World Health Organization
occupied Palestinian territory

Ministry of Health

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The Palestinian National Institute of Public Health

Cause of Death Quality Assessment for the Mortality Data Registry in Palestine 2021

using

ANACoD3
ANALYSING MORTALITY AND OF CAUSE OF DEATH 3

Acknowledgments

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Abbreviations

ANACoD3 Analysis of Cause of Death 3

ANACONDA Analysis of Causes of National Deaths for Action

ASDR Age-specific Death Rate (same as ASMR)

ASMR Age-specific Mortality Rate (same as ASDR)

CDR Crude Death Rate

CRVS Civil Registration Vital Statistics

GBD Global Burden of Disease

HIS Health Information System

ICD International Statistical Classification of Diseases and Related Health Conditions

IMR Infant Mortality Rate

MCCD Medical Certificate of Cause of Death

PCBS Palestinian Central Bureau of Statistics

PHIC Palestinian Health Information Center

U5MR Under-5 mortality rate

UNPD United Nations Population Division

UNRWA The United Nations Relief and Works Agency for Palestine Refugees

WHO World Health Organization

Summary

This report assesses the quality of cause of death registry data for the West Bank and Gaza Strip for 2021 using the ANACoD3 software tool. The results are intended to enhance the value and usability of these data for informing health policies and programs.

The data comprise 17,354 reported deaths, 10,137 of them in the West Bank and 7,217 in the Gaza Strip. Along with a variety of demographic and epidemiological indicators like sex- and age-specific mortality rates, crude death rates, life expectancy at birth, causes of death distributed by the Global Burden of Disease categories, leading causes of death, and the proportion of ill-defined causes of death, this report also reveals indicators that point to potential data quality issues. Additionally, a thorough examination of the external causes of mortality was conducted for ICD-10 data. To maximize the value and usefulness of these health data for use in building health policies and programs, this analysis identifies data quality concerns that need to be addressed. Table 1 below summarizes the key findings and suggestions for recommended actions. Findings from the West Bank and Gaza Strip indicate that action is needed to improve the quality of cause of death data by enhancing completeness and the usability index, and reducing the number of ill-defined causes of death by ICD chapter, and the frequency of specific ill-defined codes in death data.

Table 1. Summary of Key Findings, Palestine 2021

Review Component	Comments	Status
Population Profile	Results consistent with expectations and country context.	No action needed
Mortality Profile	Palestine death patterns showed an exponential increase in deaths due to communicable diseases associated with the Covid-19 pandemic.	No action needed
Completeness of Death Reporting	The completeness of death reporting in Palestine was 86.77%: 86.8% in West Bank data and 86.68% in Gaza.	Data improvement required, including improving workflow, and the revision and adoption of modified standard operating procedures (SOPs) to achieve 100% completeness.
Usability Index	86.3% of the West Bank and 74.1% of Gaza Strip reported underlying causes of death that are considered usable codes.	Data improvement required. Action is needed to improve the quality of cause of death reporting (e.g. strengthen the role of death focal points and investment in them).
ICD codes not to be used for underlying cause of death	Eleven codes in West Bank and 456 codes in Gaza death data should not be used for the underlying cause of death as they reflect morbidity and not mortality.	Data improvement required. National quality assurance should be adopted.
Deaths coded to invalid ICD codes by sex and age group	No invalid ICD code found in West Bank data and five in Gaza Strip data.	Action required to minimize these kinds of errors (e.g. adopt software with internal validation rules to minimize errors).

1. Introduction

The Palestinian National Institute of Public Health and the Ministry of Health conducted analysis of Palestine mortality registry data using the Analysis of Causes of National Deaths for Action (ANACONDA) electronic tool in 2017, 2018, 2019, and 2020. The purpose of this analysis was to assess the accuracy and completeness of mortality and cause of death data.

The World Health Organization has produced the Analyzing Mortality and Causes of Death, version three (ANACoD3), which is an online tool is to help users to perform a comprehensive and systematic analysis of mortality and cause of death data. As a result, the value and usability of these data to inform health policies and programs will be enhanced.

This report reflects the Analyzing Mortality and Causes of Death in Palestine data using version three (ANACoD3) to analyze West Bank mortality registry data and the Gaza Strip mortality registry for 2021. Data were received from the Palestinian Health Information Center (PHIC) in ICD-10 format. Population age group data for mid-year 2021 came from the Palestinian Central Bureau of Statistics (PCBS); the Jerusalem population (J1 inside the wall) were not included in the West Bank population data. This report will show indicators of potential data quality issues, as well as a variety of demographic and epidemiological indicators such as sex- and age-specific mortality rates, crude death rates, causes of death per Global Burden of Disease categories, leading causes of death, and the percentage of ill-defined causes of death. For ICD-10 data, in-depth analysis of external causes of death also took place. The goal of this analysis is to identify data quality issues that need to be addressed to increase the value and usability of these health data in developing health policies and programs.

2. Palestine Population Distribution

This report analyzes the data received from the PCBS of 4,946,471 total population for mid-2021, comprising the West Bank and Gaza population without Jerusalem city (Table 2 and illustrated in Figures 1 and 2).

Table 2: Description of the Palestine population included in this report, 2021

Total population: (4,946,471) (mid-2021)	
West Bank (without Jerusalem city)	**Gaza**
2,809,964	2136507
Population Distribution by Sex	
(1431367) (50.93%) Male (1378597) (49.06%) Female	(1089619) (51%) Male (1046888) (49%) Female

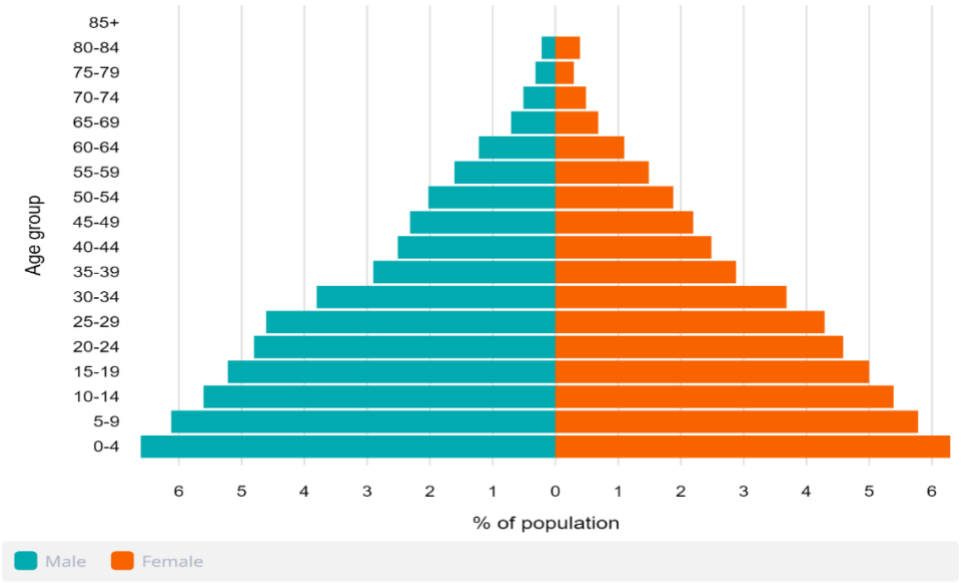

Figure 1: Population by age and sex, West Bank 2021

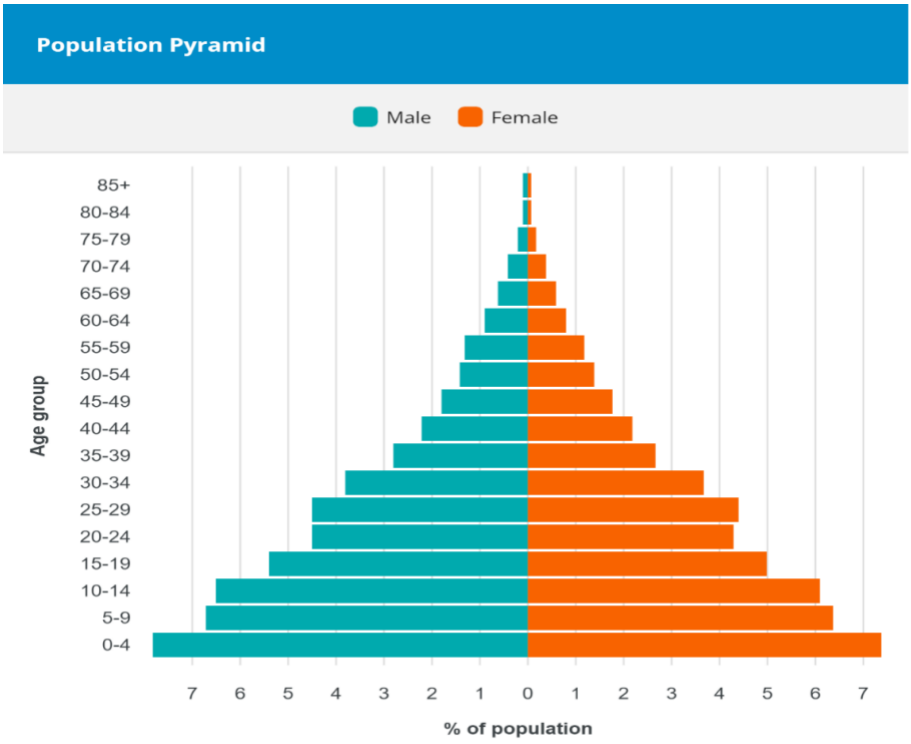

Figure 2: Population by age and sex, Gaza 2021

3. Description of Palestine Mortality Data

3.1 Demographic description of deaths in West Bank

3.1.1 Distribution of deaths by sex and age group

The total number of reported deaths in 2021, distributed in the West Bank and Gaza, is shown in Table 3 below:

Table 3: Distribution of deaths by sex and age group in Palestine, 2021

Total deaths: 17354- 2021	
West Bank	**Gaza**
10137	7217
Population Distribution by Sex	
(55%) Male 5575 (45%) Female 4562	(54.48%) Male 3932 (45.51%) Female 3285

As indicated in Figures 3 and 4, the highest death rates in the West Bank were in the 80+ age range, accounting for 31.3% of female deaths and 19.9% of male deaths respectively. In Gaza the highest death rates were in the 70–74 age group, accounting for 12.4% of both male and female deaths.

