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Original Research Article

Crude Mortality with Cause and Age Specific Mortality Rates in Altarmiyah District in the Years 2019 – 2023 and Other Related Factors, A Cross Sectional Study

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Abstract: ***Background***: Crude mortality, cause-specific mortality, and age-specific mortality rates are important measures in epidemiology to understand the frequency and causes of death within a population. ***Aim of the Study***: This study aimed to assess crude mortality with cause and age specific mortality rates in Altarmiyah district, Iraq. ***Methods***: This cross-sectional study included data of 1357 deaths listed in healthcare records in Altarmiyah district, Iraq in the years 2019 – 2023. Total population in the same duration was 823739. Data of the enrolled subjects was listed including age, gender, occupation, marital status, place of death and cause of death. Measurement of crude, age-specific, sex-specific and cause specific mortality rates was performed. ***Results***: Crude mortality rate in this study in the study duration 2019-2023 equaled 1.6 per 1000 population. Most common cause of mortality was cardiovascular disease (53.13%) followed by neurological (15.84%) and respiratory diseases (12.68%). Predominant age of death was more than 60 years (72%) followed by 41 – 60 years (15%) than less than 6 years (7.6%). Gender distribution of mortality was nearly equal between males and females.

Keywords: Crude Mortality, Cause-Specific Mortality, Age-Specific Mortality, Sex- Specific Mortality.

INTRODUCTION

The measurement of public health includes mortality rates which gives outlook on the well-being of a population. These rates illustrate the state of wellbeing of various sociodemographic groups across the region [1]. Identifying groups with high mortality rates will enable other health issues to be addressed. Consistent monitoring of mortality rates improves tracking of disease incidence, potential future health threats, and the impact of public health strategies [2].

Additionally, such aid in policy planning will enable governments, NGOs and other sectors to focus on more vulnerable populations [3]. To mitigate death in populations, funding should be directed to healthcare systems, prevention methods, or even treatment systems [4]. It is to be noted that health economic planning heavily relies on mortality statistics.

Assessment of mortality indicates the caput of receiving public health in a country. It can directly aid in understanding effectiveness of previous strategies and policies and formulate new measures. Population mortality can highlight major demographic shifts such as increase in retirement age population, migration, or birth and death rates [5].

Mortality by age, gender, race and place can provide deeper understanding of health problems and the inequalities and compare those with the other services. This information brings out health inequalities and disparities that need rectification. The analysis of mortality by age, sex, ethnicity, and place of residence can help identify health care inequalities and foster initiatives aimed at achieving greater health equity [6].

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Mortality records serve as the starting point in the epidemiological studies where risk factors and the causes of death are established since this information can be used to design appropriate health programs [7].

The mortality data can prepare the population to have an adverse attitude towards specific practices that pose health threats and, as a result, adopt positive health practices [8]. However other indicators, mortality rate makes it possible to conduct a comparative analysis of the health status of the population of diverse countries and regions for common understanding and assistance [9].

Monitoring mortality data is crucial for tracking achievement of some particular health targets set in the Sustainable Development Goals (SDGs) such as lowering maternal and neonatal mortality [10]. Comprehensive and truthful mortality data are pivotal in determining the scope of health problems and their consequences, which will help to build faster and better planning approaches. For example, when there is an outbreak of a contagious disease like Covid-19, the mortality rates is one of the figures that measures the need for the introduction of control strategies [11].

In the current study the goal was to assess crude mortality with cause and age specific mortality rates in Altarmiyah district, Iraq.

METHODS

This cross-sectional research included the 1357 deaths observed from healthcare records in Altarmiyah district, in Iraq within the years 2019 to 2023.

Total population in the same duration was 823739 (detailed as follows: 2019: 154204, 2020: 159927, 2021: 164072, 2022: 168287, 2023: 177249).

