Under-five mortality rates in Basrah Governorate for the years 2012-2018

Hasanain M. Al-Ali[1], Asaad Q. AL-Yassen[2]

[1]Higher diploma in Community Medicine. Centre of Training and Human Development.
[2]Professor of Dermato-Epidemiology. University of Basrah, College of Medicine. Department of Family and Community Medicine

Abstract— **Objective:** To study under-five mortality trend and top killers in Basrah Governorate, Iraqfor 2012-2018. **Methods:** This is a descriptive, retrospective study implemented during the period from 15th of March 2020 to 30th of December2020 in Basrah Governorate to study under-five mortality ratestime trendfor the years 2012-2018included all under-five registered deaths. A sample of 1000 death certificates is taken to elicit neonates top ten killers. **Results:** In general, for targeted yearsunder-five mortality rateand infant mortality rate dramatically decreased while the neonatal mortality rate took slight decrease. Male under-five mortality ratewas more than female under-five mortality rate. Themajority of deaths occurredin hospital in comparison to house and other places.First killer diseasein neonates was newborn respiratory distress. **Conclusion:** Under-five mortality rates shows dramaticdecrease for2012-2018. Mainly in the neonatal period, the majority of deaths occurred in infanthood.

Key words: Under-five, mortality, top killers, Iraq, Basrah.

Introduction

Deathis an irreversible stoppage ofall operations of whole brain counting the brain stem.[1]Death reflects health care quality and level with collective effects of genetic, physical, social, environmental risk factors.[2]Under-five children constitute one fifth of worldwide population.The Sustainable Development Goal (SDG) 3.2 of United Nations aims to end preventable deaths of children by the year 2030.[3]

Dramatic international progression is made in reducing under-five mortalitybyone of 11 children is dying before reaching age of five yearsin the year 1990to one of 27 children is dying before reaching age of five years in the year 2019.[4]

The ranking of top ten death aetiology of under-fiveare different during time trend and place.[5,6]Death determinants are used by health institution globally viewed as indicators of mortality.[7]As an important index of present and prospective expectation of the population health status , the infant mortality is notably advantageous measure of health status[7]by giving comprehensive manner of maternal health counting primary health care services acceptability, accessibility, feasibility, and quality utilized by pregnant women and infants.[2]

The present study aimed to determine the under-five, infant and neonatal mortality rates and their common causes of deathin Basrah Governorate for the years 2012-2018.

Methodology

Basrah is the second biggest Iraqi governorate. It locates in the south of Iraq and it is the main and most dependable contributor of Iraqi economy via oil production and exportation besides it contains the Iraqi exclusive seaports.

A descriptive, retrospective study of death records for under-five childrenin Basrah for the years 2012-2018. Records were obtained from annual reports of Iraqi Ministry of Health for the years 2012-2017,[8]annual reports of deaths of Basrah Directorate of Health for the years 2012-2018.[6]and for eliciting neonatal mortality trend a convenient sample of 1000 death certificates were obtained from Biostatics Unit in Basrah Health Directoratefor the targeted years.

For the time trend study, all registered under-five deaths in Basrah for the years 2012-2018 will be used to achieve the best coverage as possible.Causes of deathdependprimarily on what is written in death certificate in which coding of death aetiologies is done according to the International Statistical Classification of Diseases and Related Health Problems the 10th version (ICD 10).[9, 10]Epidemiological rates in this study were calculated according to the following formulas:

1. **Neonatal mortality rate (NMR):** Number of deaths among childrenless than twenty eight days of age during a given time interval / Number of live births during the same time interval × 1000.[11]
2. **Infant mortality rate (IMR):**Number of deaths among childrenless than one year of age during a given time interval / Number of live births during the same time interval × 1000.[11]
3. **Under five mortality rate (U5MR):** Number of deaths among childrenless than five years of age during a given time interval / Number of live births during the same time interval × 1000.[11]
4. **Cause-Specific under-five mortality rate:** total number of deaths related to that cause during a given time interval / Number of live births during the same time interval × 1000.[11]

