



# Maternal Mortality in the Gaza Strip

From 1<sup>st</sup> July 2014 to 30<sup>th</sup> June 2015  
Conclusions and Recommendations



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## Abbreviations

AP	Antepartum
APH	Antepartum Hemorrhage
ARDS	Adult Respiratory Distress Syndrome
BP	Blood Pressure
CBC	Complete Blood Count
CPR	Cardiopulmonary Resuscitation
C/S	Caesarean Section
CT	Computer Tomography
DVT	Deep Vein Thrombosis
ER	Emergency Room / department
Hb	Hemoglobin
HUS	HemolyticUremic Syndrome
ICU	Intensive Care Unit
IP	Intrapartum
IUCD	Intrauterine Contraceptive Device
MI	Myocardial Infarction
MMR	Maternal Mortality Rate
MoH	Ministry of Health
N/A	Not applicable
NGO	Nongovernmental Organization
NVD	Normal Vaginal Delivery
OR	Operating Room
PE	Pulmonary Embolism
PIH	Pregnancy Induced Hypertension
PP	Postpartum
PPH	Postpartum Hemorrhage
UN	United Nations
VTE	Venous Thromboembolism
WCC	White Cell Count
WHO	World Health Organization

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*The biggest challenge to moving toward a safer health system is changing the culture from one of blaming individuals for errors to one in which errors are treated not as personal failures, but as opportunities to improve the system and lack of awareness of the extent to which errors occur daily in all health care settings and organizations. In today's health systems, the vast majority of errors are not reported because personnel fear they will be punished. (Institute of Medicine, Committee on Quality of Health Care in America, 2001, p. 79*

## Executive Summary

Maternal mortality is an important health indicator, widely acknowledged as a general indicator of the overall health of a population, of the status of women in society, and of the functioning of the health system. Maternal mortality is defined as death of a woman during pregnancy or within 42 days after childbirth, spontaneous abortion or termination of pregnancy.

Gaza Strip suffers from several severe social and economic challenges due to the occupation and a 10-year of siege. Furthermore, the population has been subjected to the devastating effects of four major military campaigns, the latest was in 2014. This study aimed to verify, identify causes and investigate the 18 maternal mortalities that took place between July 2014 and June 2015. It applies a mixed design with quantitative and qualitative approaches. With the use of a data collection sheet, qualified researchers obtained and reviewed the available medical case notes, investigation reports and death certificates of these cases. The team had also conducted field visits and interviews with staff and families in order to track any missing information and for the purposes of comparison and verification.

### Results

The first major challenge for the data collection team was to find the medical case notes for the deceased women. The team collected 10 medical records out of 18. The team was able to contact and interview 16 of the families either by phone or by field visits. One family refused to talk to the research team, and contact information for the 18<sup>th</sup> case was not found. Altogether, 12 physicians were interviewed.

The standard of medical case note keeping was found to be extremely poor and a complete lack of contemporaneous notes became apparent. Assessment of hemorrhage, blood pressure readings, and timing of events were frequently missing from records and even in cases that underwent surgeries, the surgical notes were poorly written and in most cases illegible, making a proper assessment of the events an extremely difficult task.

Poor communication and/or lack of empathy was felt by eight of the concerned families (50% of cases). There was inappropriate communication in most instances which resulted in the families reporting more traumatizing experiences.

The research team noticed problems in the referral process between hospitals. Guidelines for referrals between Gaza hospitals were not respected in some cases, resulting in the shuffling of patients back and forth between hospitals. In one case, the deceased arrived to the referral center but no records exist of her arrival, death, or any medical interventions that might have been done. Furthermore, referrals to centers outside Gaza were done too late, when the patients were already in a very critical condition.

The impact of war played a factor in four cases, mostly due to restrictions on access to medical care. Socioeconomic factors and poor education were noted or played a role in five cases. In two cases, social reasons and not following doctors' advice played a significant role and were confirmed by the research team.

On several occasions, the research team came across a low morale among doctors. This was due to a high work load rewarded with only a small salary. It was also attributed to a perceived lack of support from managers and the Ministry of Health when things go wrong.

Overall and stratified by frequency, the most frequent causes for mortality were found to be pulmonary embolism, infection/septicemia, and post-partum hemorrhage with four cases each. These are followed by cardiac causes (two cases), an uncontrolled asthma (two cases), stroke (one case) and renal failure (one case). Causes of death were discerned from death certificates as well as interviews with families or doctors.

## **Recommendations**

The study recommends that a sweeping culture of change is needed to improve documentation and communication across all sectors in medical practice. Therefore, the research team made the following recommendations:

- Written protocols and leadership by clinical and managerial leaders are necessary.
- The introduction of clinical audits is needed to highlight weaknesses and make improvements. Therefore; it is recommended for an annual clinical audit to be a mandatory part of the residency training program in all specialties.
- Training courses to improve communication across the board between medical staff and patients should be available and made mandatory.
- Continuous Professional Development Plans should be introduced and to be adhered to by all doctors and these should include evidence of attendance to mandatory training courses. Such training courses have to include yearly: Obstetric Emergency Drill, Basic and advanced Life Support and Communication training to keep skills updated in a safe environment.
- Use of partogram and delivery notes including estimating blood loss following normal deliveries to be mandatory in all obstetric units in Gaza Strip. This includes regular audits to prove their correct use.
- Introduction and mandatory use of early warning systems is needed. Track and Trigger charts could help to avoid deaths by alerting the staff at earlier stages, and they further help with documentation.
- Multidisciplinary antenatal care clinics have to be established for the care of patients with complex medical needs.
- Supportive and clear leadership has to be established by the Ministry of Health and to be communicated downwards to the different management and clinical leadership levels. This involves support for clinicians involved in difficult cases and those where 'things have gone wrong'.

## Background

Maternal mortality is a health indicator that shows wide gaps between rich and poor countries. In 2000 the UN set the Millennium Goals to be reached by 2015 (UN WHO 2014). Among these was Millennium Goal number five which aimed to reduce the maternal mortality rate (MMR) by  $\frac{3}{4}$  from 1990 to 2015 (WHO Millennium Goal Report 2015). Over the last decade, MMR was fluctuating between 15.4/100,000 live births in 2004 and 2005 to 40 in 2007 (figure 1). By examining this figure carefully, it is noticed that there is a peak of MMR following each war waged by Israelis against Gaza Strip. In the context of worldwide decreases of MMR, this is an unusual trend that needs to be investigated.

Maternal mortality is defined as death of a pregnant woman or a woman within 42 days after childbirth, spontaneous abortion or termination; providing the death is associated with pregnancy or its treatment, irrespective of the gestational age or the site of the pregnancy, for a specified year. (Pattinson 2009, Say 2014). Maternal mortality ratio is defined as maternal mortality per 100,000 live birth. The MMR is the annual number of female deaths per 100,000 live births from any cause related to or aggravated by pregnancy or its management (excluding accidental or incidental causes) (Say, 2014).

MMR varies across the world with 1,360 in Sierra Leone, 789 in South Sudan, 58 in Jordan, 33 in Egypt, 9 in the UK and 6 in Germany in 2015 (WHO et al. 2015, GHO 2015). The MMR in State of Palestine delinked from 38 in 2009 to 24.7 in 2014 (Ministry of Health, 2016). According to the same report, there was a wide variation between MMR in West Bank and Gaza Strip. MMR was 30.6 in Gaza Strip compared to 19.8 in West Bank. This can again be related 2 reasons: firstly the possible underreporting in west bank because of people resides in peripheral and rural areas, secondly due to the impact of the war waged against Gaza Strip in July 2014. Many Middle Eastern countries are thought to have met Millennium Goal 5 (Global Health Observatory 2015). However, this was globally mostly not achieved and recent conflicts across the region have made this more difficult (Global Health Observatory 2015).

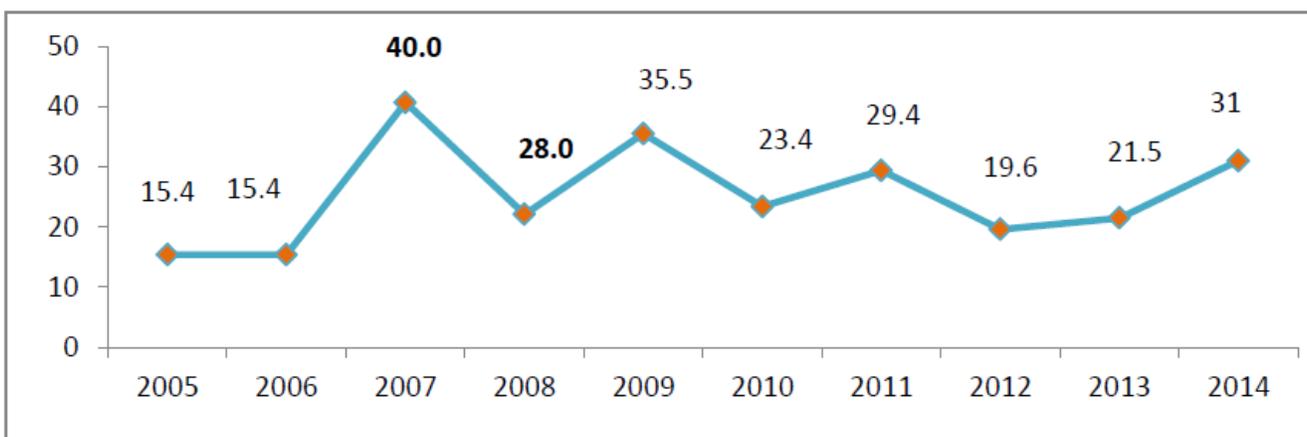


Figure 1: Maternal Mortality Rate in Gaza Strip 2005-2014 (source: Ministry of Health, 2015)

Worldwide the most common cause of maternal death is postpartum hemorrhage (PPH). Other causes of maternal mortality include infection, hypertensive disease, venous thromboembolism, ectopic pregnancy among others (Global Health Observatory, 2015). To overcome these causes, a timely and accurate response facilitated by quick access to health care facilities, availability of teams and resources to deal with the situation and appropriate hygiene measures and drugs are required. In low resource countries, the MMR remains much higher than in the developed world. Poor staffing levels, deficient hygiene measures, lack of training, paucity of equipment all contribute to this situation (UN WHO 2014).

## Introduction

Gaza Strip faces many economic and social challenges; some due to the siege that has been ongoing for a decade. Following the last war in July, 2014, more than 2,000 people were killed and more than 11,000 were injured. Furthermore; more than 12,000 houses were destroyed and people were forced to seek refuge in other places (UN 2014). In addition to this, Gaza Strip has been reported by the UN to have the highest unemployment rate in the world in 2015 (UN, 2015). The ongoing siege imposed by Israel against Gaza Strip since 2006 is placing restrictions on trading goods as well as people traveling from and to Gaza. This has had a profound impact on the economical position in Gaza Strip with a shortage in building materials, health products, spare parts and medications and contributes significantly to the high unemployment rate in the Strip. The number of maternal deaths reported between July 1<sup>st</sup> 2014 and June 30<sup>th</sup> 2015 was 18 cases (Ministry of Health, Palestine data).

### General objective

The general objective of this study was to identify possible causes of maternal mortality in Gaza Strip that occurred between July 1<sup>st</sup> 2014 and June 30<sup>th</sup> 2015.

### Specific objectives

- 1) There were several specific objectives for this study, which were:
- 2) To identify causes of MMR in Gaza Strip from July 1st 2014 to June 30th 2015;
- 3) To explore the relationship between MMR and socioeconomic status;
- 4) To specifically look at the effect of the ongoing blockade on Gaza Strip as well as possible impact of the recent war in July/August 2014 on MMR.
- 5) To investigate if there were any relationship between MMR and access to health care facilities during the crisis; and
- 6) To draw conclusions and make recommendations to relevant stakeholders to improve quality of maternal health services and reduce MMR in Gaza Strip.

## Methods

### Study Design

A descriptive, retrospective design that included a mixed (triangulation) approach of quantitative and qualitative data collection was used in this study. The use of both quantitative and qualitative approaches strengthens the design and reduces any weaknesses in either approach (Patton, 2002 and Punch, 2005). It will also provide richer and more in-depth data that will reduce bias of using a single method (Neuman, 2006 & Creswell, 2003) and will add to the richness of the study. Furthermore, the use of the triangulation method will make the study fuller (Neman, 2006) and more comprehensive and one method will cover for the limitations of the other (Creswell, 2003). For example, quantitative data gives the researcher hard data and when used with qualitative data it answers the question why.

### Participants, Sampling, and Settings

The study population included all women who died during pregnancy or within 42 days post-delivery that occurred between July 1<sup>st</sup> 2014 and June 30<sup>th</sup> 2015 in Gaza Strip. A list of 18 cases who met these inclusion criteria was presented by the Palestinian Ministry of Health (MoH) to the research team. Along with the list, the MoH presented to the research team copies of some patients' case notes of the involved cases and a copy of investigation reports related to these cases. It should be mentioned here that some patients' case notes were missed and the research team could not reach them.

### Data Collection

The research team reviewed the available clinical notes, investigation reports and death certificates for the 18 women who met the inclusion criteria. Researchers reviewed all the information available for each case and recorded all relevant data regarding the cause of death, pregnancy outcomes, associated medical conditions, and demographic and obstetrical data. The causal association between the pregnancy status and death is based on the clinical cause of death, the interval between pregnancy termination and death, and the pathophysiology of pregnancy complications.

Data collection sheets were completed by the research team for each case (appendix A). The data collection sheet was prepared by the research team and it covers five main domains which include: a) socioeconomic status, b) past medical history, c) obstetrical history, d) received antenatal care, and e) index pregnancy

Furthermore; the research team reviewed all existing documents (including case notes at the hospital where deaths had occurred). Moreover, the team made field visits to the deceased women's homes and conducted interviews with their family members to hear the family side of the story. In about seven cases, the interviews were made by phone. Besides that, the research team members interviewed 12 medical clinicians who had been involved in caring for the deceased women.

During the data collection process, the research team faced several obstacles and challenges. The first major challenge for the data collection team was to find the medical case notes. Although names and reports of investigation committees were submitted by the MoH, the actual notes were difficult to find from the local hospitals. The research team was only able to locate and view case notes for 12 out of the 18 cases. In the remaining 6 cases, information was obtained from the reports of investigation committees as well as interviews with clinicians and families of the deceased.

Similarly, contact details for patients were not recorded systematically in the notes. Contact numbers were found to be scribbled at odd places in the case notes, but were completely missing in eight cases. Therefore, other avenues to get in touch with the families had to be found, such as asking members of the team and their acquaintances who lived in the neighborhood or knew the families of the deceased to find this information. None of the telephone numbers were recorded in the initial admission sheets designated to record patient details including phone numbers.

### **Ethical Considerations**

The research team obtained approval to conduct this study from the MoH and from the administration from private and NGO facilities that had provided care for the deceased women. Before conducting the interview with family members and health care providers, the aims of the study were explained to the participants and a verbal consent to participate in this study was obtained. Collected data were dealt with high confidentiality as each case was assigned a code number. The participants were assured that no names will appear in the final report.

