Strengthening Neonatal Mortality Audits in Zaatari and Azraq Refugee Camps in Jordan

Annual Report

Report of Neonatal Death Audit Among Syrian From Zaatari and Azraq Refugee Camps, Jordan, January 1st – 31st December 2017

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Global Health Development (GHD) is a regional initiative created to support countries in the Eastern Mediterranean Region (EMR) and to strengthen their health systems to respond to public health challenges and threats. GHD was initiated to advance the work of the Eastern Mediterranean Public Health Network (EMPHNET) by building coordinating mechanisms with Ministries of Health, International Organizations and other institutions to improve population health outcomes. As an implementing arm to EMPHNET, GHD aligns its strategies with national policies and directions. Serving as a collaborative platform, GHD/EMPHNET is dedicated to serve the region by supporting national efforts to promote public health policies, strategic planning, sustainable financing, resource mobilization, public health programs, and other related services.

Contents

Background

Neonatal Death is defined as any death that occurs in the first 28 days of a baby's life. Currently, neonatal deaths account for approximately 44% of all deaths of children under the age of five within low-middle income countries.[1]

The Neonatal Death Audit is the process of assessing factors related to a neonatal death.[2] Audits are conducted in a no-blame, interdisciplinary setting. They aim to improve the care provided to all mothers and babies. Death reviews provide opportunities to examine the circumstances surrounding neonatal death, as well as the immediate and contributing causes leading to such cases. The Neonatal Death Audit also informs relevant parties of the quality of health care services provided to women and their babies during both their pregnancy and delivery. This information ultimately servers to prevent future morbidity and mortality.[3]

In line with its Global Strategy for Public Health (2014 – 2018)[4] , and with the support of the Gates Foundation, UNHCR started a project to improve neonatal care. The project focuses on low cost interventions in Jordan, Kenya and South Sudan. UNHCR Jordan approached EMPHNET to assist in conducting the neonatal mortality audits in the refugee camps in Jordan namely; Zaatari and Azraq camp.

Collectively, the Zaatari and Azraq Camps host approximately 130,000 refugees. Most of these refugees have lived in the Zaatari camp for three to five years, while in the Azraq camp, they have lived for two years. Pregnant women receive regular checkups in the camps clinics throughout their pregnancy. They usually deliver their babies in camp hospitals. However, complicated cases are referred to other health facilities when needed.

Objectives

- Strengthen neonatal mortality auditing.
- Maintain a database for neonatal deaths among Syrian Refugees for the year 2017.
- Provide a summary of the findings and offer recommendations for the improvement of neonatal care.
- Provide a summary of current and potential contributing factors.

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[1]Improving newborn and neonatal care- UNHCR   http://www.unhcr.org/57beb81e4.pdf

[2] Kerber et al. BMC Pregnancy and Childbirth 2015, 15(Suppl. 2): S9 Counting every stillbirth and neonatal death through mortality audit to improve quality of care for every pregnant woman and her baby. http://www.biomedcentral.com/1471-2393/15/S2/S9

[3] http://www.who.int/pmnch/knowledge/publications/summaries/ks27/en/

[4] http://www.unhcr.org/530f12d26.pdf

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Methodology

Neonatal mortality cases were reported to EMPHNET from Jordan Health Aid Society (JHAS) in Zaatari Camp and from the International Medical Corps (IMC) in Azraq Camp. Whenever EMPHNET was alerted about a new neonatal mortality case. it conducted a field visit. During this visit, its team filled the neonatal death audit form. This form was developed by UNHCR and is designed to collect data on neonatal Syrian refugees within an interview setting. The questionnaire required information that is either provided by the patient or looked up from medical files in the referral or camp hospital, from medical reports and death certificate which were kept by the (JHAS) in Zaatari camp, and International Medical Corps (IMC) in Azraq camp. Family members and health facility staff were interviewed, antenatal and delivery records were reviewed, the required information about neonatal death (age at death, place of death, gestational age, maternal age, birth weight, Apgar score, maternal antenatal history, type of delivery, length of labor, symptoms/signs prior to death, treatment given, cause of death etc.) were filled in the form. EMHPNET also reviews death certificates and referral hospital medical records, within 72 hours of the reported death. Completed forms are then submitted electronically to UNHCR.

A descriptive analysis of all patients was performed using epi info 7.

Definitions

- Number of neonatal deaths cases 68 neonate.

- Denominator used in analysis was 68 for neonatal death cases.

- Number of mothers investigated 63 women.

- Denominator used in the analysis was 63 for mothers of neonatal death cases.

Results

Quantitative Findings

Distribution of Neonatal Deaths by Place and Time

During the audit period which was from the January 1 to December 31, 2017 (68) neonatal deaths were reported, only 68 neonatal deaths in Zaatari and Azraq Camps were audited. EMPHNET studied all cases reported by JHAS and IMC from Zaatari and Azraq Camp during the aforementioned period and compared the findings to 41 cases in year 2016 (May – December 2016) and completed from UNHCR to be total of 55. In 2016, EMPHNET started collecting information in April from Zaatari Camp and in June from Azraq Camp.

The average timeliness for auditing the reported neonatal deaths is 2.5 ± 2 days. While the average timeliness from JHAS and IMC for reporting the neonatal death from the time of death to the time of reporting findings to EMPHNET is 1.6 ±1.7 days. Within this timeframe, there

were four cases reported late (three triplet cases reported after 83 days) and one case reported after 36 days. These cases were excluded from the timeliness average.

Among the 68 reported neonatal deaths, 48 were from Zaatari camp and 20 were from Azraq camp. The Neonatal Mortality rate in Azraq Camp is 11.9 compared to 13.8 in Zaatari Camp in 2017. Figure 1 shows the Neonatal Mortality rate per epidemiological week for Za'atri and Azraq camp. In 10 weeks out of 52, NNMR was higher in Azraq camp compared to Za'atri. 23 weeks out of 52, Neonatal Mortality was reported in Za'atri only while 7 weeks out of 52 NN mortality was reported in Azraq camp only.