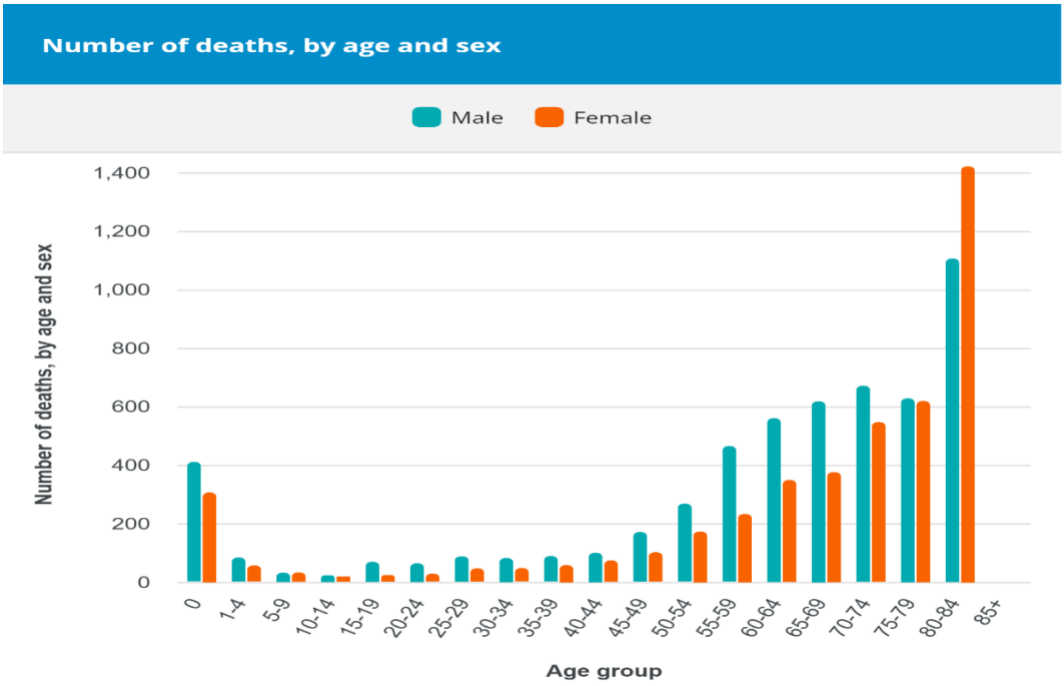

Figure 3: Number of deaths by sex and age, West Bank 2021

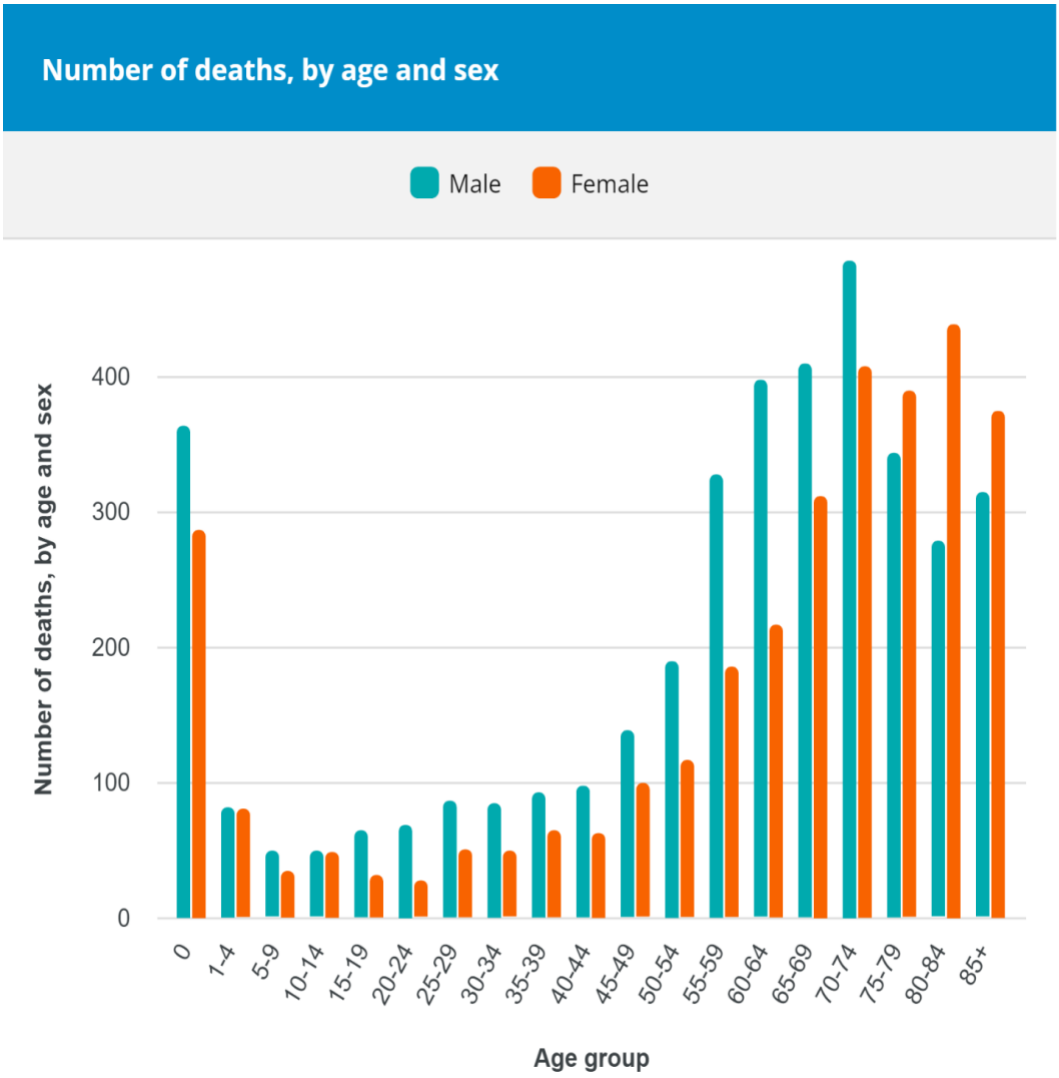

Figure 4: Number of deaths by sex and age, Gaza 2021

3.1.2 Distribution of deaths by age and sex according to income grouping, 2019

Palestine is a country with a lower-middle-income economy [1]. Figure 5 illustrates that the distribution of deaths across all age groups in the West Bank and Gaza is similar to that of other lower-middle-income countries, with the exception of those over 80 where it is similar to that of high-income nations.