### **Data Analysis**

All quantitative data were entered into an EXCEL spreadsheet. Prior to data analysis, data were checked that all values fall within the accurate range for each item. Data analysis procedures included basic descriptive statistics to describe the sample (range and percentage) and frequency distribution tables.

The qualitative part of the study was analyzed through a careful reading of the responses provided by the responders. Data analysis consisted of identifying, coding, and categorizing patterns found in data (Michelle, 2007). In this study the researchers used thematic analysis which is considered a way of seeing, as well as a process of coding qualitative data (Michelle, 2007). Throughout data coding, the researchers began with determining labels, defining the concern of each theme, describing how to know when each theme had occurred, describing any qualifications or exclusions to identify themes, and determining some positive and negative examples to eliminate the possibility of confusion when looking to the themes (Michelle, 2007). Then the investigators identified the major themes and subthemes that came from the data. When appropriate, quotes from the respondents were used.

## Results

The results of this report are divided into two major sections; the results of quantitative data analysis and qualitative data analysis.

### Quantitative Data Analysis

**Distribution of maternal mortalities by age at the time of death.** The age of the 18 deceased cases ranged between 18-44 years, with a mean age of 33.5 years (figure 2).

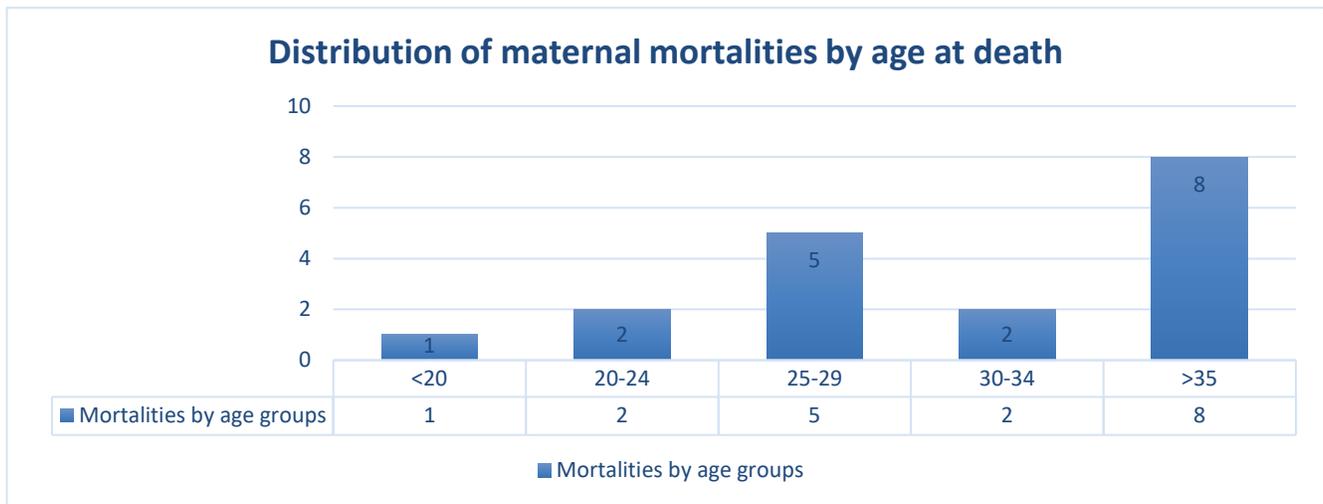


Figure 2: Distribution of maternal mortalities by age at death

**Distribution of maternal mortalities by gestational age.** Only one case was in the second trimester while the other 17 (95%) cases died during the third trimester, nine of them (50%) were at full-term.

**Distribution of maternal mortalities by parity.** Four cases (22%) were primiparous, while 10 (55%) were grand multiparous women (para five and more): table 1.

Table 1: Classification of cases by parity

Parity	Number of cases
Primiparity	4
Multiparity	4
Grand-multiparity	10

**Distribution of maternal mortalities by time of death in relation to time of birth.** Seven deaths (39%) occurred at the antepartum period, with one (5%) at intrapartum and 10 (55%) at post-partum period (figure 3).

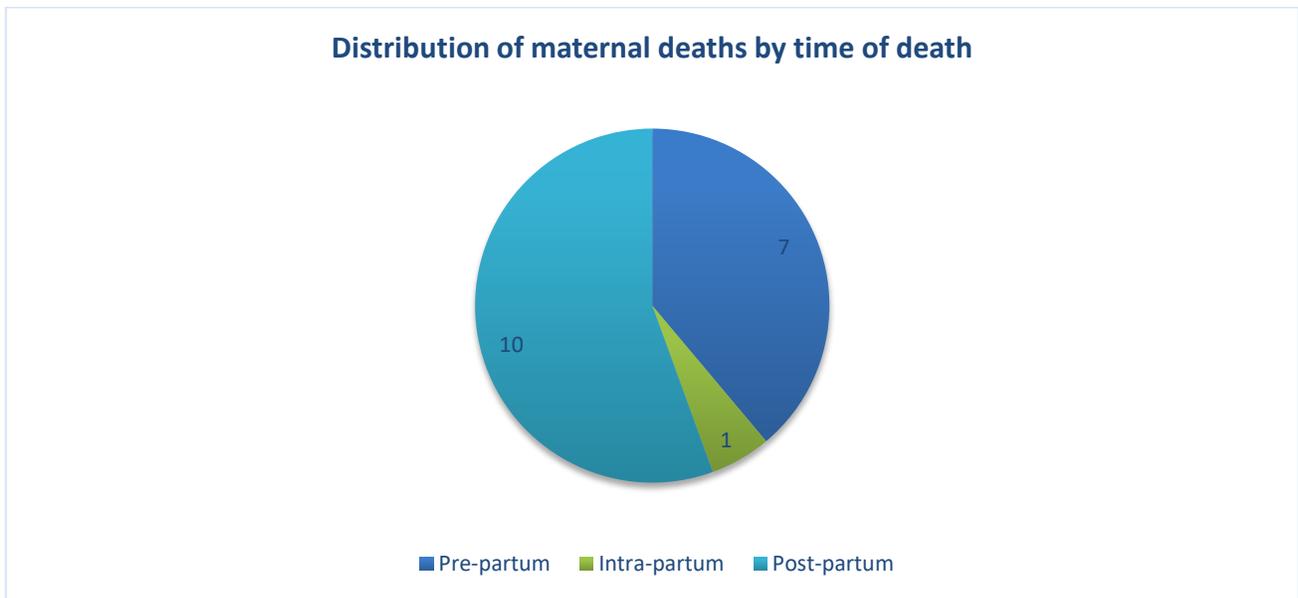


Figure 3: Distribution of maternal deaths by time of death

**Distribution of maternal mortalities by place of death.** Figure 4 shows places where death took place. Seven cases of death took place at Shifa Hospital; which reasonable as Shifa is the biggest birthing center in Gaza Strip.

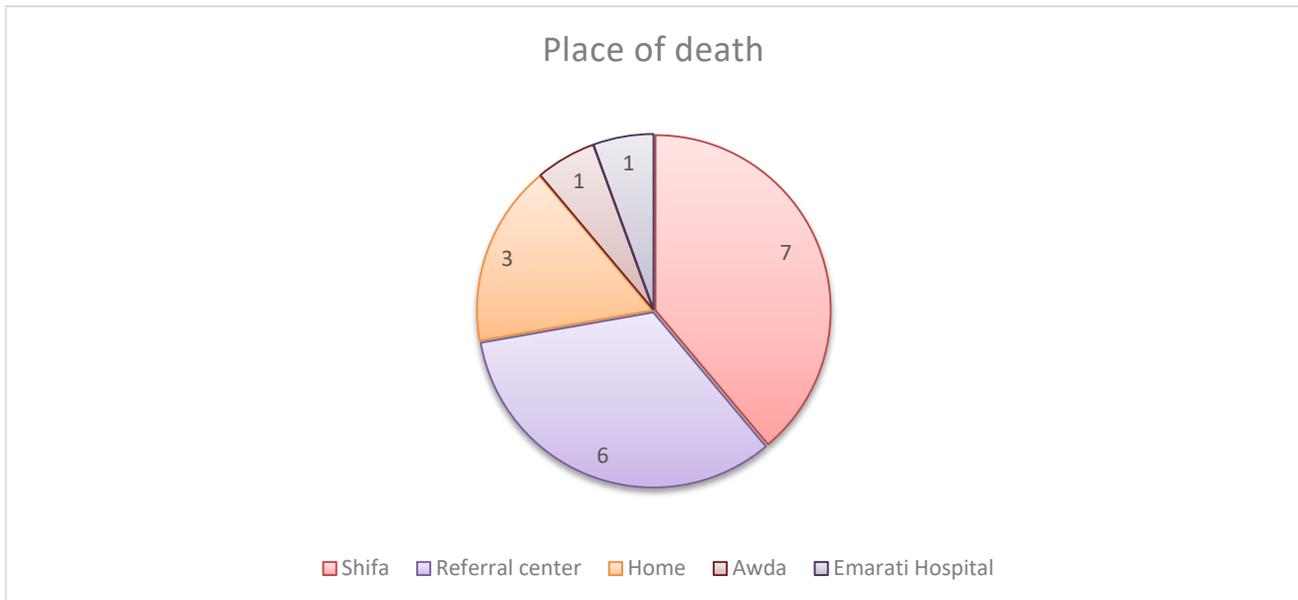


Figure 4: Place where maternal mortality happened

**Distribution of maternal mortalities by antenatal classification.** Eight of the 18 cases (44%) were classified as high-risk pregnancies, with the most frequent cause of such classification being previous Caesarean section and preeclampsia/PIH (complicated by Gestational Diabetes Miletus {GDM} in two cases). Examination of previous histories revealed that two cases were epileptic, while two suffered from poorly-controlled bronchial asthma, one had an attack of DVT during a previous pregnancy and one had an aortic stenosis.

**Distribution of maternal mortalities by cause of death.** Stratified by frequency, the most frequent causes for mortality were found to be pulmonary embolism, infection/septicemia, and post-partum hemorrhage; these were followed by cardiac causes, poorly controlled attack of bronchial asthma, stroke and renal failure (figure 5). Causes of death were discerned from death certificates as well as interviews with families or physicians.

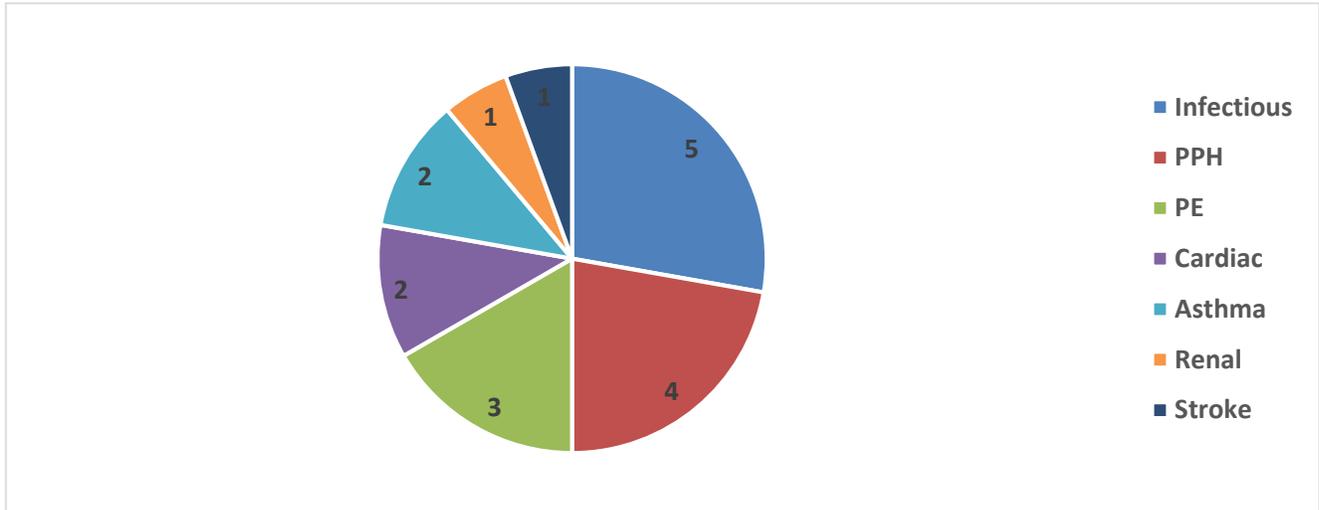


Figure 5: causes of death by frequency

**Distribution of maternal mortalities by time of death in relation to the 2014 war.** Four mortalities (22.2%) took place during the war; three of these cases were due to direct or indirect effects of war (e.g. direct injury, limited access to medical service, exhaustion of staff) which influence clinical outcome.

**Distribution of maternal mortalities by month.** Monthly rate of MMR fluctuated and ranged between zero (May and June 2015) and five cases in October 2014 (figure 6).

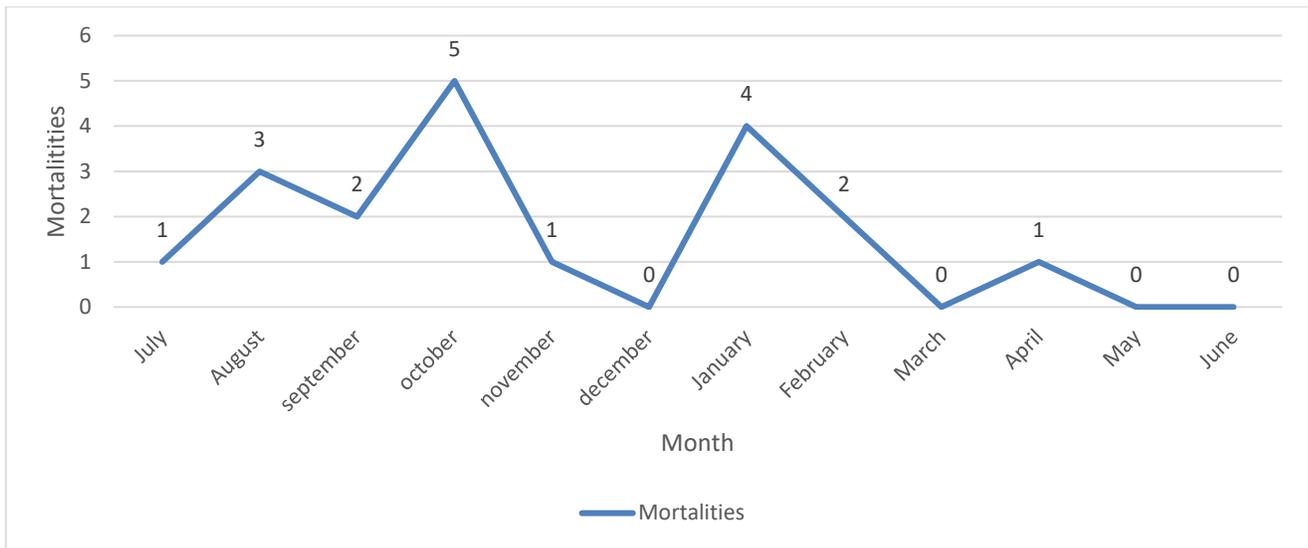


Figure 6: Frequency of mortalities per month

**Distribution of maternal mortalities by governorate.** Figure 7 shows the number of deaths occurs in each governorate. Gaza Governorate came first with six cases while Rafah and Khanyounis came last with two death cases occurred in each governorate.

