Neonatal Mortality in Thi-Qar / Bint Al-Huda Teaching Hospital / Neonatal Care Unit: Five Years (2015-2019)Trend And Causes

Dr. Jabbar Badr Mohan*   **Dr.Mohammed Aziz Katie***
Dr. Rikan Mohsen Zugair*   **Dr. Falah Abd Basher***
*(Paediatrician, Thi-Qar Health Directorate/ Bint Al-Huda Teaching Hospital)

Abstract

Background: Effectiveness of public health is determined by many indicators one of them is the neonatal mortality rate that considers an important one for these issues, it gives an impact on child health care services and welfare initiatives.

Rationale: Neonatal deaths account for a large proportion of child deaths. Mortality during neonatal period is considered a useful indicator of both maternal and newborn health   and   care.
Objectives: This study aimed to know the time trend of neonatal mortality in Thi-Qar, assess its distribution according to its main causes of death.
Subjects and Methods: Across sectional observational study extending all over the past 5 years; from January 2015 till the end of June of 2019 in Bint Al-Huda maternity and pediatrics hospital-Thi-Qar-Iraq, through which no. of live birth, neonatal deaths had been included, where sex, address, word, cause of death and lastly comorbid condition. frequencies, percentages, chi-square test, Fisher exact test, Univariate and multivariant analysis had been used to reach the proposed aims. P-value of less than 0.05 is considered significant.

Results: Even though there was a difference within a number of live birth all over the five years of the study, but it was no so big and statistically non significant (P value =0.163). The numbers of deliveries per month and seasons had significant statistical differences where P value (0.042). A rate of mortality is increasing by nearly 175%, 148 % between the year 2015 and 2019 for both ENMR and LNMR. Respiratory, prematurity, and congenital anomalies were the main causes of death all over the five studied   years.
Recommendations: Big efforts must be exerted upon full details of neonatal death to clarify its risk, causes and reducing its big burden on the health care services by prevention of this mortality rate.

Introduction:

NMR expressing the number of death occurring at the 1st 28 days of life per thousand live birth it is either early or late[1,2], the early one equal to the number of death among neonate of less than 8 days of age divided by the 1000 live birth at specific time and place, while the late expressing the number of death in the next period of neonatal life divided by the same denominators at a specific place and time[2,3,4]

They consider as an important indicator for the effectiveness of public health items including services for the child and maternal health care, and comparing countries regarding their welfare[5]

This rate is often used as an indicator of the level of health in a country. The NMR mortality rate of the world is (49.4) according to the United Nations and (34.1) according to the CIA World Factbook. The under-5 mortality rate of the world is 43 deaths per 1,000 according to the World Health Organization[6]

In 2015, (4.5) million (75% of all under-five deaths) occurred within the first year of life. The risk of a child dying before completing the first year of age was highest in the WHO African Region (55 per 1000 live births), over five times higher than that in the WHO European Region (10 per 1000 live births).[3,6]
Globally, the infant mortality rate has decreased from an estimated rate of 63 deaths per 1000 live births in 1990 to 32 deaths per 1000 live births in 2015. Annual infant deaths have declined from 8.9 million in 1990 to 4.5 million in 2015.[4,6]

Global Health Observatory (GHO) data: Of the estimated 130 million infants born each year worldwide,1 4 million die in the first 28 days of life. Three-quarters of neonatal deaths occur in the first week, and more than one-quarter occur in the first 24 hours[7,8]. Neonatal deaths account for 40% of deaths under the age of 5 years worldwide. Therefore, efforts to achieve the UN Millennium Development Goal 4 of reducing childhood mortality by two-thirds by 2015 are focused on reducing neonatal deaths in high-mortality countries.
Two-thirds of the world's neonatal deaths occur in just 10 countries, mostly in Asia. Pakistan is number three among these countries. With an estimated 298 000 neonatal deaths annually and a reported neonatal mortality rate of 49 per 1000 live births, Pakistan accounts for 7% of global neonatal deaths[7-11]. Infection (36%), preterm birth (28%) and birth asphyxia (23%) account for 87% of neonatal deaths worldwide[7,8,12-14].
In Iraq the total 37.5 death / 1000 live birth, male, female 40, 34.2 death /1000 live birth respectively.[15]

Methodology:

Type of study: A The study was a hospital based observational, analytical, cross-sectional study, extending all over the past 5 years; from January 2105 till the end of June of 2019 in Bint Al-Huda maternity and pediatrics hospital-Thiqar-Iraq.

Study population:

All live birth and all neonatal deaths had been included, from different places of death that including sterilized neonatal wards and other neonatal wards.

