

A review of maternal mortality trends in Lebanon, 2010–2018

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Abstract

Lebanon invested in the prevention of maternal mortality after the civil war, which left a deficient vital registration system leading to unreliable estimates of maternal mortality ratio (MMR). Starting in 2004, the Ministry of Public Health integrated reproductive health into primary health care and established a national notification system of maternal and neonatal deaths. From 1990 to 2013, Lebanon achieved an annual change in MMR of -7.5% , which was the highest rate of reduction in the region and met the requirements of Millennium Development Goal 5. For the period 2010–2018, data collected through the national notification system indicate an MMR of 14.9, which is below the officially reported MMR of 23. Since the influx of Syrian refugees, Lebanon has experienced a rise in the number of live births with a slightly increasing trend in MMR, especially in regions with the highest concentration of refugees. Causes of maternal mortality in Lebanon align with the three-delays model, pointing to deficiencies in the quality of maternity care. More efforts are needed toward strengthening the national notification system to include cases that occur outside hospitals, identifying near-miss cases, reinforcing the emergency response system, and engaging with all stakeholders to improve quality of care.

KEYWORDS

Arab; Lebanon; Maternal mortality; Middle-income country; Surveillance

1 | BACKGROUND

Maternal mortality continues to be a major health problem worldwide with unacceptably high numbers of preventable cases (303 000 maternal deaths reported in 2015).¹ Risks during pregnancy vary among communities, countries, and regions. The risks are 15 times higher in low-income than in high-income countries due to poor resources and weak dysfunctional health services; as a result, the maternal mortality ratio (MMR), a health indicator of development and quality of life, shows the largest disparities between wealthy and impoverished countries.^{2,3} The failure to achieve the desired MMR in two decades of the Safe Motherhood movement (1987–2007) has been “one of the most deforming scars on the body of global health”.⁴ Both funding and political commitment toward achieving this goal are frequently emphasized as confounding factors in this failure, in addition to conflicting priorities in maternal health and poor evidence of certain interventions.⁴

Improving maternal health constituted one of the eight major Millennium Development Goals (MDG5), whereby countries were committed to reducing maternal mortality by three-quarters between 1990 and 2015. Between 1990 and 2015, the incidence of maternal death decreased by 43.9% worldwide and suboptimal to moderate progress has been made.¹ In Sub-Saharan Africa, maternal mortality has halved in several countries (41%).⁵ In Asia and North Africa, even greater progress has been made (69% and 66% reduction, respectively), and 18 countries globally, including Lebanon (76% reduction), achieved the MDG5 target by 2015.⁵

The MMR of countries of the Middle East and North Africa (MENA) region, extending from Morocco in the west to Iran in the east, varies widely due to the different socioeconomic and political gradient. MENA encompasses one-third of the world's regions with the highest maternal mortality: MMR was approximately 145 in 1990, but had decreased to an average of 69–74 in 2013, a 50% reduction

in 23 years.⁶ Most recently, political and military turmoil has led to a serious interruption of maternal health care and has increased the vulnerability of pregnant women to medical complications of pregnancies and childbirth, thereby increasing maternal morbidity.⁷ At the same time, much encouraging experiences from Tunisia, Egypt, Saudi Arabia, Oman, and Lebanon in relation to emergency obstetric care and pre-natal complications has proved adequate to help reduce maternal mortality. Political commitment, knowledge transfer, and women's involvement are an essential triad for improving maternal health in the MENA region.⁸ In 2013, as part of the Dubai declaration, MENA countries agreed (1) to develop and execute national plans to improve maternal and child health, (2) to take measurable steps to strengthen their health systems, and (3) to mobilize domestic and international resources to establish sustainable financing mechanisms.⁹

Lebanon has almost universal coverage of skilled attendants at birth and most deliveries take place in hospitals.¹⁰ The country has a highly privatized healthcare system and there are no formal mechanisms of referrals between different health facilities. Services depend mainly on the resources available in the healthcare center to the individuals concerned. Lebanon has experienced long years of civil unrest that have affected all aspects of governmental and public administration, and private agencies and institutions, leaving the country with low-quality vital statistics and essential data. In view of the scarcity of data, international agencies working on health issues assigned Lebanon to "category H", including countries with "no national data on maternal mortality".¹¹ Based on hospital data and convenience samples, earlier reports dating back to 1970s and 1980s estimated the MMR at 128¹² and 63,¹³ respectively. In the 1990s, various governmental institutions, including the Ministry of Public Health (MOPH) and the Ministry of Social Affairs, took the lead in reconstructing the picture of well-being in Lebanon. The Pan Arab Project for Child Development survey, conducted in 1996, estimated the MMR at 104 based on the sisterhood method.¹⁴