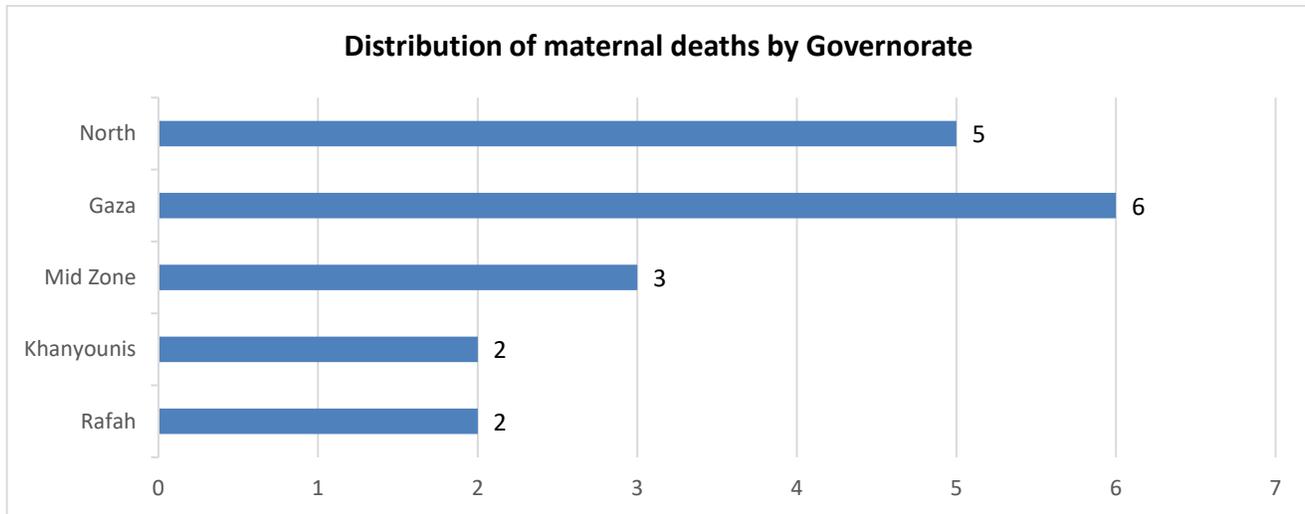


Figure 7: Distribution of maternal deaths by Governorate

## Results of Qualitative Data Analysis

The data collection team was able to get in touch with 16 of the 18 families of the deceased. In some cases, it required several calls to finally speak to them and in one case, the husband only agreed to speak to us in the presence of his lawyer. The team was able to visit seven families and interviewed the rest of the families over the phone. However, one family declined any sort of interview with the data collection team.

In 14 of the 18 cases (78%), families were willing to talk to the team. On the other hand, in some cases the clinicians were more difficult to contact. Altogether we interviewed 12 clinicians and gathered their views. However, not in all cases was a clinical team involved in the events. It was significantly more difficult to collect information from private healthcare settings than from government hospitals.

Besides the interviews, the research team reviewed the available medical records. They read through the notes. The interviews with family members and medical staff were transformed into verbatim. Researchers read all of the transcripts, coded the data and extracted the following themes: standard of medical note keeping, family members' views, antenatal care, referral process, impact of war and socioeconomic factors. From some of these themes, several subthemes emerged.

**Standard of medical note keeping.** Altogether 12 of the 18 (67%) case notes were available to be viewed by the research team. In one case, the team was told that the case notes were not returned to the hospital by the investigation committee. In other cases, they were simply not able to be located by the medical record team or clinicians.

The standard of medical case note keeping was found to be extremely poor, and a complete lack of contemporaneous notes became apparent. In particular, no attention was being paid to recording timings of events or the given medications in any of the cases. Essential details such as recording estimated blood loss in cases of hemorrhage were also consistently missing in the notes. For that reason, making a proper assessment of events from the notes was extremely difficult in most cases.

**Family members' views.** Eight of the interviewed families (44.4%) expressed a high degree of disappointment and the view that their relative was treated negligent. In five cases (28%), this view was very strong. In all of these cases there, were evident communication shortfalls between medical staff and families. Eight cases (44.4%) reported a lack of information given to them or 'inappropriate reassurance', i.e. that they were reassured that everything was OK regarding the condition of their wife shortly before her death. For example, one husband said: "I was told that my wife was completely well, although she had a severe headache at the time." For the following two days she stayed at home despite ongoing headache. She died of meningococcal septicaemia shortly after she attended the hospital again. Another one had been reassured when his wife was in the ICU, but she died the following night when 'she was not a hopeless case,' as her husband said. He had not understood the severity of the illness. In yet another case with hemolyticuremicsyndrome (HUS), the deceased had been transferred to Nablus for further treatment and was at that point in multi-organ failure. However, the husband was not aware of this, but was told about the deteriorating condition of his wife over the phone by a doctor from Nablus.

Furthermore, two husbands experienced the communication of bad news about the death of their child or their wife as traumatic and done without empathy or respect. In one case, the husband reported to have waited two hours and then only a pathologist came to see him and not the treating doctor. In the other case, the husband reported that the doctor informed him in the middle of the ward, while smoking a cigarette about the serious condition of the baby as well as the mother.

**Antenatal Care.** Antenatal care provision and accessibility is generally good in Palestine (Yousef et al 2015). This is also true for Gaza Strip. However, not all patients took advantage of this service, as was evident in 27.8% of cases who did not attend ANC at all, attended very late into their pregnancy or irregularly. In a further 16.7% the attendance is unknown and was not possible to be confirmed

A further aspect of antenatal care, is the number of women whose pregnancy went without problems until the time of delivery, when they attended the hospital. This might include those that were classified as 'high risk', but who did not experience any complications during their antenatal period. For 33.3%, the entire antenatal period was without any complications. Among these were typically all of the cases who died of PPH. For a further 11.1% of cases this is unknown.

Therefore, 55.6% had some degree of complication in their antenatal period. These include the two cases with uncontrolled asthma and the young women with severe aortic stenosis, as well as the patient who died of suspected PE and did not attend until the hospital despite her symptoms.

**Referral process.** Eight patients (44.4%) needed to be referred to another hospital, either inside Gaza Strip or outside.

**Referral within Gaza Strip.** In two cases, referrals were done from Aqsa Hospital to Shifa Hospital. In both of these cases admission was refused to Shifa Hospital and the patients were sent back. Then admission to Aqsa Hospital was refused. One of these patients had to travel the way during the war, when hostilities were taking place.

**Referral to hospitals outside Gaza Strip.** Three patients were referred to Israel, one to Egypt and two to the West Bank (Nablus and Khalil). Review of the notes and the experience of the families in all referrals to Israel and the West Bank revealed that the patients were transferred in an already extremely critical condition, leading to death very briefly after arrival to the respective hospitals and before any intervention could take place. Additional delay occurred in one case, where the referral process had been started, but could not be completed on the same day due to the Erez crossing point being closed.

**Impact of war.** The clinical course in four cases (22%) was directly impacted by the events of the 2014 war. In two cases, families reported that the war made their access to medical care difficult, mainly due to the lack of safe movement under attack. A further family felt that the condition of the deceased was worsened due to impact of war. In a further case, all information was missing, confirming that she was seen at Shifa emergency room (ER). This happened on the second day of the 2014 war and doctors reported that a large influx of injuries contributed to a degree of chaos and disorganization.

**Socioeconomic factors.** In three cases, all of them lived in Shajaeiya district and Gaza city, socioeconomic conditions and poor education made the situation and condition of the deceased difficult and contributed to her lack of access to medical care and compliance with treatment and antenatal care. In a further two cases, the housing was inadequate and contributed to the outcome, as these patients died in winter from uncontrolled asthma.

Two further families felt that their relative herself displayed a degree of carelessness and did not comply with medical treatment or antenatal care, which was confirmed in the review by the researchers. One of these had concealed her pregnancy from her husband and did not seek antenatal care. The other also did not attend antenatal care and ignored her doctor's advice to avoid pregnancy because she 'desperately wanted a male child'.

Poor education (until class 9 only) was evident in six patients, 33.3%. Three of these patients were between 14 and 16 years old when they first got married. In another three cases, poor education and poor understanding of their health and importance of antenatal care contributed to the poor pregnancy outcomes. These included the two patients with asthma. Figure 8 depicts the socioeconomic status of the deceased.

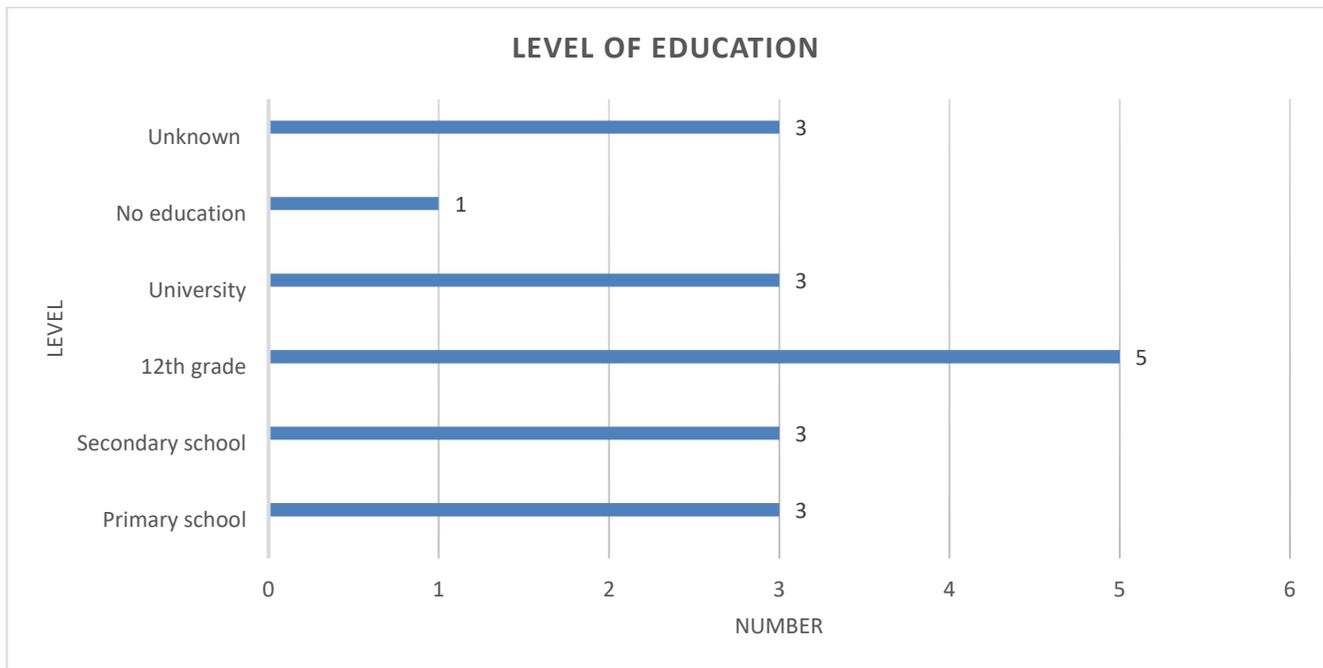


Figure8: Level of Education in total numbers

**Common contributory factors to pregnancy outcome.** This report revealed a few common contributory factors to the poor outcome in these cases. These are either patient dependent or healthcare staff dependent factors and are discussed in details in each chapter below, as well as pinpointed again in the discussion. Table 2 summarizes these factors for ease of understanding at one glance. Please note that in some cases, multiple factor contributed significantly to the outcome.

Table 2: Contributory Factors to poor outcome and aspects of care

Contributory Factor	Total Number	Percentage of Total
Poor Documentation	17	94.4%
Poor Communication	9	50%
Impact of War	4	22.2%
Poor Education	3	16.7%
Socioeconomic Factors	5	27.8%
Poor understanding of illness/ Self Neglect	4	22.2%
Access difficulties	2	11.1%
Irregular / late antenatal care attendance	5	27.8%

**Table 3: Maternal Mortalities 1<sup>st</sup> July 2014 – 30<sup>th</sup> June 2015**

No	Age	Age at 1 <sup>st</sup> marriage	Gestation (weeks)	Parity	Risk	Previous C/S	Mode of Delivery	Time of Death	Cause of Death	Place of Death	Avoidable?
1	24	Unknown	39	5	low	0	NVD	PP	PE	Shifa	no
2	40	Unknown	40	9	Unknown	0	NVD	PP	Probable PPH	Shifa	yes
3	25	22	39	1	low	0	NVD	PP	Sepsis	Al-Arish	no
4	30	Unknown	42	6	low	0	C/S	PP	PPH	Shifa	yes
5	37	22	34	6	high	4	C/S	PP	Septic shock	Israel	yes
6	37	16	About 24	8	N/A	1	N/A	AP	Cardiac arrest	home	yes
7	40	24	27	7	high	0	NVD	PP	Hemolytic uremic syndrome (HUS)	Nablus	yes
8	29	Unknown	39	4	low	0	NVD	PP	PE	Shifa	yes
9	22	18	32	1	high	1	IUFD/C/S	AP	Aortic Stenosis	Khalil	yes
10	36	21	34	7	?	0	C/S	PP	Stroke	Shifa	yes
11	29	22	40	3	low	0	NVD	PP	PPH	Emirati	yes
12	29	27	35	1	low	0	N/A	AP	Meningococcal Sepsis	Shifa	yes
13	27	23	34	1	high	0	C/S	IP	Suspected H <sub>1</sub> N <sub>1</sub>	Shifa	yes
14	44	20	32	9	high	0	N/A	AP	Asthma	home	yes
15	31	14	39	7	high	1	C/S	PP	Asthma	Shifa	yes
16	35	Unknown	32	3	Unknown	0	C/S	PP	Suspected H <sub>1</sub> N <sub>1</sub>	Israel	yes
17	39	22	40	7	Unknown	0	breech	PP	PE	Shifa	yes
18	18	16	40	2	low	0	NVD	PP	Secondary PPH	Shifa	yes

## Distribution of Maternal Mortalities by Cause of Death and Contributing Factors

Several causes were found to be responsible for the death of the deceased women. The list of causes included pulmonary embolism, postpartum hemorrhage, cardiac arrest and others (table 2).

**Pulmonary embolism.** Three cases (17%) died of suspected pulmonary embolism (PE), with no confirmation available. In each case the diagnosis was made based on strong clinical suspicions, rather than confirmation by spiral CT or autopsy. Due to this uncertainty, it is therefore not surprising that in one case there was a discrepancy between the cause of death determined by the investigation team and that by the treating clinical team. In this case (case No 8, Appendix B) the investigation team determined the cause of death to be postpartum hemorrhage (PPH), as a PPH was noted in the nursing notes, but unfortunately, was not documented in the medical notes and delivery notes were not available. However, the PPH was treated and controlled and after the delivery the hemoglobin (Hb) was 9.8 g/dl. According to the notes, another Hb was taken 2-3 hours later which was only 4.8. However, according to the available documentation, no evidence of bleeding was found on assessment. This was confirmed during our interview with the clinicians. Therefore, it is possible to be an artifact due to blood sampling on an extremity with running IV fluids.