Inclusion and exclusion criteria

All live birth, deaths regardless of their gender or age were included, those who delivered as stillbirth, or died with more than 1 month of life were excluded.

Variables of Interest:

1-age by days that registered to include the whole life of neonate (from birth to death). 2-sex that resorted into males and females. 3- date and time of death as documented in the case sheet of the dead neonate. 4- an address that had been sub-classified according to the known area geographical distribution into Al-Nasiriyah, and other districts. 6- word f admission by which the neonate had died, time of inward admission had been registered also.7- cause of death, which was one of the interesting outcomes for this study, it sub-classified according to specific formal forma and depends on the diagnosis by consultants.

Ethical considerations:

Ethical clearance was obtained from the Bint Al-Huda teaching hospital directorate to perform the study. Informed consent also was taken from all participants parents.

a pilot study was carried out during the first two months 2015 on (72) dead neonates, to know the feasibility, cost and time required for the final study and also know the adequacy of the specified tools and unexpected problems extent.

Procedures of recording, coding and checking of data:

The data directly registered in the questionnaire form at the work field and checked daily and weekly. A quantitative approach was used for coding and the questionnaire data was pre-coded by using of statistical package for social science (SPSS)version (24).

Statistical Analysis:

SPSS version (25) was used for data analysis. descriptive statistics, frequencies, percentages, associations, tests of significance (chi-square test or Fisher exact test) were used for the analysis of categorical variables. means and standard deviations were used to present data of continuous variables. Correlation and logistic regression analysis were performed to recognize the independent predictors of NMR. A P-value < 0.05 was considered statistically significant .

Results:

Even though there was a difference in a number of live birth and deliveries and their percentages but it was no so big and statistically non significant within the five studied years among attendants of Bint Al-Huda Hospital (P value =0.163). According to months and seasons of the five years, the number of deliveries per month had significant statistical differences where P value (0.042). as shown in table 1 and figure 1.
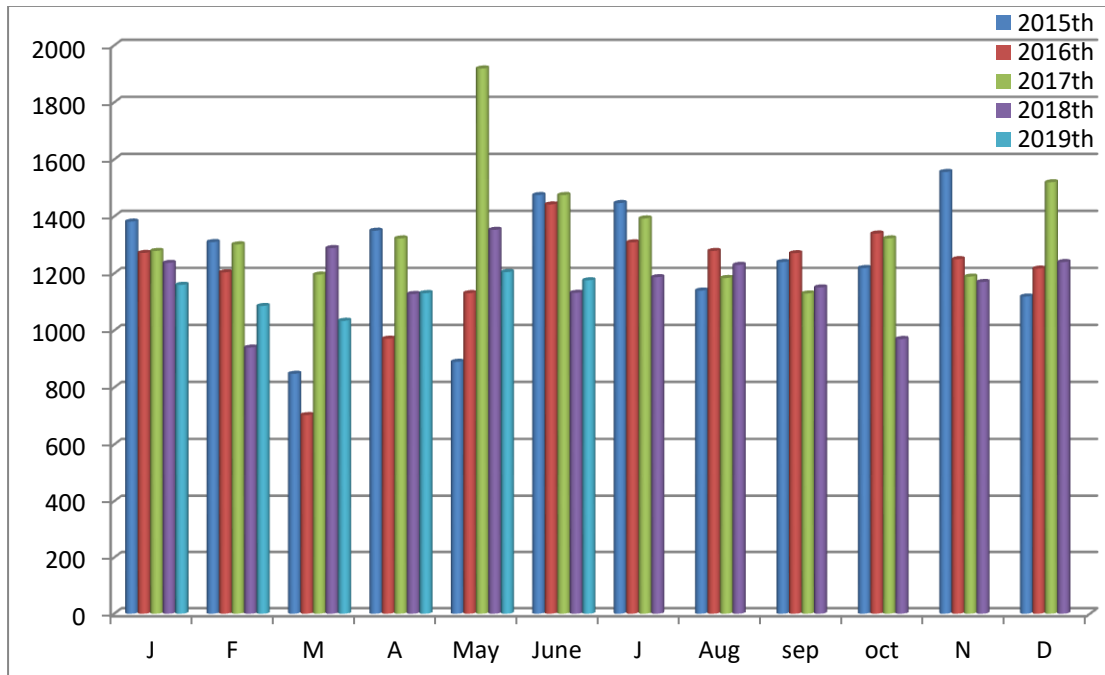
Figure 1: Live birth trend of the past five years according to months

Table1: Months, Seasons and yearly Five Years Live Birth Trend.

