Time trends and determinants of infant mortality in Thi-Qar 2016-2017

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Rationale:

A large proportion of child deaths had been accounted from neonatal deaths. Mortality during neonatal period is considered a useful indicator of both maternal and newborn health and care.

Aim of the study:

This study aimed to know the magnitude of IM, assessment of its distribution and knowing of its main determinants

Subjects and method

A cross sectional observational study extending all over the past 2 years; from January 2106 till the end of august of 2017 in Bint Al-Huda maternity and pediatrics hospital-Thiqar-Iraq, through which 1188 deaths had been included, where age by days, sex,date of death, address, day by the week, word, time of inward admission, cause of death and lastly comorbid condition. Frequencies, percentages, figures, chi-square test, fisher exact test, Univariet and mulivarient analysis had been used in order to reach the proposed aims. P value of less than 0.05 consider as significant.

Results:

The study involve 1188 infant deaths, distributed according to their early, late and post neonatal life (69%, 10%,21%)respectively,IMR were higher among male than females. Winter and autumn at 2016 were the higher seasons of death, while Summer of 2017 register the highest death rate among infants,

There was no significant statistical association between the death number and percentages and the day of death regarding their ordinal distribution with in the week (p>0.05).According to the 20th months of the study; January, February and October of 2016 were the highest months of IM registration, while the July of 2017 was the highest month of death for the infants, there was no significant statistical association between sex distribution and place of residence of died infants, and also no sex difference regarding the days of weeks at which the infants died .

the respiratory causes (52.1%) constituting the highest rate fallowed by septicemia (18.1%), while the well-known   infectious diseases   and endocrine diseases

representing the lesser cause specific fatality rate (0.08%). There was a highly significant statistical association between causes of death season of the year (P <0.0001) age (P <0.0001). Residence of died infant showing significant statistical association with the causes of death (p 0.011)

Conclusion: Early neonatal life representing the highest proportion of death risk than other infantile life period, Male having more mortality rate at age of less than 1 year of age, days of weeks had no significant difference in occurrence of death among infants, seasonal variation of death had been noticed. 5-respiratory causes and septicemia were the major killers. 6.age, place of residence and seasons had significant statistical association with cause of death

Introduction:

The infant mortality rate referring tounder one year of age number of deaths occurring among the live births in specific time (one year duration) and place, per 1,000 live births occurring among the population of the given geographical area during the same year[1,2].

NMR expressing the number of death occurring at the 1st28 days of life per thousand live birth it is either early or late, the early one equal to 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 specific place and time[2,3,4]

They consider as an important indicator for the effectiveness of public health items including services for child and maternal health care, and for 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 Fact book. 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 2 years; from January 2106 till the end of august of 2017 in Bint Al-Huda maternity and pediatrics hospital-Thiqar-Iraq.

Sample and study population:

1188 deaths had been included, from different places of death that including sterilized neonatal ward, pediatric emergency roomsurgical rooms, ICU and other neonatal wards

Inclusion and exclusion Criteria :

 All deaths regardless to their gender or age were included, those who died a 1 year of
  life were excluded.

Variables of interest:

1-age by days that registered to including the whole life of neonate (from birth to death) , 2-sex that resorted into male and females.
3- date and time of death as documented in the case sheet of the died neonate. 4- address that had been sub-classified according to the known area geographical distribution into Al-Nasirriyah, Suq-Alheyokh, Shatrah, All-Rifaee and lastly Al-Chibayesh.   5-day by the week into Friday, Saturday, Sunday, Monday, Tuesday, Wednesday and lastly Thursday; to compare the death number and frequencies of death between the holidays and other days of week.

6- word f admission by which the neonate had been died, time of inward admission had been registered also.

7- cause of death , which was one of the interested outcome for this study, it sub-classified into: respiratory, GIT and hepatic, CVD, CNS, renal, congenital anomalies, systematic, natal causes and septicemia .

8- lastly comorbid condition that exist before admission to the hospital and not conditionally contributing to the death.

Ethical considerations:

An ethical clearance was obtained from Bint Al-Huda teaching hospital directorate to perform the study. An informed consent also was taken from all participants parent.

Pilot Study :

A pilot study was carried out during the first two weeks of January 2016 on ten, to know the feasibility, cost and time required for the final study and also know the adequacy of the questionnaire and the extent of any unexpected problems.