There were several factors that possibly contributed to the death of these cases. These factors include substandard medical care, patient-safety neglect, poor documentation, poor communication among health care professionals, and poor communication between doctors and families.

**Substandard medical care.** Substandard care was evident in two cases, in both due to a failure to recognize the critical clinical condition of the patients. In Case 8 (see table 2 and appendix B), there was evidence of substandard care in several points. Firstly, no documentation of the delivery existed and no medical reports of the estimated blood loss or the PPH were available. This is important information, which needs to be available to clinical teams. Furthermore, postnatal follow up and observation on the ward appeared good, but the gradual deterioration had not been recognized. Gradual drop of blood pressure and increase of heart rate were documented, but not acted upon. This was exacerbated by deficient clinical experience with a lack of supervision. An earlier involvement of senior obstetricians was necessary to avoid these pitfalls. Arrangements for appropriate supervision have to be made in the system.

**Patient self-neglect.** In Case 17 (see table 2 and appendix B), there was evidence of neglect as this patient was not on thromboprophylaxis. She had a history of deep vein thrombosis (DVT) in a previous pregnancy, but was not taking heparin. Despite this previous history of DVT, she only presented to antenatal care for the first time at 32 weeks and did not attend regularly. In case of a previous estrogen associated DVT, such as in pregnancy or with combined contraceptive use, patients should receive thromboprophylaxis from the beginning of the pregnancy until after the postpartum period (Royal College of Obstetricians and Gynecologists, 2015). This omission was compounded by the fact that she

had symptoms for four weeks prior to her death, including dyspnea, cough and fever, for which she did not seek medical advice. When she developed cyanosis 10 days prior to delivery, she finally went to Al-Awda Hospital. Here she was advised to go to Shifa Hospital, which she did not do. Instead, she waited until the onset of labor before presenting to Al-Awda Hospital, when she was already fully dilated and delivered quickly. She was described by her husband as 'blue', when he took her to Al-Awda Hospital. Following delivery, she was transferred to Shifa Hospital without delay. Here she arrived already in a critical condition, and was admitted to the ICU instantly. Despite the immediate interventions, she died within 24 hours of admission of a suspected pulmonary embolism.

**Poor documentation.** Documentation was poor in all three cases who died of suspected PE. In no case were delivery notes or admission notes available and subsequent deterioration was not recognized. The critical condition in two of the cases was not immediately noticed by clinicians and therefore, the clinical management was inappropriate with evidence of substandard in both cases.

**Poor Communication between health professionals.** In case 8 the cause of death remained disputed between investigation committee and clinicians. During the interviews, several clinicians said that they felt the investigation committee came across "like policemen", wanting to find a fault.

**Poor Communication between doctors and families.** In one case (case 17), there was striking evidence of poor communication between doctors and the family leading to poor compliance and inappropriate reassurance. Firstly, the family felt reassured when they went home and they were not aware of the seriousness of their wife's and sister's condition. The husband said that "she was not a 'hopeless case', so why did she die". But the reports about her condition on arrival to Al-Awda then to Shifa reported a very serious and critical condition. The second failure of communication happened after death when clinicians avoided the family and avoided to sit down and discuss events. When finally, the forensic pathologist saw them, they said that they were 'just seen to be asked to sign a paper declining an autopsy'.

## Recommendations

- Introduction of Early Warning Scores to the obstetric wards for documentation of vital signs and to prompt clinical review early when necessary and appropriate.
- All clinicians should undergo systematic training in appropriate and effective communication skills.
- Responsibility of the treating doctors includes communication with families to discuss the outcomes even after patient loss.
- The Ministry of Health and the Palestinian Medical Council have to take a leadership role in investigations of adverse events in a no-blame culture. These have to include clinicians and support clinicians. Improvement of the system can only take place if investigations of adverse

events look at system failures and seek to develop additional safeguards to protect patients from harm.

**Postpartum hemorrhage.** In the time of this report, four patients (22.2%) died of Postpartum Hemorrhage (table 2). In three cases with primary PPH, there were significant similarities (for details see Appendix B). In all cases Oxytocin for management of third stage had been given. There were several factors that possibly contributed to the death of these cases. These factors include poor documentation, substandard care, lack of supervision, and impact of war.

**Poor documentation.** Firstly, documentation was extremely poor in all four case who died of PPH. No delivery notes were available. Although in all cases there had been evidence of hemorrhage during or immediately following each delivery, no documentation of these facts or their management was made. The evidence was found in the nursing notes, the investigation reports and at the interviews with the families.

In addition to this, no documentation had been made of timing of intervention and clinicians present at the times. For example, in case 11 there was reported delay of arrival of the senior clinician. This became apparent by interview with clinicians, but is not documented in the notes and also not reflected in them, as times of interventions and management are systematically not documented. Therefore, it remains unclear if delay actually occurred or this was only perceived. Lack of appropriate documentation raises suspicion and is evidence for substandard care.

**Substandard Care.** Delay in recognition of hemorrhage was evident in all three cases. Furthermore, management was not efficient and no evidence is available that clinical teams actually employed timely and efficient management in any case.

In case 4 (table 2 and Appendix B), a deterioration happened gradually over night with no intervention taken by staff. The patient was observed throughout the night, as well as reviewed, but her major intra-abdominal hemorrhage was undiagnosed until shortly before her death, when it was too late. She complained of dyspnea repeatedly, but this was not investigated with care (for example CBC was not done). Clinical inexperience with a lack of supervision was responsible for the failure to recognize that the dyspnea was caused by irritation of the diaphragm by the massive intra-abdominal hemorrhage. In case 18, there was a massive secondary PPH, which are always more difficult to manage. Here, a delay occurred before hysterectomy was performed, leading to DIC.

Another aspect of possible substandard care was the suggestion that pressure had been exerted on the abdomen while delivering the placenta in case 18. The family reported that the patient related to them that she had felt a sharp abdominal pain, at the time of delivery of the placenta, when a clinician was exerting pressure on her abdomen. Afterwards, a uterine rupture was detected as the cause of the initial bleeding after delivery. The exertion of fundal pressure is bad practice, as it does not help delivery of the placenta, but can induce uterine rupture (Verhejjen et al. 2009; Murray et al. 2013). As medical

notes are missing from this delivery, and as for all deliveries, exact events remain unknown. However, reports of the family suggest some exertion of pressure for delivery of the placenta. The lack of documentation in this case compounds this assumption, and does not protect against such suggestions.

**Impact of war.** One case (Case 2; see table 2 and Appendix B) occurred on 9<sup>th</sup> July 2014, which was the third day of the war. Only a deficient file of medical case notes was available for this case, but a meeting with the husband clarified events to a certain degree. The husband told the research team that she was Para 9 and had a normal delivery followed by a massive PPH. She had sudden massive bleeding and was transferred to Shifa Hospital; this is the only information found in her small file that was available to be viewed at the ministry of health – legal council’s office. Her death was probably due to PPH, but without more notes available, this cannot be stated with certainty. Meeting with her husband, he declined to give information unless he was permitted by his lawyer. This patient was an educated woman, and she was the headmaster of a girl’s school. She had a normal delivery at Shajaeiya, but then was transferred to Shifa due to severe bleeding. This process was flawed by difficulties due to ongoing hostilities and transfer across the roads in Gaza at that time was not safe. At Shifa Hospital, she allegedly was taken to the operating room (OR) and operated upon. No notes were available with regards to her operation or presence in the OR.

There appears to have been a complete lack and breakdown of communication. On the second day of the war, Shifa Hospital had to cope with a huge influx of injuries and casualties and this could be the reason for the nearly complete lack of documentation in her case.

### **Recommendations**

- Introduction of Early Warning Scores to prompt early clinical review also by the appropriately experienced clinician.
- Introduction of the use of partogram and delivery proforma, which documents blood loss following every delivery.
- Stop the use of fundal pressure in all situations.
- Appropriate supervision of inexperienced clinicians.
- Regular, mandatory emergency drills for all clinicians of all grades.

**Puerperal septicemia and infectious disorders in pregnancy.** In total, five (27.8%) patients died of Sepsis, Septicemia or other infective causes. Of these five patients three (66.7%) had been transferred to Israel or Egypt and died there. Two patients (table 2 and Appendix B; Cases number three and five) had clearly been affected by the war with restrictions in reaching hospitals and difficulty in transportation. Documentation was also extremely poor in both cases, with the war possibly impacting on the care being taken for documentation as well as the decision made for admission to the ward.

The actual causes of death were heterogeneous and all remain unconfirmed. No culture results were present in the notes. In at least one case a sample was documented to have been sent to the laboratory, but the result was never documented in the notes, possibly because the patient had died. Furthermore, clinicians told us that cases with suspicion of H<sub>1</sub>N<sub>1</sub> Virus could not be confirmed as PCR kits are available in Gaza but not free to be used by clinicians.

Most of patients (66.7%) had attended a hospital earlier in the course of their illness and had been assessed by a doctor then. One case (Case five, Appendix B) was sent back and forth from Shuhada Al-Aqsa Hospital to Shifa Hospital and back, while she was unwell only to be finally admitted to the ICU at Shuhada Al-Aqsa four days later. When her condition was deteriorated, she was transferred to Shifa and unfortunately died after five days. The other two cases (Cases 12 and 13, table 2 and Appendix B) were seen, not admitted and died within days following these assessments. None of the assessments were documented. Therefore, it is unclear what assessments were done, but they show inaccurate clinical judgement and a lack of supervision. This was compounded by a lack of appropriate safety netting, with instructions to patients on signs and symptoms and times when they should return.

There were several factors that possibly contributed to the death of these cases. These factors include poor documentation, poor communication, lack of supervision, and lack of safety netting.

**Poor documentation.** Medical documentation was extremely poor in all cases with assessments and laboratory results not documented. Times, events and interventions were also missing from the notes.

**Poor communication.** Communication between healthcare professionals was poor, so that two patients (cases 2 and 4, Appendix B) were sent from one hospital to another due to a failure of communication between medical teams.

**Lack of supervision.** Lack of supervision of inexperienced staff in at least in 66.7% of cases resulted in misjudgment and inappropriate advice.

**Lack of safety netting.** Another important factor was the fact that no safety netting was attempted in any of the cases, leading to patients not attending, although their condition might not have improved or even deteriorated. They had been completely reassured by the doctor who had assessed them. Clear instructions about the timeframe, i.e. when they should present again, were not provided to the patients. Furthermore; discussion of risks were not provided (Almond 2009; Neighbour 2004).

## **Recommendations**

- Implement systematic documentation of deliveries, assessments and interventions. This should include outpatient assessments at all hospitals system and especially that forms are available but not filled in. Furthermore, a systemic approach needs to be devised to document results in the notes such as culture results, blood results, etc.

- Reaching a formal written agreement on a referral policy for cases that need tertiary center care at Shifa Hospital. This should define referral criteria and be audited regularly (for example six months after implementation and every one to two years thereafter) with view to the referral process.
- Communication strategies need to be appropriate, including communication about risk and safety netting with instructions about re-attendance.
- The healthcare team should ascertain and confirm the diagnosis, even in the event of a patient's death with the help of blood tests, cultures, imaging. Correct diagnosis is important for the management of future cases and learning from adverse events.
- Furthermore, patients and their relatives have to be accepted as part of the healthcare team. This means listening to their concerns and taking to them seriously, as they often have justified concerns about their own or their relatives' condition.

**Bronchial Asthma.** Two patients (11.1%) died of bronchial asthma. Both cases had a long history of poorly controlled asthma and were frequently seen and admitted with exacerbations. They both came from poor socioeconomic backgrounds and their education level was up to the 8<sup>th</sup> and 9<sup>th</sup> grade only. Both of the two cases had multiple risk factors (Appendix B). In one case, housing was inadequate with no concrete ceiling and the cold floor immediately underneath. This would make asthma more difficult to control in winter. Furthermore, unemployment and domestic violence with a husband who had anger management problems added to the difficulties. In both cases a big family (seven and eight children respectively) might have made them more likely to ignore their own care to a certain degree.

It is striking that both of these women suffering from asthma with frequent exacerbations were neither on high dose corticosteroid inhalers nor on long acting beta agonists (LABA). This could have made a material difference to their control. A lack of provision of these more appropriate drugs combined with a lack of understanding of their condition and necessity for treatment, compounded the problems.

### **Recommendations**

- Improve communication and safety netting with patients.
- Introduction of guidelines with the stepwise approach to management of asthma including high dose corticosteroid inhalers and LABA for poorly controlled asthma (Asthma UK, National Asthma Prevention and Education Program 2010).
- Multidisciplinary care for patients with poorly controlled asthma in pregnancy improves outcome. This includes an obstetrician as well as respiratory physician and asthma nurse.

**Cardiovascular Conditions.** In the examined timeframe, three patients (16.7%) died from cardiovascular causes (table 2 and Appendix B).

In cases six and 10 the researchers could not reach any conclusions due to a lack of data. In case six (table 2, Appendix B), the woman concealed her pregnancy from her husband. She had multiple risk factors and neglected antenatal care. In case 10 (table 2, Appendix B) the available notes were poor and the family declined all cooperation. Although the diagnosis of 'stroke' was made, no clinical documentation was available and no imaging to confirm the diagnosis was done.

Case No nine (table 2, Appendix B) was one of complicated social and medical needs. This was a young woman with known aortic stenosis. She had been warned explicitly that she should not get pregnant because of the risk incurred with pregnancy. Her condition deteriorated during pregnancy with heart failure developing at 20 weeks, which Obstetricians did not want to get involved in her care and cardiologists managed the case largely without obstetric support. A termination in the first trimester was offered but declined, as she was still relatively well at that time and the social pressure for her to have a boy was very high. Insight into the seriousness of her condition was lacking and she had not taken necessary medication with her pregnancy such as heparin.

In complicated patients with complex medical needs, multidisciplinary and preconception care are essential for a good outcome. This enables clinicians to plan and administer care together and give concordant advice. The care given to the patient was a reactive (responding to problems) rather than a proactive (preempting and preventing problems) approach to care. Doctors avoided getting involved in this complicated case due to a possible poor outcome with lack of support by management, MoH and threats by families. Clinicians voiced their experience of lack of support in the case of adverse events. This leads to doctors feeling alone in difficult situations, with disciplinary action by MoH and no support.

### **Recommendations**

- Establishing multidisciplinary care clinics for complex cases with preexisting medical problems. As part of this system, preconception care and counseling should be offered as well. This should include patients with preexisting epilepsy, diabetes, cardiac disease and renal disease.
- The Ministry of Health has to improve their support for doctors and clinicians specifically in such high risk cases.

**Renal Disease.** Only one patient (5.3%) suffered of a renal disease (table 2 and Appendix B, case 7). This patient had been admitted with antepartum hemorrhage and developed renal failure as a result of HUS. She was admitted to the ICU and the nephrologist came to see her regularly and this was a case of proactive multidisciplinary care.