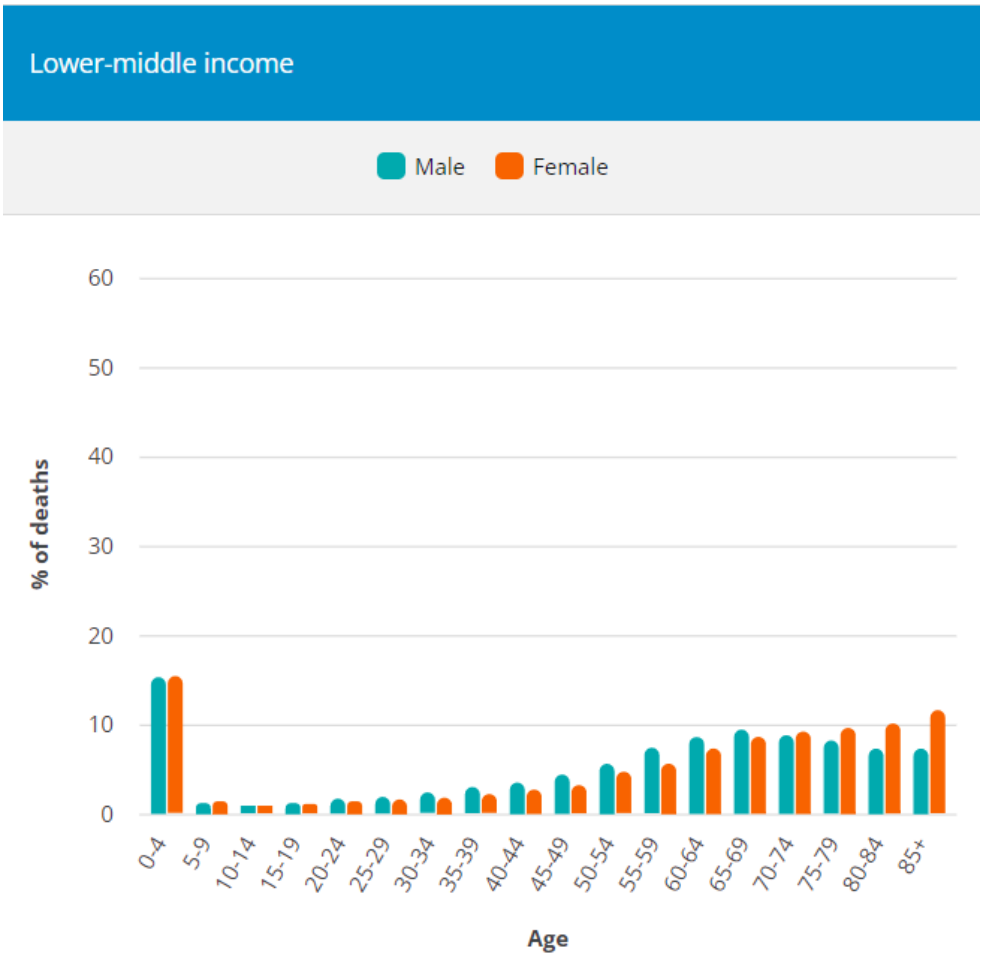

Figure 5: Distribution of deaths by age and sex in lower-middle-income countries

3.1.3 Age-specific mortality rates, all causes

In the West Bank, males have a greater mortality rate than females across all age categories. As indicated in Figure 6, the highest mortality rate in the West Bank in 2021 was among people who were equal to or older than 80 years with a rate of 15,875/100 000 for men and 13,221.5/100 000 for women. Figure 7 indicates that the age group of 85 years and over had the greatest mortality rate in Gaza at 19,137.3/100 000 for men and 14,329/100 000 for women.

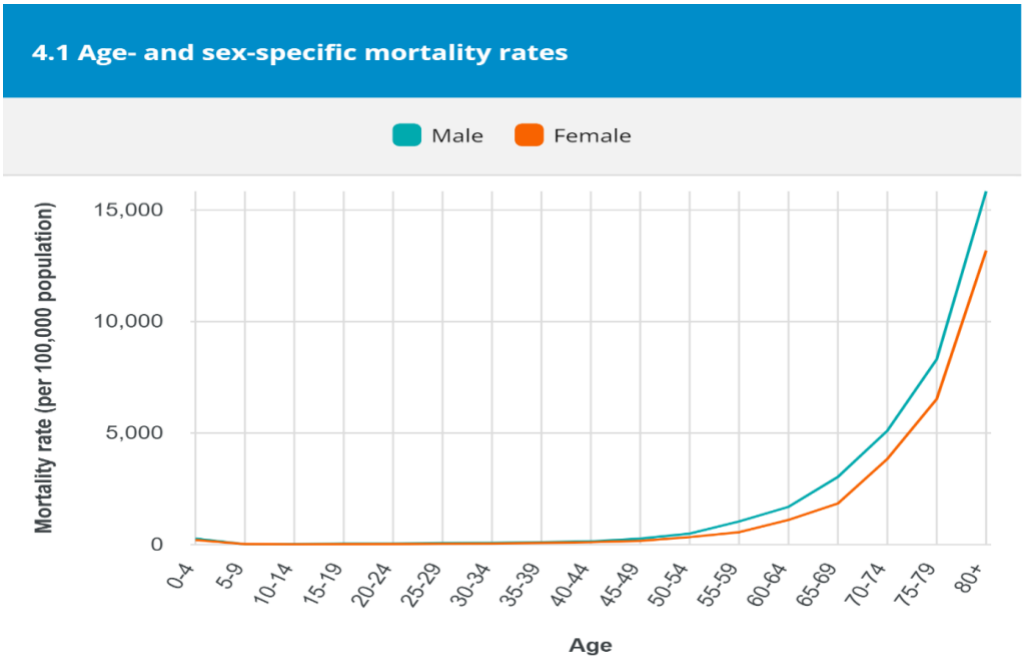

Figure 6: Age and sex-specific mortality rates, West Bank 2021

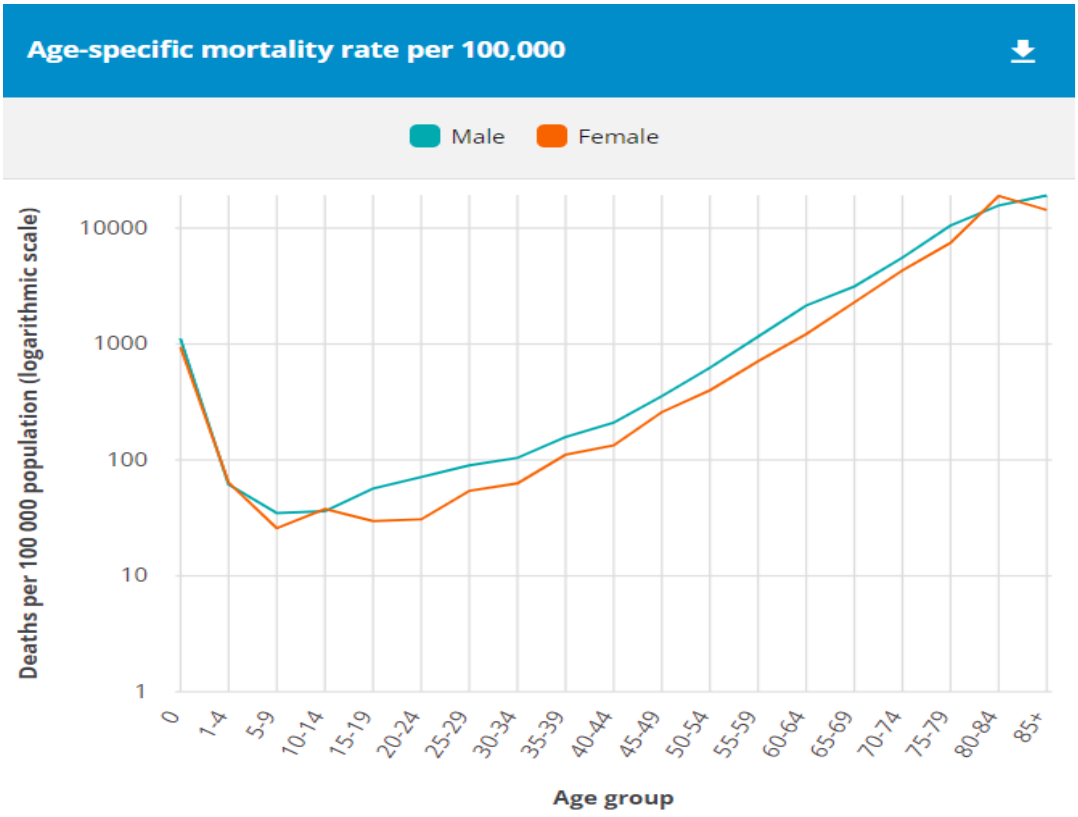

Figure 7: Age-specific mortality rates, Gaza 2021

3.1.4 Ratio of male to female mortality rates

The ratio of male to female mortality rates in the West Bank in 2021 was higher than the world average ratio in age groups (0-4), (15-19), (20-24), (25-29), and (55-59) years, and less than the world average in age groups (30-34), (40-44), (45-49), (50-54), (60-64), and (70-74) years, as reflected in Figure 8. However, death data from Gaza in 2021 show a lower mortality rate than the world average in age groups (10-14), (35-39), and (40-49) years, and higher than the world average in age groups (19-15), (20-24), (25-29), and (60-64) years, as seen in Figure 9.