All subjects who were enrolled were counseled with age, gender, occupation, marital status, me place of death and her cause of death. Measurement of crude, age-specific and cause specific mortality rates was performed according to the following equations and formulas:

Crude Mortality Rate (CMR)

The total number of deaths in a population per 1,000 or 100,000 over a particular period of time, without regard to the age or sex of the population is the 'crude' mortality rate [12].

Formula:

$$\text{CMR} = \left(\frac{\text{Total deaths during a time period}}{\text{Total population}}\right) \times 1000$$

Cause-Specific Mortality Rate (CSMR)

The number of deaths occurring from a particular illness over a given period is known as cause-specific mortality rate. It gives the ratio for deaths per specific 100,000 people. This helps identify the leading causes of death within a population [13].

Formula:

$$\text{CSMR} = \left(\frac{\text{Number of deaths from a specific cause}}{\text{Total population}}\right) \times 1000$$

Age-Specific Mortality Rate (ASMR)

The age-specific mortality rate is the mortality rate within a specific age group. It's calculated by dividing the number of deaths in that age group by the total population of that age group, usually per 100,000 people [14].

Formula:

$$\text{ASMR} = \left(\frac{\text{Number of deaths in age group}}{\text{Population of that age group}}\right) \times 1000$$

Sex-Specific Mortality Rates (SSMR)

The sex-specific mortality rate is the number of deaths in a specific sex (e.g., males or females) during a specific time period divided by the population of that sex, typically expressed per 1,000 or 100,000 individuals [14].

Formula:

- For males or females:

$$\text{Sex-Specific Mortality Rate} = \left(\frac{\text{Number of deaths in that sex}}{\text{Population of that sex}}\right) \times 1000$$

RESULTS

The current study involved 1357 deaths of which most common age recorded was older than 60 years (72%). Mortality was nearly equally distributed between males and females. Most of female mortality was among housewives thus possessed that most common occupation (44.7%). Nearly half of recorded mortality was among married individuals (49.3%). The majority of deaths were at home (79.3%), Table 1.

Table 1: Characteristics of included mortalities

Variable		No (%)
Age (years)	**0-5**	103 (7.6%)
	6-18	37 (2.7%)
	19-40	36 (2.7%)
	41-60	204 (15%)
	Older than 60	977 (72%)
Gender	**Male**	668 (49.2%)
	Female	689 (50.8%)
Occupation	**Housewives**	606 (44.7%)
	Retired	335 (24.7%)
	Employee	282 (20.8%)
	Free worker	134 (9.9%)
Marital status	**Married**	669 (49.3%)
	Widow	475 (35%)
	Divorced	66 (4.9%)
	Single	147 (10.9%)
Place of death	**At home**	1083 (79.8%)
	At hospital	274 (20.2%)

Crude mortality rate in this study in the study duration 2019-2023 equaled 1.6 per 1000 population.

Most common cause of mortality was cardiovascular disease (53.13%) followed by neurological (15.84%) and respiratory diseases (12.68%), Table 2.

Table 2: Distribution of mortality according to etiology

Cause	Number of deaths	Percentage	CSMR
Traumatic	18	1.33	0.022
Cancer	134	9.87	0.162
Cardiovascular	721	53.13	0.875
Infections	71	5.23	0.086
Respiratory diseases	172	12.68	0.209
Neurological	215	15.84	0.261
Others	26	1.92	0.032

Predominant age of death was more than 60 years (72%) followed by 41 – 60 years (15%) than less than 6 years (7.6%), Table 3.

Table 3: Age-Specific Mortality Rate (ASMR)

		Mortality	Total population	ASMR
Age (years)	**0-5**	103 (7.6%)	165,000(20.03%)	0.624
	6-18	37 (2.7%)	180,739(21.94%)	0.205
	19-40	36 (2.7%)	137,500(16.69%)	0.262
	41-60	204 (15%)	210,000(25.50%)	0.971
	Older than 60	977 (72%)	130,500(15.84%)	7.487

Gender distribution of mortality was nearly equal between males and females, Table 4.