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 (23) .

Statistical analysis:

SPSS version (23) was used for data analysis . descriptive statistic , frequencies , percentages , associations , tests of significance (chi-square test or Fisher exact test) were used for 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:

The study involve 1188 infant deaths, majority of them were during the early neonatal life (69%), other about 10% were during late neonatal life, while the remaining part was representing the post neonatal period as shown in figure 1.
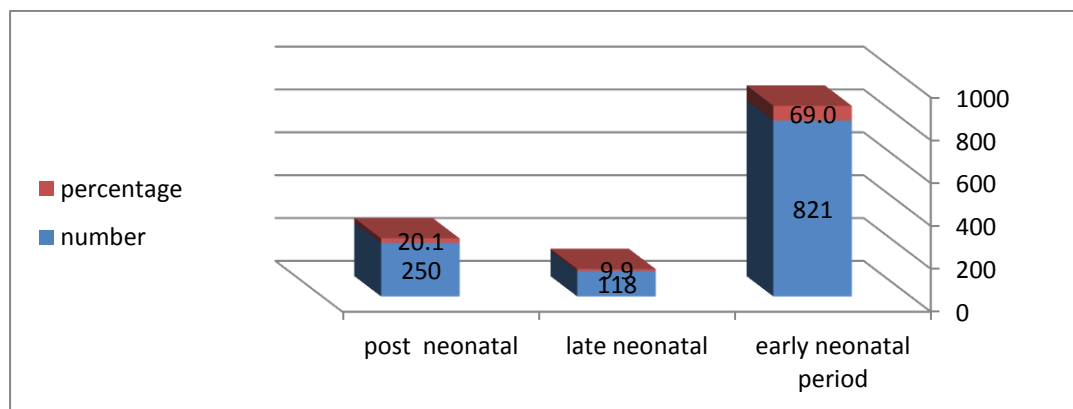

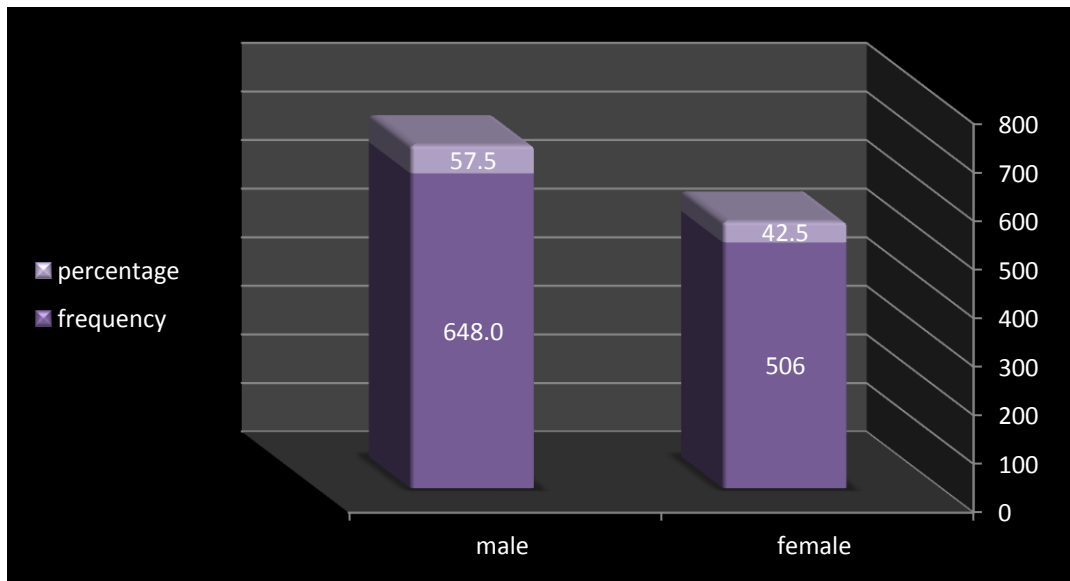Figure 1: Distribution of IMR according to its subtypes.

Figure 2: IMR according to sex shows that IMR were higher among males than females.