There were a couple of pitfalls noticed pertaining to this case; poor documentation and poor communication.

**Poor Documentation.** The family reported that many doctors came to see her in the ICU but only the nephrologists' notes were found in the notes. It appears that the blood loss was severe – Hb went down to 5.3g/dl. The management and documentation did not reflect this and were not adequate. These are examples of substandard care.

**Poor Communication.** The husband reported that the doctors in charge about his wife case continued to reassure his wife that she will be fine, although he could witness her deterioration. He also reported that the doctors did not inform them about the condition openly, as they also reassured the family and did not give an accurate account of her condition. Only after she had been transferred to Nablus did the husband realize the actual condition of his wife, when a doctor from Nablus called him and told him that she was in a critical condition with a multi-organ failure by the time she arrived there.

Furthermore, the death of the fetus was communicated in an inappropriate way, not reflecting the seriousness of the details. The family and the patient were kept on the sidelines by reassurance and not included in decisions and care by the healthcare team.

### **Recommendations**

- Systematic training of clinicians in communication, especially breaking bad news.
- For the Palestinian Medical Council to take a leadership on training doctors in communication skills and deliver regular written information to all doctors registered with them, as well as mandatory training courses.
- Improvement of note taking and medical note keeping. This also is a priority and has to be supported by leadership from the administration, senior obstetricians and MoH. It can only be implemented if it is also supported by a regular (i.e. yearly) clinical audit process to check or prove the standard of notes.

## Discussion

In this report, only a few changes were observed in the perceived causes of death, compared to the previous report for the year 2008/09 by Abdo et al. (Abdo et al. 2010). No major change occurred in the frequency of PE (17% in this report vs 20% in the previous report) and the frequency of PPH for a cause of maternal death (17% in both reports). However an increase was noted in the percentage of women who died of infectious causes (27.8% in this report vs 17% in the previous report), bronchial asthma (11.1% this time vs none in the previous report) and renal disease (5.3% in 2014/15 vs none in 2008/09). On the other hand a decrease occurred in the percentage of women dying of cardiovascular disease with only 16.7% in this report, compared to 30% in the previous one. Hypertension was only implicated as a contributory factor to death in one case. This is probably an expression of the excellent routine antenatal care available to women across Gaza Strip free of charge (Yousef et al., 2016).

The research team noted several common contributing factors in most cases discussed in this report. These factors include: medical note keeping, communication (among health care providers and with families), substandard care, failure to confirm suspected cause of death, lack of transparency, impact of war, and socioeconomic status and morale.

### Medical Note Keeping

This investigation reveals a shocking degree of non-compliance with confidential and safe handling of case notes which contain important information about medical care received by patients. Furthermore, the clinicians' and archive workers' attitudes towards the fact that the notes were missing lacked any standard of responsibility or accountability for this situation. Individuals usually ended blaming other individuals or institutions for this fact. An apparent lack of accountability became clear with lack of attributing clear responsibilities for keeping medical notes safe and confidential, leading to an attitude towards medical note keeping which lacks seriousness and accountability. This was compounded by a lack of an effective tracking system for medical notes.

Furthermore, the standard of case note keeping reveals a complete lack of awareness amongst clinicians of the importance of this document, not only for current management of cases, but also for a later reference as in this investigation or for other quality improvement projects such as clinical audit or significant event analysis. Common standards for note keeping are lacking and can therefore not be upheld. This has been shown in a number of local audit project performed in 2015 and 2016 (Abu Jarrad, 2016; Abu khalil, 2016; and Abu karesh, 2015). One recent Clinical Audit in Gaza Strip (Abu Jarrad, 2016), showed a striking lack of documentation of occurrence and management of PPH; another showed a near complete lack of documentation of operative vaginal deliveries (Abu karesh, 2015).

Amongst the notes that were reviewed for this report, there has not been 'ONE Case' that was recorded contemporaneously and detailed as well as legibly. Especially, the review by doctors as well as decisions

that were made were not recorded in the notes. Only one case showed consistent and comprehensive documentation by one team member, which was the nephrologist review in the case of hemolytic uremic syndrome (appendix B, case no 7).

Another significant weakness was the complete lack of delivery notes and the lack of estimating and recording Estimated Blood Loss after deliveries. This should be done following EVERY delivery, as also revealed by the audit on PPH (Abu Jarrad et al., 2016).

The currently existing pressure of work load on doctors and nurses, as well as the poor pay and work conditions are often being cited as obstacles to affecting this improvement in medical note keeping. However, in the long run, well-kept clinical notes are not such a great extra burden on the time, but can facilitate clinical assessment due to easy access to previously gathered information on each case. Furthermore, well-kept clinical notes are a source of protection for clinicians against accusations and suspicions of negligence and substandard care. Last but not least, they are also a source of information for systematic clinical audit and significant event analysis. All of these represent tools of quality improvement in healthcare across healthcare settings and therefore mandatory if the system is sought to be improved.

### **Communication**

A broad lack of trust by patients in the healthcare system of Gaza became evident. This appears to be caused, at least partly, by poor communication between healthcare professionals and patients and their families. Furthermore, patients and their families felt not included as part of the healthcare teams and were not involved in decision making early enough. A recurrent issue was inappropriate reassurance by the medical team, as well as avoidance of seeing the family shortly following the patient's death. This reveals a lack of training and skill by medical teams and clinicians in breaking bad news and communication with patients and families about poor conditions of patients (Tongue, 2005).

The lack of effective communication has been shown to be an obstacle to providing appropriate healthcare and safeguarding patient safety. Effective communication between teams, amongst healthcare professionals and between healthcare professionals and their patients is essential in the transfer of information (handover), getting a clear picture of the problem and in given instructions as to further treatment, follow up and safety netting. To this effect, including the patient as part of the team is essential for obtaining information and decision making (Fang, et al., 2010). In this investigation, one or all of these aspects have been missing or insufficient in 12 of the 18 cases (66%).

In two cases (11.1%) who were sent back and forth from Aqsa to Shifa and vice versa, effective and direct communication between the involved professionals could have clarified the situation. This is essential for full handover and information transfer for proper assessment of the situation. If the staff at Shuhada Al-Aqas Hospital could communicate with their counter partners at Shifa Hospital about

these cases, they would save the family unnecessary repeated travel journeys between the two hospitals in the midst of the war where movement was highly dangerous.

In another case the investigation committee was perceived by clinicians to be searching for faults and persecution. This contradicts the investigation of adverse events in a 'no-blame culture' with looking to making improvements instead of handing down disciplinary measures. Investigations into adverse events should always seek to find weaknesses in the system, analyzing and addressing these in order to improve the quality of healthcare (Reason 2004). While blaming individual clinicians will only lead to disciplinary measures without improvements made to the system and a false sense of security, as the problems are felt to be dealt with (Reason, 2004; Wachter,2007).

### **Communication between healthcare professionals and patients**

The communication between healthcare professionals and patients included the inappropriate reassurance, lack of safety netting and instructions for re-attendance and poor skills at breaking bad news.

**Inappropriate reassurance.** This is a recurring problem within this report. At least 33.3% of families had been reassured by doctors that the condition of their relative was not critical, but their relative died shortly afterwards. What leads to this discrepancy? Tongue et al. (2005) showed that 75% of orthopedic surgeons thought their communication with patient was satisfactory or even excellent, but only 21% of patients did. It could just be a misjudgment of communication and patient understanding on the side of the doctors. But a deep discomfort with breaking bad news could add to this, as avoiding the actual consultation is a common pitfall in the process of this task.

**Lack of safety netting and instructions for re-attendance.** About 22.2% of patients, who presented to healthcare professionals, were found to be not unwell enough for admission at that time. However, no instructions were given to them about when to re-present for follow up in all of the five cases. Partly responsible for this was clinical inexperience and possible also a lack of culture of safety netting. Patients expect clear and unambiguous diagnosis and instructions. Therefore, the idea of safety netting, i.e. raising the possibility of further attendances or deterioration is unusual for patients in Gaza Strip. Clear guidelines, policies and procedures could help doctors change practices and enforce these with patients. In the presence of uncertainty with ongoing symptoms such as persisting headache or a general feeling of being unwell, it is inappropriate to completely reassure patients. Instead, communication of risks and safety netting is essential to give clear instructions and keep patients safe after discharge and with ongoing symptoms (Almond 2009; Neighbour 2004).

**Poor skills at breaking bad news:** Another recurring weakness in the communication between doctors and patients and their relatives was the way that bad news was communicated poorly to patients. Doctors wanted to escape the situation of communicating bad news. There was evidence of an obvious discomfort in these situations. The husband of the patient who died from HUS was not adequately

informed about her prognosis and the seriousness of her condition. Similar situations happened to the families of one case with Pulmonary Embolism and the one case with meningococcal sepsis. Other families were made to wait to receive the bad news.

Families voiced repeatedly the fact that they had not felt the bad news were communicated appropriately or the clinicians avoided seeing them in the first place. These situations occurred due to the discomfort doctors felt when having to give such news to patients' family members. This discomfort can be alleviated with training in this area of work. A doctor will have to frequently break bad news to patients and feeling comfortable with it will not only improve the patients' experience but also help the doctors feel more comfortable and reduce their stress at work (Fang et al., 2010).

### **Substandard Care**

Evidence of Substandard Care was found by the team in 55.6% of the cases. In all of these cases, documentation was significantly substandard, compounding the poor care. In two cases, patients deteriorated slowly overnight, which was not recognized by nursing staff or doctors. The use of Early Warning Scores is recommended as a tool to identify gradually deteriorating patients and trigger action systematically before it is too late. It will also encourage improvement of documentation (Prythechet al., 2010).

A second aspect of substandard care was the fact that both patients who died from Bronchial Asthma experienced frequent exacerbations, but they were only on Ventolin and Becotide and not on a long-acting Beta agonist. In case of insufficient asthmatic control with Salbutamol and Corticosteroid inhalers, long-acting Beta agonists should be the next step and often help to give better control. Both of these patients died in winter, which is, of course, typical for frequent exacerbations (Asthma UK, Asthma Education and Prevention Programme, 2010).

Multidisciplinary approach to antenatal care could have helped to better control this problem in the pregnancy. This should again open the way to multidisciplinary antenatal clinics, which could be provided under the UNRWA as well as the government umbrella, with input by primary care clinicians.

Substandard care was also present in the patient who had a previous DVT and was not prescribed Heparin. A confounding factor here was the high degree of carelessness by the patient, amounting to self-neglect that was evident in her case.

The management of massive postpartum hemorrhage was lacking in promptness. The fact that one patient was found to have 'no bleeding' and a 'uterus contracted' at night, until hypovolemic shock occurred, leads to the suspicion that staff were not experienced in identifying other signs of intra-abdominal hemorrhage such as dyspnea due to irritation of the diaphragm by the blood collection. Administration of drugs such as prostaglandins and oxytocin were not usually documented. Emergency

drills will help teams to improve in their response to these difficult and often terrifying situations in a prompt and effective manner (RCOG PPH guideline No 52, 2009).

Lack for supervision was evident in some of these cases, as the case of the woman with dyspnea shows. Dyspnea, a serious sign in a young patient, was not recognized to have been caused by irritation of the diaphragm from the massive intraabdominal hemorrhage. In this case, the junior doctor reviewing the patient should have called his senior obstetrician for advice and help.

### **Failure to confirm suspected cause of death**

Responsibility of Care reached further than the patient's death. Therefore, even after death, it is important to detect or confirm a suspected cause of death. This is important so the clinicians and the teams can learn from it and revise their management. In two cases, one with suspected meningococcal septicemia and the other who died of possible H<sub>1</sub>N<sub>1</sub> with bilateral pulmonary infiltrates, could have had a postmortem diagnosis established without the need for autopsy. In the latter case cultures had been taken, but the results had not been documented in the notes. An awareness of such results can inform management of future cases and help in improving quality of care.

### **Lack of Transparency**

Lack of transparency was a frequent criticism by patients and people in Gaza towards the healthcare system as well as vice versa from doctors towards patients. At times both sides were not clear with their information, history and most of all mistakes that were made or occurred. This can have obvious reasons, as clinicians feel that this will help them avoid litigation or anger by patients and families and patients on the other hand feel it might improve their care.

With these assumptions both were wrong and affect the opposite, but doctors especially had to change their culture. As patients felt that things were covered up, they felt that doctors were at fault, when they possibly were not or that events were much more serious and negligent than they really were. On the other hand, an open meeting, sharing of information and timely response would help patients and families to come to terms with events as well as appreciate what healthcare teams have actually done for them or their family and what obstacles prevented a better outcome (Maguire, 2002; Reason, 2004).

Similarly, on a professional level, only open sharing of information and events will lead to a culture of learning from adverse events. As nobody is perfect, everybody will have some mistake to share. This has to be supported by the Ministry of Health and hospital management.

### **Impact of War**

A direct impact of the war was found on four cases mainly with limitations of safe transport to access care during the war. Another two families found that certain stressors had an effect on patients even

after the hostilities had ceased. At least seven families (five were in Shajaeiya) were displaced during the war and found shelter either in a mosque, a school or with relatives. However, the deaths occurred only in six (33.3%) cases during or immediately following the war.

But it was evident that the MMR in the Gaza-Strip increased in 2014. The annual report on death of Gaza Strip (Ministry of Health, 2015) showed an increase in MMR from 21.5 in 2013 to 31 in 2014. Data from the same report showed similar trends following the previous recent wars in 2006 and 2008/9 (MoH 2015). MMR increased to 41 in 2007 following the 2006 offensives and 35.5 in 2009 following the 2008/2009 offensives. Therefore, the assumption is possible that the war impacted on people's health and lives (including MMR) beyond the actual days of hostilities. The war of 2014, like previous wars, took its toll on the health and wellbeing of mothers and had an impact on MMR beyond the actual casualties caused. Some important factors in this can be displacement, neglect of health concerns, additional stress factors, economic uncertainty.

### **Socioeconomic Status**

Economic disadvantages lead to poorer health outcomes. This is true all over the world within one country between different parts of the population, and between different countries with diverging economic situations (GHO, 2015; UN, 2014). In this report, for at least 27.8% of cases, the poor socioeconomic situation, lack of work and poor housing contributed to early death. This is very evident in both cases who died of bronchial asthma, where inadequate housing contributed to exacerbation of this chronic condition. In at least one further case, the young woman with aortic stenosis, the cost of ongoing medication proved to be a very heavy burden on the family and might have contributed to non-compliance and poor outcome in the case. Furthermore, there have been two cases where extreme self-neglect was combined with very poor socioeconomic state. In one case, the pregnancy was concealed and therefore antenatal care was not accessed. The other one was a patient with a history of previous DVT who died of PE. It remains unclear to what degree cost implications contributed to her non-compliance.

### **Morale**

On several occasions when meeting doctors' teams, the research came across a low morale. This was firstly due to a high volume of work rewarded with only a small salary, which is not regularly paid. Secondly, doctors perceived a lack of support from managers and the Ministry of Health when things go wrong. On the contrary, health officials and managers quickly find one doctor to blame and discipline in case of adverse events and think that the issue is dealt with in this way. Of course, this is wrong, as the blame culture ignores the fact that failures occur not usually as a result from individual failings, but rather a chain of events with multiple little failings that lead to the error. Therefore, the system needs to be looked at thoroughly and only an improvement and change here can lead to an improvement of patient safety. Only by identifying such chains of events and system failures can

patient safety be improved by putting safeguards in place. Currently, doctors feel that individuals are singled out and fed to the lions in order to save the management and the hospital in total from the criticism or blame.