Months	2015	2016	2017	2018	2019	Total
Jan	1382	1272	1279	1237	1160	6330
Feb	1310	1204	1302	940	1086	5842
March	848	703	1196	1289	1034	5070
April	1350	971	1323	1128	1131	5903
May	890	1131	1919	1353	1205	6498
June	1475	1442	1475	1132	1176	6700
July	1447	1309	1393	1187		5336
August	1140	1279	1184	1230		4833
Sept	1240	1271	1130	1151		4792
October	1219	1340	1323	970		4852
November	1556	1250	1189	1170		5165
December	1119	1217	1520	1240		5096
	14976	14389	16233	14027	6792	66417

Blue color= winter, Green=Spring, Black = Summer, yellow=Autumn

Figure 2. Total No.of Live Birth
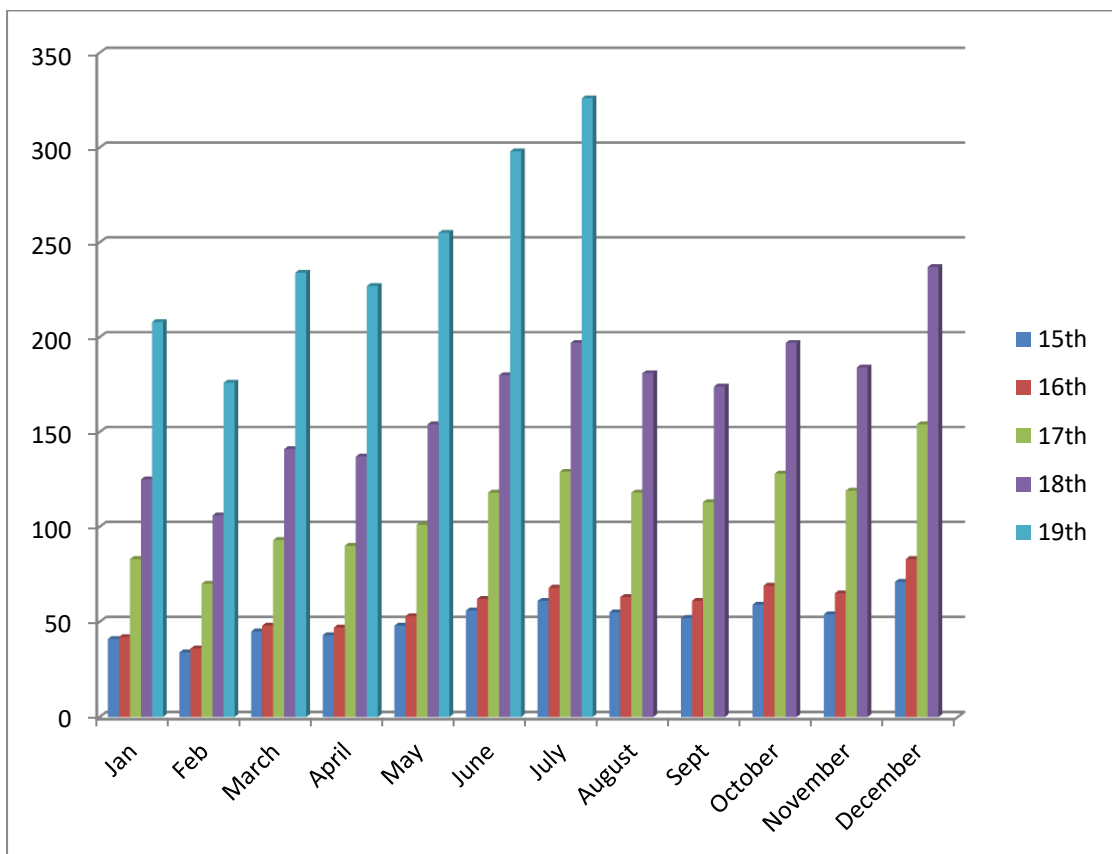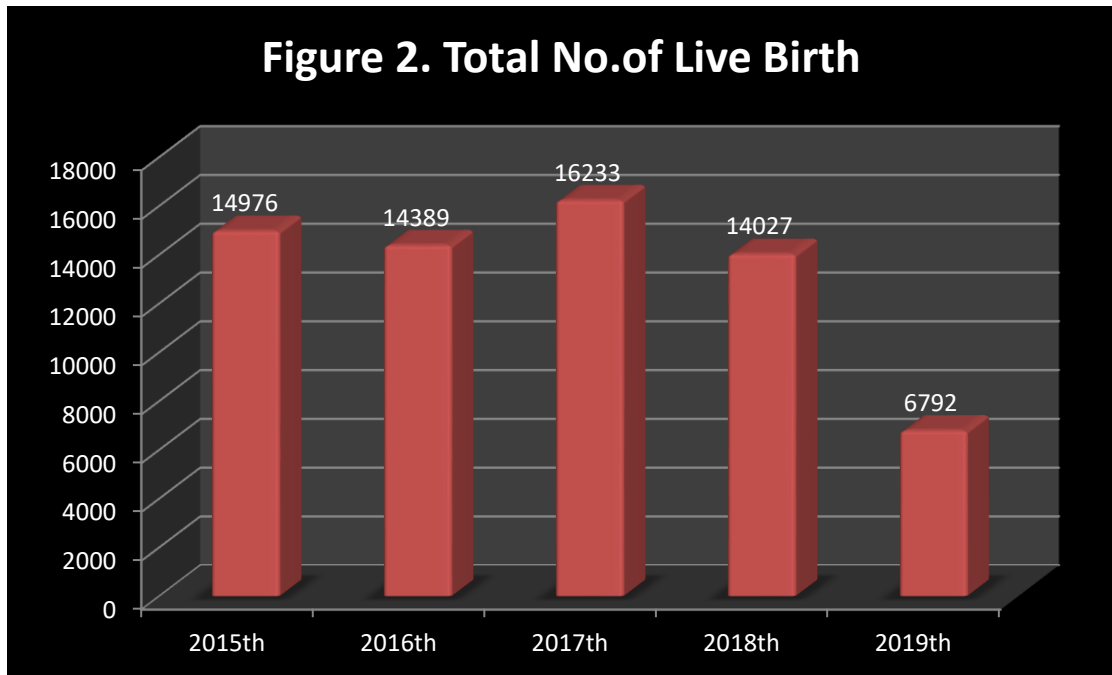
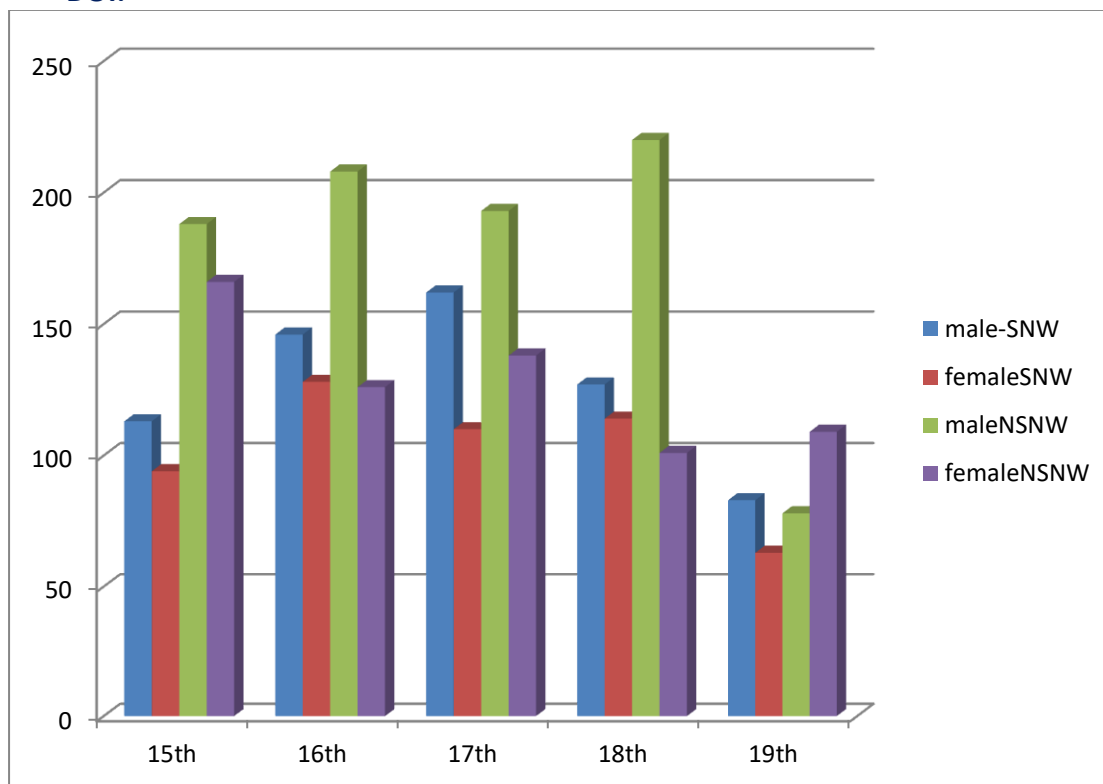**Figure 3: Neonatal Mortality Trend all over the 5 years**