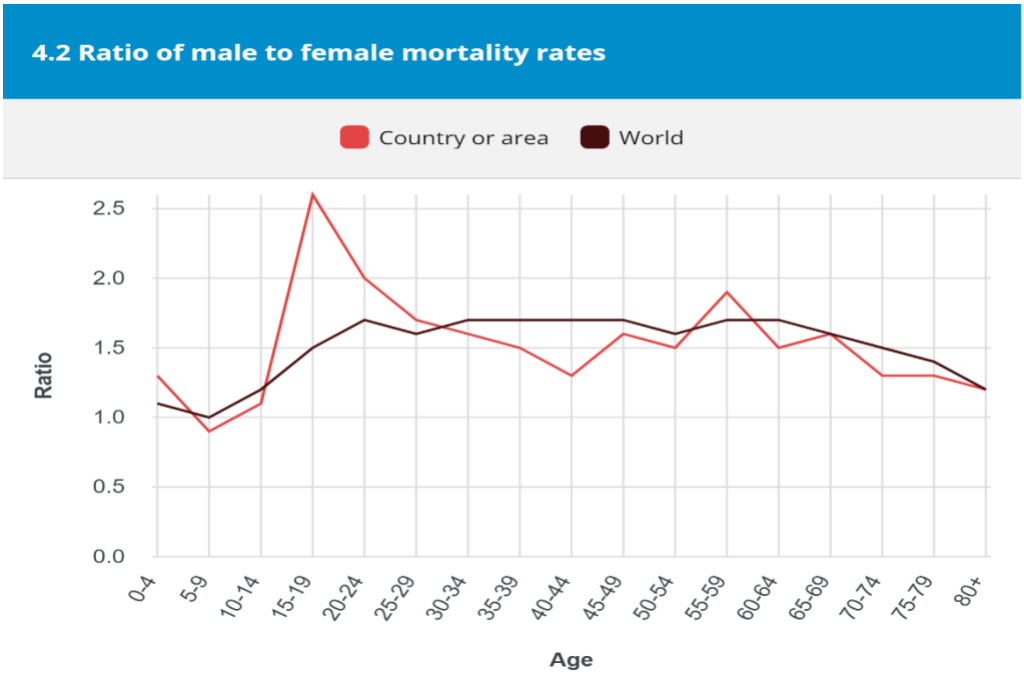

Figure 8: Ratio of male to female mortality rates in West Bank compared with global average.

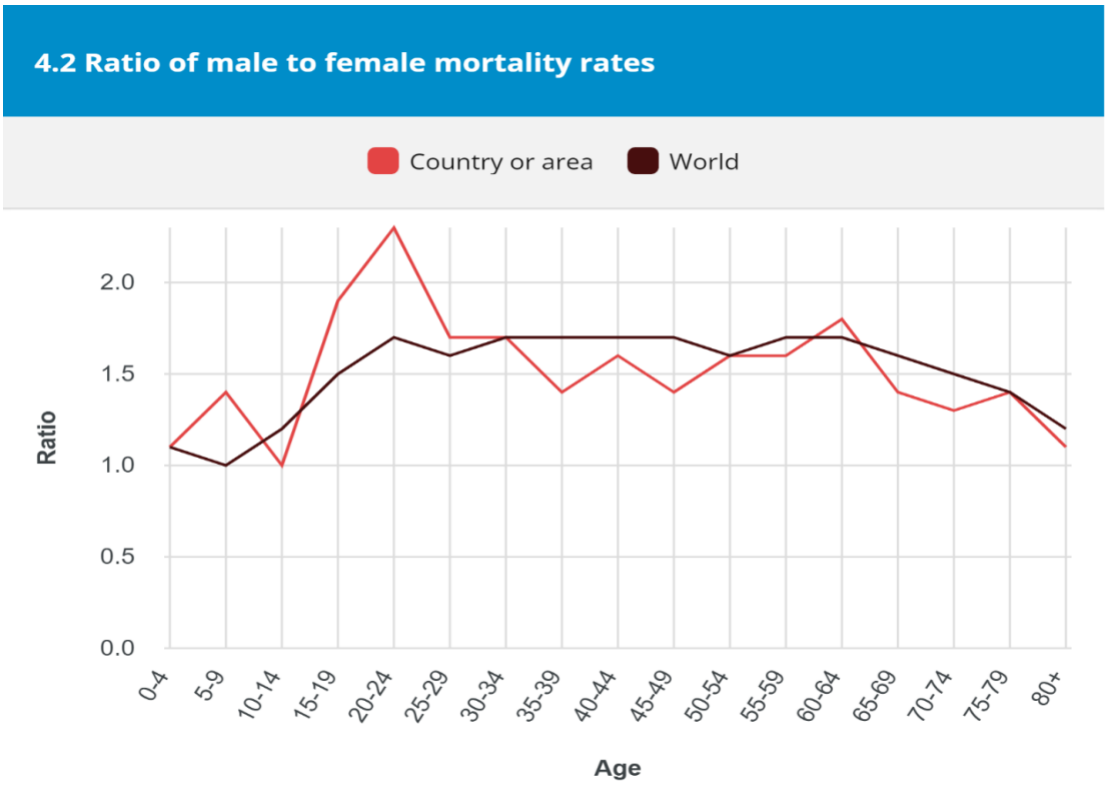

Figure 9: Ratio of male to female mortality rates in Gaza compared with global average

4 Mortality Indicators

4.1 Crude death rate

According to Table 4, the crude death rate (CDR) was 3.6 in the West Bank and 3.4 in Gaza per 1000 people. A CDR of below five per 1000 is caused by high growth rates resulting from natural increase (more births than deaths). In Palestine according to the PCBS, the number of births in 2021 was 141,092, which was higher than deaths in that year [2].

Table 4: Crude death rate in West Bank and Gaza, 2021

	Crude death rate (per 1 000 population) West Bank	Crude death rate (per 1 000 population) Gaza
Both sexes	3.6	3.4
Males	3.9	3.6
Females	3.3	3.1

4.2 Child mortality indicators

According to ANCoD3 analysis, the mortality rate in children under the age of five years was 11.6 in the West Bank and 12.8 in Gaza (Table 5). The PCBS reported the under-five child mortality rate in Palestine as approximately 14 per 1000 live births during 2015 to 2019; 15 in the West Bank and 14 in the Gaza

Strip. The infant mortality rate in Palestine was 12 per 1000 live births in the same period (12 in the West Bank and 13 in the Gaza Strip) [3].

Table 5: Indicators of early childhood mortality West Bank 2021

Age group (years)	Mortality Indicator	Probability of death (nqx) West Bank	Probability of death (nqx) Gaza
0-1	Infant mortality rate (1q0)	9.6	10.3
1-4	Child mortality rate (4q1)	2	2.5
0-5	Under-five mortality rate (5q0)	11.6	12.8

5 Causes of Death Analysis

5.1 Distribution of deaths according to the Global Burden of Disease

The distribution of deaths in Palestine according to the Global Burden of Disease includes three groups: Group I: Communicable diseases; Group II: Non-communicable diseases (e.g. cancer, diabetes, heart disease, and stroke); and Group III: External causes of mortality (e.g. accidents, homicide, and suicide).

The highest percentages of causes of death in Palestine data were in Group II: non-communicable. This reflected life expectancy rises and improved lifestyles but an increase in chronic disease risk factors like being overweight or smoking. Table 6 lists death distribution in the West Bank and Gaza as per the Global Burden of Disease

Table 6: Number of deaths according to Global Burden of Disease, West Bank and Gaza 2021

	Cause	**West Bank**	**Gaza**
6a. Number of deaths by major cause, with deaths of unknown age redistributed	All causes	10137	7217
	Group 1	3017	1947
	Group 2	6554	4113
	Group 3	441	521
	Ill-defined diseases	4	622
	Invalid codes	121	14
6b. Number of deaths by major cause, with deaths of unknown age and ill-defined causes redistributed	All causes	10137	7217
	Group 1	3018.3	2146.8
	Group 2	6556.7	4535.2
	Group 3	441	521
	Invalid codes	121	14
6c. Proportion of deaths by major cause (excluding invalid codes)	Group 1	0.30	0.3
	Group 2	0.65	0.63
	Group 3	0.04	0.07
	All causes	1	1

5.2 Top 20 causes of death according to the Global Burden of Disease

Covid-19 was the leading cause of death in the West Bank and Gaza among all age groups, although premature birth and low birth weight were the leading cause of death in children aged 0-4 years. Tables 7 to 10 show the top 20 leading causes of death in West Bank and Gaza data for all ages, sexes, and the 0-4 year age group.

Table 7: Top 20 causes of death, West Bank 2021, according to the Global Burden of Disease

Rank	Cause	Number of deaths	% of total deaths
1	COVID-19	2558	25.2
2	Ischaemic heart disease	1665	16.4
3	Diabetes mellitus	1077	10.6
4	Cerebrovascular disease	799	7.9
5	Hypertensive disease	677	6.7
6	Prematurity and low birth weight	286	2.8
7	Trachea, bronchus and lung cancers	206	2
8	Colon and rectum cancers	180	1.8
9	Chronic obstructive pulmonary disease	162	1.6
10	Road traffic accidents	144	1.4
11	Breast cancer	140	1.4
12	Congenital heart anomalies	132	1.3
13	Lymphomas and multiple myeloma	83	0.8
14	Falls	83	0.8
15	Cirrhosis of the liver	74	0.7
16	Leukaemia	70	0.7
17	Pancreatic cancer	69	0.7
18	Homicide	66	0.7
19	Stomach cancer	64	0.6
20	Prostate cancer	62	0.6

Table 8: Top 20 causes of death, Gaza 2021, according to the Global Burden of Disease

Rank	Cause	Number of deaths	% of total deaths
1	COVID-19	1549	23.5
2	Hypertensive disease	878	13.3
3	Ischaemic heart disease	644	9.8
4	Cerebrovascular disease	283	4.3
5	War and conflict	200	3
6	Nephritis and nephrosis	188	2.9
7	Diabetes mellitus	169	2.6
8	Prematurity and low birth weight	128	1.9