Winter and autumn at 2016 were the higher seasons of death, while Summer of 2017 register the highest death rate among infants of Thi-Qar as shown in figure 3.
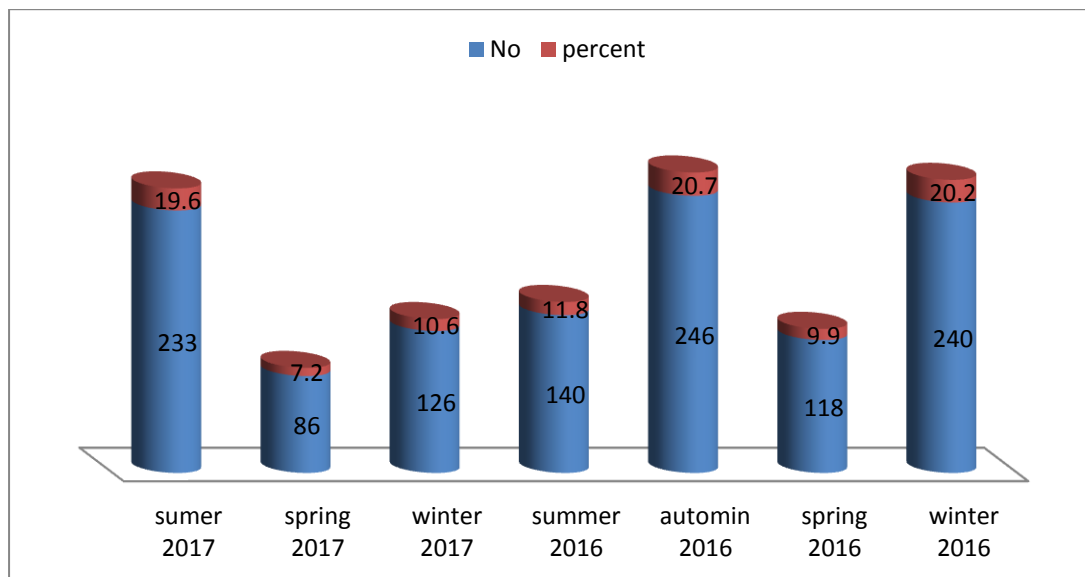
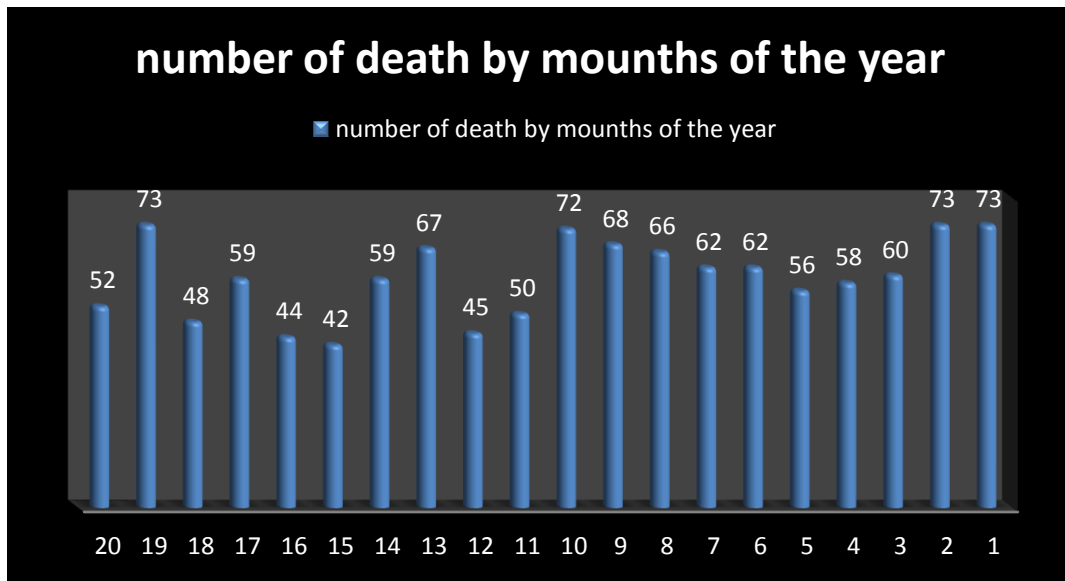

Figure 3: Seasonal trends of IMR at 2016and 2017

According to the 20th months of the study; January, February and October of 2016 were the highest months of IM registration, while the July of 2017 was the highest month of death for the infants.