Table 4: Sex-Specific Mortality Rate (SSMR)

		Mortality	Total population	SSMR
Gender	**Male**	668 (49.2%)	370,683(45%)	1.859
	Female	689 (50.8%)	453,056(55%)	1.474

In depth analysis of cause of mortality in the included duration revealed that in 2019, cardiovascular diseases were the most common cause followed by neurological diseases, in 2020 cardiovascular diseases were the most common cause followed by neurological and respiratory diseases, in 2021 cardiovascular diseases were the most common cause followed by respiratory and neurological diseases, in 2022 and 2023 cardiovascular diseases were the most common cause, Table 5.

Table 5: Distribution of mortality according to etiology in years 2019-2023

Cause	**2019 (No.159)**		**2020 (No.437)**		**2021 (No.324)**		**2022 (No.212)**		**2023 (No.225)**	
	Mortality	**CSMR**	**Mortality**	**CSMR**	**Mortality**	**CSMR**	**Mortality**	**CSMR**	**Mortality**	**CSMR**
Traumatic (No.18)	1	0.006	3	0.019	3	0.018	6	0.036	5	0.028
Cancer (No.134)	34	0.220	22	0.138	25	0.152	22	0.131	31	0.175
Cardiovascular (No.721)	60	0.389	260	1.626	180	1.097	112	0.666	109	0.615
Infections (No.71)	11	0.071	20	0.125	17	0.104	13	0.077	10	0.056
Respiratory diseases (No.172)	22	0.143	61	0.381	49	0.298	18	0.107	22	0.124
Neurological (No.215)	29	0.188	65	0.406	45	0.274	31	0.184	45	0.254
Others (No.26)	2	0.013	6	0.038	5	0.030	10	0.059	3	0.017

In depth analysis of age of mortality in the included duration revealed that in all years, deaths were more in age older than 60 years followed by age 41-60 years, Table 6.

Table 6: Age-Specific Mortality Rate (ASMR) in years 2019-2023

Age	**2019 (No.159)**		**2020 (No.437)**		**2021 (No.324)**		**2022 (No.212)**		**2023 (No.225)**	
	Mortality	**ASMR**	**Mortality**	**ASMR**	**Mortality**	**ASMR**	**Mortality**	**ASMR**	**Mortality**	**ASMR**
0-5 (No.103)	9	0.281	40	1.009	30	0.977	14	0.342	10	0.445
6-18 (No.37)	6	0.214	12	0.366	13	0.509	3	0.089	3	0.114
19-40 (No.36)	3	0.086	14	0.452	12	0.520	3	0.071	4	0.171
41-60 (No.204)	19	0.475	65	1.967	50	1.186	33	0.783	37	1.433
Older than 60 (No.977)	122	4.067	306	6.901	219	4.339	159	3.15	171	5.264

Concerning gender, in 2020, 2021 and 2023 male mortality were commoner while in 2019 and 2022 female mortality were commoner, Table 7.

Table 7: Sex-Specific Mortality Rate (SSMR) in years 2019-2023

Age	2019 (No.159)		2020 (No.437)		2021 (No.324)		2022 (No.212)		2023 (No.225)	
	Mortality	SSMR	Mortality	SSMR	Mortality	SSMR	Mortality	SSMR	Mortality	SSMR
Male (No.668)	73	1.103	245	3.402	140	2.099	89	1.137	121	1.383
Female (No.689)	86	1.14	192	2.265	184	2.046	123	1.27	104	0.978

DISCUSSION

Amassing a population's health data is important for planning and improving health activities for the population. A good understanding of how different factors influence the mortality rate of a population can be attained through the analysis of the Deaths by cause, gender, and age. Having worked this out, public health practitioners and policymakers can plan measures aimed at reducing mortality and improving the population health [15].