9	Breast cancer	122	1.8
10	Endocrine disorders	119	1.8
11	Trachea, bronchus and lung cancers	113	1.7
12	Colon and rectum cancers	103	1.6
13	Chronic obstructive pulmonary disease	64	1
14	Liver cancer	52	0.8
15	Pancreatic cancer	49	0.7
16	Falls	49	0.7
17	Lower respiratory infections	47	0.7
18	Congenital heart anomalies	47	0.7
19	Cirrhosis of the liver	43	0.7
20	Birth asphyxia and birth trauma	41	0.6

Table 9: Top 20 leading causes of death in both sexes of children aged 0-4 years, West Bank, 2021

Rank	Cause	Number of deaths	% of total deaths
1	Prematurity and low birth weight	286	33.1
2	Congenital heart anomalies	106	12.3
3	Birth asphyxia and birth trauma	62	7.2
4	Sudden infant death syndrome	33	3.8
5	Endocrine disorders	21	2.4
6	Road traffic accidents	21	2.4
7	Down syndrome	13	1.5
8	Falls	10	1.2
9	Renal agenesis	6	0.7
10	COVID-19	5	0.6
11	Abdominal wall defect	5	0.6
12	Drownings	5	0.6
13	Oesophageal atresia	4	0.5
14	Leukaemia	4	0.5
15	Spina bifida	3	0.3
16	Nephritis and nephrosis	3	0.3
17	Lower respiratory infections	2	0.2
18	Anencephaly	2	0.2
19	Epilepsy	2	0.2
20	Meningitis	2	0.2

Table 10: Top 20 leading causes of death in both sexes of children aged 0-4 years, Gaza, 2021

Rank	Cause	Number of deaths	% of total deaths*
1	Prematurity and low birth weight	128	18.2
2	Endocrine disorders	54	7.7
3	Congenital heart anomalies	41	5.8
4	Birth asphyxia and birth trauma	39	5.5
5	Ischaemic heart disease	22	3.1
6	War and conflict	14	2
7	Road traffic accidents	13	1.8
8	Lower respiratory infections	13	1.8
9	Falls	11	1.6
10	Down syndrome	10	1.4
11	Renal agenesis	9	1.3
12	Sudden infant death syndrome	8	1.1
13	Inflammatory heart diseases	6	0.9
14	COVID-19	5	0.7
15	Alzheimer and other dementias	4	0.6
16	Epilepsy	4	0.6
17	Leukaemia	4	0.6
18	Chronic obstructive pulmonary disease	3	0.4
19	Abdominal wall defect	3	0.4
20	Hypertensive disease	3	0.4

6 Quality of Mortality Data

The quality of cause of death data depends on the accuracy of death certification and the reliability of coding. Internationally established rules and guidance in the ICD govern these two separate but related functions. ICD-10 are 4-character codes to indicate that every death be attributed to one (and only one) underlying cause based on information reported on the death certificate. This section covers the quality of cause of death data for Palestine in 2021, including a usability index, the number of ill-defined causes of death by ICD chapter, the frequency of specific ill-defined codes and invalid codes inconsistent with age and sex, and ICD codes not to be used for the underlying cause of death.

6.1 Deaths defined by invalid ICD code by sex and age group

One invalid ICD code was found in West Bank data for a male aged below one year. The code was P19 which refer to metabolic acidemia in a newborn. No invalid ICD codes were found in Gaza mortality data for 2021.

6.2 ICD codes inconsistent with age and sex

The inconsistent codes are those unlikely to cause death in a certain sex and/or age group, for example male maternal deaths, suicides among young children, or prostate cancer deaths in females. No inconsistent codes were found in West Bank data but there were five inconsistent codes related to sex in Gaza data, including four male maternal deaths and one female death due to undescended testis (Table 11). Thirty-three inconsistent codes related to age were found in Gaza mortality data for 2021 (Table 12).

Table 11: ICD codes not to be used for underlying cause of death, Gaza 2021

ICD Code	Disease	Sex recorded	Number of deaths
C620	Undescended testis	F	1
O039	Spontaneous abortion, complete or unspecified, without complication	M	1
O60	Preterm delivery	M	1
O601	Preterm labor with preterm delivery	M	2
Total			5

Table 12: ICD codes inconsistent with age, Gaza 2021

ICD Code	Disease	Ages	Number of deaths
I21	Acute myocardial infarction	<15 yrs	3
I229	Subsequent myocardial infarction of unspecified site	<15 yrs	1
I25	Chronic ischaemic heart disease	<15 yrs	12
O039	Spontaneous abortion, complete or unspecified, without complication	<12 & >49 yrs	1
O223	Deep phlebothrombosis in pregnancy	<12 & >49 yrs	1
O60	Preterm delivery	<12 & >49 yrs	1
O601	Preterm labor with preterm delivery	<12 & >49 yrs	5
O822	Delivery by caesarean hysterectomy	<12 & >49 yrs	1
P073	Other preterm infants	>1 yrs	1
P21	Birth asphyxia	>1 yrs	1
P29	Cardiovascular disorders originating in the perinatal period	>1 yrs	1

P39	Other infections specific to the perinatal period	>1 yrs	1
P615	Transient neonatal neutropenia	>1 yrs	1
P95	Fetal death of unspecified cause	>1 yrs	1
R95	Sudden infant death syndrome	>1 yrs	2
Total			33

6.3 ICD codes not to be used for underlying cause of death

According to volume 2 of ICD regulations and standards, some codes should not be used for the underlying cause of death because they indicate morbidity rather than mortality. Table 13 lists 11 codes from the West Bank mortality data for 2021 that should not be utilized for underlying causes of death. Table 14 lists the 456 codes from Gaza mortality data.

Table 13: ICD codes not to be used for underlying cause of death, West Bank 2021

ICD Code	Disease	Number of deaths
I39	Endocarditis and heart valve disorders in diseases classified elsewhere	1
I469	Cardiac arrest, unspecified	2
P74	Other transitory neonatal electrolyte and metabolic disturbances	1
P740	Late metabolic acidosis of newborn	1
P748	Other transitory metabolic disturbances of newborn	1
P749	Transitory metabolic disturbance of newborn, unspecified	3
T754	Effects of electricity current	1
Z942	Lung transplant status	1
Total		11

Table 14: ICD codes not to be used for underlying cause of death, Gaza 2021

ICD Code	**Disease**	**Number of deaths**
B961	Klebsiella pneumoniae [K. pneumoniae] as the cause of diseases classified to other chapters	1
C77	Secondary and unspecified malignant neoplasm of lymph nodes	4
C78	Secondary malignant neoplasm of respiratory and digestive organs	3
C787	Secondary malignant neoplasm of liver	2
C79	Secondary malignant neoplasm of other sites	1
C791	Secondary malignant neoplasm of bladder and other and unspecified urinary organs	1
C795	Secondary malignant neoplasm of bone and bone marrow	2
C798	Secondary malignant neoplasm of other specified sites	3

F00	Dementia in Alzheimer's disease	1
G46	Vascular syndromes of brain in cerebrovascular diseases	2
G463	Brain stem stroke syndrome	2
G464	Cerebellar stroke syndrome	196
I22	Subsequent myocardial infarction	3
I229	Subsequent myocardial infarction of unspecified site	1
I252	Old myocardial infarction	1
I391	Aortic valve disorders in diseases classified elsewhere	1
I43	Cardiomyopathy in diseases classified elsewhere	1
I46	Cardiac arrest	1
J17	Pneumonia in diseases classified elsewhere	45
J91	Pleural effusion in conditions classified elsewhere	1
K912	Postsurgical malabsorption not classified elsewhere	1
K913	Postoperative intestinal obstruction	1
K918	Other postprocedural disorders of digestive system not classified elsewhere	1
N168	Renal tubulo-interstitial disorders in other diseases classified elsewhere	1
O822	Delivery by caesarean hysterectomy	1
P740	Late metabolic acidosis of newborn	1
P95	Fetal death of unspecified cause	5
R572	Septic shock	5
R69	Unknown and unspecified causes of morbidity	53
S02	Fracture of skull and facial bones	1
S020	Fracture of vault of skull	1
S062	Diffuse brain injury	1
S065	Traumatic subdural haemorrhage	1
S069	Intracranial injury, unspecified	1
S07	Crushing injury of head	3
S099	Unspecified injury of head	1
S12	Fracture of neck	2
S277	Multiple injuries of intrathoracic organs	1
S31	Open wound of abdomen, lower back and pelvis	1
S36	Injury of intra-abdominal organs	1
S397	Other multiple injuries of abdomen, lower back and pelvis	1
S72	Fracture of femur	11
S720	Fracture of neck of femur	26
S729	Fracture of femur, part unspecified	1
S797	Multiple injuries of hip and thigh	1
S82	Fracture of lower leg, including ankle	1