Figure 4:IMR according to the 20thmonths of the study; started from January 2016 (1) till august 2017 (20). The arranged months according to their ordinal arrangement.

There was no significant statistical association between the death number and percentages and the day of death regarding their ordinal distribution within the week. As shown in figure 5.
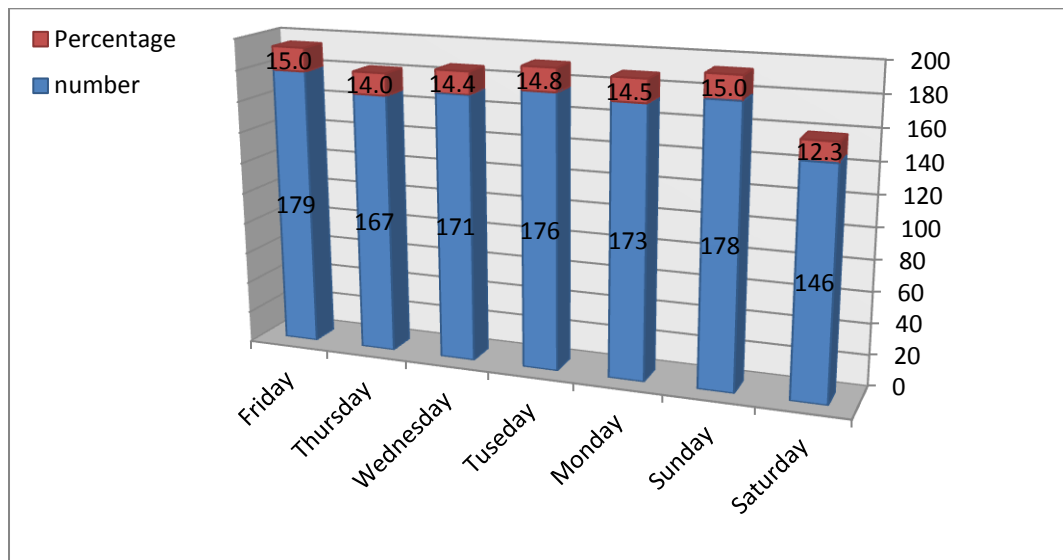

Figure 5: IMR according to the days of week

There was significant statistical association between address of died infants age.
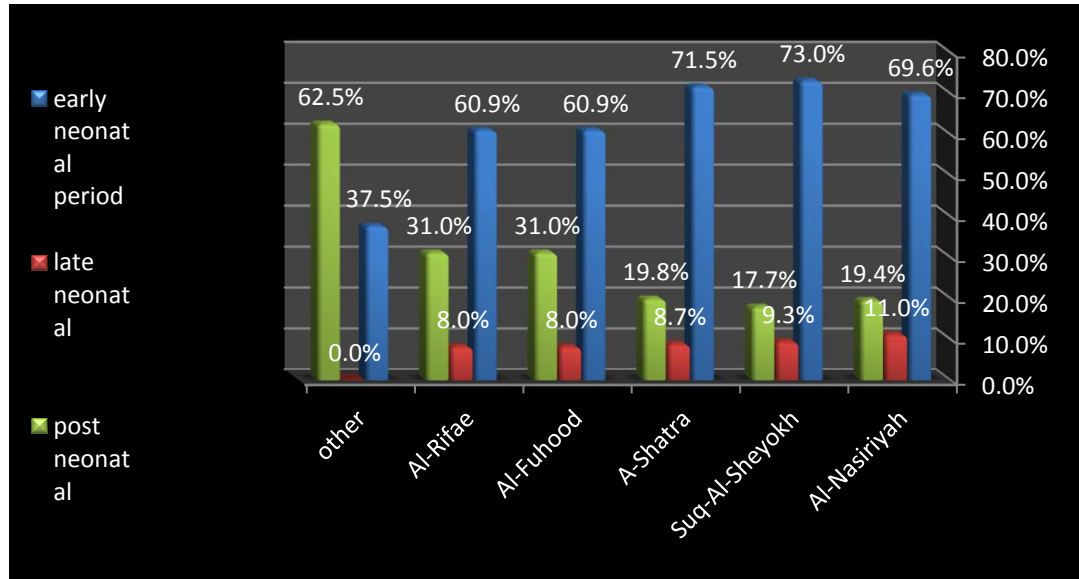