The MOPH led studies to generate reliable estimates applying evidence-based approaches¹⁵ and took measures to address maternal mortality. A milestone study was conducted by the MOPH and UNICEF (National Study on Perinatal Morbidity and Mortality in 1999–2000), committing the MOPH to the right of every woman to have access to perinatal care and the elimination of all forms of discrimination against women, later ratified by the Lebanese

Government.¹⁶ A reproductive health program at the MOPH was built under primary health care with a clear strategy to help decrease MMR from 104 to 64, among other goals.⁶ At present, the primary healthcare network continues to increase, facilitating universal pre-natal care coverage and contributing to the decline in MMR across the country.¹⁷

In 2004, the Pan Arab Family Health Survey for Lebanon reported an MMR of 86.3.¹⁰ It was clear that MMR was decreasing at the national level; however, there were discrepancies between districts, with highest levels reported in rural underdeveloped areas in the north of Lebanon.¹⁸ The MOPH launched an initiative in that poverty pocket area to deliver essential health care to the population of 31 villages housing approximately 23 000 individuals, with a focus on maternal and childcare services.¹⁹

The MMR estimates available through indirect methods were subsequently considered to be "unrealistic" by the authorities, given the vast network of specialized services available in the country and the health sector reform that has taken place. This led to the Reproductive Age Mortality Study in 2009, which aimed to provide a valid MMR for Lebanon. According to that study, the estimated ratio was 15.3 per 100 000 deliveries.²⁰ This estimation became the lower limit of an uncertainty interval, with an upper limit of 30.6. Therefore, the mean of the interval, 23/100 000 (15.3–30.6), was adopted as the national MMR for Lebanon.²¹ After that study, Lebanon was moved from category H to category B.¹¹ Table 1 summarizes the findings from several studies that have estimated MMR in Lebanon. In 2004, and with the aim of activating a notification system of maternal and neonatal deaths in the country,²² the MOPH established a "National Committee for Safe Motherhood," which was subsequently renamed as the "National Notification System on Maternal and Neonatal Mortality." This was achieved in collaboration with experts from the Lebanese Society of Obstetrics and Gynecology, the syndicate of private hospitals, and United Nations Population Fund (UNFPA)–Lebanon. Lebanon currently ranks first among countries in MENA with an annualized rate of change in MMR of –7.5% from 1990 to 2013, the highest rate of reduction among MENA countries and meeting the MDG5 requirements.^{8,23} The aim of the present study was to provide an overview of maternal mortality burden and causes in Lebanon based on the national notification system for the period 2010–2018 in order to track progress and identify gaps in service provision.

TABLE 1 Sources and reports on MMR for Lebanon.

Source	Method	Population	MMR per 100 000	Date of estimate
Mashini et al. ¹²	Hospital-based sample	AUB Hospital	128	1970
Deeb et al. ¹³	Sisterhood	Beirut	63	1980
WHO et al. ⁶	Model	Region	145	1990
MOPH & Arab League ¹⁴	Sisterhood	National	104	1996–1997
Central Agency for Statistics ²⁰	RAMOS	National	23	2009
Lebanese Family Health Survey ¹⁰	PAPFAM	National	86.3	2004
WHO et al. ⁶	Model	Region	69–73	2013

Abbreviations: MOPH, Ministry of Public Health; PAPFAM, Pan Arab Family Health Survey; RAMOS, Reproductive Age Mortality Study.

2 | METHODS

For the overview, data for maternal mortality in Lebanon for the period January 1, 2010, to December 31, 2018, were collected through retrospective and prospective methods. The collected data were aggregated by cause of death, region, and year, as prepared by MOPH staff for use by the national committee or for internal reports. Ethical approval therefore was not deemed necessary.

Data collected via the MOPH are revised through the following threefold operational system.