Introduction of Root Cause Analysis and Risk Managers in the hospitals could improve this and help to change the attitude to error as well as improve the learning from adverse events. Investigation of adverse events has to be done within a non-blame culture (Wachter, 2007). Unfortunately, clinicians reported that investigators often came across as 'policemen' who were hunting for faults and weaknesses. This is diametrically opposed to the approach in a non-blame culture, where an investigation by investigators and clinicians together is supposed to lead to improvements in the system rather than to finding faults and blaming individuals (Reason, 2004).

## Limitations and Challenges

The first major challenge for the data collection team was to find the medical case notes. Although names and reports of investigation committees were submitted by the MoH, the actual notes were difficult to find from the local hospitals. The research team was only able to locate and view case notes for 12 out of the 18 mortality cases. In the remaining 6 cases, information was obtained from the reports of investigation committees as well as interviews with clinicians and families of the deceased.

Similarly, contact details for patients were not recorded systematically in the notes. Contact numbers were found to be scribbled at odd places in the case notes, but were completely missing in eight cases. Therefore, other avenues to get in touch with the families had to be found, such as asking members of the team who lived in the neighborhood or knew the families to find this information. None of the numbers had been recorded in the initial admission sheet designated to record patient details including phone numbers.

The lack of notes throws a shadow on the interviews with medical teams and clinicians, as it is unlikely for clinicians to be able to remember a situation in detail especially with timings and interventions and their timings, without referral to notes. Therefore, the interviews of clinicians carried these evident weaknesses.

Families also will have had a biased experience of events and their recount of timings especially can be equally flawed. While their experience is important and will fill in details where these are missing, their recall of events will not be accurate.

In the course of this study, the data collection team experienced a few obstacles on the way. Some medical team members avoided to meet with the data collection team, while at other times notes were missing. Furthermore, the lack of interviews with all families and clinicians prevented us to get a full set of details and knowledge on all cases.

## Recommendations

To improve the efficacy of obstetric care and to reduce the MMR in Gaza Strip, the following recommendations were made. These recommendations pertain to the following topics: documentations, communications, clinical audit, guidelines/policies, early warning scores/track and trigger charts, partograms, safety netting, leadership in healthcare, risk management in obstetrics and multidisciplinary antenatal care teams.

### Documentation

Documentation has to be improved significantly. This has to be led by a culture of change, which makes it necessary for clinicians to record events in the medical notes contemporaneously. Documentation should be comprehensible, complete and legible. Written protocols have to be devised in regard to this. Leadership by clinical and managerial leaders is necessary here, and this group has to be trained in order to affect this change in their practice. Furthermore, requirements to perform a regular (yearly or biannually) audit of hospital notes to check compliance to available standards can check and enforce this practice.

### Communication

Mandatory training courses for all clinicians to improve communication across the board between patients and doctors should be run and enforced by the Palestinian Medical Council. The Palestinian board should introduce this as well into the standards for postgraduate training given to resident doctors. In addition to this, written information supplied regularly by email or pamphlet, can reinforce and remind doctors.

### Clinical Audit

Clinical audit is a process of systematically assessing healthcare delivery, comparing this to a set of standards and implementing improvements where necessary. It is a cornerstone in improving the quality of delivered care in any healthcare setting. As such, it has to be adopted by clinicians, managers and the Ministry of Health in order to find weaknesses and put in place improvements, thereby improving the quality of healthcare delivered to patients (Clinical Audit Support Center, 2016).

The research team recommends making a yearly mandatory Clinical Audit as a part of the residency program in all specialties, and for the Palestinian Medical Council to consider making it mandatory for all clinicians to prove active participation in the audit process on a yearly basis.

### Guidelines / Policies

Guidelines and policies are essential in setting down a standard of expected quality in the healthcare system in Gaza Strip. For obstetrics, guidelines have been developed and written in 2006. Representatives of the MoH have said that these have been updated in 2015, but this update is not yet

available to clinicians. During the study, it became apparent that clinicians were often not aware of these guidelines. Therefore, on publication of the updated version, the MoH has to ensure a broad dissemination of updated guidelines to clinicians by making an online version available as well as the written one. Furthermore, staff meetings and study days for informing staff (doctors, midwives and nurses) about these guidelines help to raise awareness. Additionally, creating an Application for mobile phones could encourage frequent use and reference to them.

In order to ensure adherence to guidelines, current practice has to be audited by the clinicians against such guidelines and therefore help them to identify weaknesses and put in place improvement strategies. This is an issue that should be achieved without delay and with support –practical and financial– by the Ministry of Health. Active participation in the audit process has to be made mandatory and proven by individual clinicians as well as obstetric departments. Establishing audit departments at hospitals who facilitate identifying cases and finding notes facilitates this process.

### **Early Warning Scores / Track and Trigger charts**

Introduction of mandatory use of early warning systems in obstetric units in Gaza Strip. The use of Early Warning Scores for recording vital signs that prompt clinicians to call for review by a doctor or a more senior doctor, depending on certain triggers, can reduce the occurrence of clinical scenarios to be missed, where patients deteriorate slowly over a period of time (NICE CG50, 2007).

A written policy and guideline detailing the use of Early Warning Scores needs to be devised and disseminated within obstetric units. Regular audit in every setting of the use and response to this system is also important.

### **Partogram**

Mandatory use of partograms and delivery notes including estimating blood loss following normal deliveries in all obstetric units in Gaza Strip is recommended. This is besides regular audit to prove their correct use.

### **Safety Netting**

Safety netting is an important skill for clinicians to develop, especially clinicians in primary care, antenatal care as well as those in the emergency room. This includes giving detailed instructions about when patients should re-attend the healthcare professionals and what the red flag symptoms are that need to be attended. It is a part of patient safety and important part of patient care (Almond, Neighbors). Introducing safety netting into the healthcare practice in Gaza is recommended, especially in outpatient clinics, emergency rooms and daycare assessment centers.

### **Leadership in Healthcare**

Supportive and clear leadership has to be established from the Ministry of Health downwards through the different management and clinical leadership levels. This involves support for clinicians, including situations of difficult cases and those where 'things have gone wrong'. As part of this approach, investigations into adverse events should take place in a 'non-blame' atmosphere, led by concerns about how to improve the system and care provided to patients, rather than 'who was wrong' or 'who is to blame'. Training in Significant Event Analysis and Root Cause Analysis of managers as well as clinicians should be made mandatory to achieve this goal.

### **Risk Management in Obstetrics**

Obstetrics is a specialty with inherent risks and unexpected events that can lead to grave and devastating outcomes. Therefore, establishing a system of risk management in obstetric units is of great importance. This includes incident recording systems, systematic clinical audit and mandatory training courses in communication, documentation and emergency drills and is at the heart of investigating and managing adverse events. These issues have to be addressed and established in all obstetric units in order to affect change and continuous improvement in the healthcare provided in these areas. Appointing an experienced clinician (i.e. a senior midwife or senior doctor) into such a position will facilitate the process and establish responsibility.

### **Multidisciplinary Antenatal Care Teams**

Complicated cases, such as the patient with aortic stenosis, cannot be managed by obstetricians or cardiologists in isolation, but need input from both specialties. In the care of such cases both doctors and patients benefit from a multidisciplinary team approach, which can optimize patient's care. It offers the advantage of a shared care and responsibility for doctors and expertise for patients. These teams can also offer a preconception care to the patients with complex medical needs. Furthermore, they should include an experienced midwife to offer the patients extra care and support. This helps also with improvement of patient understanding. Such teams should be established for all areas of possible complex medical needs, such as cardiac disease, diabetes, epilepsy, thrombophilic disorders, poorly controlled asthma etc.

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## Appendix A

### Data Collection Sheet

Patient name:

Phone No:

No	
1.	Age
2.	Gestational age at time of death
3.	Date of death
4.	Death occurred Antepartum Intrapartum Postpartum                      if yes: after how many days of labor Post-abortion
5.	Place of living
6.	Hospital of admission: Date and time of admission:
7.	Hospital where death occurred
8.	Where delivery occurred? hospital _____ UNRWA Clinic _____ MoH Clinic _____ Private clinic _____
9.	Cause of death According to birth certificate According to hospital records According to MOH-WHDD (Women Health and Development Directorate of Ministry of Health)
10.	Avoidable Unavoidable
11.	Type of delivery Normal Vaginal Delivery _____ Cesarean section _____emergency / elective Indication:..... ..... Assisted delivery ____Forceps / Ventose; ____ Indication:_____
12.	Did the mother have any complications during this pregnancy No _____ Yes _____  Preeclampsia Gestational Hypertension

	<p>Asthma                  Pulmonary Embolism                  Respiratory                  Bleeding Diathesis                  Epilepsy                  CVS                  Gestational Diabetes                  Other: Specify</p> <p>Explain:</p>
13.	<p>Did the mother have any complications during this labor</p> <p>No _____                  Yes _____                  Specify:</p>
14.	<p>Did the mother have any complications during previous pregnancies</p> <p>No _____                  Yes _____                  Specify:</p>
15.	<p>Gravida _____                  Para _____</p>
16.	<p><b>Obstetric History:</b>                  Previous deliveries:                  Live births _____                  Normal vaginal deliveries _____                  Operative vaginal deliveries _____                  Previous Caesarean sections _____                      Elective. Why.....                      Emergency. Why.....</p>
17.	<p>Age at first marriage</p>
18.	<p><b>Social History</b>                  Level of education                  Housewife                  Employed                  Specify:                  _____                  _____</p>

	<p>Status: married / divorced                  Consanguinity: yes / no                  Husband:                  Self-employed: _____                  Employed: _____                  Unemployed:                  Housing:                  Concrete house and roof:                  Other: _____                  _____</p>
<p>19.</p>	<p>The woman received antenatal care                  No ___                  Yes _____                  If yes,                      Private doctor                      NGO                      UNRWA clinic                      MoH clinic                  Attendance:                  Regular:                  Irregular: Why? _____</p>
<p>20.</p>	<p>During pregnancy, the woman was classified as                  High risk _____                  Low risk _____</p>
<p>21.</p>	<p><b>Medical History:</b>                  Did the woman have any chronic disease?                  No _____                  Yes _____                    Chronic Hypertension                  Type 1 or 2 Diabetes                  Epilepsy                  Heart Disease                  Congenital heart disease                  Asthma                    Other: Specify _____                    Well controlled                  Uncontrolled                    Explain:</p>

<p>22.</p>	<p><b>Drug History</b></p> <p>1. _____</p> <p>2. _____</p> <p>3. _____</p> <p>4. _____</p> <p>5. _____</p> <p>Compliant: Yes / No</p>
<p>23.</p>	<p><b>Allergies:</b></p> <p>_____</p> <p>_____</p>
<p>24.</p>	<p><b>Family History:</b></p> <p>_____</p> <p>_____</p> <p>_____</p>
<p>25.</p>	<p><b>Events leading to death:</b> Including timeline of events. Information gathered from the notes: Insert more sheets if necessary:</p>
<p>26.</p>	<p><b>Healthcare staff perception:</b> Insert further sheets if necessary</p>



29.	<b>Evidence of Substandard Care:</b>  No  Yes Explain in which points:
30.	<b>Recommendations:</b>

## Appendix B

### Case by Case Discussion

This section offers further details on individual cases to readers who wish to know more about the events in each individual cases. Not for all cases are further details available.

#### Pulmonary Embolism

**Table 3: Cases who died of suspected Pulmonary Embolism**

Case No	Mode of Delivery	Age	VTE Risk Factors	VTE Prophylaxis	Time of Death	avoidable
1	NVD	24	No	No	Postpartum	No
8	NVD	40	No	No	Postpartum	Yes
17	NVD	39	Yes	No	Postpartum	Yes

#### Case 1: H. B.

H.B. was 24-year-old G4P4. She had a Normal Vaginal Delivery at Shifa and was discharged home the next morning (9 hours later).

2 hours following discharge she was rushed back to the ER with cyanosis and dyspnea. Resuscitation was performed, and she was given IV heparin. Her situation necessitated ICU admission, where she died less than 3 hours after her presentation to the ER.

Cause of death was stated in the death certificate as “possible pulmonary embolism”.

Her notes specify that she was discharged “against medical advice”, but they fail to mention specific reasons for the advice against discharge or any risk factors she might have had. During the interview with her husband, he denied receiving any warning or advice against her discharge. In fact, he blamed the medical team for an early discharge. He also denied she was examined for lower limb swelling or pain.

#### Case 8: S.

On 8/10/14 at 8:30 am, S. a 29-year-old attended Shifa with Pre-labour Rupture of her Membranes at 39 weeks in her 6th pregnancy, having had 3 previous normal deliveries and two miscarriages.

In the course of the day, she was given Prostaglandin, as she did not start to labour spontaneously. S had a normal delivery at 22:40 on the same day.

Following delivery, a PPH occurred and was treated. There were no delivery notes and no medical notes available about the PPH that ensued. About the management of this event the only available information was in the nursing notes. These partly legible notes relate that she was given:

- 20 units Pitocin
- .....? Solution running
- 10 units Pitocin given, Methergin given
- 4 tablets Cytotec: one rectally, 3 sublingually
- Foleys catheter inserted
- For observation

A CBC was taken at 23:15 and nursing checks are noted in the notes hourly.

On 9/10/14 at 1 a.m. her observations are noted down as BP 96/74, HR 86, Temp 37, uterus contracted and no bleeding.

At 2 a.m., S. complained of chest pain, and the doctor was called. Her CBC was recorded in the notes at this point as Hb 9.8. The doctor found dyspnea, cyanosis, and the patient to be unwell with blood pressure of 60/40. At that point an ultrasound was performed which showed 'Uterus intact' and no free fluid. No evidence of intra-abdominal blood was found. No vaginal bleeding occurred.

Therefore, the diagnosis was made of a suspected PE and she was transferred to ICU at 2:30 a.m.

On admission, RR was high, ABG done, result not available. The CBC was repeated and S. was resuscitated. The Hemoglobin was documented in the notes as 5.6, but on a lab report timed 4:06 am it is reported as 4.6.

The obstetric team was called again. No evidence of bleeding was found on assessment.

At 4:30 am, S. died from suspected Pulmonary Embolism.

Here is a discrepancy between the investigation report findings and the clinical team assessments. The cause of death is sited as Postpartum Hemorrhage. However, clinicians present at the time of death report that there was no active bleeding after control of the initial PPH. Of note is also that the Hb at 3 a.m. was 9.8. Following this at 4 a.m. it was 4.6. This seems an extreme drop within 1-2 hours' time without visible evidence of bleeding as well as no evidence of intra-abdominal bleeding on ultrasound scan. Therefore, this appears more likely to be an artifact such as blood taken from an extremity where IV fluids were running at the same time. No delivery notes are available and the PPH that occurred was not documented in the notes.