5. **The age-standardized death rate:** is a weighted mean of the age-specific mortality rates per (100, 000) persons, where the weights are the proportions of persons in the corresponding age groups of the (WHO) standard population.[12]Age-adjusting standardized death rate is produced to overcome crude death rate influencing by different age distribution in populations.[13]

The data of death were analyzed using statistical package forsocial sciences (SPSS) version 25. Data were presented using descriptive statistics in the form of frequencies and rates. Chi-square was used where appropriate to compare the proportions. P-value of less than 0.05 was considered statistically significant.

The official endorsements were issued from theCollege of Medicine at University of Basrah and Basrah General Directorate of Health.[4]

Results

Under-five mortality rate dramatically decreased with advancing years from 4,503 (32.1 per 1000 live births) in 2012 to 2,367 (24.6 per 1000live births) in 2018. In general,(IMR) showeddescending manner, withthe exception in 2015, we found that there is a slight increase in (IMR) of (24.8 per 1000 live births). (NMR)declined for the targeted years via relative increasefor the years 2012-2014followed by decrease to reach the least value in 2018 of (14.8 deaths per 1000 live births).
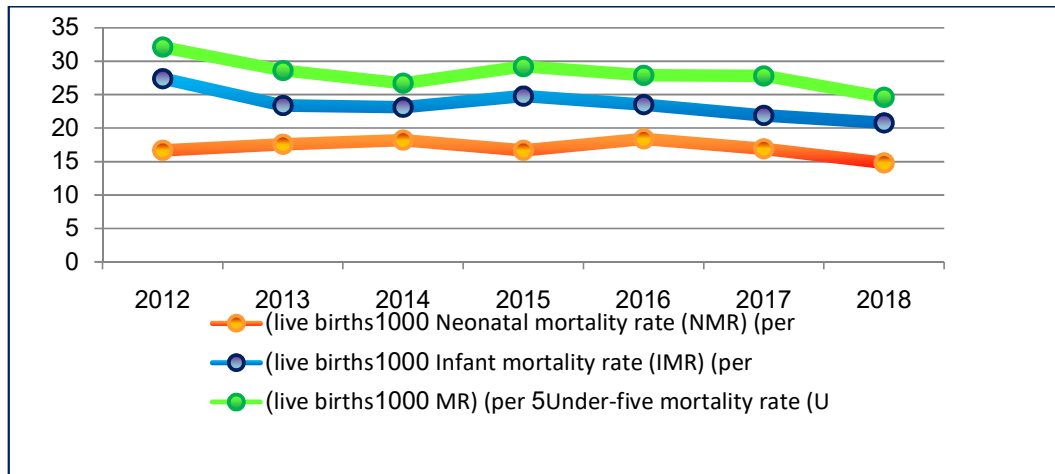
(Figure 1).

Figure (1) Under- five mortality rates for the years 2012-2018 in Basrah

Figure (2) showed a higher male-specific (U5MR) than female-specific (U5MR) in most studied years with the biggest difference registered in 2013 (P value 0.23).Both male and female (U5MR) showed descending manner with advancing years.
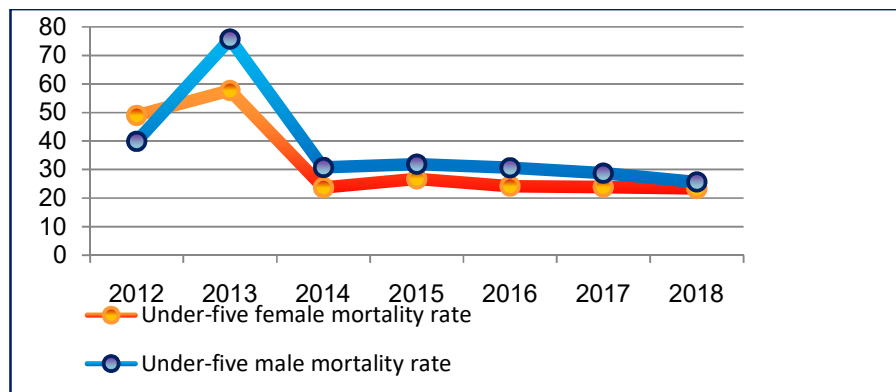