Figures 2 and 3 compares the NNMR in both camps between 2016 and 2017. In Azraq camp the NNMR decreased from 19 per 1000 live births in 2016 compared to 11.9 in 2017. While in Za'atri camp the NNMR increased from 10 per 1000 live births in 2016 compared to 13.78 in 2017.

88.9% (56/63) cases of the women had a singleton delivery and five 7.9% (5/63) women had twins and two 3.2% (2/63) had triplets. 10 (14.7%) cases occurred in September 2017, out of which five cases (50%) were either triplet or twin births. In February, 7 death cases were reported, out of these 42.9% were triplet (Figure 5).

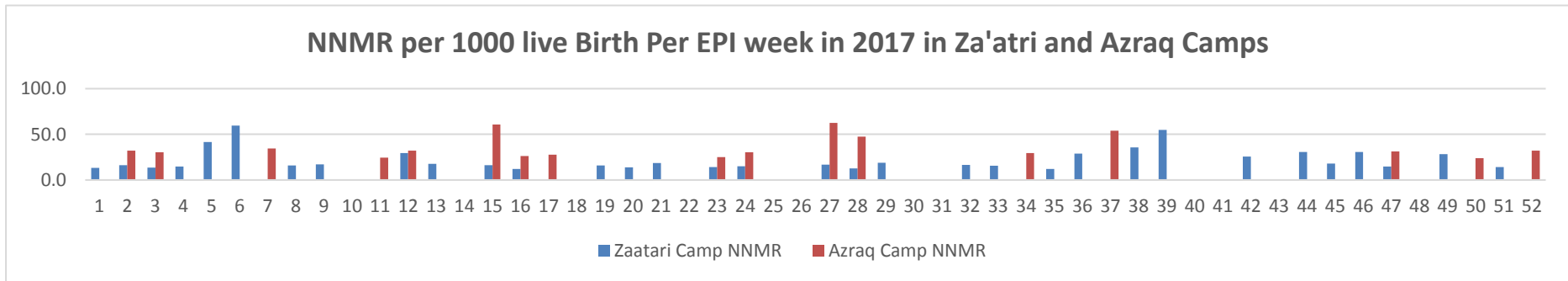NNMR per 1000 live Birth Per EPI week in 2017 in Za'atri and Azraq Camps

Figure 1

NNMR per 1000 live births per EPI week for Za'atri camp in 2016 and 2017

Figure 2

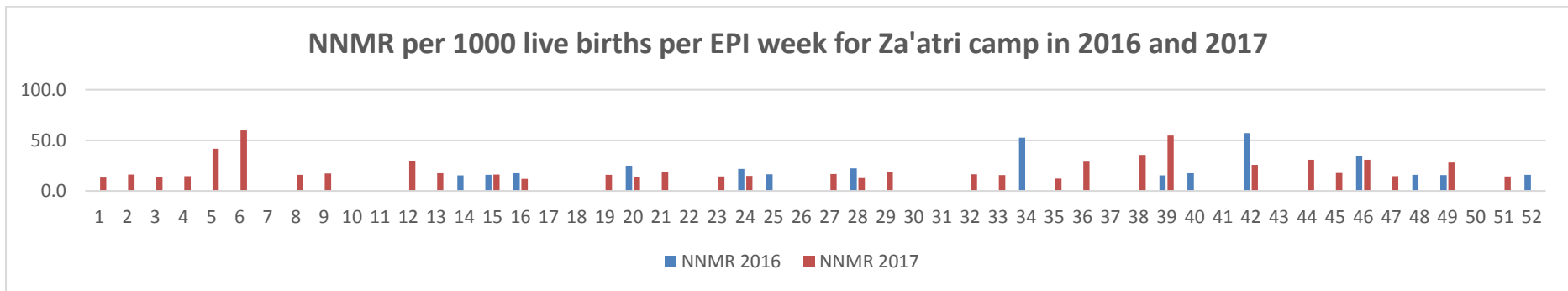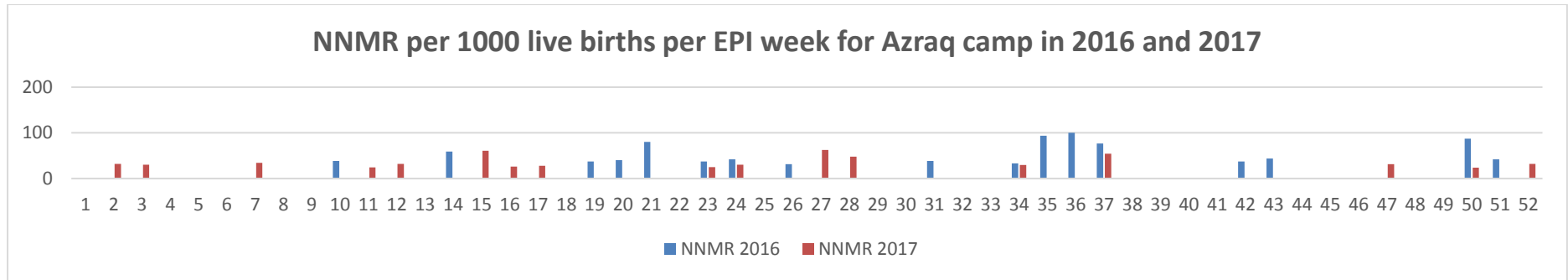**NNMR per 1000 live births per EPI week for Azraq camp in 2016 and 2017**
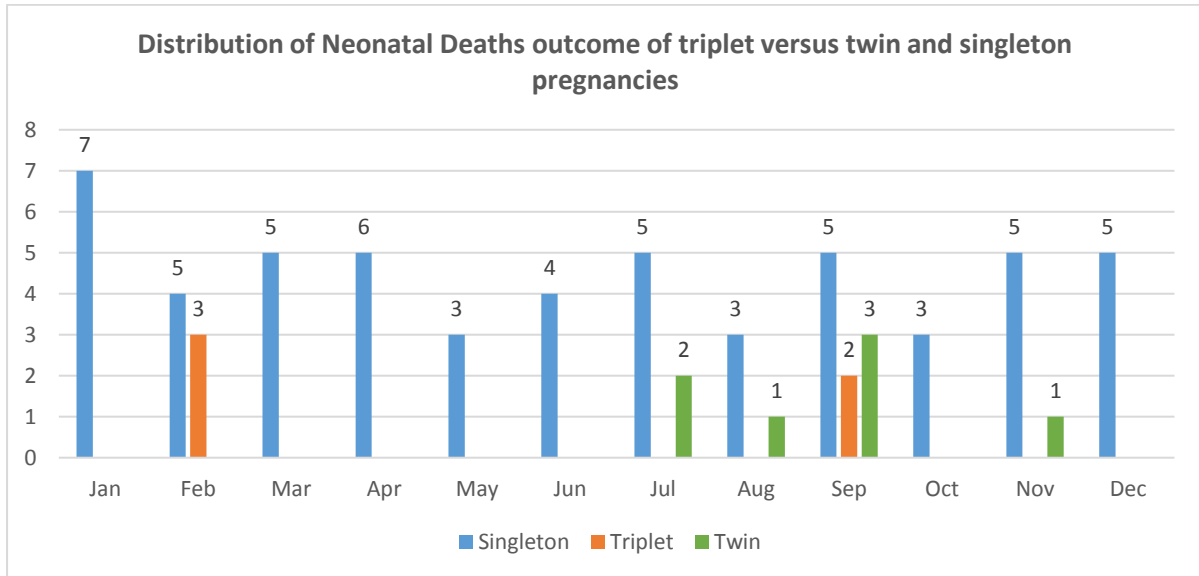
■ NNMR 2016   ■ NNMR 2017