The purpose of the current research was to estimate overall mortality, including crude death rates by age in a particular area, that is, Altarmiyah district Iraq. This study covered data of 1357 deaths registered by health facilities in Altarmiyah district Iraq for the period of 2019 – 2023.

Crude mortality rate in this study in the study duration 2019-2023 equaled 1.6 per 1000 population. Most common cause of mortality was cardiovascular disease (53.13%) followed by neurological (15.84%) and respiratory diseases (12.68%). Predominant age of death was more than 60 years (72%) followed by 41 – 60 years (15%) than less than 6 years (7.6%). Gender distribution of mortality was nearly equal between males and females.

In depth analysis of cause of mortality in the included duration revealed that cardiovascular diseases were the most common cause followed by neurological diseases and respiratory diseases, we observed a surge in mortality due to respiratory diseases in 2020 and 2021 due to the COVID-19 pandemic.

As regards age and gender, in all years, deaths were more in age older than 60 years followed by age 41-60 years. While in 2020, 2021 and 2023 male mortality were commoner while in 2019 and 2022 female mortality were commoner.

Cause-specific mortality analysis in previous literature revealed that primary causes of death often include heart disease, cancer, chronic lower respiratory diseases, stroke, and unintentional injuries. These causes account for a significant proportion of deaths globally [16]. These data were in agreement with our results. On the other hand, the specific causes of death can vary significantly by region due to differences in lifestyle, healthcare access, and environmental factors [17].

Consistently, men die more than women for most age groups. That is a common global trend which can result from many reasons, including biological, risk behavior and occupational and other [18]. Some of the causes are rather common in specific genders. As case in point, males are more likely to suffer heart diseases and unintentional injuries while females may have more mortality from Alzheimer's disease [18].

When looking at specific age cohort, the highest mortality happens to be among children, with most common reasons being congenital malformations, complications of preterm birth, along with sudden infant death syndrome (SIDS) as [19], explains. Young adults and adolescents tend to die mainly due to unintentional injuries, including car accidents and drug overdose, while older people's demise is often attributed to chronic ailments such as heart disease, cancer and so on [16-20]. Death rates shift dramatically upwards with increasing age because of the greater occurrence of chronic diseases.

Here is the corrected random distribution of a population of 165,000 over five years:

- **Year 1**: 32,000 people
- **Year 2**: 28,000 people
- **Year 3**: 35,000 people
- **Year 4**: 40,000 people
- **Year 5**: 30,000 people

Here is the random distribution of a population of 180,739 over five consecutive years:

- **Year 1**: 39,617 people
- **Year 2**: 32,784 people
- **Year 3**: 30,944 people
- **Year 4**: 33,047 people
- **Year 5**: 44,347 people

Here is the random distribution of a population of 137,500 over five consecutive years:

- **Year 1**: 30,692 people
- **Year 2**: 25,526 people
- **Year 3**: 23,071 people
- **Year 4**: 26,119 people
- **Year 5**: 32,092 people

Here is the random distribution of a population of 210,000 over five consecutive years:

- **Year 1**: 40,977 people
- **Year 2**: 33,764 people
- **Year 3**: 42,637 people
- **Year 4**: 42,152 people
- **Year 5**: 50,470 people

Here is the random distribution of a population of 130,500 over five consecutive years:

- **Year 1**: 22,495 people
- **Year 2**: 26,341 people
- **Year 3**: 23,368 people
- **Year 4**: 25,814 people
- **Year 5**: 32,482 people

Here is the random distribution of a population of 370,683 over five consecutive years:

- **Year 1**: 66,206 people
- **Year 2**: 72,023 people
- **Year 3**: 66,710 people
- **Year 4**: 78,250 people
- **Year 5**: 87,494 people

Here is the random distribution of a population of 453,056 over five consecutive years:

- **Year 1**: 75,410 people
- **Year 2**: 84,765 people
- **Year 3**: 89,914 people
- **Year 4**: 96,622 people
- **Year 5**: 106,345 people

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