are noticeable where the women's status in the community is lower than the men and they have fewer chances for educational enrolment and employment. The family income, the cost of healthcare services, disparities with poor perceived QoC of the HFs and long distances are other challenging factors for decision-making and access to health care. Women in rural areas are less privileged than urban women in terms of access to health care. All the mentioned factors are worsened by the actual conflict. The power of decision-making is usually in the hand of the man in the family and/or greatly influenced by his opinions. Most women are poorly educated and unemployed which make them financially dependent on their spouses and their families. Moreover, socio-cultural factors restrict women's movement alone as they must be accompanied by a member of the family (a male companion called "mahram مَحْرَم") most of the time. Good ANC counselling on pregnancy danger signs for men and women, birth preparedness and male involvement in maternal health is believed to have a good impact on women's utilization of ANC and delivery services, but this is hindered by many social and individual perceptions held by both men and women (63)(64). The poor knowledge and low number of safe delivery preparedness might be explained by insufficient information and education of pregnant women and their spouses on the BPACR such as the danger signs, place for safe delivery and what to do in emergency case. The male involvement role is influenced by the level of health education that men receive about the importance of maternal care and the HWs attitude towards their participation. The explored studies showed that women's level of knowledge was low despite utilization of ANC services mainly due to the low level of HWs knowledge and insufficient time for proper counselling (75)(76). On the other hand, a systematic review of studies in Sub-Saharan Africa, South East Asia and Central America showed that intervention in BPACR may increase the knowledge but doesn't necessarily correspond to increasing in utilization of SBA services (133).

In emergencies, education is overlooked and not a priority compared to life-saving responses (34). Many studies showed that the educational status of the women is correlated to the level of RH service utilization and health outcomes. Educated women may have better access to health information about pregnancy-related complications and health services compared to uneducated women. It was shown that 80% of maternal

mortality was among uneducated women comparing to 20% in educated women (9). Women's education increases their chances for employment which may improve their socio-economic status and autonomy of decision-making. The conflict disrupted the education system and denied families income due to unpaid salaries, loss of employment and/or displacement. Girls are taken out of the education system more often than boys and there is an increasing rate of child marriage due to poverty and family reprioritization of their needs. Girls' lack of education may have an impact on their health, socio-economic status and decision-making ability soon.

In the second delay, roadblocks and the security situation due to current conflict has aggravated and prolonged the time needed to reach a HF. The difficulties of the physical environment, bad condition of the roads and the need to take longer alternative roads to avoid conflict areas are main challenges. Moreover, the ambulances have to take longer alternative ways, they are sometimes attacked and even delayed at checkpoints which prolong the second delay (95). Roadblocks, insecurity and checkpoints don't only delay women's access to health care on time, but also hamper the delivery of humanitarian assistance to the HFs in affected areas.

Accessing and receiving adequate health services is another big challenge for pregnant women in Yemen especially with the current conflict, making women more vulnerable and lack access to health care. The disparities of the HFs between urban and rural areas, the long distance and unavailability of adequate services due to staff and medication shortage are big problems. The minimum acceptable level of EmOC is 5 EmOC HFs for every 500,000 population, with at least one with comprehensive services (8). In April 14th, 2010, the United Nations (UN) launched "the Global Strategy for Women's and Children's Health" in New York to improve women and child health (134)(135). Yemen had made a commitment to expand RH services by 85% focusing in rural areas and an increase of 20% in HFs that provide basic and comprehensive EmOC services (134)(136). The commitment also included full cost coverage of RH commodities, to increase essential drug availability and to improve the logistic system management (134)(136). Yemen has formed good RH and EmOC strategies guidelines, but unfortunately it is not well implemented and there is no emphasis on the importance of the role of male involvement in RH service delivery and utilization (34). This resulted in fragile health system and contributed to inadequate response to health needs during the conflict. The emergency response capacity of the health system in Yemen was already weak before the conflict and exacerbated further by the conflict.

