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Faculty of Natural Science

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MPhil Population Studies

Thesis Title:

The determinants of under-five child mortality in the State of Palestine and Malawi: A comparative study

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Abstract

Mortality is one of the significant vital events for which a government collects data, especially child mortality, because it is one of the contributing indicators that are used to assess the wellbeing of a nation. Globally, in the public health sphere, under-five child mortality remains a major concern, especially in developing countries. There has been significant progress made to reduce under-five child mortality rates since 1990s. The global under-five child mortality rate has dropped by 60%, from 93 deaths per 1 000 live births in 1990 to 37 deaths per 1 000 live births in 2020.

However, the under-five child mortality rates remain a considerable concern for the governments in Malawi and the State of Palestine, despite determined efforts made to reduce the mortality rates. In 2020, the under-five child mortality rate in Malawi stood at 38.6 deaths per 1 000 live births, which is the highest in sub-Saharan Africa, and in the same year, the under-five child mortality rate for the State of Palestine was 16.5 deaths per 1 000 which was the highest in the Middle-East.

The main objective of this research is to draw a comparison between the two countries, which operate in different demographic, socio-economic, cultural, and political contexts, and then differentiate which factors affect their under-five child mortality rates. The research will seek to determine if there are determinants of under-five child mortality that are similar in the two countries regardless of these factors. The study also looks to determine or identify the theories that will explain the possible differences in the under-five child mortality rates in the two respective countries.

The research findings can be a resource for the government to improve both health care services and implement policies for mothers and their children to lower the current under-five child mortality rates.

Key words*: *Under-five infant mortality, Determinants of mortality, State of Palestine, Malawi, Risk factors, Development Theories

Declaration

I declare that The determinants of under-five child mortality in the State of Palestine and Malawi: A comparative study is my own work, that has not been submitted before for any degree or examination in any other university, and that all sources I have used or quoted have been indicated and acknowledged by complete reference.

ROBYNN ASHLEY HERA NOVEMBER 2022

SIGNED:...

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Abbreviations

ARR	-	Annual rate of reduction
CI	-	Confidence Intervals
CMR	-	Child Mortality Rate
DHS	-	Demographic and Health Survey
IM	-	Infant mortality
IMR	-	Infant Mortality Rate
LDCs	-	Least Developed Countries
LMIC	-	Low and Low Middle-Income Countries
MDGs	-	Millennium Development Goals
MICS	-	Multiple Indicator Cluster Surveys
NM	-	Neonatal mortality
NMR	-	Neonatal Mortality Rate
SBI	-	Short Birth Interval
SDGs	-	Sustainable Development Goals
SPSS	-	Statistical Package for Social Sciences
UN	-	United Nations
UNICEF	-	UN International Children's Emergency Fund
UN-IGME	-	UN inter agency group for child mortality estimation
U5M	-	Under-five mortality
U5MR	-	Under-five mortality rate
U5IMR	-	Under-five infant mortality rate
WHO	-	World Health Organisation

Definitions of concepts

Child mortality - Death of a child between their first and fifth birthday.

Child mortality rate - probability of dying between the first and the fifth birthdays.

COVID-19 - Coronavirus disease is an infectious disease caused by the SARS-CoV-2 virus.

Infant mortality - Occurs before the child reaches twelve months.

Infant mortality rate - Probability of dying between birth and the first birthday. The number of deaths among infants under one year of age per 1 000 live births in the same year.

Live births - Refers to the birth of a living child.

Neonatal mortality rate - Probability of dying within the first month of life.

Post-neonatal mortality - The difference between infant and neonatal mortality.

Short birth interval - Birth-to-birth interval of less than 33 months.

Under-five child mortality rate - The probability of a child dying before the age of five.

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Chapter one

Introduction

The context of the study

1.1 Introduction and rationale

Mortality, or the rate of death is an important variable in demographic studies, and the two most important demographic variables when calculating mortality are age and gender. Mortality is not only one of the fundamental components of population change, but it is also important in terms of population expansion. Governments collect mortality data through vital statistics registration systems, and where registration of deaths is not undertaken or is missing, annual surveys and censuses are used to make estimations. Analysis of mortality statistics is essential to programs of disease control. Local health authorities use the statistics to improve public health and provide individuals with documentary proof of death.