T18	Foreign body in alimentary tract	1
T20	Burn and corrosion of head and neck	1
T21	Burn and corrosion of trunk	1
T29	Burns and corrosion of multiple body regions	3
T293	Burns of multiple regions, at least one burn of third degree mentioned	2
T30	Burn and corrosion, body region unspecified	1
T300	Burn of unspecified body region, unspecified degree	1
T314	Burns involving 40-49% of body surface	1
T316	Burns involving 60-69% of body surface	1
T317	Burns involving 70-79% of body surface	1
T45	Poisoning by primarily systemic and haematological agents not classified elsewhere	2
T455	Anticoagulants	1
T509	Other and unspecified drugs, medicaments and biological substances	1
T512	2-Propanol	1
T599	Gases, fumes and vapors, unspecified	2
T610	Ciguatera fish poisoning	1
T71	Asphyxiation	4
T754	Effects of electric current	2
T782	Anaphylactic shock, unspecified	1
T79	Certain early complications of trauma not classified elsewhere	1
T81	Complications of procedures not classified elsewhere	1
T811	Shock during or resulting from a procedure not classified elsewhere	1
T818	Other complications of procedures not classified elsewhere	1
T822	Mechanical complication of coronary artery bypass and valve grafts	3
T86	Failure and rejection of transplanted organs and tissues	1
T909	Sequelae of unspecified injury of head	1
Z031	Observation for suspected malignant neoplasm	1
Z730	Burn-out	2
Z74	Problems related to care-provider dependency	9
Z741	Need for assistance with personal care	1
Z86	Personal history of certain other diseases	1
Z888	Personal history of allergy to other drugs, medicaments and biological substances	1
Z89	Acquired absence of limb	1

Z905	Acquired absence of kidney	1
Z933	Colostomy status	2
Z948	Other transplanted organ and tissue status	1
Z95	Presence of cardiac and vascular implants and grafts	1
Z958	Presence of other cardiac and vascular implants and grafts	1
Z982	Presence of cerebrospinal fluid drainage device	1
Total		456

6.4 Completeness of death data

The completeness of death data is calculated by dividing the total number of deaths by the most recently available UN-estimated number of expected deaths and multiplying by 100 to obtain a percentage. The completeness of death data in Palestine is 86.77% based on the UN estimated deaths for Palestine in 2021 of 20,000 deaths [4]. The completeness of death data in the West Bank is 86.8% and in Gaza is 86.68%.

6.5 Percentage of ill-defined causes of death

Ill-defined reflects vague or unspecific diagnoses that may be found in most of the other ICD chapters and unspecified conditions that do not generate information of public health value.

If ill-defined causes of deaths are high (> 20% of all causes of death), care should be taken in interpreting the data. Where a high proportion of all deaths are coded as ill-defined causes, the cause of death distribution will likely be biased and unreliable. The number and percentage of deaths attributed to ill-defined or vague and unspecified causes of death according to the ICD is 0.4% of West Bank mortality data and 14.5% of Gaza mortality data (Figures 10 and 11).

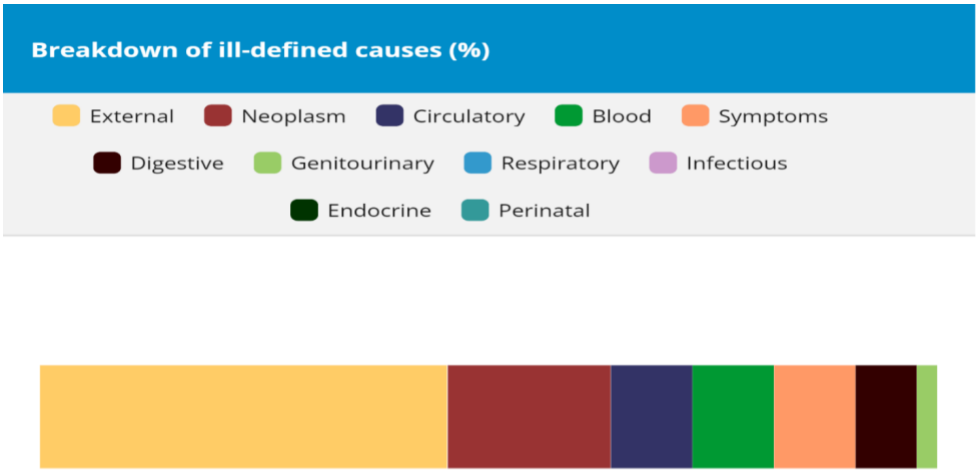

Figure 10: Breakdown of ill-defined causes of deaths in West Bank 2021

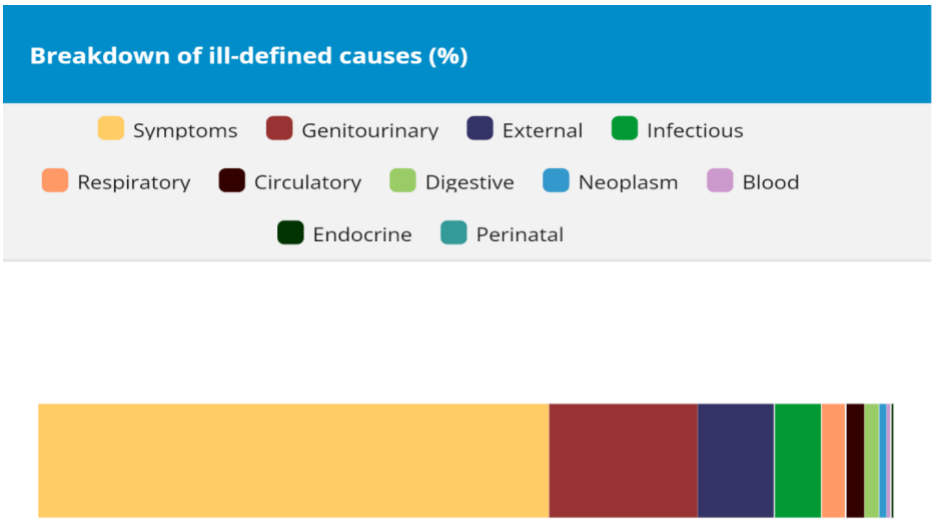

Figure 11: Breakdown of ill-defined causes of deaths in Gaza 2021

6.6 Ill-defined codes according to broad age groups

Specific ill-defined codes, ranked by number and percentage in the West Bank and Gaza, are shown in Tables 15 and 16. These could be mitigated by improving certification and coding practices.

Table 15: Frequency of ill-defined codes, West Bank 2021

Rank	Ill-defined ICD code	Description	Number	% of ill-defined
1	Y20	Hanging, strangulation and suffocation, undetermined intent	7	15.9
2	C80	Malignant neoplasm without specification of site	6	13.6
3	D65	Disseminated intravascular coagulation [defibrination syndrome]	4	9.1
4	Y17	Poisoning by and exposure to other gases and vapors, undetermined intent	4	9.1
5	Y30	Falling, jumping or pushed from a high place, undetermined intent	4	9.1
6	I469	Cardiac arrest, unspecified	2	4.5
7	Y33	Other specified events, undetermined intent	2	4.5
8	C760	Head, face and neck	1	2.3
9	C763	Pelvis	1	2.3
10	I269	Pulmonary embolism without mention of acute cor pulmonale	1	2.3
11	I39	Endocarditis and heart valve disorders in diseases classified elsewhere	1	2.3
12	I51	Complications and ill-defined descriptions of heart disease	1	2.3
13	K72	Hepatic failure not classified elsewhere	1	2.3
14	K720	Acute and sub-acute hepatic failure	1	2.3
15	K729	Hepatic failure, unspecified	1	2.3
16	N188	Other chronic renal failure	1	2.3
17	R96	Other sudden death, cause unknown	1	2.3
18	R99	Other ill-defined and unspecified causes of mortality	1	2.3
19	T754	Effects of electric current	1	2.3
20	Y12	Poisoning by and exposure to narcotics and psychodysleptics [hallucinogens] not classified elsewhere, undetermined intent	1	2.3
21	Y872	Sequelae of events of undetermined intent	1	2.3
22	Z942	Lung transplant status	1	2.3

Table 16: Frequency of top 20 ill-defined codes, Gaza 2021

Rank	Ill-defined ICD code	Description	Number	% Of ill-defined
1	R96	Other sudden death, cause unknown	406	38.9
2	N18	Chronic renal failure	123	11.8
3	R99	Other ill-defined and unspecified causes of mortality	60	5.8
4	R69	Unknown and unspecified causes of morbidity	53	5.1
5	A419	Septicaemia, unspecified	47	4.5
6	J17	Pneumonia in diseases classified elsewhere	45	4.3
7	N17	Acute renal failure	33	3.2

8	S720	Fracture of neck of femur	26	2.5
9	J96	Respiratory failure not classified elsewhere	15	1.4
10	K72	Hepatic failure not classified elsewhere	15	1.4
11	J81	Pulmonary oedema	13	1.2
12	I10	Essential (primary) hypertension	11	1.1
13	N189	Chronic renal failure, unspecified	11	1.1
14	S72	Fracture of femur	11	1.1
15	Z74	Problems related to care-provider dependency	9	0.9
16	N180	End-stage renal disease	8	0.8
17	A41	Other septicaemia	7	0.7
18	C80	Malignant neoplasm without specification of site	6	0.6
19	D65	Disseminated intravascular coagulation [defibrination syndrome]	6	0.6
20	N179	Acute renal failure, unspecified	6	0.6

6.7 Cause of death data usability index

The WHO usability index assesses the overall quality of cause of death data. It is calculated as the proportion of completeness, multiplied by the proportion of deaths assigned an ill-defined cause of death code, and multiplied by 100. The higher the usability index, the better quality the data and the more accurate the indicators. However, the usability index will realistically never be 100% because it is next to impossible to have perfect cause of death data. In the real world, there will always be some deaths coded to signs and symptoms, and other vague or unspecified causes of death. The West Bank usability index was 86.3% and Gaza usability index was 74.1%.