Figure (2) Gender specific under-five mortality ratesfor the years   2012-2018 in Basrah

Place-specific under-five mortality rates decreasedwith advancing years.In all targeted years,the majority of deaths were occurred in hospital more than deaths occurred at home and another placeconsequently.

Age-standardized death rate for all causesof under-five children in Basrahshowed dramaticdecreasesfrom (129.6per 100,000) in 2012 to (68.8per 100,000) in 2018 (P value 0.28).
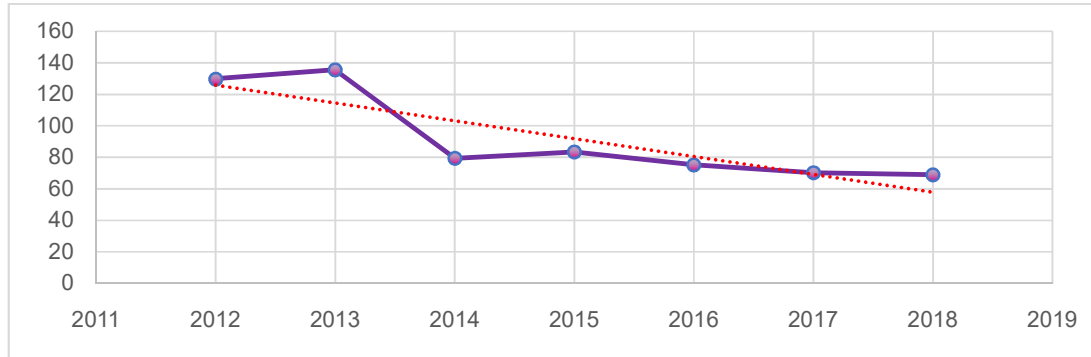
(Figure 3)

Figure (3) Age-standardized death rate of all causes per 100,000 of under-five children in Basrah
for the years 2012-2018

The first top killers for age group (≤ 1 year) were theperinatal disorders (O00-O99) for all targeted years with the exception of the year 2013 in whichthey wereCirculatory system disorders (I00-I99).

While in age group (2-4 years),the first top killers werenon-elsewhere classified disorders (R00-R99)with external causes (V01-Y98) (injuries, accidents, poisoning and other external stresses).

Ranking of top ten killer diseases in Basrah for under-fivediffers and fluctuates in rankingwith advancing years. In General, the sequence of first three top killers were Perinatal disorders   (O00-O99), Congenital and Chromosomal disorders (Q00-Q99) and Non elsewhere classified disorders (R00-R99).

(Table 1)

Table (1) Ranking of top ten killer diseases under-five for the years 2012-2018 in Basrah

Diseases Category	2012	2013	2014	2015	2016	2017	2018
Perinatal disorders (O00-O99)	1	2	1	1	1	1	1
Circulatory system (I00-I99)	2	1	6	6	6	6	6
Non elsewhere classified (R00-R99)	3	5	3	3	3	3	3
Infectious and parasitic (A00-B99)	4	3	4	4	10	4	4
External causes (V01-Y98)	5	7	10	10	5	10	10
Congenital and Chromosomal (Q00-Q99)	6	6	5	8	4	5	8
Neoplasms (C00-D48)	7	9	2	5	8	8	5
Respiratory system (J00-J99)	8	4	8	2	2	2	2
Genitourinary system (N00-N99)	9	8	7	7	7	7	7
Nervous system (G00-G99)	10	10	9 / 11	11	11	9	12
Endocrine (E00-E90)	11						
Digestive system (K00-K99)	12						

A sample of 1000 death certificates was obtained from the Biostatics Unit in Basrah Health Directoratefor the years 2012-2018 in order to elicit the top ten killers for neonates. It was revealed thattherespiratory distress of newborn (P22) was the first killer, (87%) of themoccurred in theearly neonatal period.