1. A hospital-based notification system that follows a structured process with MOPH. Data are collected by 140 vital data observatory focal persons (part of the staff of public and private hospitals), who are assigned and trained to report maternal death notification to the MOPH Primary Care Department on a monthly basis by means of an online app-based program with a built-in quality check. The notification program at the ministry enters all reported data into a structured format and sends cleaned data to the MOPH Statistics Department for further analysis.
2. A unified investigational maternal mortality review form. Once a maternal death case is reported to the MOPH, the national committee (NCSM) designates an independent expert (from the Lebanese OBGYN Society) to investigate the case and prepare a medical and/or technical report to be kept at the NCSM. The report is based on interviews conducted with the medical team in charge of the case and the hospital administration, and an in-depth

review of the medical chart. The collected cases are studied and assessed during regular committee meetings, which are scheduled every 4–6 months or more frequently based on need. Members of the committee discuss the presentation of each case in the reports in terms of the identified cause of maternal death and propose recommendations using standardized forms.

3. Statistical compilation of data. The MOPH Statistics Department collects all the reports of investigations from the independent experts or the NCSM, generates a unified comprehensive report about maternal death in Lebanon with identified causes and determinants, and submits it to the national committee on an annual basis.

3 | RESULTS

Between 2010 and 2018, an estimated 136 cases of maternal death were reported, averaging approximately 14.9 per year, indicating an MMR below the officially reported number of 23. The MMR peaked at 20 in 2016 and decreased to 13 in 2018 (Fig. 1). During the same period, the number of live births in Lebanon increased from 71 968 to approximately 120 000 with the influx of Syrian refugees into the country.²⁴

During the study period, the healthcare system faced extraordinary challenges due to the massive inflow of Syrian refugees crossing the border to Lebanon, estimated at more than 1.5 million individuals and representing more than one-quarter of Lebanon's pre-crisis population.²⁴ This is reflected by the slight increase in