Figure 5: Distribution of Neonatal Deaths outcome of triplet versus twin and singleton pregnancies 2017

Distribution of Neonatal Deaths outcome of triplet versus twin and singleton pregnancies

Legend: ■ Singleton ■ Triplet ■ Twin

Characteristics of Neonatal Deaths

All mothers who participated in the interview were Syrian. The number of male neonatal death was 46 (67.6%). These were almost double the number of female neonatal deaths which were recorded to be 22 (32.4%). The mean ± SD birth weight of the neonates was 2083.1 ± 979.6 grams ranging from 700 to 4,000 grams; with 63.2% of the babies being smaller than normal size (<2500 gm). 52.9% of the babies died within the first two days after birth; and 85.3% during the first week of life (Figure 5). The mean age at death was 5.0 days and standard deviation 7 days.

Figure 6: Neonatal age at time of death during 2017

Neonatal age at time of death
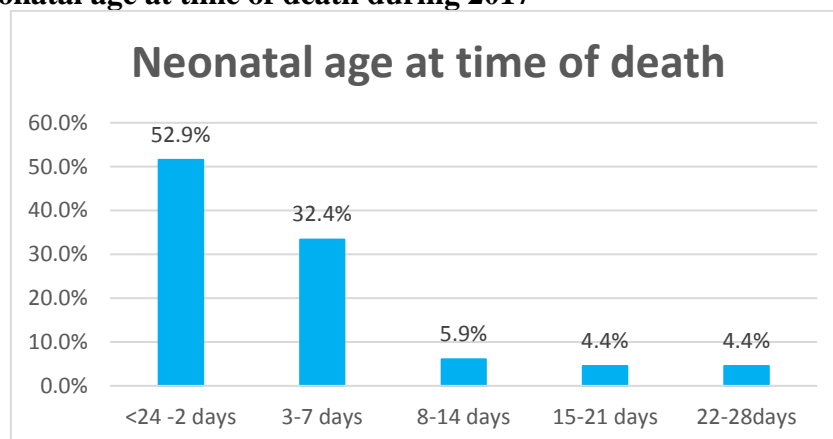
Sixty-one babies (89.7%) died at referral hospitals, four (5.9%) died at home, and three (4.4%) babies died in the camp hospitals. (76.5%) percent of babies born in the referral hospitals were never discharged from the hospital; (23.5%) of neonates transferred to the health facilities and

died there. Four babies died at home and were referred to the forensic medicine department. Resuscitation was required for (82.4%) of neonates. (Table 1).

Table 1: Characteristics of the neonatal death.

Parameter	Number	Percent
Type of pregnancy		
Single	56	82.4
Twin	7	10.3
Triplet	5	7.3
Gender		
Male	46	67.6
Female	22	32.4
Place of Birth		
Referral Hospital	52	76.5
Camp Hospital	16	23.5
Age Group at time of Death		
< 24 hours - 2 days	36	52.9%
3-7 days	22	32.4%
8 - 14 days	4	5.9%
15-21 days	3	4.4%
22-28 days	3	4.4%
Birth weight		
Low birth weight	43	63.2
Normal birth weight	25	36.8
Birth weight classification		
Extremely low birth weight $\leq$ 1000 gm	13	19.1
Very low birth weight 1001-1500 gm	14	20.6
Moderate low birth weight 1501 -2500	16	23.5
Normal birth weight > 2500 gm	25	36.8
Resuscitation needed at time of delivery		
Yes	56	82.4
No	22	32.4
Place of Death		
Referral Hospital	61	89.7
Home	4	5.9
Camp Facility Hospital	3	4.4
Total	**68**	**100.0**

Table 2: Distribution of neonatal Deaths by Place of death /2017

Name of Referral Hospital	Number	Percent
Al Khansa' Hospital	17	25.0
Al Najah Hospital	16	23.5
Mafraq Pediatric and Obstetric Hospital	9	13.3
Al Makased Hospital	8	11.7
Irbid Islamic Hospital	8	11.7
Home	4	5.9

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Camp Hospital	3	4.4
Mafraq Hospital (this case was referred to Mafraq hospitals, and documented)	1	1.5
Al Hanan Hospital	1	1.5
Jordan University Hospital	1	1.5
Total	**68**	**100.0**

Results showed that 25.0% of neonatal death occurred in Al- Khansa' Hospital and 23.5% occurred in Al Najah Hospital, followed by Mafraq Pediatric and Obstetric Hospital at 13.3% (Table 2).