Increasing cost of health services and medications and low family income might negatively impact the access to health care. Pregnant women in areas affected by the war might be more vulnerable than those living in safe areas. Less than half of the HFs are functional and severe shortages of health staff, equipment and medication for provision of services may explain the increase in maternal mortality in Yemen from 5 to 12 maternal deaths per day between 2013 and 2018 (47). Assessments for service availability and QoC showed that 43% of the surveyed HFs provide MCH and only 18% can provide quality MCH services (45)(98). The impact of the war on PHC functionality and MCH capacity to provide EmOC services and QoC created another second phase delay, because of unavailability of services in PHC and the need to be referred to the tertiary level. This may also lead to overstretching of the tertiary HFs resources and capacity to provide QoC services. In addition to the shortage in health staff there is a noticeable disparity between the distribution of the doctors, nurses and midwives in remote areas and governorates affected by the conflict compared to the other governorates. Unpaid salaries and absence of financial incentives aggravate the lack of motivation and absenteeism among HWs. Shortage of essential medical and non-medical supplies is another crucial factor impacting the availability and quality of services. The

study also showed that IDPs might be an additional burden on the overstretched and disrupted health system and pregnant IPDs women have less access to health services and more prone to pregnancy-related complications (137). HFs in communities where there are IDPs may have a greater strain on their resources and lack the capacity to meet the population's needs. Long waiting hours and poor QoC can be some of the outcomes.

The MoPHP in collaboration with the humanitarian partners in health cluster is working to minimize the impact of war on the MCH, but there are many challenges faced within the process of service delivery from the prioritization, planning to the implementation point. Unfortunately, their response to maternity and RH needs are scattered, lower prioritized and overlooked compared to the response to acute emergencies like war casualties. In addition, insecurity, violence against humanitarian personnel, increasing checkpoints and administrative challenges are constraints to the delivery of humanitarian aid in 78% of the districts affected by war (95). The provision of EmOC services during conflicts and displacement faces unique challenges (138). The available studies showed that different interventions implemented by humanitarian partners in Yemen and other countries with similar contexts had improved access to maternity care, but the interventions were not integrated or sustainable and only covered one or two of the three-delays in maternal mortality. The inability of the government to allocate a budget for the emergency response and the failure of the NGOs to cover this shortfall due to huge needs and low funds led to unsustainable interventions and delay in emergency response to needs. However, there were some good examples of implemented interventions. The subsidized vouchers program implemented by the Yamaan foundation in Yemen was a good example of the provision of an integrated package where the vouchers covered all the three-delay levels to ensure women’s accessibility to good QoC. The reviewed studies also showed that during and post-conflict time, trained TBAs and HWs task-shifting have a positive impact on the reduction of maternal mortality, improving women’s knowledge on danger signs and early referral of complicated cases for further intervention (123)(125)(131)(132)(139).

Study Limitation

Scarcity and unavailability of data from Yemen especially after the conflict was a main challenge in this study.

6. Chapter 6: Conclusion and Recommendations

6.1 Conclusion

The emergency situation in Yemen needs adaptation of strategies and interventions that can adequately respond to the needs and strengthen the health system. Recognition and prioritizing the EmOC response are critical to reduce maternal death. The ongoing conflict has had a serious impact on the maternal mortality, because of the fragile health system, shortage of health services, shortage of staff and medical supplies and exacerbation of other determinants of maternal mortality.

The initiative to seek health care, having the autonomy and power to make these decisions are equally essential and vital factors to reduce maternal mortality. Women's autonomy of decision-making could have a positive impact on their health status and pregnancy outcomes. In Yemen, gender inequality, the lower status of women in the socioeconomic hierarchy, and lack of education and employment opportunities were already there and aggravated by the conflict. In addition to the perceived QoC, the availability of accessible HFs with an affordable service costs are essential factors to enhance the utilization of the health care services in any community. However, the service availability in an area does not necessarily lead to improved access and usage of services. Therefore, there must be more sensitization, awareness and focus on importance of RH services and its utilization especially in areas affected by conflict.