Discussion

The United Nations Sustainable Developmental Goal (SDG) number 3.2 plans to decrease global (U5MR) to (25 per 1000 live births) in 2030.[3] This was surpassed by dramatic decline in Basrah Governorate(U5MR) by reaching(24.6 per 1000 live births) in 2018 in the present study.

Two parallel household surveys were done by United Nations International Children´s Emergency Fund (UNICEF) for situational analysis of children and women in Iraqshowed that (U5MR) was (63

per 1000 live births) for the years 1986-1990 then a surge happened in 1991 (the second Gulf War) to be (118 per 1000 live births).[15,16]

A cross-sectional household survey was done to study causes and differentials of childhood mortality in Iraqin 1999showed that Iraq (U5MR) was (124.5 per 1000 live births) for the years 1990-1994.[17]

An observational, descriptive studyof Basrah Governoratemortality trend for the years 1978 and 2007 showed decline in (U5MR) by (41.9%).[7]

A rapid epidemiological survey for under-five mortality study was done in Mosul City (North of Iraq) in 2007 showed that (U5MR) was (107 per 1000 live births).[18]

An observational, descriptive studyof mortality trend was done in Erbil Governorate(Kurdistan region of Iraq) for the years 2007-2011 showed decline in (U5MR) by (22.7%).[19]The possible explanation is the relative stability and better health care service in Kurdistan region compared to other parts of Iraq.

A cross-sectional study of under-five mortality in Basrah Governorate was done in 2014 showed that (U5MR) was(24.5 per 1000 live births).[20]

The decline of (U5MR) was (23.4%) for the years 2012-2018 in the present study. This gives an indicationfor improvement of the health status in Basrah Governorate. The different (U5MR) may be due to differences in financial and human resources, health polices, infrastructures, health care services accessibility and socioeconomic development. [21,22]

In the present study, themajority of under- five death was occurringduringinfanthood perioddue to exposure of neonates to difficult preventive conditions such as congenital anomalies, preterm complications, sepsis, convulsions and other lethal diseases.[23]Routine programme of vaccinations against targeted infections with improvement of water supply lead to decrease deaths in older under-five children.[24]

Male (U5MR) was more than female (U5MR) by (6.8%) in Iraqfor the years 1994-1999,[17](14.7%) inBasrah Governoratein 2014,[20] and(13.2%) in Basrah in the present study.

In the present study, the majority of deaths were occurringin hospital because of neonatal deaths forming the most of under-five mortality and ill neonates remainingadmitted in hospitaldue to health problems seriousness in this period of life.

Under-five age-standardized death rate of all causeswas declined in Erbil city for the years 2007-2011 by (25.9%)[19]while in the present study, Basrah decreasesby (18%)for the years2012-2018.

InIraqthe external causes (V01-Y98) were the first top killers in (2-4 years) for the years 1994-1999.[17]This agrees with the present study. The possible reason may be the physical activity of children in this age makes them more exposed to injuries and accidents.

In the report issued by the Institute for Health Metrics and University of Washington in 2019,the top killers of under-five for the years 2012-2018 worldwide wereperinatal disorders and respiratory infections & Tuberculosis while inEast Mediterranean Regional Office of World Health Organization(EMRO) and Iraqwere perinatal disorders and enteric infections.[5]

InIraq, under- five mortality were due to illnesses of childhood constituted (81%), sudden death (9%) and accidents (3.3%)for the years 1994-1999.[17]

A study was done inMosul in 2007showed thattop under-five mortalitykillers were respiratory diseases (26%), congenital disorders (15.5%) and diarrhoeal diseases (8.6%).[18]

A cross-sectional study of under-five mortality in the Khuzestan area in Iran (the neighboring governorate to Basrah)for the years 2011-2015 showed that Prematurity and congenital anomalies represented (46%) of all causes of under-five mortality.[25]

In the present study, the top killers for under-five wereperinatal disorders and congenital & chromosomal disorders.