7 Analysis of External Causes of Death in Palestine Death Data 2021

This stage comprised a deeper analysis of deaths due to injuries. Deaths from injuries are categorized according to intent: unintentional injury (road traffic accidents, poisonings, falls, fires, and drownings); intentional injury (self-inflicted injury/suicide, homicide, war and conflict); and ill-defined injuries/accidents (undetermined intent). Another important dimension in analyzing external causes is the mechanism by which the death due to injury occurred. There may be room to improve the specificity of medical certification and/or coding if certain codes are used excessively or if many deaths are assigned codes of an unspecified nature.

7.1 ICD-10 codes most assigned to deaths due to external causes

The objective of this analysis was to gain more detail on the most assigned and habitually used codes for external causes of injury. Table 17 ranks the top fifteen external causes of death codes in the West Bank, and Table 18 covers Gaza.

Table 17: ICD-10 codes most assigned to deaths due to external causes, West Bank 2021

Rank	ICD Code	Cause	Total deaths	% of all deaths from external causes
1	V892	Person injured in unspecified motor vehicle accident, traffic	100	22.7
2	W19	Unspecified fall	72	16.3
3	X95	Assault by other and unspecified firearm discharge	49	11.1
4	V49	Car occupant injured in other and unspecified transport accidents	34	7.7
5	Y364	War operations involving firearm discharge and other forms of conventional warfare	24	5.4
6	Y83	Surgical operation and other surgical procedures as the cause of abnormal reaction in the patient or of later complication, without mention of misadventure at the time of the procedure	8	1.8
7	Y20	Hanging, strangulation and suffocation, undetermined intent	7	1.6
8	W74	Unspecified drowning and submersion	6	1.4
9	W85	Exposure to electricity transmission lines	6	1.4
10	X70	Intentional self-harm by hanging strangulation and suffocation	6	1.4
11	Y30	Falling, jumping or pushed from a high place, undetermined intent	4	0.9
12	X999	Assault by sharp object, unspecified place	4	0.9
13	Y17	Poisoning by and exposure to other gases and vapors, undetermined intent	4	0.9
14	Y84	Other medical procedures as the cause of abnormal reaction in the patient or later complication, without mention of misadventure at the time of the procedure	4	0.9
15	Y883	Sequelae of surgical and medical procedures as the cause of abnormal reaction in the patient or later complication, without mention of misadventure at the time of the procedure	3	0.7

Table 18: ICD-10 codes most assigned to deaths due to external causes, Gaza 2021

Rank	ICD Code	Cause	Total deaths	% of all deaths from external causes
1	Y362	War operations involving explosions and fragments	165	31.7
2	W34	Discharge from other and unspecified firearms	58	11.1
3	W19	Unspecified fall	46	8.8
4	S720	Fracture of neck of femur	26	5.0
5	Y369	War operations, unspecified	21	4.0
6	V093	Pedestrian injured in unspecified traffic accident	17	3.3
7	X70	Intentional self-harm by hanging strangulation and suffocation	16	3.1
8	X95	Assault by other and unspecified firearm discharge	13	2.5
9	S72	Fracture of femur	11	2.1
10	Y366	War operations involving biological weapons	11	2.1

11	W87	Exposure to unspecified electricity current	9	1.7
12	W40	Explosion of other materials	7	1.3
13	V892	Person injured in unspecified motor vehicle accident, traffic	6	1.2
14	W69	Drowning and submersion while in natural water	5	1.0
15	W73	Other specified drowning and submersion	5	1.0

7.3 Distribution of external causes of death by GBD

This section covers the number of external deaths by sex and according to GBD external cause categories (group III causes). External death rates for each causal category per 10 000 population for West Bank and Gaza are shown in Tables 19 and 20.

Table 19: Distribution of external causes of death according to GBD, West Bank 2021

Cause of death	Number of deaths			Crude death rate per 10 000			
	Both sexes	Males	Females	Both sexes	Males	Females	Ratio male/female
Injuries	**441**	**343**	**98**	**1.6**	**2.4**	**0.7**	**3.4**
Unintentional injuries	**319**	**237**	**82**	**1.1**	**1.6**	**0.6**	**2.8**
Road traffic accidents	144	114	30	0.5	0.8	0.2	3.7
Poisonings	7	4	3	0.0	0.0	0.0	1.3
Falls	83	59	24	0.3	0.4	0.2	2.3
Fires	4	3	1	0.0	0.0	0.0	2.9
Drownings	12	9	3	0.0	0.1	0.0	2.9
Other unintentional injuries	69	48	21	0.2	0.3	0.2	2.2
Intentional injuries	**102**	**92**	**10**	**0.4**	**0.6**	**0.1**	**8.9**
Self-inflicted injuries	10	6	4	0.0	0.0	0.0	1.4
Homicide	66	62	4	0.2	0.4	0.0	14.9
War and conflict	25	23	2	0.1	0.2	0.0	11.1
Other intentional injuries	1	1	0	0.0	0.0	0	0.5
Ill-defined injuries/accidents	**20**	**14**	**6**	**0.1**	**0.1**	**0.0**	**2.2**

Table 20: Distribution of external causes of death according to GBD, Gaza 2021

Cause of death	Number of deaths			Crude death rate per 10 000			
	Both sexes	Males	Females	Both sexes	Males	Females	Ratio male/female
Injuries	**521**	**376**	**145**	**2.4**	**3.5**	**1.4**	**2.5**
Unintentional injuries	**192**	**147**	**45**	**0.9**	**1.3**	**0.4**	**3.1**
Road traffic accidents	32	20	12	0.1	0.2	0.1	1.6
Poisonings	1	1	0	0.0	0.0	0.0	0.0

Falls	49	34	15	0.2	0.3	0.1	2.2
Fires	3	3	0	0.0	0.0	0.0	0.0
Drownings	16	12	4	0.1	0.1	0.0	2.9
Other unintentional injuries	91	77	14	0.4	0.7	0.1	5.3
Intentional injuries	**235**	**175**	**60**	**1.1**	**1.6**	**0.6**	**2.8**
Self-inflicted injuries	18	14	4	0.1	0.1	0.0	3.4
Homicide	17	16	1	0.1	0.1	0.0	15.4
War and conflict	200	145	55	0.9	1.3	0.5	2.5
Other intentional injuries	0	0	0	0	0	0	0
Ill-defined injuries/accidents	**94**	**54**	**40**	**0.4**	**0.5**	**0.4**	**1.3**

7.4 Deaths from transport accidents

Deaths from transport accidents in the West Bank and Gaza are shown in Tables 21 and 22. A motor vehicle traffic accident is any accident involving a motorized vehicle that occurs on a public highway, and other transport accidents involving vehicle accidents, motorized or non-motorized, that occur in any place other than a public highway, by land, water, air or space.

Table 21: Distribution of deaths from transport accidents, West Bank 2021

Distribution of deaths from transport accidents	
Motor Vehicle Traffic	139
Occupant	36
Pedal cyclist	1
Pedestrian	2
Other	100
Other transport	7

Table 22: Distribution of deaths from transport accidents, Gaza 2021

Distribution of deaths from transport accidents	
Motor Vehicle Traffic	9
Motorcyclist	1
Pedestrian	2
Other	6
Other transport	19

7.5 Deaths aged 15 years and above: age-standardized death rates per 100 000 population

This section presents age-specific death rates (ASDR) per 100 000 for West Bank and Gaza due to external deaths causes and compared with the global ASDR. West Bank and Gaza mortality data

reflected lower ASDR than low-middle income countries in all injuries, unintentional injuries, road traffic accidents and poisoning (Figures 12 to 15).