Figure 6: IMR ants subtype according to place of residence of died infant.

$$X^2= 24.889, P value=0.05$$

Table 1: sex distribution of studied infantile deaths according to their residence and days of death

Address	Sex (N,%)		Total	X^2
	Female	Male		P value
Nassiriyah	220, 41.8%	306, 58.2%	526	
Suq-Al_Sheyokh	108, 43.5%	140, 56.5%	248	2.925
AL-Shatra	104, 41.1%	149, 58.9%	253	0.815
Al-Fohood	28, 41.8%	39, 58.2%	67	
AlRifae	43, 49.4%	44, 50.6%	87	
Others	3, 37.5%	5, 62.5%	8	
	Days of week			
Sunday	80, 44.9%	98, 55.1%	178	
Monday	76, 44.2%	96, 55.8%	172	8.452
Tuesday	70, 39.8%	106, 60.2%	176	.0.329
Wednesday	60, 35.1%	111, 64.9%	171	
Thursday	70, 41.9%	98, 58.2%	168	
Friday	82, 46.1%	96, 53.9%	178	
Saturday	68, 46.6%	78, 53.4%	146	
Total	506, 42.5%	684, 57.5%	1190	

This table(1), shows no significant statistical association between sex distribution and place of residence of died infants, and also no sex difference regarding the days of weeks at which the infants died.

Figure (7) showing the cause specific mortality rate of infants death according to the known causes of death; where the respiratory causes constituting the highest rate fallowed by septicemia and then congenital anomalies, while the well-known infectious diseases and endocrine diseases representing the lesser cause specific fatality rate
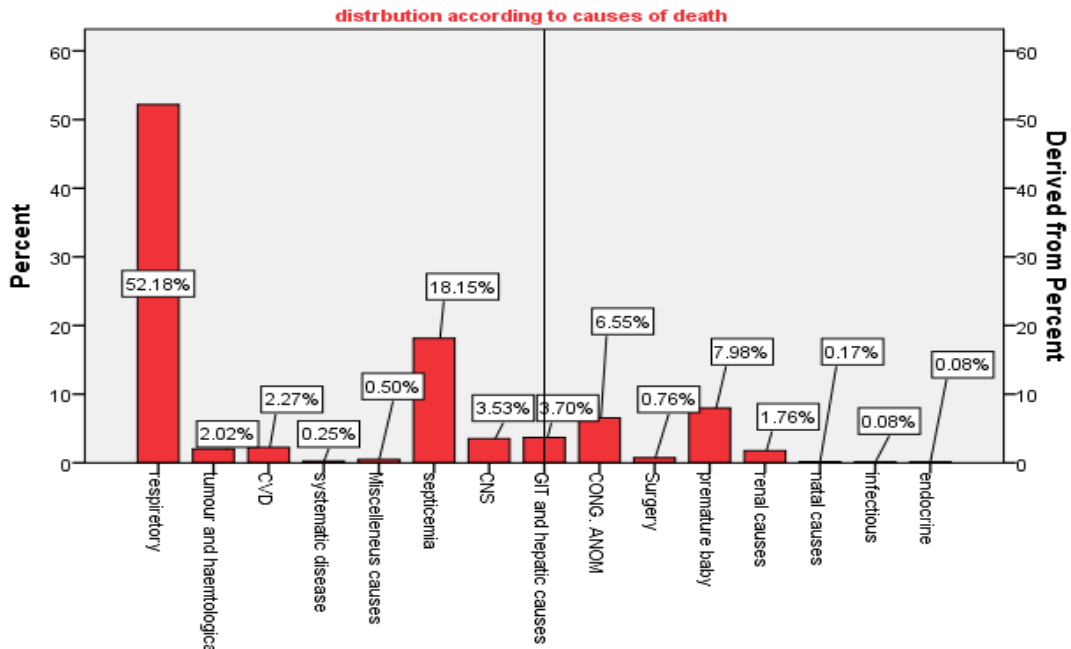