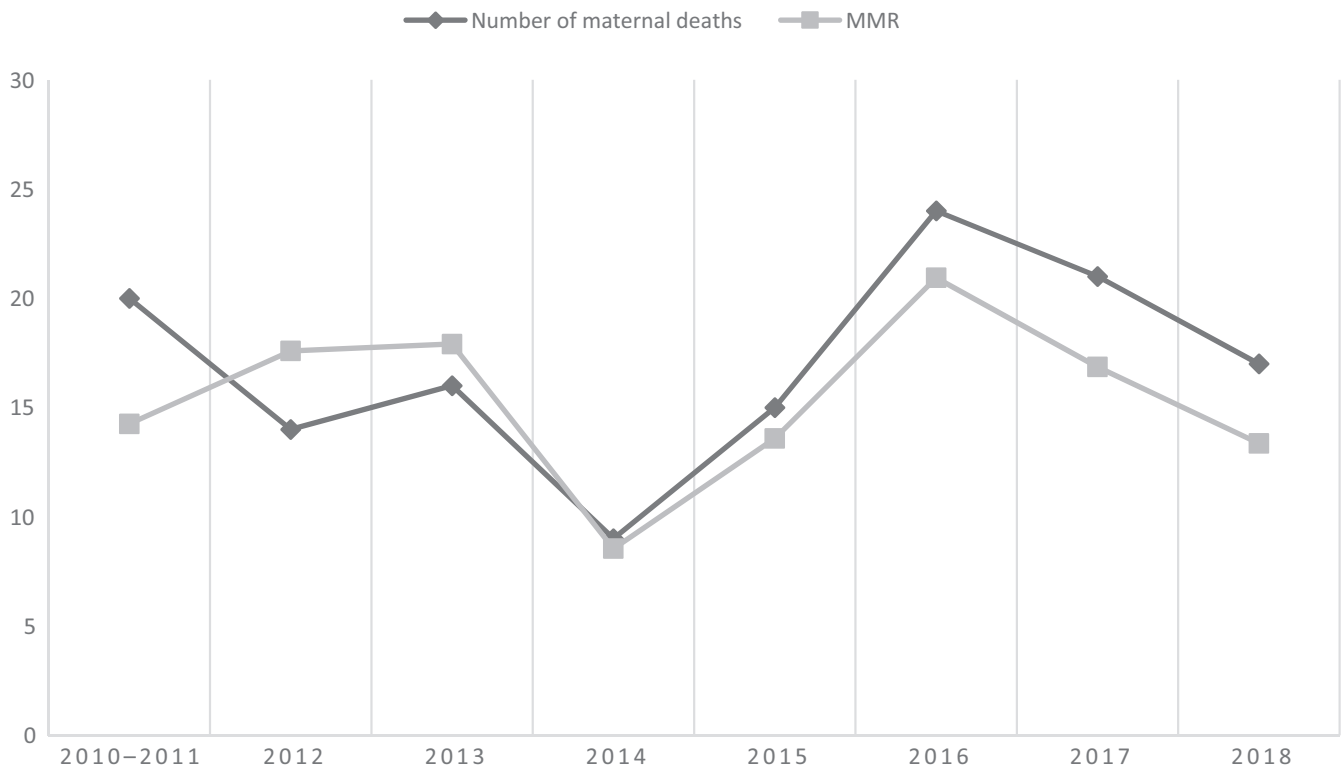


FIGURE 1 Maternal mortality in Lebanon, 2010–2018.

maternal mortality cases, especially in areas of the highest concentration of Syrian refugees (i.e., Beqaa, North), where there is less availability of large referral centers, which are mostly concentrated in Beirut (Fig. 2). The opposite trend is shown for Beirut, as expected. The increasing trend in maternal mortality cases among women younger than 18 years is also indicative of the change in the profile of women giving birth in Lebanon due to the influx of Syrian refugees, who have higher rates of early marriage than their Lebanese counterparts (Fig. 3).

Maternal mortality cases are reported in accordance with the cause of death recorded by the attending obstetrician and reviewed by an expert from the NCSM. The data show that the main causes of maternal deaths are postpartum hemorrhage (25%), non-obstetric causes (16%), embolism (15%), hypertensive disorders of pregnancy (pre-eclampsia and HELLP) (15%), and abnormal placentation (8%) (Fig. 4). They also show that the most common causes of maternal

mortality are generally common across all regions of Lebanon. The majority of maternal deaths in Lebanon are due to direct causes, which had decreased to a low of 53% in 2015 but have since shown an increasing trend. By contrast, indirect causes of death were highest in 2015 and have since been decreasing.

4 | DISCUSSION

The present data highlight the continued low MMR in Lebanon despite the vast increase in number of deliveries due to the influx of Syrian refugees. This can be explained primarily by the nature of the health system and the universal health coverage in relation to pregnancy and childbirth. Lebanon maintains a strong and resilient healthcare system, an extensive accessible network of primary healthcare centers, more than 140 hospitals and maternity facilities,