Table 3: Distribution of neonatal deaths by Hospital and Birth weight /2017

Name of Referral Hospital	Weight <1000gm	weight 1001-1500 gm	Weight 1501-2500gm	Weight >2500gm	Total No.
Al Khansa' Hospital	2	6	4	5	17
Al Najah Hospital	2	5	2	7	16
Mafraq Pediatric and Obstetric Hospital	3	0	3	3	9
Al Maqased Hospital	2	0	2	4	8
Irbid Islamic Hospital	4	1	0	3	8
Home	0	0	2	2	4
Camp Hospital	0	1	1	1	3
Mafraq Hospital (this case was referred to Mafraq hospitals, and documented)	0	0	1	0	1
Al Hanan Hospital	0	0	1	0	1
Jordan University Hospital	0	1	0	0	1
Total	**13**	**14**	**16**	**25**	**68**

Table 4: Distribution of neonatal death cases by Hospital and gestational age /2017

Name of Referral Hospital	Extremely preterm (< 28 wks)	Very preterm (28- < 32 wks)	Moderate preterm (32- <37 wks)	Full Term (37-42 wks)	Total No.
Al Khansa' Hospital	2	6	4	5	17
Al Najah Hospital	5	3	2	6	16
Mafraq Pediatric and Obstetric Hospital	3	2	0	4	9
Al Maqased Hospital	0	2	2	4	8
Irbid Islamic Hospital	3	2	0	3	8
Home	0	0	2	2	4
Camp Hospital	0	0	2	1	3
Mafraq Hospital (this case was referred to Mafraq hospitals, and documented	0	0	0	1	1

Al Hanan Hospital	0	0	1	0	1
Jordan University Hospital	0	1	0	0	1
Total	**13**	**16**	**13**	**26**	**68**

Reasons for Admission

The most common reason for hospital admission was recorded to be prematurity at (60.2%), and dyspnea (57.4%), low birth weight at (39.7%), and congenital anomalies at (25.0%). Other reasons for hospital admission of the neonates due to (cyanosis, hypoactive and no movement, refusal to suck and meconium aspiration) were recorded to be 23.5% (Table 5). 98.0% of neonates were in critical condition. 82.3% required resuscitation at birth.

Table 5: Reasons for hospital admissions of the neonates/ 2017.

Reasons for admissions	Number	Percent
Prematurity	41	60.2%
Dyspnea	39	57.4%
Low birth weight	27	39.7%
Congenital anomalies	17	25.0%
Others	16	23.5%
Neonatal sepsis	13	19.1%
Birth asphyxia	13	19.1%
Fever	4	5.9%
Jaundice	2	2.9%
Hypothermia	2	2.9%
Convulsion	1	1.5%
Refusal to suck	1	1.5%

Table 6: Lists of Interventional procedures provided for neonatal babies during admission/2017

Interventions provided	Number	Percent
oxygen	62	91.2%
IV fluids	59	86.8%
Parenteral antibiotics	46	67.6%
Mechanical ventilator	42	61.8%
Surfactant	9	13.2%
Parenteral anticonvulsants	8	11.8%
Phototherapy	5	7.4%
Central umbilical catheter	4	5.9%
Blood transfusion	3	4.4%
Oral rehydration salts	1	1.5%
Operation for illness (hernia repair)	1	1.5%

The most important clinical intervention for the neonatal hospital admitted cases was oxygen therapy (91.2%), followed by given IV fluids (86.8%) cases. Parenteral antibiotic therapy and mechanical ventilators was the other principle of intervention in (67.6%) & (61.8%) respectively. For the remaining of neonatal hospital admitted cases, health care providers used one or more of the mentioned intervention in (Table 6).

Maternal Characteristics

A total of 47 pregnant women were interviewed with a mean age (33.5 ± 5.4) years ranging between 16 and 44 years. Their mean gestational age 33.1 ± 5.7 wks. range between 25 and 41 wks. 61.7% were preterm < 37 wks., and 38.3 % were normal full term (Table 7).

Table 7: Maternal Characteristics of neonatal deaths/ 2017

Characteristics	Number	Percent
Age (years)		
Age Mean + SD	27.3±7.6	
Age Range	16-44	
Gestational age mean + SD	33.5 ± 5.4	
Range	25-41	
Extremely preterm (< 28 wks)	13	19.1%
Very preterm (28- < 32 wks)	16	23.5%
Moderate preterm (32- <37 wks)	13	19.1%
Full Term (37-42 wks)	26	38.3%
Gravida and Parity		
Gravida (mean ± SD)	4.6 ± 2.9	
Gravida Range	1-12	
Parity	3.4 ± 2.3	
Parity Range	1-10	
Number of antenatal visits	7.6± 2.7	
Range Number of visits	2-15	
Mode of delivery		
Cesarean Section	46	67.6%
Spontaneous Vaginal delivery (skilled attendant)	21	30.9%
Assisted Vaginal delivery (vacuum, Forceps)	1	1.5%
Fetal Presentation		
Cephalic presentation	63	92.6%
Breech presentation during pregnancy	4	5.9%
Transverse lie	1	1.5%
Pregnancy Danger Signs		
No danger signs were applied	32	47.1%
Elevated blood pressure	9	13.2%
vaginal bleeding	6	8.8%
Edema in lower and upper limbs	5	7.4%
Abdominal pain	4	5.9%
Anemia	3	4.4%
Urinary Tract infection	3	4.4%

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glucosuria	3	4.4%
Fever	2	2.9%
Decreased/ no fetal movement	1	1.5%
Adverse labor events		
Prolonged ROM beyond 24 hours	6	8.8%
preterm rupture of membranes	6	8.8%
Meconium stained discharge	3	4.4%
Abnormal Fetal heart sound	2	2.9%
Fever	1	1.5%

Antenatal care is so important during pregnancy. All the women had visited the camp clinic during pregnancy with a mean number of 7.6 visits (SD ± 2.7) (a range between 2 -15 visits). Four patients had visited the clinic more than 10 times due to partial separation of the placenta and anemia. Furthermore, women delivering their babies by Cesarean section were 67.6%, Breech presentation and Transverse lie were 7.4%. Among the women who experienced a NN death 47.1% experienced no danger signs during pregnancy. Among who experienced danger signs the two most common signs were Prolonged ROM beyond 24 hours and preterm rupture of membranes which constitute 8.8% for each sign. While the danger signs that women had during pregnancy were elevated blood pressure, vaginal bleeding, edema in lower and upper limbs 13.2%, 8.8%, and 7.4% respectively (table 7). One important element in the ANC is the use of ultrasound technology so as to detect early avoidable probable risk factors in pregnant women, such as congenital anomalies, placenta previa, abruptio. Handheld portable ultrasound devices can easily be made accessible to healthcare providers in the rural settings.