Figure 4: Trends of Death according to Years and Gender

**Table 2: Neonatal Mortality Rate all over the 5 Years:**

Years	Live birth	Early Neonatal Death No.	Early neonatal M.R /1000	Late Neonatal death No.	Late neonatal M.R/1000
2015	14976	207	13.82	344	22.97
2016	14389	276	19.18	312	21.68
2017	16233	259	15.955	294	18.11
2018	14027	243	17.32	339	24.167
2019(1st 6M only)	6792	157	23.115	231	34.01
Total	66417	1142	17.194	1520	22.885

All over the past five years, the rate of mortality is increasing by nearly 175%, 148 % between the year 2015 and 2019 for both ENMR and LNMR as seen in Table 1.

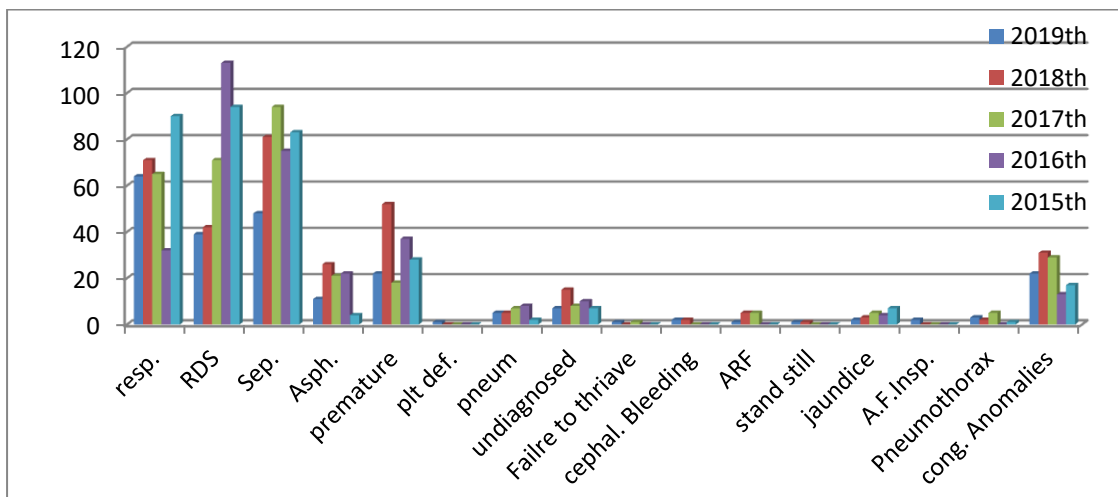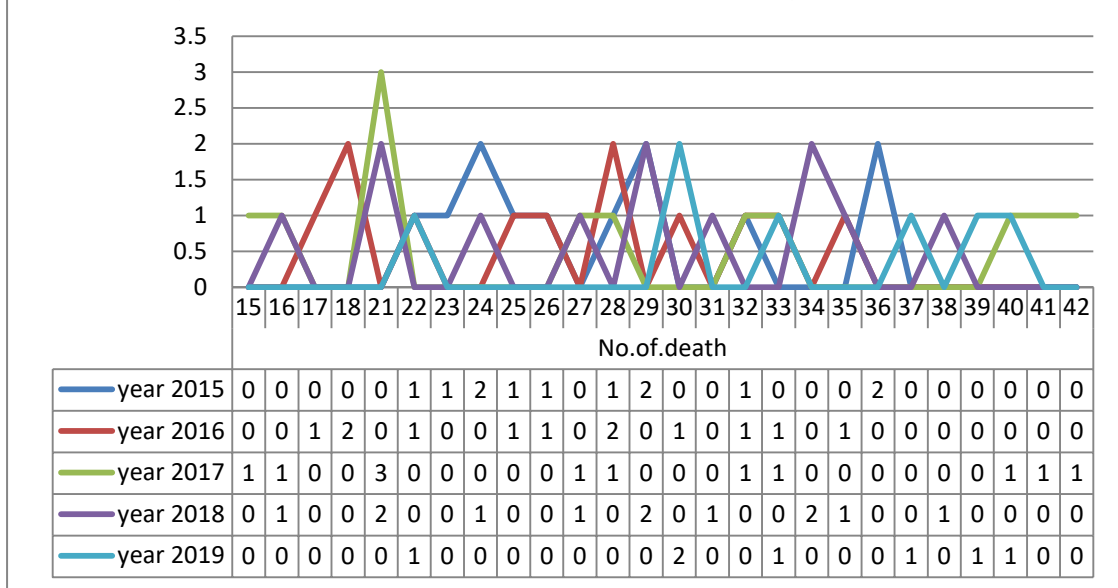## Table 3:Five years' time trend of total neonatal mortality rate