A comparison between the observational, descriptive study of Basrah Governoratemortality trend for the years 1978 ,2007[7] and the present study in the year 2018revealed thatdisorders of perinatal disorders (O00-O99) were in the first rank of all of these three years. The second rank was occupied by Infectious and parasitic diseases (A00-B99) in both 1978 and 2007 whilein 2018 it was occupied byCongenital andChromosomal disorders (Q00-Q99).(IMR)in Basrah showeddescending manner of (34 per 1000 live births) in 1978, (21 per 1000 live births) in 2007 and(19.7 per 1000 live births) in 2018.

In conclusion, generally there is a dramatic decrease of under-five mortality rates for the years 2012-2018with the majority of deaths occurred in infanthood mainly in the neonatal period.

The present study recommends to improve antenatal care, birth facilities and neonatal health care with prioritization of health sources toward neonatal health problems.

References

[1] William C, Shiel Jr.Medical Definition of Death. MedicineNet. https://www.medicinenet.com/script/main/art.asp?articlekey=33438. Cited September 2020.

[2] Habib OS. Basic Concepts and Methods in Epidemiology and Demography for Medical Students. First edition . Basrah. 2009.

[3] Burstein R, Henry N.J, Collison M.L,Marczak L.B,Sligar A,Watson S, et.al. Mapping 123 million neonatal, infant and child deaths between 2000 and 2017. Nature. 2019; 574(7778): 353–358. Published online 2019 Oct 16. doi: 10.1038/s41586-019-1545-0. Cited December 2020.

[4] World health organization. Children: improving survival and well-being. Key facts. Online version. 8 September 2020. https://www.who.int/en/news-room/fact-sheets/detail/children-reducing-mortality . Cited December 2020.

[5] Global Burden of disease (GBD) Compare. Institute for Health Metrics and Evaluation. Seatle. U.S.A. 2019. https://vizhub.healthdata.org/gbd-compare/. Cited December 2020.

[6] Republic of Iraq. Ministry of Health.Basrah health directorate. planning department. Biostatistics unit. Epi-info statistical reports (2012—2018). Cited February 2020.

[7] Sadek H, Ajeel N. Age-standardized mortality rates by cause in Basra, Iraq: 1978 and 2007. East Mediterr Health J. 2012;18(10):1049-54. https://applications.emro.who.int/emhj/v18/10/2012_18_10_1049_1054.pdf. cited September 2020.

[8] Republic of Iraq. Ministry of Health.Directorate of planning and resources development. Annual reports from (2012) to (2017) .

[9] http://www.moh-planning.com/ . Cited December 2020.

[10] Republic of Iraq. Ministry of Health.International Statistical Classification of Diseases and Related Health Problems Tenth Revision. Volume 1. 2003. http://www.moh-planning.com/pdf/first%20part.pdf. Cited April 2019

[11] Republic of Iraq. Ministry of Health.Guidelines for filling and encoding of birth, dead birth, and death Certificates. 2016. http://www.moh-planning.com/pdf/dalel%20ahsa.pdf. Cited April 2019.

[12] Centers for disease control and prevention (CDC). Principles of Epidemiology in public health practice. An introduction to applied Epidemiology and Biostatistics. Third edition. 2012 http://www.cdc.gov/csels/dsepd/ss1978/. Cited September 2020.

[13] Ahmad OB, Boschi-Pinto C, Lopez A, Murray CJL, Lozano R and Inoue M. Age Standardization of rates R: A new WHO standard. GPE Discussion Paper Series: No.31 . World Health Organization 2001. https://www.who.int/healthinfo/paper31.pdf .Cited September 2020.