Understanding and recognition of pregnancy-related complications and danger signs is a key factor for women to seek health care on time. There must be more emphasis on health education and awareness for pregnant women and their spouses and surrounding community to improve utilization of RH services. There is also a big need to implement the existing RH guidelines in the HFs and building the capacity of HWs and task-shifting to provide adequate health services and overcome the HWs shortage. TBAs capacity building and involvement in providing basic RH and delivery services within their communities during the conflict is key to overcome the health staff shortage and access barriers. Equipping EmOC centres in the PHCs level is another essential step to ensure sustainability of health services during emergency response in Yemen. There are good examples of maternal health interventions in Yemen and other countries with similar context, which can be replicated, adopted and implemented to reduce the impact of war on maternal mortality.

6.2 Recommendations

With the current situation in Yemen, the response to maternal health needs and overcoming the barriers leading to the three-delays must be tackled in a multi-sectorial approach involving the MoPHP, humanitarian partners and the communities. The recommendations can be made in three main areas. The recommendations are also provided in a table that gives the full oversight and connect the three levels (MoPHP, HCs and the community) and its impact on the three-delays (Annex 1).

6.2.1 To the MoPHP

6.2.1.1 National Level

1. To review the current applied **RH strategies** especially at the PHC level and adapt it to the current situation to improve the response to maternal health during emergencies and post-conflict.
2. To ensure **integration of maternal health response** within the emergency response package during any emergency and not overlooked.

3. To coordinate between the different humanitarian parties to improve the **provision of EmOC interventions** and ensure sustainability and avoid duplication and overlapping.
4. To provide **ambulances to the HFs** especially in the most affected areas and improve the communication between the HFs for better continuum of care.
5. To prioritize **budget allocation** for the health sector to bridge the gap of delay in responding to emergencies.
6. To ensure the **implemented interventions** are based on needs and fairly distributed between the urban and rural areas in affected populations and create feasible strategy for **equitable distribution** of human resources.
7. To form a strategy for **task-shifting** to bridge the shortage of HWs during emergencies.
8. To incentivize midwives and health workers in rural areas and areas with ongoing conflict to **retain staff** and support the continuation of the service delivery.
9. To promote **livelihood and income generating-based projects** to support generation and improve family income which may improve health service accessibility.

6.2.1.2 Government Level

1. To facilitate **the administrative process** for humanitarian actors to import and deliver required assistance urgently.
2. To negotiate with the different **political parties** and reach an agreement to facilitate movement through the checkpoints for ambulances and delivery of urgent assistance to affected populations.
3. To ensure **regular salary payment** to the health workers to retain health staff.
4. To update **maternal health database** on regular basis in order to have a good insight on the progress of the situation.

6.2.2 To the Governorate and District Health Service Level

1. To implement current **standardized EmOC strategies** and provide **MISP package** in the PHCs and train the health staff on it.
2. To implement **training for TBAs** in conflict affected areas and support them with basic kits to provide safe delivery in areas with limited access to maternal health services.
3. To improve and strengthen the **communication and referral pathway** between midwives and TBAs at the community level and the HCs to improve service accessibility.
4. To disseminate maternal health **education sessions to males** and create **husbands' friendly space** in the HCs to engage them in their wife's consultation and birth preparedness.
5. To implement **safe motherhood vouchers** program in most affected areas to ensure access to comprehensive maternity and EmOC services.
6. To monitor and evaluate the HFs where **RH and EmOC services** are provided to ensure service delivery and quality of care.
7. To ensure availability of buffer stock for **emergency preparedness and response**
8. To organize **monthly mobile clinic outreach,** provide basic RH services (ANC, PNC and consultations) for hard to reach populations.
9. To provide **regular monthly reporting** from the HFs on the MHC and EmOC services.