Years	Live birth	Neonatal Death No.	neonatal M.R /1000	P value
2015	14976	551	36.792	0.038
2016	14389	588	40.086	
2017	16233	553	34.066	
2018	14027	592	42.220	
2019(1$_{st}$ 6M)	6792	388	57.126	
Total	66417			

Figure 5: Distrbution of death in sterile neonatal word
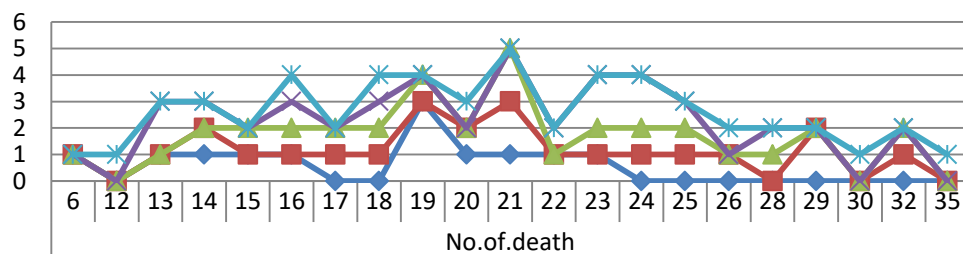
	6	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	28	29	30	32	35
2019th	0	1	0	0	0	1	0	1	0	1	0	0	0	0	0	1	0	0	1	0	1
2018th	0	0	2	1	0	1	0	1	0	0	0	1	2	2	1	0	1	0	0	0	0
2017th	0	0	0	0	1	1	1	1	1	0	2	0	1	1	1	0	1	0	0	1	0
2016th	0	0	0	1	0	0	1	1	0	1	2	0	0	1	1	1	0	2	0	1	0
2015th	1	0	1	1	1	1	0	0	3	1	1	1	1	0	0	0	0	0	0	0	0

No.of.death

Figure 6-Distribution of neonatal mortality in the NSW

No.of.death

	15	16	17	18	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42
year 2015	0	0	0	0	0	1	1	2	1	1	0	1	2	0	0	1	0	0	0	2	0	0	0	0	0	0
year 2016	0	0	1	2	0	1	0	0	1	1	0	2	0	1	0	1	1	0	1	0	0	0	0	0	0	0
year 2017	1	1	0	0	3	0	0	0	0	0	1	1	0	0	0	1	1	0	0	0	0	0	0	1	1	1
year 2018	0	1	0	0	2	0	0	1	0	0	1	0	2	0	1	0	0	2	1	0	0	1	0	0	0	0
year 2019	0	0	0	0	0	1	0	0	0	0	0	0	0	2	0	0	1	0	0	0	1	0	1	1	0	0