[14] Age-standardized mortality rate (per 100000 population).World health data platform. GHO. Indicator meta data registry list. Global health observatory. World Health Organization.2020. https://www.who.int/data/gho/indicator-metadata-registry/imr-details/78 .Cited September 2020

[15] Republic of Iraq. Ministry of Health. The Code of Ethics in Research. 2018. https://www.moh.gov.iq/upload/upfile/ar/886.pdf. Cited April 2019.

[16] UNICEF. Situation Analysis of Children and Women In Iraq. UNICEF/Iraq Report; 1998. https://nointervention.com/archive/UN/Iraq/UNICEF/Iraq_sa-1998.pdf. Cited January 2021

[17] Ali M, Blacker J and Jones G. Annual mortality rates and excess deaths of children under five in Iraq, 1991-98. World Health Organization, London School of Hygiene and Tropical Medicine, UNICEF report ; 2003. https://www.researchgate.net/publication/10638874_Annual_morality_rates_and_excell_deaths_of_children_under_five_in_Iraq_1991-98 . Cited January 2021.

[18] Awqati N.A, Ali M.M, Al-Ward N.J, Majeed F.A, Salman K, Al-Alak M. and Al-Gasseer N. Causes and differentials of childhood mortality in Iraq. BMC Pediatrics. 2009; 9: 40. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2714513/ . Cited January 2021.

[19] Al-Zubeer A.A. Childhood mortality in Mosul city during the year 2007. Annals of the College of Medicine. Mosul 2009; 35(1): 1-7.
https://mmed.mosuljournals.com/article_8892.html. Cited January 2021

[20] Zangana A, Al-Banna H. and Al-Hadithi T. Mortality trends in Erbil, Iraq, 2007–2011.World Health Organization (WHO) 2019.EMHJ – Vol. 25 No. 5 – 2019.
https://applications.emro.who.int/emhj/v25/05/EMHJ_2019_25_05_315_321.pdf . Cited January 2020.

[21] Alwan Z.A, Al-Mussawy M.M, Mohammed A.A. A study of mortality among under-five children in Basrah-2014International Journal of Medicine and Pharmaceutical Science (IJMPS) ISSN (P): 2250-0049; ISSN (E): 2321-0095 Vol. 9, Issue 4, Aug 2019, 7-22.
http://www.tjprc.org/publishpapers/2-51-1561525637-2.IJMPSAUG20192.pdf . Cited December 2020.

[22] Bishai DM, Cohen R, Alfonso NY,Adam T,Kuruvilla S and SchweitzerJ. Factors contributing to maternal and child mortality reductions in 146 low- and middle-income countries between 1990 and 2010. PLOS ONE. 2016;11:e0144908.
https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4718632/ .Cited December 2020.

[23] Marmot M. Social determinants of healthinequalities. Lancet. 2005;365:1099–1104.
https://pubmed.ncbi.nlm.nih.gov/15781105/ .Cited December 2020.

[24] Pasha O,McClure EM, Wright LL, Saleem S, Goudar SS, Chomba E, et al. A combined community- and facility-based approach to improve pregnancy outcomes in low-resource settings: a Global Network cluster randomized trial. BMC Med. 2013;11:215.
https://pubmed.ncbi.nlm.nih.gov/24090370/ . Cited December 2020.

[25] Roth G.A, Abate D, Abate K.H, Abay S.M, Abbafati C, Abbasi N, etal.GBD 2017 Causes of Death Collaborators Global, regional, and national age-sex-specific mortality for 282 causes of death in 195 countries and territories, 1980–2017: a systematic analysis for the Global Burden of Disease Study 2017. Lancet. 2018;392:1736–1788.
https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6227606/ . Cited December. 2020.

[26] Anafcheh T, Doust M.Y, Mojadam M, Mirkazemi R, Khafaie M.A. Temporal and spatial distribution of under-five mortality and factors associated with multiple cases of under-five deaths within a family in the rural area of Khuzestan, Southern Iran. Scientific reports. Nature research. PMC6298982. 2018; 8: 17930.
https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6298982/. Cited December 2020.