Postnatal follow up on the ward appeared good, but the gradual deterioration was not noticed, as blood pressure went down slowly and Heart Rate increased. Using 'track and trigger' charts or 'Early Warning Scores', that prompt clinicians to call for review by a doctor or more senior doctor depending

on certain triggers, can reduce similar clinical scenarios to be missed. They demonstrate the slowly deteriorating patient and prompt clinical review accordingly (NICE CG50 July 2007).

### **Case 17: H M L**

HML was a 39-year-old multiparous woman who died of Massive Pulmonary Embolism at 40 weeks' gestation. She had had 6 previous normal deliveries and one stillbirth at 30 weeks. In a previous pregnancy, she did have a DVT.

In this pregnancy, she presented to the Antenatal clinic for the first time at 32 weeks. She did not attend regularly.

Four weeks prior to her delivery, she felt unwell with dyspnea, cough and fever. The family reported that this lasted for one month but she did not seek medical help. When she developed cyanosis, she finally went to Al-Awda Hospital about 10 days before her delivery. Here she was advised to go to Shifa Hospital, but she did not go. Instead she decided to wait until her labour started.

Onset of labour occurred on 24/4/2015 at 2:30 a.m. The time of arrival at Al-Awda Hospital was illegible in the notes.

When H arrived at Al-Awda Hospital, her cervix was fully dilated and she had a breech presentation. She delivered quickly with assisted breech delivery. Her notes from Al-Awda Hospital are not available to us, and neither her condition on arrival is described well nor have we had her delivery notes. However, her husband described her as all over 'blue' when he took her to Al-Awda Hospital.

Shortly after delivery she was clearly dyspneic, cyanotic, tachypnea and referred to Shifa Hospital. Her baby had birth asphyxia and was taken to Nasser Hospital.

Arrival at Shifa Hospital was between 5:00 and 5:30; the records show conflicting notes.

She was seen by a doctor and immediately taken to ICU. H. arrived in a critical condition with dyspnea, tachycardia, tachypnea and cyanosis. When she was seen by the doctor she was noted to have 'no past history of disease, uterus well contracted and normal lochia'. The diagnosis was a suspected pulmonary embolism.

In the following, the timings are recorded inconsistently and conflicting in the notes.

She was admitted to ICU and stabilized and resuscitated and ventilated. H. became anuric and bloods were taken. An urgent ECHO was done on ICU and the diagnosis of Pulmonary Embolism was again suspected. She was ordered to have therapeutic Clexane, and was prepared for a spiral CT to confirm the diagnosis.

On 25/4/16, H. died at 00:40, before she could have the CT.

The husband went home during the day and had been told by a doctor that the condition was stable. He was hoping that she could leave ICU the next day, but then he was called to tell him his wife had died.

At 7 a.m., the husband arrived in hospital to find out what happened. But no Doctor took time to talk to him. Instead he was made to wait there until 9:30 am. At that time the forensic doctor talked to the family and told them that they have to agree to autopsy if they want to make a case in court. The family decided against autopsy and 'signed the papers.'

### Postpartum Haemorrhage

**Table 4: Details of cases who died of Postpartum Haemorrhage (PPH).**

	Age	Gestation	Mode of Delivery	Parity	Pregnancy Risk	Medical Records	Place of Death	Avoidable/unavoidable
<b>2</b>	40	40	normal	9	high	none	Shifa	avoidable
<b>4</b>	30	40	caesarean	6	low	Poor	Shifa	avoidable
<b>11</b>	29	42	normal	3	low	Poor	Emirati	avoidable
<b>18</b>	18	40	normal	2	low	Poor	Tel Aviv	avoidable

### Case 2: M Q

M. was G9P8 when she gave spontaneous NVD to a healthy child. She was at al-Harazeen clinic at Shajaeiya. This was on 9 July 2014, second day of the war. She had sudden massive bleeding and was transferred to Shifa; this is the only information found in her small file that was available to be viewed at the ministry of health – legal council's office.

Her death was probably due to postpartum hemorrhage, but without more notes available, this cannot be stated with certainty.

Meeting with her husband, he declined to give information unless he is permitted by his lawyer. We went to meet his lawyer, and he initially refused to talk due to the "sensitivity of the matter" and because he himself "knows nothing" besides the shreds of information we already knew.

Over the course of the conversation some other bits of information became available. M. was an educated woman, and she was the manager of a girl's school. She gave a normal delivery, but then was transferred to Shifa due to severe bleeding. No official papers exist following the point or referral. Her husband says they arrived at Shifa and remained at the Surgical ER for around an hour, during which she received no care. During this hour he was instructed to go to the blood bank and obtain units of blood, but he wasn't given the necessary papers in full or the blood type. He went back and forth for the duration of an hour, and at the time his wife was deteriorating.

An hour later she allegedly was taken to the OR and operated upon.

#### **Case 4: R M A A**

A 30-year-old patient who passed an uncomplicated pregnancy and came for Induction of Labour at 42 weeks' gestation on 23.8.2014. She was induced with Prostaglandins in the morning, but was found to have a non-reassuring CTG at 18:00 and decision was made for urgent caesarean section.

The medical records now report an uncomplicated lower segment caesarean section was performed with no intraoperative complications.

However, the investigation report gave details of a caesarean section, which lasted longer than usual and was complicated by intraoperative bleeding. This was not documented in the operation report. The operation report is short and illegible.

Postoperative antibiotics, analgesia and heparin was prescribed and the patient transferred to the obstetric ward overnight. These are nursing notes from the ward. There are no medical notes.

In the following night, the patient complains repeatedly about dyspnea. For the first time this is recorded at 1:30 a.m. The doctor is called at 2 a.m. for review, but makes no notes in the medical record of his assessment or action. The nursing notes detail that nasal oxygen was ordered and applied.

Despite this the dyspnea continues. She is being seen regularly throughout the rest of the night with hourly assessments and noted in the notes: 'uterus well contracted, no vaginal bleeding', but significantly also: 'dressing not clean'. Complaints of dyspnea continue throughout the night.

The patient is seen again by the doctor at 6:30 a.m., but no legible note about this assessment is made in the notes. Action plans are not clear from the notes either.

At 8:00 the patient arrests and is resuscitated and taken back to theater, where intra-abdominal bleeding is found. Hysterectomy is performed, but the patient unfortunately dies four hours later.

This case demonstrates significantly substandard care in the following points:

The reasons for this are:

- Lack of systematic documentation.
- Clinical inexperience to recognize the significance of dyspnea and find the cause for it.
- Failure to call the senior doctor for review in ongoing significant symptoms (dyspnea) where no diagnosis could be made.
- Appropriate investigations were not done such as CBC.

### **Case 11: H S E**

This is a 29-year-old woman who died of PPH following her 4th delivery. She received regular antenatal care at the UNRWA clinic, and she was classified as 'low risk' despite the fact that she was taking Tegretol for epilepsy since two years.

H. had a twin pregnancy, which was otherwise uncomplicated. She was transferred to Emirati Hospital from Kuwaiti Hospital because of her twin pregnancy. At Emirati she arrived in active labour with 7 cm dilatation. She was described as 'out of balance' by the medical team, not clarifying what exactly is meant by this, as her vital signs are reported as stable.

Following her admission, the labour progressed well. The first baby was delivered by normal delivery at 20:10, and the second followed at 20:15. Appropriate medication was given to expedite placental delivery (IV oxytocin and IM methergin) and to prevent PPH (600 mcg Misoprostol, Cytotec).

At this point H. remained unattended for a time, as reported by her relatives. Therefore, the bleeding went unnoticed until the escort of another patient came out to tell her family that H. was bleeding.

Assessment by the resident doctor followed at 20:00, who found the uterus contracted and contacted the on-call specialist to attend. He examined her and gave more IV fluids. At 21:30 further bleeding was noted. More cannulas were inserted, which was difficult and therefore help from the anesthetist was sought. Blood was ordered for transfusion at this point.

Sudden deterioration occurred with an 'unexplained' amount of blood being lost. The chief of anesthesia was called and the medical director attended by chance, when he was doing an evening round in the hospital.

Cardiac arrest occurred, and CPR was done by the above staff for 45 minutes. At this time, it was stopped due to lack of response.

Initially, the family refused to talk to the medical team. But, after attempts, doctors were able to relate events to them. There is a great amount of anger from the family towards the medical team, who feel that negligence and delay are responsible for this outcome. They described the doctor involved in the care of their relative had 'a license to kill.'

### **Case 18: N M A**

This is an 18-year-old patient who died following her second pregnancy of massive secondary PPH. N. had passed an uncomplicated, low risk pregnancy. Following her second normal delivery on 3/4/15 at 23:30, the placenta was delivered with fundal pressure. The mother-in-law reported that N. had felt a very sharp, intense pain at that time, which she later related to her mother-in-law.

She experienced ongoing bleeding after her delivery initially. The notes do not give details of her delivery or the estimated blood loss. But the clinicians reported that the bleeding was thought to be caused by uterine atony, and she was treated accordingly. No summary or contemporaneous notes are available on this. As the vaginal bleeding was ongoing, she was taken to theatre for exploration on 4/4/15 at 3 a.m. A cervical tear was found and sutured.

However, due to ongoing bleeding, a senior doctor attended for assessment at 5:30 a.m. The decision was taken at that time for abdominal exploration under anesthesia. A 'small' uterine rupture was found and sutured. The cause has not formally been established. It most commonly is mechanical, other causes are the exertion of fundal pressure and for this reason, and this is the practice, which is not recommended.

N. was observed on ICU overnight. The bleeding stopped and she was stabilized. She stayed in hospital for 3-4 days with no further complications and was discharged. The clinicians reported that a follow-up was arranged 7 days after discharge for review and removal of sutures. At that time, she was well with no further problems. The family also agreed that there were no further problems.

Unfortunately, on 22/4/15 N. went to the bath, at which time she experienced a massive secondary PPH. She was taken to Shifa Hospital and admitted there at 16:30. On assessment there was evidence of intra-abdominal bleeding on the ultrasound scan, with Hb 6.8 and INR of 2.3. She was admitted to ICU.

Following initial stabilization, an abdominal exploration was performed at 18:30 on 22/4/15. Consent for hysterectomy had been taken, but not done. At surgery, intra-abdominal bleeding was found. A vascular surgeon was asked for help, and bilateral ligation of Iliac arteries was performed. This initially controlled the bleeding.

However, on 24/4/15 at 2:05 a.m., bleeding restarted, and decision for Hysterectomy was taken. However, this failed to stop the bleeding.

In total, N. had a massive blood transfusion of over 50 units of blood in addition to FFP and Cryoprecipitate, and Disseminated Intravascular Coagulation developed. No further treatment was available for her in Gaza. Therefore, a decision was made for her to travel to Israel, which was arranged in the morning.

N. arrived in Tel Aviv on 24/4/15 at 21:00. Unfortunately, she died before any intervention could be taken at Tel Aviv on 25/4/15 at 2 a.m.

The documentation and records in this case show significant shortfalls, and therefore events are difficult to track and order on a timeline. The family and the clinicians showed a significantly conflicting account of timings and such details are difficult to recall in detail without referral to valid medical notes. Only a few times found which are recorded in the notes about decisions made, actions taken, doctors

present or interventions given. Contemporaneous notes about medication administered, including blood transfusions, are completely missing.

The initial uterine rupture occurred unexpectedly in this patient who delivered normally a 3.8 kg baby. However, this complication was dealt with appropriately and follow up was arranged and attended. The patient was stable. The massive secondary PPH developed quickly and unforeseen. Possibly, hysterectomy at the first abdominal exploration, as initially planned, could have altered events slightly. But social pressure for larger families is big in Gaza and therefore, it is understandable for the attempt to save the uterus after bleeding appeared initially controlled without hysterectomy.

### Puerperial Sepsis and Septicaemia

**Table 5: Details of cases who died of Sepsis or Septicaemia**

No	Age	Gestation	Parity	time	Cause of death	Mode of delivery	Risks	Risk	Place of death	Avoidable?
3	26	39	1	Post partum	Sepsis	NVD	PROM	low	Al Arish	Avoidable
5	37	34	6	Post partum	Sepsis / DIC	C/S	Prev 4 C/S	high	Israel	Avoidable
12	29	35	1	Ante partum	Meningococcal	nil	nil	low	Shifa	Avoidable
13	27	34	1	Intra partum	Suspect. H1N1	C/S	Epilepsy	high	Shifa	Avoidable
16	35	32	3	Post partum	Suspect. H1N1	C/S	nil	low	Israel	Avoidable

#### Case 3: S Q

S. was a 26-year-old woman in her first pregnancy. She had an uncomplicated pregnancy that ended on 21/7/14 with a normal delivery at 39 weeks. She had an episiotomy and a 2<sup>nd</sup> degree perineal tear. She had presented to Shifa on 21/7/14 at 19:40 with Pre-labour Rupture of the Membranes (PROM) at 39 weeks. Medical notes report that Flagyl and Cefazolin was given to her. No reason mentioned why or illegible.

Following this, she was firstly well, but on 30/7/14 she started to be unwell with difficulty in breathing. First it was thought that this is due to the ongoing shelling and bombings during the war. But on 2/8/14 her husband found her body swollen and she had difficulty breathing and he took her to Emirati Hospital in the night. As they have no ICU facilities, they applied Oxygen and sent her to Nasser Hospital, where she was admitted to ICU from the emergency department.

'Suspected PE' is written in the admission notes. S. became unconscious shortly after arriving on ICU, and she was ventilated.

Time recordings are unclear in the notes, and the notes are incomplete. But an assessment was noted down as tachycardia, lower limbs edema, WBC 48 and Plt 70: 'Septicaemia' was now suspected in this first review at Nasser. Rocephine and Flagyle were started as treatment.

On 4/8/14, S. was extubated and treated for puerperal sepsis, acute renal failure and 'shocked liver'. She had fever and abdominal pain, liver function tests were largely elevated to AST 1463, ALT 1065. An ultrasound scan showed no free fluid and no collection. An Echocardiogram showed impaired LV Systolic function with EF 35%.

On 5/8/14 there was a new deterioration, and S. was confused and irritable with fever and abdominal pain. She had tachycardia; her chest was clear but her temperature was raised to 38.5 with blood pressure of 110/70. The white cell count (WBC) was 18.8, and Hb 9.8. Transfer to Al-Arish was arranged for further treatment. The decision and date of transfer are not in the notes, but on this day is the last entry into the notes.

S Q died in Al-Arish on 7/8/14.

This delivery occurred in the war. Rockets were given as reasons for her dyspnea initially. She re-attended the hospital after delivery only after she was already in a very poor condition. The war, the bombings and the shelling might have been a reason for her to re-attend later than otherwise. She was immediately transferred to Nasser Hospital for ICU treatment.

Documentation was poor in the notes. Especially, time is not recorded and the decision for transfer is also not properly documented. But otherwise, she was given all treatment and support possible and transferred out to Al-Arish without obvious delay.