Figure7: Causes of death in the neonatal word

Table 4-A: Causes and Criteria of Death in the neonatal Word

| Causes of death	Mean	Std. Deviation	ANOVA	p
Respiratory	309.00	44.771	15.433	.0001
RDS	64.40	20.911	6.886	.002
Sept	71.80	32.228	4.982	.008
Asphyxia	76.20	17.195	9.909	.001
Premature	16.80	9.038	4.156	.014
Plat .deficiency	31.40	13.557	5.179	.007
Pneumonia	.20	.447	1.000	.374
Undiagnosed	5.40	2.302	5.245	.006
Failure to thrive	9.40	3.361	6.253	.003
Cephalic .Hem	.40	.547	1.633	.178
ARF	.80	1.095	1.633	.178
Stand Still	2.20	2.588	1.901	.130
B. lung disorder	.40	.547	1.633	.178
Jaundice	4.200	1.923	4.882	.008
Amniotic fluid .insp	.40	.894	1.000	.374
p. Thorax	2.20	1.923	2.557	.063
cong. Anom	22.40	7.668	6.532	.003
Nasiriya	95.40	22.176	9.619	.001
District	219.20	23.242	21.089	.0001
GA more than 33 wks.	100.20	44.330	5.054	.007
GA 33 WK	106.00	28.098	8.436	.001
CS	107.60	59.672	4.032	.016
NVD	133.40	56.976	5.235	.006
Male	147.80	54.522	6.062	.004
Female	91.40	29.398	6.952	.002
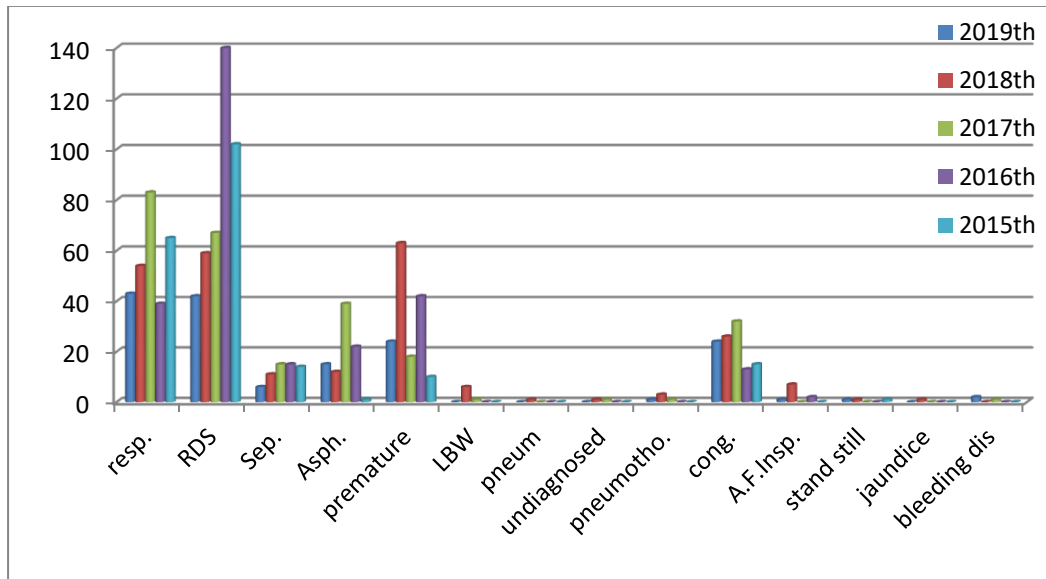
Figure 8: Causes of death in sterile N. W.

Table 4-B: Causes and criteria of death in the sterile neonatal word

Causes and criteria of N.D.	Mean	S. D	T	P value
Respiratory	228.4000	47.35821	10.78	.000
RDS	56.8000	17.81011	7.131	.002
Sept.	82.0000	39.10882	4.688	.009
Asphyxia	12.2000	3.83406	7.115	.002
Premature	17.8000	14.06058	2.831	.047
LBW	31.4000	21.23205	3.307	.030
Pneumonia	1.4000	2.60768	1.200	.296
Undiagnosed	.2000	.44721	1.000	.374
pneumothorax	.4000	.54772	1.633	.178
cong. anomalies	1.0000	1.22474	1.826	.142
Amniotic F inspiration	22.0000	7.90569	6.223	.003
Stand Still	2.0000	2.91548	1.534	.200
Jaundice	.6000	.54772	2.449	.070
Bleeding disorder	.2000	.44721	1.000	.374
Nasiriya	.6000	.89443	1.500	.208
Other districts	110.8000	36.57458	6.774	.002
GAmore33	116.8000	21.47557	12.16	.000
GA33WK	65.2000	34.01764	4.286	.013
CS	90.4000	15.78924	12.80	.000
NVD	120.4000	31.73011	8.485	.001
Male	103.6000	26.94995	8.596	.001
Female	126.2000	30.47458	9.260	.001

Discussion:

A cross sectional study had been extended all over 54 months to studying the time trend of neonate mortality in Thi- Qar that extended from January 2015 till the end of July 2019, obstacle some problems such not all neonatal death especially neonatal death registered at the extra place of the study, because of the presence of other hospitals had an emergency and pediatric wards and death of such age group may occur within. another problem is that many death also occurs before reaching to a hospital, but the researcher expects that these 2 main problems not effecting on the predictions of the result because the neonatal mortality we expect that the proportion of out of hospital death of no difference in the pattern of seasonal trend and causes of death.

Trend according to the Causes of Death:

The present study shows that the respiratory causes constituting the highest rate fallowed by, prematurity, congenital anomalies, and then septicemia, while the well-known infectious diseases and endocrine diseases representing the lesser cause-specific fatality rate which differ **from** Database of Mortality by WHO [2]and neonatal and perinatal mortality as mentioned in Geneva by WHO [3]other studies such Jalil F, study [11], Feng XL, et al [16], -Guglielmo M &Luis A study [17], -Qi-Jun Wu et al study [18] and Zeitlin J et al study [19] which might be due to the difference with the extent of risk factor, extent of the diseases, individual characters and health care services efficacy.