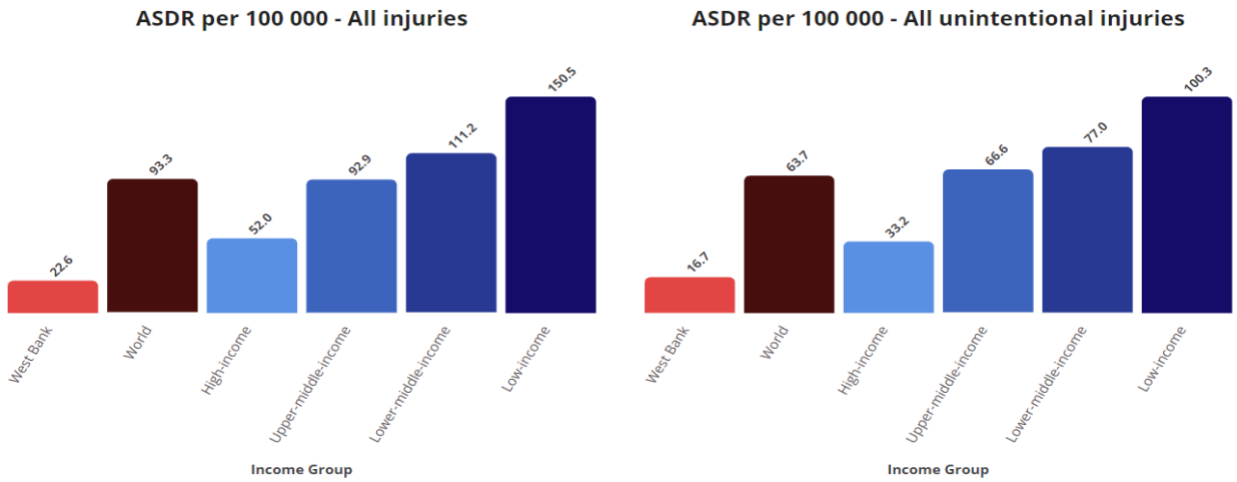

Figure 12: Comparison of ASDR for injuries globally and the West Bank

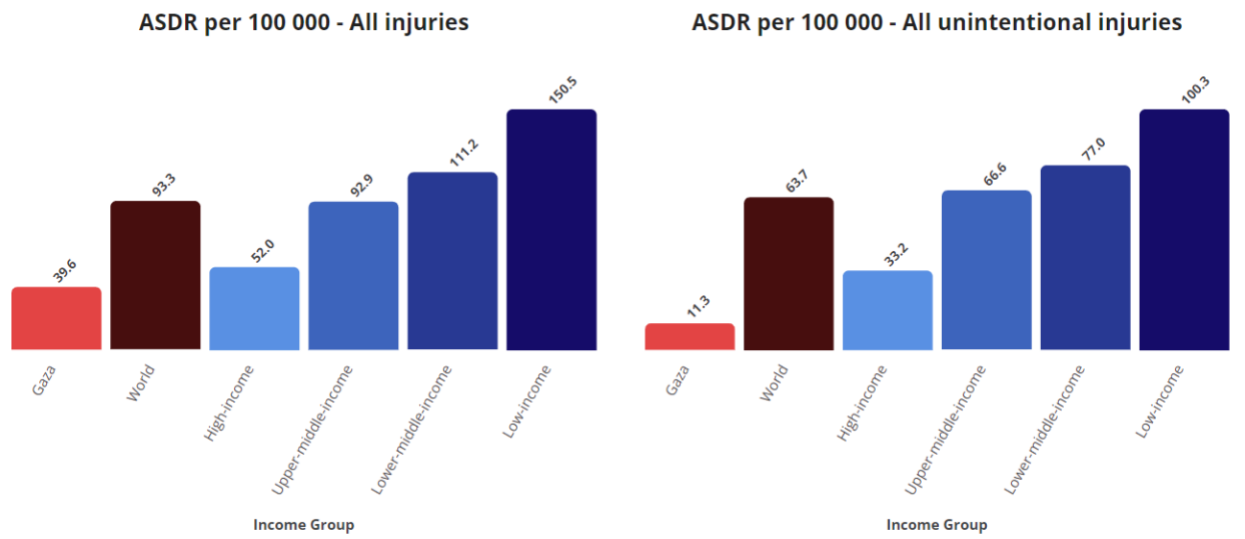

Figure 13: Comparison of ASDR for injuries globally and in Gaza

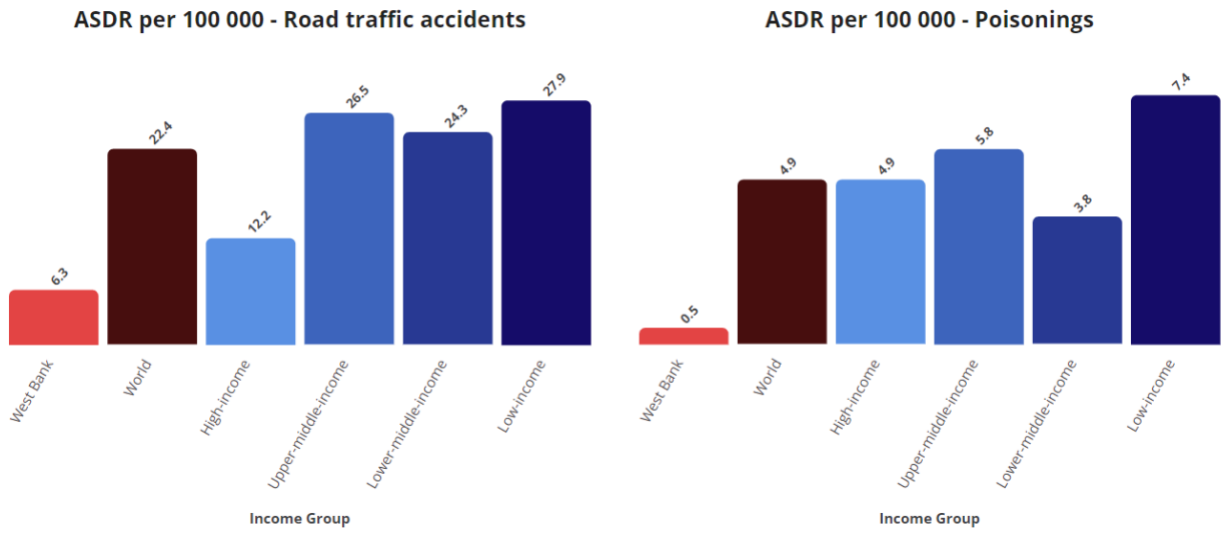

Figure 14: Comparison of ASDR for road traffic accidents and poisoning globally and in West Bank

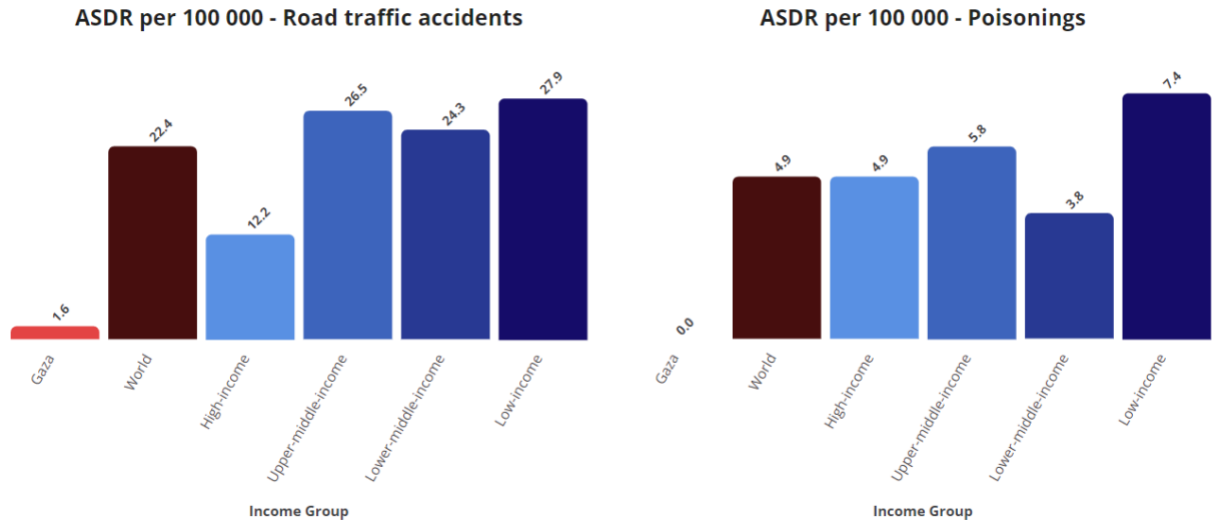

Figure 15: Comparison of ASDR for road traffic accidents and poisoning globally and in Gaza

8 Conclusion and Recommendations

Palestine is one of the first countries to use the ANACoD3 software to conduct an overall assessment of the quality of CoD data. This is a critical step towards identifying areas for improving the quality of death data and developing interventions to reduce errors in death certificates.

Certain limitations exist when comparing the quality of Palestine's death data with other low-middle-income countries because Covid-19 seems to be the primary cause of death in the 2021 death statistics and comparisons are made with the data from 2019 for these countries.

Overall, cause of death data for Palestine in 2021 demonstrated 86.77% of completeness: 86.65% for West Bank data and 86.68% for Gaza data. The West Bank usability index is 86.3% and Gaza 74.1%. Eleven underlying cause of death codes that should not be used represent an opportunity to improve the quality of data in terms of deaths reporting and documentation at the national level. The assessment showed that additional organized efforts are still needed to raise the standard of mortality data in the areas of death completeness, cause of death reporting quality, and the level of cause-specific detail provided.

To close the performance gaps in the CoD data and improve its quality, the following actions are proposed:

1- Capacity building for the cause of death focal points, including training and briefing sessions on medical certification rules and significance, in addition to related issues, for physicians working in UNRWA, private, and NGO sectors, including forensic medicine.
2- Adopt a curriculum and resources for medical students and graduates, as well as internship requirements.
3- Encourage the implementation of updated SOPs for death reporting and notification on a national level, and the commitment of all relevant parties.
4- Facilitate communication among the relevant parties, including hospitals, cause of death focal points, PHIC, health directorates, and forensic medicine.
5- Make use of technology to connect the CoD Registry to other health information systems (HIS) in hospitals.

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