There were few complaints from the refugees about the services they received in the camps during the antenatal care but there were no complaints from the referral or camp hospital during the delivery.

The immediate cause of death is Respiratory Distress Syndrome (RDS) due to Low birth weight and prematurity which is around 44.1%, followed by congenital heart anomalies (20.6%). Acute Severe Pneumonia, Neonatal Sepsis and Birth Asphyxia 11.8%, 10.3% and 8.8% respectively play important role depending on clinical examinations only babies who died at home send to forensic medicine for autopsy. (Table 8).

Table 8: Immediate cause of neonatal deaths/2017

Immediate cause of death	Number	Percent
RDS + Prematurity, Low birth weight	30	44.1
Congenital Heart disease or congenital anomalies	14	20.6
Acute Severe Pneumonia	8	11.8
Neonatal Sepsis	7	10.3
Birth Asphyxia	6	8.8
Septicemia	3	4.4
Total	**68**	**100**

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Risk Factors

The Risk factors contributing to the Neonatal death can be medical avoidable and medical, non-avoidable. In case of non-avoidable risk factors no intervention can be done. The most important objective of the neonatal death audit is to identify the risk factors contributing to the neonatal death and to take proper actions in order to avoid these deaths in the future. The following bar chart shows the causes of death and risk factors contributed to neonatal death in both camps (Zaatari and Azraq).

It is worth mentioning that each neonatal death case has more than one cause and contributing factors for death

Figure 7: Risk Factors for Neonatal Deaths, 2017 in Zaatari and Azraq Camps (N=68)
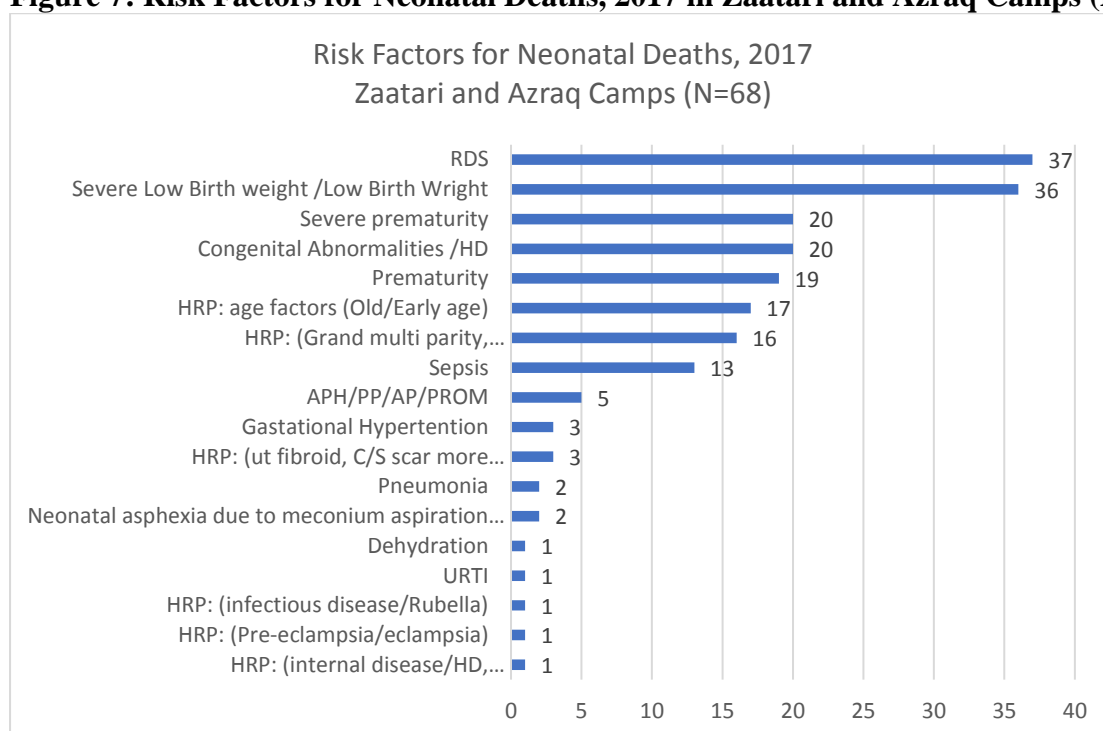
The following bar chart shows the avoidable and non-avoidable of neonatal death case in both camps (Zaatari and Azraq).