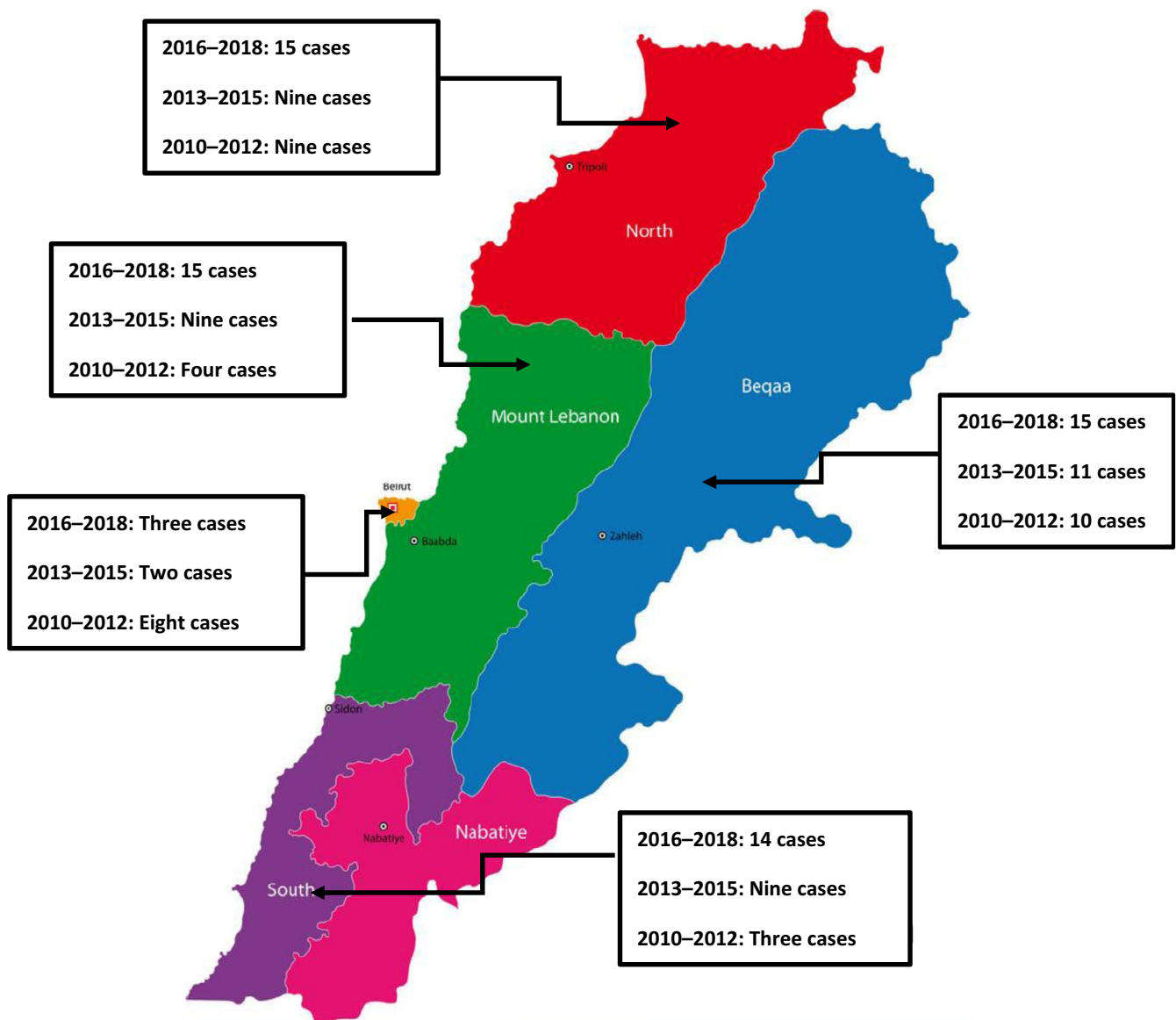


FIGURE 2 Distribution of maternal deaths in Lebanon by region, 2010–2018.

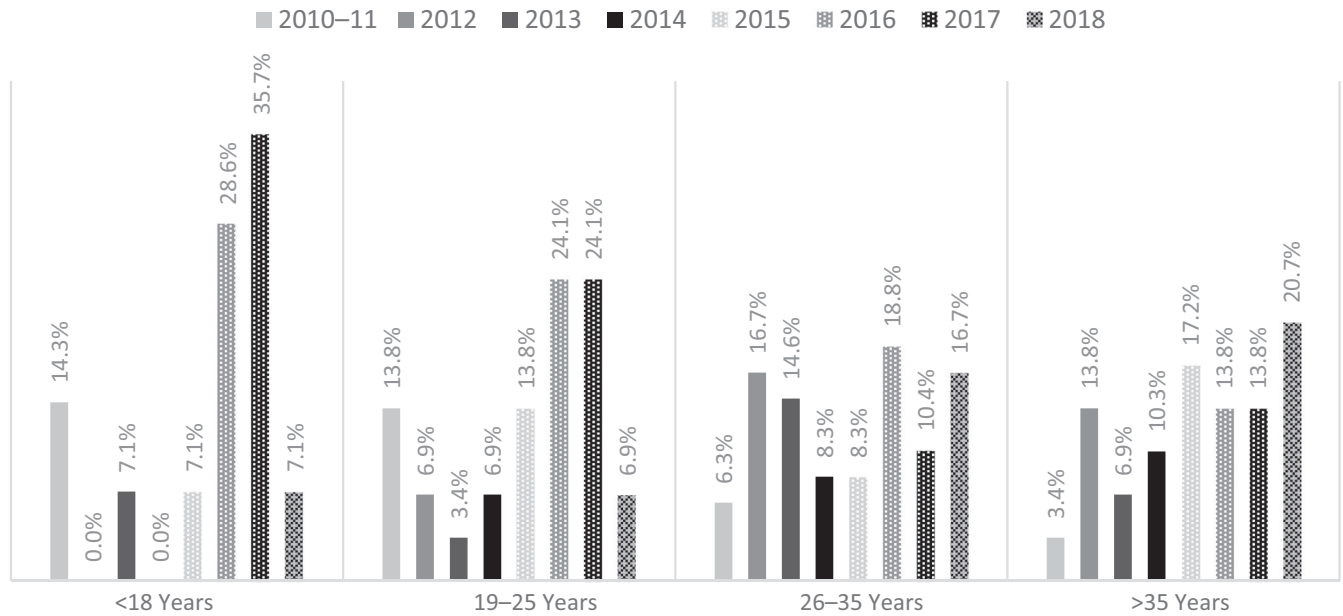


FIGURE 3 Distribution of maternal mortality cases in Lebanon by age group, 2010-2018.