6.2.3 The Community Activities

1. To sensitize the communities on the importance of MCH services and **effective role of male involvement** in women's access to the services.
2. To promote **community-based initiatives** such as demand side based vouchers initiatives to increase the accessibility opportunities for pregnant women to services.
3. To involve community and religious leaders in community awareness campaigns on women's right to health, **women empowerment** and motivate men to involve in improving women's health seeking behaviour.
4. To involve the communities in armed group **awareness campaign** on the importance of prioritization of ambulances and emergency assistance in checkpoints.
5. To provide **regular reporting from the TBAs and community midwives** on the number of maternity cases delivered and/ or transferred

Annex 1: Recommendations Oversight at the Three Levels (MoPHP, HC and Community) and three-delays

To MoPHP National and Government Level	To the Governorate and District Health Service Level	To Community Activities	Three-delay impact
To review the current applied **RH strategies** especially at the PHC level and adapt it to the current situation to improve the response to maternal health during emergencies and post-conflict.	To implement current **standardized EmOC strategies** and provide **MISP package** in the PHCs and train the health staff on it.	To sensitize the communities on the importance of MCH services and **effective role of male involvement** in women's access to the services.	3rd delay
To ensure **integration of maternal health response** within the emergency response package during any emergency and not overlooked.	To implement **training for TBAs** in conflict affected areas and support them with basic kits to provide safe delivery in areas with limited access to maternal health services.	To involve community and religious leaders in community awareness campaigns on women's right to health, **women empowerment** and motivate men to involve in improving women's health seeking behaviour	1st and 3rd delay
To coordinate between the different humanitarian parties to improve the **provision of EmOC interventions** and ensure sustainability and avoid duplication and overlapping.	To disseminate maternal health **education sessions to males** and create **husbands' friendly space** in the HCs to engage them in their wife's consultation and birth preparedness.		1st and 3rd delay
To provide **ambulances to the HFs** especially in the most affected areas and improve the communication between the HFs for better continuum of care.	To improve and strengthen the **communication and referral pathway** between midwives and TBAs at the community level and the HCs to improve service accessibility.		2nd delay
To prioritize **budget allocation** for the health sector to bridge the gap of delay in responding to emergencies.	To monitor and evaluate the HFs where **RH and EmOC services** are provided to ensure service delivery and quality of care.	To promote **community-based initiatives** such as demand side based vouchers initiatives to increase the accessibility opportunities for pregnant women to services.	1st and 3rd delay
To ensure the **implemented interventions** are based	To implement **safe motherhood vouchers** program in most affected		1st, 2nd and 3rd

on needs and fairly distributed between the urban and rural areas in affected populations and create feasible strategy for **equitable distribution** of human resources.	areas to ensure access to comprehensive maternity and EmOC services.		delay
To form a strategy for **task-shifting** to bridge the shortage of HWs during emergencies.			3rd delay
To incentivize midwives and health workers in rural areas and areas with ongoing conflict to **retain staff** and support the continuation of the service delivery.	To organize **monthly mobile clinic outreach,** provide basic RH services (ANC, PNC and consultations) for hard to reach populations.		1st and 3rd delay
To promote **livelihood and income generating-based projects** to support generation and improve family income which may improve health service accessibility.			1st delay
To facilitate **the administrative process** for humanitarian actors to import and deliver required assistance urgently.	To ensure availability of buffer stock for **emergency preparedness and response**		3rd delay
To negotiate with the different **political parties** and reach an agreement to facilitate movement through the checkpoints for ambulances and delivery of urgent assistance to affected populations.		To involve the communities in armed group **awareness campaign** on the importance of prioritization of ambulances and emergency assistance in checkpoints.	2nd delay
To ensure **regular salary payment** to the health workers to retain health staff.			3rd delay
To update **maternal health database** on regular basis in order to have a good insight on the progress of the situation.	To provide **regular monthly reporting** from the HFs on the MHC and EmOC services.	To provide **regular reporting from the TBAs and community midwives** on the number of maternity cases delivered and/ or transferred	

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