Figure 7: the IMR according to the causes of death

Table 2:Relationship Between Age, Sex and Causes of Death

Causes of death	Age			Sex		Total
	early neonatal period	late neonatal	post neonatal	Female	Male	
Respiratory causes	541, 87.1%	36, 5.8%	44, 7.1%	256, 41.2%	365, 58.8%	621, 100.%
Tumor &haemto.	4, 16.7%	1, 4.2%	19, 79.2%	8, 33.3%	16, 66.7%	24, 100.%
CVD causes	3, 11.1%	2, 7.4%	22, 81.5%	18, 66.7%	9, 33.3%	27, 100.%
systematic dis.	0, 0.0%	0, 0.0%	3, 100.0%	3, 100.0%	0, 0.0%	3, 100.%
Miscellaneous	1, 16.7%	0, 0.0%	5, 83.3%	3, 50.0%	3, 50.0%	6, 100.%
Septicemia	112, 51.9%	52, 24.1%	52, 24.1%	99, 45.8%	117, 54.2%	216, 100.%
CNS causes	9, 21.4%	5, 11.9%	28, 66.7%	18, 42.9%	24, 57.1%	42, 100.%
GIT &hepatic	9, 20.5%	5, 11.4%	30, 68.2%	14, 31.8%	30, 68.2%	44, 100.%
Cong. anomalies	48, 61.5%	5, 6.4%	25, 32.1%	34, 43.6%	44, 56.4%	78, 100.%
Surgery causes	6, 66.7%	2, 22.2%	1, 11.1%	3, 33.3%	6, 66.7%	9, 100.%
Premature baby	83, 87.4%	5, 5.3%	7, 7.4%	39, 41.1%	56, 58.9%	95, 100.%
Renal causes	4, 19.0%	3, 14.3%	14, 66.7%	8, 38.1%	13, 61.9%	21, 100.%
Natal causes	2, 100.0%	0, 0.0%	0, 0.0%	2, 100.0%	0, 0.0%	2, 100.%
Total	822, 69.1%	116, 9.9%	250, 21.%	648,57.5%	506,42.5%	1188
Age association, Fisher's Exact Test	414.796	P=0.0001	Sex association Fisher's Exact Test		19.207	P =0.095

The table above show significant statistical association between age of death and causes of death, while the causes of death dosn't show such association.

Table 3: Seasonal Trend of IMR

Causes of death	Winter 2016	Spring 2016	Autumn 2016	Summer 2016	Winter 2017	Spring 2017	Summer 2017	Total
Respiratory causes	107, 17.2%	66, 10.6%	135, 21.7%	80, 12.9%	54, 8.7%	47, 7.6%	132, 21.3%	621, 100.%
Tumor &haemto. dis.	7, 29.2%	2, 8.3%	2, 8.3%	3, 12.5%	5, 20.8%	0, 0.0%	5, 20.8%	24, 100.%
CVD causes	8, 29.6%	1, 3.7%	4, 14.8%	3, 11.1%	5, 18.5%	1, 3.7%	5, 18.5%	27, 100.%
systematic dis.	0	0	0	0	0	1, 33.3%	2, 66.7%	3, 100.%
Miscellaneous causes	0	0	5, 83.3%	1, 16.7%	0	0	0	6, 100.%
Septicemia	44, 20.4%	17, 7.9%	39, 18.1%	22, 10.2%	35, 16.2%	20, 9.3%	39, 18.1%	216, 100.%
CNS causes	6, 14.3%	6, 14.3%	9, 21.4%	5, 11.9%	4, 9.5%	2, 4.8%	10, 23.8%	42, 100.%
GIT &hepatic	14, 31.8%	6, 13.6%	6, 13.6%	4, 9.1%	1, 2.3%	5, 11.4%	8, 18.2%	44, 100.%
Cong. anomalies	18, 23.1%	6, 7.7%	8, 10.3%	9, 11.5%	13, 16.7%	7, 9.0%	17, 21.8%	78, 100.%
Surgery causes	2, 22.2%	0	2, 22.2%	2, 22.2%	1, 11.1%	0	2, 22.2%	9, 100.%
Premature baby	28, 29.5%	11, 11.6%	34, 35.8%	10, 10.5%	4, 4.2%	2, 2.1%	6, 6.3%	95, 100.%
Renal causes	6, 28.6%	3, 14.3%	0	1, 4.8%	3, 14.3%	1, 4.8%	7, 33.3%	21, 100.%
Natal causes	1, 50.0%	0	0	0	1, 50.0%	0	0	2,
Total	241, 20.3%	118, 9.9%	246, 20.7%	140, 11.8%	126, 10.6%	86, 7.2%	233, 19.6%	1188, 100.0%
Fisher's Exact Test	126.712	P value=0.0001						

There was a highly significant statistical association between causes of death season of the year.