#### **Case 5: R A**

R was a 37-year-old woman in her 6th pregnancy, having had 1 previous normal delivery and 4 caesarean sections. Her pregnancy was complicated by preeclampsia and gestational diabetes, and she was treated with Methyldopa. She attended regular antenatal care in the Middle Governorate. On 24th August 2014, at 34 weeks, she presented to her obstetrician at a private clinic because she felt unwell, who wanted her to be seen at Shifa Hospital as she is a high risk pregnancy.

They went to Shifa in the war under bombardment and had a difficult journey there, but they went without a referral letter and in a private car. At Shifa they were refused admission as they came from the Mid-zone, so they went back to Al-Aqsa Hospital where they talked to the obstetrician again. He also was not prepared to admit them, and said that she had to go to Shifa. This time he gave her a paper and promised to phone the obstetrician at Shifa. So they went back to Shifa. Here they were

seen, but communication between the doctors had not taken place. They were told at Shifa that she did not require hospitalization, and that they were not prepared to see her, so they went back to al-Aqsa. Here, they too did not want to admit her so they went home.

At that point, her husband said that she felt unwell, with general edema, dizziness and severe weakness, and she could not walk. No assessment of her condition was documented at Shifa or Aqsa Hospitals.

The combination of having been reassured, the war and the previous refusals by the hospitals, made R. stay at home until contractions started on 28th August 2014 at 5 a.m. This time they went to Aqsa Hospital, where an emergency caesarean section was performed and stillborn fetus was delivered. She was taken to ICU at Aqsa Hospital and received some blood transfusions. No notes about blood loss are made in the notes.

Later the same day, she was found to have intra-abdominal bleeding, and was taken back to theatre for further surgery. It is unclear what was found and done at this surgery or how much blood was found intra-abdominally, but it is documented that R. developed Disseminated Intravascular Coagulation (DIC), and communication took place between the Aqsa and Shifa Hospital and Shifa Hospital agreed to admit her to their ICU on 29th August, where she arrived at 15:00.

During her time at Shifa, she required a massive blood transfusion as well as Fresh Frozen Plasma and Cryoprecipitates. She was finally transferred to Israel on 1st September 2014, and arrived at Barzaeli Hospital at 22:30. Unfortunately, she passed away the following day, on 2nd September 2014.

The family remains unclear about what was done at the surgery and what the cause of her blood loss was. Septicemia and DIC is given as the Cause of Death.

#### **Case 12: Gh A A**

Gh was a 29-year-old patient who died 39 weeks into her second pregnancy. She had no known prior risk factors and she was classified as low risk. One morning, she woke up with severe headache, and was seen at Al-Awda hospital, where she was assessed, reassured, discharged and given Diclofenac. They were told: all is normal.

She went home and remained unwell with headache for 2 days. Headache was only relieved by Diclofenac, but then returned. 2 days later, she got worse and started vomiting again. Her family took her to Shifa at night, where she was directly admitted to ICU. The obstetric team refused involvement at this point. No documentation is available regarding this; it was related to us by clinicians. A CT scan was done and was normal. Blood results are again not available for review. No culture is available or was taken.

She died briefly after this, with diagnosis 'Meningococcal Septicemia. '; this remains unconfirmed. No laboratory confirmation was sought to confirm this diagnosis.

Gh was the second wife of her husband. The economic situation of the family was reasonable, although her husband was out of work, but he had elder sons from his previous marriage who were working and contributing. There have been unconfirmed suspicions of domestic violence at admission due to presence of bruising. This was not closer investigated at the time. Our meeting with the family could not substantiate these suspicions.

Gh A A re-attended late at Shifa after 2 days of unrelenting and severe headache. This occurred due to a failure of safety netting and a lack of appropriate advice after the first review such as return if no improvement in 24 hours or getting worse. She had just been told that all was perfect.

### **Case 13: N A-K**

This is a 27-year-old patient who died 34 weeks in her 3rd pregnancy, having had one previous normal delivery. She was classified as a high risk pregnancy, and was taking Methyldopa (Aldomin) for PIH and Carbamazepine (Tegretol) for Epilepsy.

One week before her death, she attended the Aqsa Hospital because she was not feeling, well and was referred to Shifa because of being 34 weeks. The referral was done as her blood pressure was recorded as 150/80 with 3+ proteinuria. She was assessed at Shifa, but found that she did not need admission on that occasion.

The following week, the family told us that they went to Shifa 4 times and back to Aqsa who sent them back to Shifa. Finally, she was admitted at Shifa because it was policy to admit all cases who present after midnight.

However, medical assessment at Shifa had led to the opinion that it had not been necessary to admit her earlier. Unfortunately, there are no records of these consultations in the notes. Therefore, it is not possible to gain a clear chain of events in this case or to know what the assessment of N. included at this point.

A caesarean section was performed because of a non-reassuring CTG. Fetal reasons were cited, not maternal reasons. The caesarean section went without surgical complications, but N. had a cardiac arrest on the operating table and needed cardiac resuscitation.

An Echo revealed LV hypokinesia and pleural effusion. CT scan showed extensive bilateral pulmonary infiltrates; a Pulmonary Embolism was excluded. Culture of the pleural effusion was sent, but results were not available.

The provisional cause of death is pneumonia without laboratory confirmation. It is highly unlikely that a young woman develops this severe pneumonia without previous medical evidence of being unwell, as was reported by the medical team at Shifa. But, due to poor documentation and a lack of determination to really establish a cause of death (i.e. by following up the culture result and making it available), this cannot be established reliably.

A lack of willingness to take responsibility for this case by both hospitals remains apparent. Furthermore, clinical misjudgment of N's condition at Shifa could have contributed to this outcome. Due to lack of documentation, it is impossible to ascertain what assessment has been performed at Shifa, but it appears to have been substandard care and serious clinical misjudgment to miss a pneumonia with bilateral infiltrates, which causes the death of a young woman only hours afterwards. It remains to be suspected that she must have been unwell at the point of review at Shifa Hospital. Furthermore, her family was very worried regarding her condition, and this should have been a trigger to look at her closer and admit her.

#### **Case 16: Sh A-F**

Sh. was 35-year-old G3P3. Her first pregnancy was at age 25, with a 4-year spacing between her second pregnancy and the last. Her files were not available and her family dodged our calls. According to a MOH questionnaire, her husband said she had no chronic illnesses, but he didn't know if she attended ANC regularly.

She presented to Nasser hospital at 32-week-gestation with pneumonia, and was referred to Israel on the same day. C/S was performed in Israeli hospital, but she died two days later. Death certificate specifies the cause of death as pneumonia with ARDS secondary to influenza H1N1.

According to reports of the MOH maternal mortality investigation committee, there was a 5-day delay by the family before bringing Sh. to the hospital.

### **Bronchial Asthma**

**Table 6: Details of cases who died of bronchial asthma**

No	Age	Gestation	Parity	Risk	Medication	Place of death	Avoidable ?
14	44	32	9	High	Ventolin/Becotide	home	Avoidable
15	31	39	7	High	Ventolin/Becotide	home	Avoidable

#### **Case 14: Kh A T**

This 44-year-old woman who was in her 10th pregnancy, having had nine normal deliveries prior to this. She had suffered from asthma since childhood, and was on Becotide and Ventolin for this. She attended regular antenatal care, and has seven episodes of exacerbation of asthma documented in her notes,

mainly in the winter months from November to January, which is also the month of her death. Furthermore, she had at least three admissions to the hospital for exacerbation of asthma.

On 24/1/2015, when she was at 32 weeks, she appeared well in the morning when her husband left for work at 8:30 a.m., and she wanted to visit her daughter in Rafah. Her daughter reported that she was watching TV when she was found unconscious, and the daughter arranged transport to hospital immediately. At 9:00, her husband was called by the hospital and told that his wife had 'fainted' at home and arrived dead in the hospital.

Kh. had frequent exacerbations during the pregnancy, but she was still only on Ventolin and Becotide. She should have been on the next step on the ladder to asthma treatment, which would be a long-acting sympathomimetic, possibly combined with a high dose corticosteroid inhaler.

### **Case 15: M D B**

M. was 31-year-old patient who died at 39 weeks' gestation, with cause of death given as 'Pregnancy induced Hypertension'. She had 7 normal vaginal deliveries with 6 living children.

Antenatally, she had many problems:

- Asthma with frequent exacerbations, especially in winter, when she died as well
- Obesity
- Gestational diabetes
- PIH.
- Anemia to 6.0, which was not unusual for her in her pregnancies.

Prior to her death, she was unwell and was sent to Shifa by the UNRWA clinic. She was sent home and did not go back to see a doctor, although she remained unwell. The day of her death, she took her inhalers, but she woke up dyspneic, at which point her husband took her to Shifa where she died 5 minutes after arrival.

A peri-mortem caesarean section was performed for a live neonate who died 40 days later.

### **Socioeconomic situation**

M. lived in difficult socioeconomic circumstances, and had only been educated to 8th grade and her husband to 5th grade. The family suffered from poverty due to unemployment, at times they had little food only. The war was especially difficult for them, when they were evacuated to a school for 50 days. The housing situation is very poor, without concrete roof, and must be very cold in winter which is very dangerous for a patient with poorly controlled asthma as M.

Domestic violence further complicated the situation. M.'s husband has an anger management problem and suffered from panic attacks. For these he was on psychiatric medication: Xanax, a benzodiazepine, for times.

## Cardiovascular Disease

**Table 7: Details of cases who died from cardiovascular disease**

No	Age	Gestation	Parity	time	Cause	Risk	Place of death	other	avoidable
6	34	24	8	Ante partum	Cardiac Arrest	No ante-natal care	home	Concealed Pregnancy	avoidable
9	22	32	1	Ante partum	Cardiac Arrest	High	Khalil	Aortic stenosis	avoidable
10	36	34	7	Post partum	Stroke	?	Shifa	No notes, family not	?

### Case 6: N G

A 37-year-old patient in her 9th pregnancy, who died five months into a concealed pregnancy for which she had not received any antenatal care so far. She had told her husband that she had had an IUCD inserted following her last delivery, but this had never really been done. Her husband was unaware of this pregnancy.

N. had had seven normal deliveries and one caesarean section for breech presentation.

She was largely obese and suffered from hypertension. She was not compliant with her treatment and did not go to follow up. In her family is her sister who had an MI at about the age 43, and her father who had two strokes.

N.'s husband had casual work and was long periods out of work. They lived in a wrought iron house, were poor and had very little education. Therefore, N.'s husband had expressed a wish for no further children following her last delivery. N. seems to have had desire for further children and got pregnant without her husband's knowledge.

One morning, N. got up as usual and was well. Her husband had left for casual work. She suddenly deteriorated and died before she reached hospital from a suspected myocardial infarction. No death certificate was available with the family upon our visit.

This family was living under extremely difficult conditions, exacerbated at the time of the war. Education was poor and no understanding of health issues and the importance of treatment, compliance and antenatal care.

### Case 9: A M

A. was a 22-year-old with aortic stenosis, unclear if congenital or rheumatic. Family history was positive for non-obstructive cardiomyopathy in two siblings. She was married after A-levels to her cousin. She

did not adhere to regular follow-up with cardiologists and did not have any preconceptual counseling before her first pregnancy shortly after marriage. This first pregnancy was difficult, but ended well with a live birth of a healthy female.

Following this, A. and her family were advised strongly by the cardiologists NOT to get pregnant again, but the wish for a boy was strong and shared also by her mother, and this advice was disregarded and a second, planned pregnancy followed. It appears a strong social pressure was felt by A. to have a boy.

In this pregnancy, A. presented late to the doctors. She did not comply with her medication before and during pregnancy, especially taking no heparin. The medication was a heavy financial burden on her family. Education, understanding and insight into the problem of her illness was poor in her family and herself.

As soon as she presented in the 4<sup>th</sup> month, she was advised to terminate the pregnancy. This was declined by her and the family. The medical teams also were reluctant to give them a signature for this, the cardiologists saying it has to come from the Obstetrics&Gynaecology team and the other way around. With the Obstetrics&Gynaecology team being scared of any intervention and possible intra-operative death, saying they needed an 'OK' from the cardiologists.

From the 4th month, A. was in heart failure and the gradient across the valve was very high. Frequent attendance and finally admission to CCU followed until the end of the pregnancy. Doctors avoided to look after her, care was mainly reactive as a response to problems rather than proactive. No multidisciplinary team or approach existed here. Cardiologists and Obstetricians treated her on their own, not in cooperation.

Referral to al-Khalil for aortic valve replacement was made after an IUFD at 34 weeks, and she died 4 hours after arrival prior to surgery, with her dead fetus still in utero.

#### **Case 10: K**

Unfortunately, there are no notes available for K. and the family contact was unavailable too. It appears that they had been unwilling to talk to the investigation committee that had contacted them before.

She was 36 years old., G7P6 and lived in north Gaza. During this pregnancy, she visited antenatal care clinic twice and she had hypertension.

At 34-week gestation, there was a sudden loss of consciousness and she was taken to Shifa Hospital. Here she was taken to ICU and a caesarean section was performed. Following this, she died.

A note written down on official MOH paper said 'Postpartum Hemorrhage', but gave no further details. The official cause of death was 'stroke'. No evidence or result of a CT scan was found to confirm this. No other information was available to us in this case.

## Renal Disease

### Case 1: S Y M

On 17/9/14 attended the antenatal care and was sent to Nasser Hospital. She had Proteinuria ++, Uric Acid high, Hb 8.6, liver function test raised and BP 130/90.

On 21/9/14, S. was discharged with diagnosis PIH/UTI. Her investigations showed Uric acid 5.6, BP 120/60, Proteinuria +, Hb 9.4. She was started on Methyldopa and Cephalosporin.

On 25/9/14 at 5:30 a.m., S. was readmitted with antepartum hemorrhage. Placental abruption was diagnosed and an NVD followed. She suffered a postpartum hemorrhage, of which no details are recorded in her notes except for 'severe vaginal bleeding'. But, her haemoglobin dropped to 5.3. She developed oliguria and anuria following this.

Her condition remained critical and she was reviewed by the nephrologist on 27/9/14. Anuria continued and bilateral retinal detachment occurred. The diagnosis was made of HaemolyticUraemic Syndrome (HUS).

S. was started on hemodialysis on 28/9/14, which was done daily since then and she had daily nephrology reviews. Her blood pressure was 120-140/90-95, and the ultrasound showed increased renal echogenicity and poor differentiation of cortico-medulla. The need for regular hemodialysis continued and the decision for transfer to Nablus was made. Actual decision and date and time of this was not found in the notes. Date of transfer was also not in the notes.

She died in Nablus.

### References

Ministry of Health. (2016). Maternal mortality rate in Palestine in 2014. Available at [http://www.moh.ps/Content/Books/c3hMAwB6mVi7AIY4oDpRhsINLPglvKooQBxSnK7kxtgrjiGMY3eeOb\\_B9pwQA4EiaaJYiDaBDOzmL4gclQ7AeUICZXPWfvRXI6diyLdX4kPvk.pdf](http://www.moh.ps/Content/Books/c3hMAwB6mVi7AIY4oDpRhsINLPglvKooQBxSnK7kxtgrjiGMY3eeOb_B9pwQA4EiaaJYiDaBDOzmL4gclQ7AeUICZXPWfvRXI6diyLdX4kPvk.pdf)