Figure 8: Avoidable/Non-Avoidable Risk Factors for Neonatal Deaths, 2017 in Zaatari/Azraq Camps (N=68)

Avoidable/Non-Avoidable Risk Factors for Neonatal Deaths, 2017 in Zaatari/Azraq Camps (N=68)
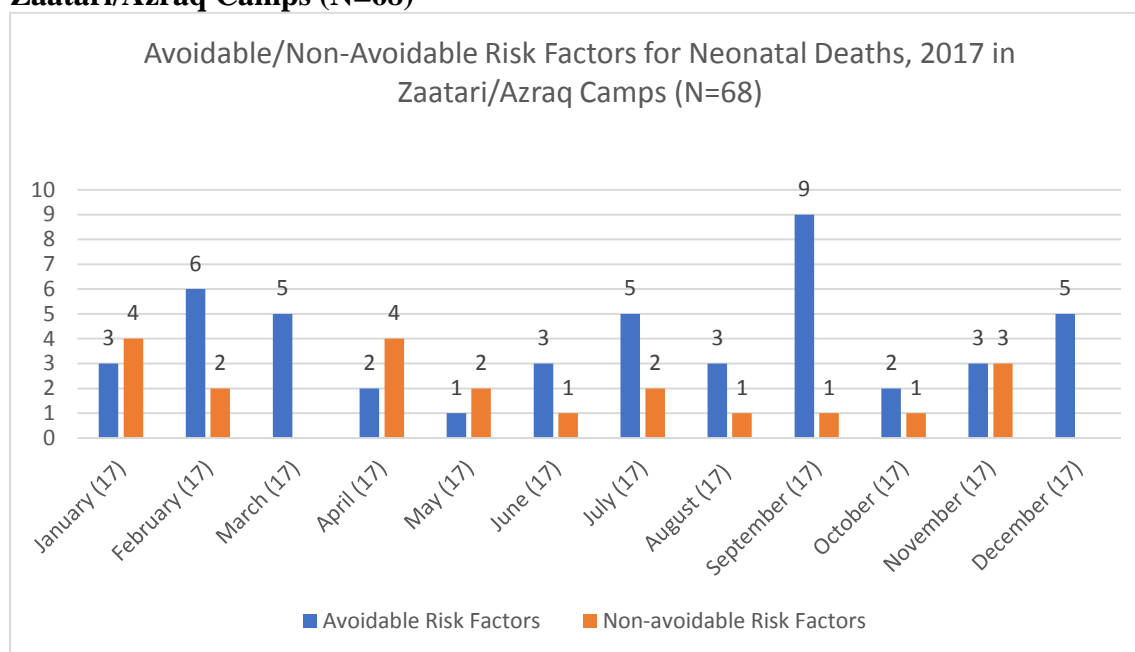
For more investigation of causes and contributing risk factors of neonatal death cases, Please see the following bar charts, which show individually in Zaatari and Azraq camps.

Figure 9: Risk Factors for Neonatal Death, 2017 in Zaatari Camp (N=48)