Table 4: IMR According to Address

Causes of death	Al-Nassiriyah	Suq-Al_Sheyokh	AL-Shatra	Al-Fohood	Al-Rifae	Other	Total
Respiratory	265, 42.7%	138,22.%	145, 23.3%	33, 5.3%	37, 6.0%	3, 0.5%	621
tumour and haemtological dis.	7,29.2%	4,16.7%	7,29.2%	4,16.7%	2,8.3%	0,0.0%	24
CVD	10,37.0%	4,14.8%	6,22.2%	4,14.8%	3,11.1%	0,0.0%	27
systematic disease	1,33.3%	0,0.0%	1,33.3%	0,0.0%	1,33.3%	0,0.0%	3
Miscelleneus causes	2,33.3%	0,0.0%	1,16.7%	0,0.0%	3,50.0%	0,0.0%	6
septicemia	116,53.7%	4822.2%	27,12.5%	9,4.2%	15,6.9%	1,0.5%	216
CNS	16,38.1%	7,16.7%	10,23.8%	4,9.5%	4,9.5%	1,2.4%	42
GIT and hepatic causes	17,38.6%	8,18.2%	7,15.9%	5,11.4%	6,13.6%	1,2.3%	44
CONG. ANOM	35,44.9%	8,10.3%	22,28.2%	3,3.8%	8,10.3%	2,2.6%	78
Surgery	5,55.6%	2,22.2%	1,11.1%	0,0.0%	1,11.1%	0,0.0%	9
premature baby	42,44.2%	23,24.2%	20,21.1%	3,3.2%	6,6.3%	0,0.0%	95
renal causes	7,33.3%	6,28.6%	5,23.8%	2,9.5%	1,4.8%	0,0.0%	21
Total	526,44.2%	248,20.8%	253,21.3%	67,5.6%	87, 7.3%	8, 0.7%	1188, 100.0%
Monte Carlo sig.(2 sided)=140.238							
P value=0.011							

Residence of died infant showing significant statistical association with the causes of death.

The statistical analysis doesn't show such association between causes of death and days of death (FE test value=165.405,p value= 0.277).

Regarding the comorbid conditions only 7 infants showing such character, so it was negligible by the investigator.

Discussion:

A cross sectional study had been extended all over 20 month to studying the time trend of infant mortality in thi- Qar that extended from January 2016 till end of August 2017, obstacle some problem such not all infantile death especially at post neonatal period had been registered at the place of the study, because of the presence of other hospitals had emergency and pediatric wards and death of such age group may occur within. other problem is that many death also occur before reaching to hospital; but the researcher expect that these 2 main problem not effecting on the predictions of the result because the post neonatal infant mortality constitute lesser proportion

of IMR, the second one we expect that the proportion of out of hospital death of no difference in the pattern of seasonal trend and causes of death.

Trend by age:

Death during neonatal life representing the majority of the death during infancy, that was (69%)during the early neonatal life, and about 10% were during late neonatal life, while only 21% was representing the post neonatal period death. These finding are comparable to other studies in different national regions(*16,17,18)*

Trend by sex:

Even though there was no significant statistical association, the infant mortality were higher among male than females, these finding also similar to other studies (15,19-21)

Mortality by season:

Winter and autumn at 2016 were the higher seasons of death, while Summer of 2017 register the highest death rate among infants of Thi-Qar, that surely differ from other studies(21-24)

This might be due to difference in individual susceptibility, and difference in the distribution of the causes of death according to different time of the year

This study show no significant difference in the mortality of infant 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 difference in the design of the study.

Address is also show no significant association with mortality rate of infants that may be due to the difference in the sub-classification of the address, where they classified them into urban and rural, and we classify according the districts of the governorate, who already composed of rural and urban.