and diverse competent human resources to successfully handle the increased burden of pregnancies and childbirth. All of these have been important factors to absorb the high load of pregnancies and deliveries in the country since 2012. In addition, pregnant Syrian refugees, similar to their Lebanese counterparts, have a universal prenatal and childbirth coverage partially sponsored by the United Nations High Commissioner for Refugees.²⁴ These important factors have kept maternal mortality from rising in response to the crisis experienced. Nevertheless, vulnerable individuals remain in the North and Beqaa regions of Lebanon,²⁵ where there is a large concentration of refugee populations, and among younger women given that early marriage (<18 years) is reported to be common among Syrian refugees.²⁶

In terms of the causes of maternal mortality, the data indicate that they align with the three-delays model²⁶; namely, (1) women who

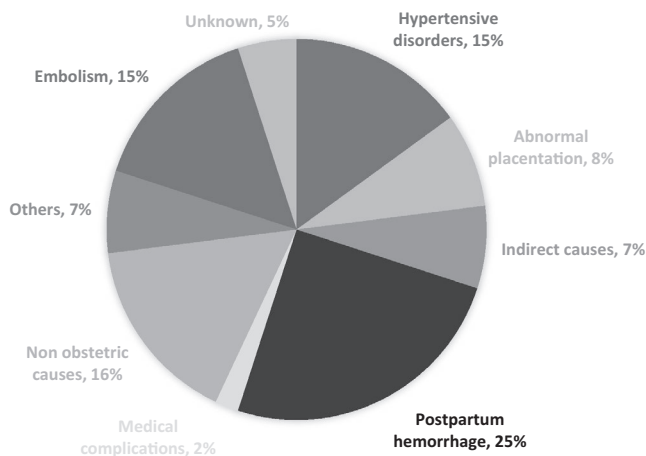


FIGURE 4 Percentage of maternal mortality cases in Lebanon by cause of death, 2010-2018.

arrive in a moribund state too late to benefit from emergency care, either because their high-risk condition was not identified or they failed to seek routine care, or they were denied admission due to their inability to secure additional funds; (2) women who do not receive timely and effective interventions, either because of lack of specific skills, or inadequate diagnosis of the emergency condition, usually in rural remote areas; and (3) women who are admitted for normal delivery who subsequently develop serious complications (either naturally or through iatrogenic factors) and die.

The pattern of maternal mortality in Lebanon is mixed in its etiology between high- and low-income countries, suggesting a transition toward better care and better promotion of maternal health, which should be captured and strengthened. The causes of maternal death in Lebanon are common to those in central Europe and some high-income countries, with a mixture of type I delay and health system (environment) disorganization.²⁷ The increase in the proportion of indirect causes of maternal mortality over time in Lebanon reflects success in addressing the direct complications of childbirth and calls for further investigation to understand the possible changing etiology and the role of non-communicable diseases and mental health.²⁸

One of the successful interventions to address type I delay in Lebanon has been to develop a protocol to identify placenta accreta syndrome (PAS) through targeted ultrasound or MRI in cases of placenta previa with two previous cesarean deliveries. After diagnosis of PAS, women are referred to three designated tertiary care centers for management by a skilled multidisciplinary team. This intervention, which was implemented in 2013, has almost eliminated maternal mortality due to PAS complications by early detection through referral to tertiary centers for a sonography by skilled practitioners.

In general, the data point to deficiencies in quality of maternity care in the Lebanese health system. In a country with almost universal coverage of prenatal and delivery care, more effort should be focused