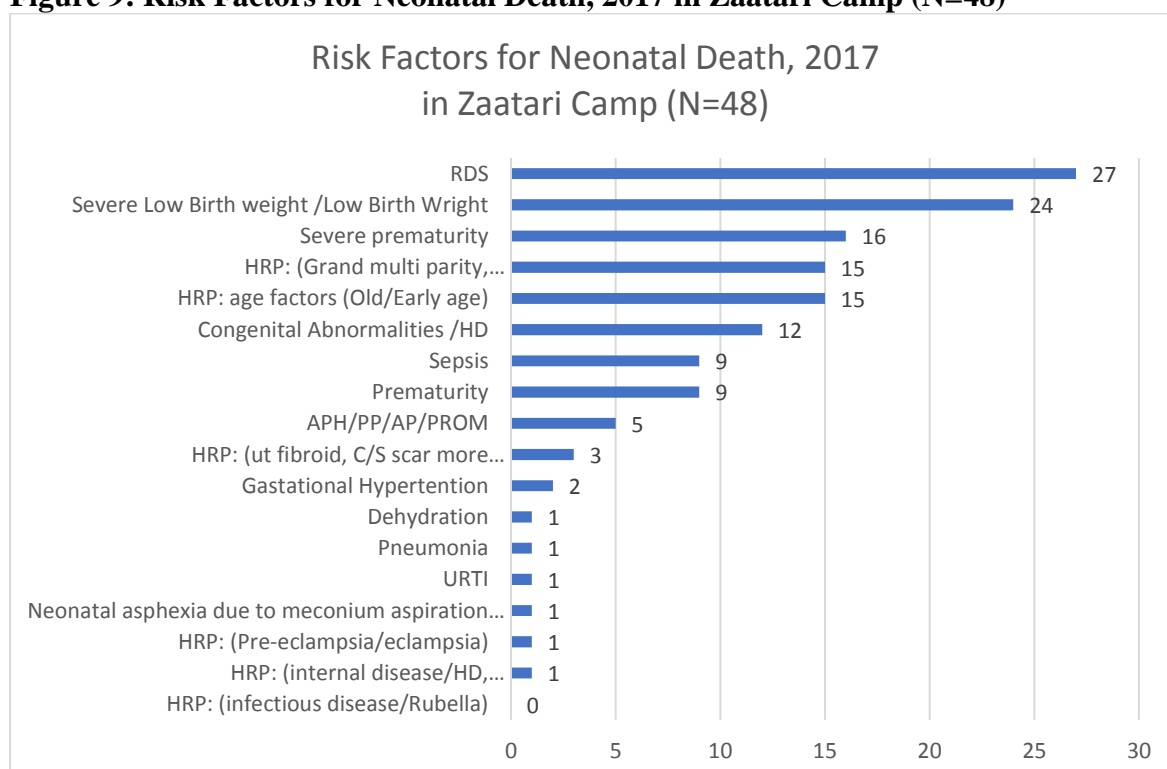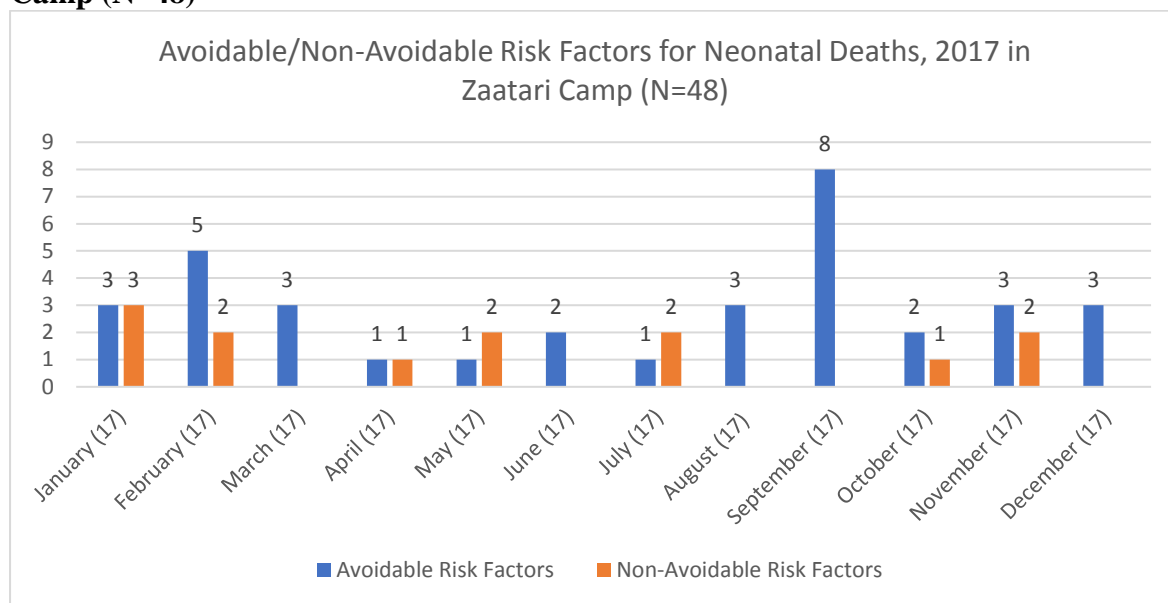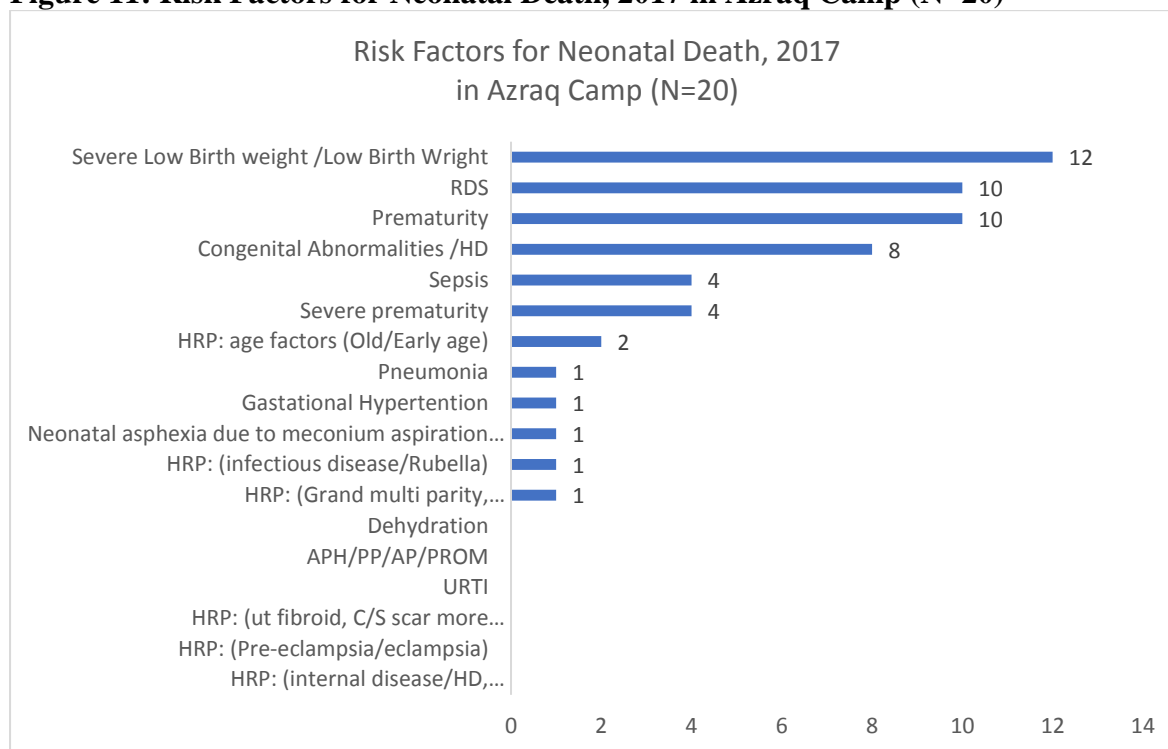Risk Factors for Neonatal Death, 2017 in Zaatari Camp (N=48)

Figure 10: Avoidable/Non-Avoidable Risk Factors for Neonatal Deaths, 2017 in Zaatari Camp (N=48)

Avoidable/Non-Avoidable Risk Factors for Neonatal Deaths, 2017 in Zaatari Camp (N=48)

Neonatal death causes and contributing risk factors in Azraq camp.

Figure 11: Risk Factors for Neonatal Death, 2017 in Azraq Camp (N=20)

Risk Factors for Neonatal Death, 2017 in Azraq Camp (N=20)

Avoidable and non-avoidable neonatal death causes and contributing factors in Azraq camp.