Trend according to the causes of death:

The present study show that the respiratory causes constituting the highest rate fallowed by septicemia and then congenital anomalies, while the well-known infectious diseases and endocrine diseases representing the lesser cause specific fatality ratewhich differ **from** other studies (2,3,9,11,16-19) which might be due the difference with the extent of risk factor, extent of the diseases, individual characters and health care services efficacy.

Conclusions and recommendations:

1-Early neonatal life representing the highest proportion of death risk than other infantile life period. 2-Male having more mortality rate at age of less than 1 year of age. 3- days of weeks had no significant difference in occurrence of death among infants. 4- seasonal variation of death had been noticed. 5-respiratory causes and septicemia were th major killers. 6.age, place of residence and seasons had significant statistical association with cause of death.

Recommendations:

Well- constructed plane should be putted to overcoming the real determinants of IMR, specially modifiable agents with special emphasis on major causes of death. Promote health education strategies regarding the simple preventive control method involving social media and primary health care programs

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الاتجاهات الزمنية ومحددات وفيات الرضع في ذي قار
2016-2017

الأستاذ المساعد الدكتور علي جرن الجابري

الخلاصة :

الأساس المنطقي: تم حساب نسبة كبيرة من وفيات الأطفال من وفيات الولدان. ويعتبر معدل الوفيات خلال فترة الوليد مؤشرا مفيدا لكل من صحة الأم والوليد والرعاية الصحية

هدف الدراسة: هدفت هذه الدراسة إلى معرفة حجم وفيات الرضع وتقييم توزيعها ومعرفة المحددات الرئيسية لها

الموضوعات والطريقة: عبر دراسة الرصد المقطعية تمتد في جميع أنحاء العامين الماضيين. من كانون الثاني 2106 حتى نهاية أب 2017 في مستشفى بنت الهدى للأمومة وطب الأطفال – ذي قار-العراق، والتي من خلالها تم إدراج 1188 حالة وفاة، حيث العمر (حسب الأيام) والجنس وتاريخ الوفاة والعنوان، يوم الوفاه من أيام الأسبوع، الردهه، وقت الدخول إلى الداخل، سبب الوفاة وأخيرا الحالة المرضية. الترددات، والنسب المئوية، والأعداد، واختبار مربع مربع، ، واختبار الكاي مربع، واختبار الصيادين الدقيقين، واستخدم تحليل المتغيرات الاحاديه والتحليلات المتعددة من أجل الوصول إلى الأهداف المقترحة. قيمة الاحتمالية أقل من 0.05 تعتبر معنويه احصائيا.

النتائج: تضمنت الدراسة 1188 حالة وفاة بين الرضع، موزعة حسب العمر المبكر والحديث والمتأخر لحديثي الولادة (69٪، 10٪، 21٪) على التوالي، وكانت نسبة وفيات الرضع أعلى بين الذكور من الإناث. وكان الشتاء والخريف في عام 2016 أعلى مواسم الموت، في حين أن صيف 2017 سجل أعلى معدل وفيات بين الرضع،

لم يكن هناك ارتباط إحصائي معنوي بين عدد الوفيات والنسب المئوية و يوم الوفاة فيما يتعلق وفقا للأشهر العشرين من الدراسة؛ وكان يناير. (0.05 <p) بتوزيعها الترتيبي مع أيام الأسبوع وفبراير وتشرين الأول من عام 2016 أعلى أشهر تسجيل وفيات الرضع ، في حين أن يوليو من عام 2017 كان أعلى شهر وفاة للرضع، لم يكن هناك ارتباط إحصائي كبير بين توزيع الجنس ومكان إقامة الأطفال الرضع،

الاستنتاج: الحياة الوليدية المبكرة التي تمثل أعلى نسبة من خطر الوفاة من فترة حياة الطفل الأخرى، الذكور لديهم معدل وفيات أكثر في سن أقل من 1 سنة من العمر، لم يكن هناك فرق كبير في حدوث الوفاة بين الرضع حسب الأيام من الاسبوع وهذا يدرس اثر تعطيل الدوام على نسب الوفيات، والتغيرات الموسمية لها اثر كبير في الموت. وكانت الأسباب الجهاز التنفسي وتسمم الدم هي الرئيسية المشاركه في الوفاه. مكان الإقامة والمواسم له ارتباط إحصائي كبير