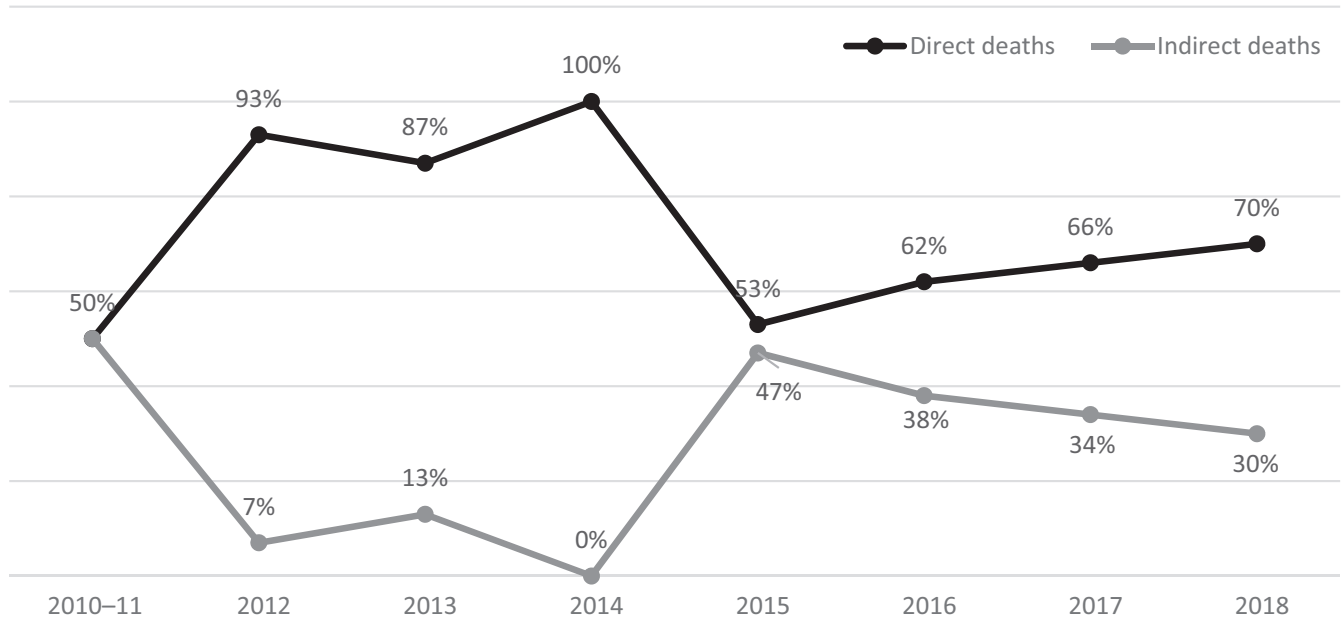


FIGURE 5 Percentage of direct vs indirect maternal deaths in Lebanon, 2010–2018.

on improving the quality of prenatal care, including prompt diagnosis, early identification, and follow-up of serious medical and obstetric problems such as pre-eclampsia and PAS. The unacceptably high rates of cesarean deliveries (41.8%)²⁹ might be in part responsible for the cases of embolism and postpartum hemorrhage observed in Lebanon. This necessitates a call for a national effort toward the reduction of unnecessary cesarean procedures.

The study has some limitations. First, the data were limited to reports from a maternal death reporting system established at a national level in a country with deficiencies in civil registration and vital statistics. Second, although home births are very rare in the country, there might be some underreporting or missed cases of deaths occurring outside hospitals.

5 | CONCLUSION

In Lebanon, efforts should focus on regulating the environment of maternal health care. Evidence-based reproductive healthcare policies and programs at national levels should consider the following to ensure further reductions in MMR. First, strengthening maternal mortality reporting to include possible cases that might be happening outside hospitals by involving the local authorities (mayors). Second, identifying high-risk/near-miss cases by developing an identification guideline and a network referral system to advise and manage these cases. Third, strengthening interventions and the response system to reduce delays (related to the three-delays model) in collaboration with national societies of obstetrics and gynecology, health authorities, UNFPA, WHO, and syndicates of hospitals and midwives. Fourth, providing continuous training on emergency obstetric care modules and other skills based on an in-depth understanding of pregnancy care under normal and conflict situations, childbirth environment,

healthcare capacity, and women's engagement in birth care plans emanating from qualitative, quantitative, and operational research. Last, organizing national efforts to look into possible pathways of reducing the practice of cesarean deliveries through the engagement of all stakeholders including women.

AUTHOR CONTRIBUTIONS

FK and TKK led the analysis, interpreted the data, and drafted the manuscript. WA and AN interpreted the data and revised the manuscript. All authors approved the final manuscript.

ACKNOWLEDGMENTS

The authors acknowledge the assistance of Linda Kabbani and Sirine Daouk in editing and formatting the manuscript.

CONFLICTS OF INTEREST

The authors have no conflicts of interest.

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