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Figure 12: Avoidable/Non-Avoidable Risk Factors for Neonatal Deaths, 2017 in Azraq Camp (N=20)
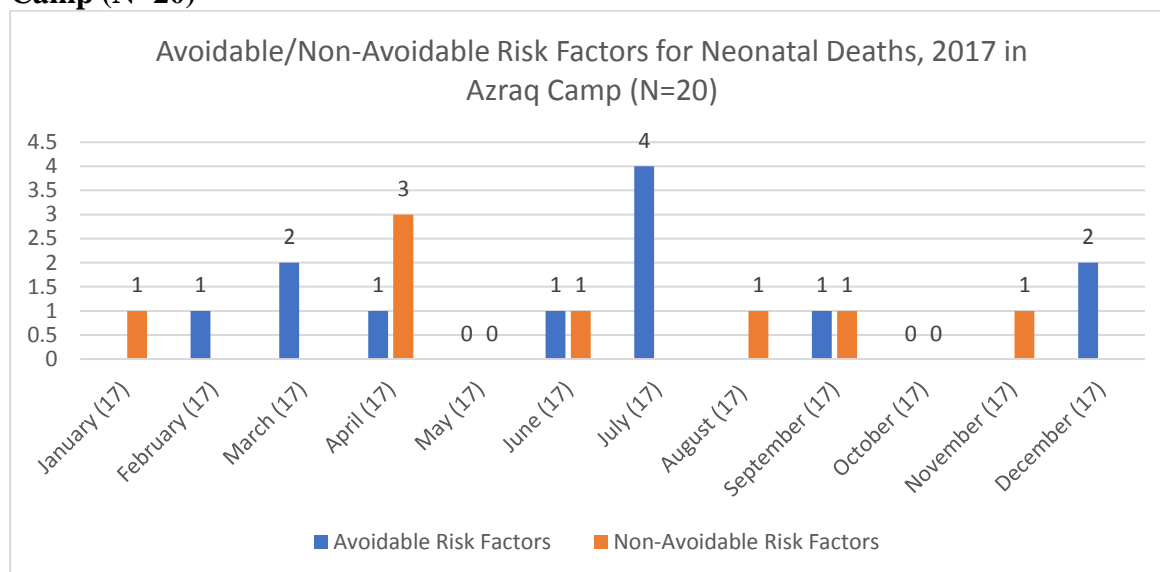
Qualitative Findings

Over the period January to December 2017, EMPHNET's field team visited 68 neonatal death cases. Information was obtained from health facilities and household interviews in Syrian refugee camps (Zaatari and Azraq).

Overall, 68 neonatal death cases were audited. This report summarizes major findings from the audited death cases and it provides an analysis of the causes and contributing risk factors behind the investigated cases.

The following three categories of causes were associated with 68 investigated neonatal death cases in both camps (Zaatari and Azraq):

1. Most of deaths occurred in the first week of life are due to RDS, the major causes of RDS were prematurity (severe prematurity) and Low birth weight (severe low birth weight). Therefore, RDS (due to prematurity and low birth weight) was the first leading cause of death in both camps (Zaatari and Azraq).
2. Congenital abnormalities/Congenital heart disease was the second leading cause for neonatal death cases in both camps (Zaatari and Azraq).
3. Sepsis, Pneumonia/meconium aspiration pneumonia Upper Respiratory Tract Infection, and Dehydration were deemed as the third leading causes for all neonatal death cases.

Listed below are risk factors related to maternal were associated in all 68 investigated neonatal death cases in both camps:

1. High Risk Pregnancy related to age factors (Early age marriage and old age pregnancy)
2. High Risk Pregnancy related to (Great grand multiparty, Twins pregnancy, Triple pregnancy, Anemia, RH ABO incompatibility)

3. High Risk Pregnancy including Antepartum Hemorrhage (Placenta Previa, Abruptio Placenta, PROM)
4. High Risk Pregnancy (Gestational hypertension, pre-eclampsia and eclampsia, Diabetes mellitus, huge uterine fibroid.

Discussion

According to the literature, approximately three quarters of neonatal deaths occurs during the first week of life in most of refugee camps.[5] Results of this study indicated that 86.2% of neonatal deaths occurred during the first week of life. 70.6% were in Zaatari and 29.4% were in Azraq Camp. The studies also showed that low birth weight contributes 60-80 % of all neonatal deaths.[6] Our review showed that 63.2% of the women delivered low birth neonates below 2.5 kg. 14.1% were in Azraq and 68.7% were in Zaatari.

Rates of survival decrease with low gestational age and low birth weight were cited as factors. Our review showed that 61.8 % of the neonatal deaths were preterm < 37 wks. of Gestational age, and 63.2% were low birth weight below 2.5 kg. Risk factors and direct cause of death were cited to be respiratory distress syndrome due to prematurity and low birth weight, on the other hand congenital anomalies / Heart anomalies the second leading cause of neonatal death in our review.

Recommendations

Based on the main findings of the risk factors associated with the death cases, we recommend the following measures to be implemented:

1. Enhancing the technical meeting on monthly basis between the technical staff of EMPHNET and UNHCR.
2. There is an urge to improve the awareness of the pregnant women, most notably birth spacing as well as activating the policy related to RH ABO incompatibility among health care providers and shedding the light on the potential risks of early marriages.
3. Adhering to Standard antenatal care (ANC) protocol since this is very important in the early detection of maternal risk factors and maternal complications. It is also advised to provide the minimum required number of ANC visits (as per WHO guidelines) to every Syrian mother. This measure will help with the identification of those mothers who are in need of closer follow-up and in return, will reduce the magnitude of maternal complications and neonatal deaths.
   These elements must be investigated as part of the provision of standard antenatal care (complete obstetrical examination, LMP and calculation EDD accordingly, examination of BP examination of Hb Blood group and examination of urine

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[5] Jehan, Imtiaz, et al. "Neonatal mortality, risk factors and causes: a prospective population-based cohort study in urban Pakistan." *Bulletin of the world Health Organization* 87.2 (2009): 130-138.

[6] World Health Organization, and World Health Organization. "Care of the preterm and/or low-birth-weight newborn." *Geneva, Switzerland: WHO* (2014).

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(Bacteriuria and proteinuria). Advice must also be given with regards to the preventive measures (Iron supplements, Folic acid, Tetanus Toxoid and Anthelminthic in hookworm cases), Screening test (US) as per their needs, health educations advice and counselling follow up, fetal wellbeing, and investigating danger signs throughout the pregnancy, and taking all appropriate actions.[7]

4. Raising awareness on the risks of young age and old age pregnancies. Young age pregnancy and multigravida are due to early marriage, moreover family planning should also be placed under the umbrella of awareness. Apart from raising awareness on pregnancy, some genuine efforts should be dedicated towards generation activities and behavior change communication (BCC) efforts.

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[7] WHO Recommendations on Antenatal Care for a Positive Pregnancy Experience. © World Health Organization 2016. Available at http://apps.who.int/iris/bitstream/handle/10665/250796/9789241549912-eng.pdf?sequence=1