Trend by sex:

Even though there was no significant statistical association, the infant mortality was higher among male than females, these finding also similar to other studies mentioned in factbook-demography of Iraq [15], *Zeitlin J* et al [19], *Stevenson DK* et al studies[20] and – Revision of UNWPP at 2015 [21])

Mortality by Season:

The years 2015, 2016 show no significant difference in the distribution of death allover the two years. Even though there was no significant statistical difference in the death distribution but Winter and autumn at 2017, 2018 were the higher seasons of death, while Summer of 2019 register the highest death rate among neonate of Thi-Qar, that surely differs from other studies and UNWPP Report at 2015 [21] and

- *Miranda ML et al study* [22], *world factbook report 2017*[23] and under-five mortality report [24].

This might be due to difference in individual susceptibility, and a difference in the distribution of the causes of death according to a different time of the year This study show no significant difference in the mortality of neonates regarding the occurrence in different days of the week which differ from S.Farhan study in Al-Kut at 2016 [25] that find the end week death rate is higher than death in other days of the week, this might differ in the design of the study.

Qu-Jun Wu et al show noncomparable causes of death which detailed as NMRs decreased significantly in 1997–2014 in the following categories:

congenital malformations (APC = −9.97%, 95% CI = −12.04%–−7.84%), perinatal period diseases (APC = −6.04%, 95% CI = −7.20%–−4.81%), and of the resp. system diseases (APC = −8.52%, 95% CI = −12.31%–−4.55%). The other causes showing a non-significance statistical time trends neonatal death causes.

Conclusion: Early neonatal life representing a considerable proportion of death risk, Sterile neonatal word had a different rate and causes of death than non-sterile NW. Male having more mortality rate at age of less than 1 month of age, seasonal variation of death had been noticed. respiratory causes, congenital anomalies, and septicemia were the major killers.

Recommendations: big efforts must be exerted upon full details of neonatal death to clarify its risk, causes and reducing its big burden on the health care services by prevention of this mortality rate.

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معدل وأسباب وفيات حديثي الولادة في ذي قار \ مستشفى بنت الهدى التعليمي \ وحدة عناية حديثي الولادة: خمس سنوات (2015-2019)

الدكتور جبار بدر موحان   الدكتور محمد عزيز كاظع

الدكتور ريكان محسن زغير   الدكتور فلاح عبد بشير

أطباء أطفال في دائرة صحة ذي قار مستشفى بنت الهدى التعليمي

الخلفية: كفاءة الصحة العامة تحدد بعدد من المحددات ومنها معدل وفيات الأطفال حديثي الولادة والذي يعتبر من اهم هذه المحددات، معطي انطباعا حول الخدمات الأولية لصحة ورفاهية الأطفال

الأهداف: معرفة معدل وفيات حديثي الولادة وكذلك أسباب الوفيات الأساسية

اشخاص وطريقة الدراسة: دراسة مقطعية امتدت لخمس سنوات مضت، من شهر كانون الثاني عام 2015 لغاية نهاية شهر حزيران عام 2019, في مستشفى بنت الهدى التعليمي في ذي قار، وتم اخذ عدد الولادات الحية وكذلك وفات حديثي الولادة وكذلك توزيعها حسب الجنس والعنوان والأسباب، واستخراج معدلات الوفيات والنسب المئوية، واستعمال اختبار كاي مربع وكذلك اختبار فيشر، وتحليل احدى ومتعدد المتغيرات استخدم للوصول الى الأهداف المقترحة، قيمة بي اقل من 0.05 تعتبر ذات دلالة.

النتيجة: بالرغم من وجود اختلافات في معدل ولادات الأطفال حديثي الولادة خلال فترة الدراسة ولكن لم يكن بالفرق الكبير ولا بالدال احصائيا حيث ان (قيمة بي =0.163)، عدد الولادات في الشهر وكذل في الفصل كانت دالة احصائيا (قيمة بي = 0.042) , معدل الوفيات ازداد قريبا من 175%,148% بين عام 2015 وعام 2019 لكل من وفيات حديثي الولادة المتقدم ووفيات حديثي الولادة المتأخر , الجهاز التنفسي والولادة الأطفال الخدج والتشوهات الخلقية كانت اهم أسباب الوفيات خلال خمس سنوات الدراسة

التوصيات: جهد حثيث للوقوف على التحليل الشامل لمعدل وفيات حديثي الولادة ودراسة العوامل المؤثرة في ذلك للمحاولة من تقليل تأثيرها على خدمات الرعاية الصحة.