In view of the very close relationship between age and the risk of death, age may be considered the most important demographic variable in the analysis of mortality. The under-five mortality rate (U5MR) is considered a very significant public health measure to estimate a country's development and, in general, its welfare status because a significant part of the total death rate in countries with high mortality is due to the U5MR. Furthermore, the under-five mortality rate in least-developed countries has been rather low. The U5MR is defined as the probability of a child dying for every 1 000 live births before the age of five years. Globally, approximately 4.6 million infant deaths occur annually. Since the 1990s, much progress has been made to reduce U5MR because the global rate has dropped by 60% from 93 deaths per 1 000 live births in 1990 to 37 in 2020, according to the World Health Organisation (WHO).

Due to programmes such as the Millennium Development Goals (MDGs) and various other programmes such as the Sustainable Development Goals (SDGs), which were implemented to reduce U5M in the 2000s period, progress has accelerated, with the majority of countries having already reached the target sets. The SDGs have their target set for U5MR at 25 or fewer deaths per 1 000 live births by 2030 (World Bank, 2021). However, according to the United Nations (UN) (2020), in many countries, and especially in developing countries, U5M remains a major concern, as the speed at which the decrease has occurred has been very slow compared to their developed counterparts. According to the UN IGME (2023), in 2021 over 5 million children under the age of five died because they were denied access to decent healthcare, vaccines, enough food, clean water, and sanitation. Children continue to die because efforts to combat communicable and infectious illnesses that are avoidable remain insufficient. In 2021, the under-five mortality rate in low-income nations was 67 deaths per 1000 live births, whereas it was just 5 deaths per 1000 live births in high-income countries (United Nations IGME, 2022). The under-five mortality rate in sub-Saharan Africa was expected to be 74 deaths per 1000 live births in 2021, according to the UN IGME. According to the UN IGME (2022), sub-Saharan Africa and South Asia had the highest number of child mortality in 2021, with children under the age of five accounting for 2,7 million of the deaths. In addition, they argue that the burden of under-five mortality is not distributed fairly over the globe, as seen by the fact that 40 percent of all under-five fatalities worldwide in 2021 occurred in sub-Saharan Africa and Southern Asia.

There are several risk factors that influence child mortality, but the leading causes of death are pre-term birth complications, birth asphyxia, birth trauma, pneumonia, diarrhoea and malaria, which health practitioners argue can be prevented or treated with access to affordable interventions in health and sanitation. In addition, there are socio-economic and socio-demographic factors that greatly influence the risk of living or dying.

Millions of children below the age of five die each year from infectious diseases such as pneumonia, diarrhoea and malaria, which are being identified as leading causes. Pre-term birth complications, birth asphyxia, and birth trauma are risks that health practitioners argue can be prevented or treated with access to affordable interventions in health and sanitation. In addition, there are socio-economic and socio-demographic factors that greatly influence the risk of living or dying. High U5MR can also be attributed to low vaccination and immunisation rates. Many researchers have determined that the majority of those deaths could have been prevented. In order for countries to reduce their under-five mortality rates, they need to use proven interventions and strategies to help achieve their goals in a sustainable way. It is thus important to try and determine the causes of these deaths in order for countries to choose the most effective interventions and strategies suitable for their contexts.

This thesis compares two countries, Palestine and Malawi, which operate in different socio-demographic, socio-economic, cultural, and political contexts, and then differentiates which factors affect their under-five mortality rates. The risk factors associated with under-five mortality are wide and varied. They are: maternal age, employment, parental education, gender of the child, place of residence, birth order, and other factors. These factors will be discussed in detail in the literature review.

1.2 History and geography of the State of Palestine

1.2.1 History

The geo-political history of Palestine has always been influx since Biblical times. Palestine was part of the former Ottoman territories, which were placed under the United Kingdom's administration in 1992. All of the territories eventually became fully independent states, except Palestine. In 1917, the Balfour Declaration, declared by Britain, gave support for a national home for the Jewish people in Palestine (Richard N. Lebow, 1968). There was a large-scale Jewish immigration from 1922 to 1947. However, there was resistance from the Arab leadership, which led to a rebellion. Today, Palestine theoretically includes the West Bank and the Gaza Strip (see Figure 1.1). However, controls over these regions are complex due to the ongoing violence from the Israeli government. Since 2012, Palestine has been officially recognised by the United Nations (UN) as a non-member observer state. Several religious populations live in Palestine: 86% are Sunni Arabs, 13% are Jews, and 1% are Christians (World Fact Book, 2022).

In the occupied Palestinian territory, access to maternal and child healthcare services is constrained due to the prolonged Israeli military occupation, the Separation Wall, army checkpoints, and restrictions on the movement of people and goods (Tiziana Leone et al., 2019). Exposure to armed conflict has repercussions for the civilian population, and in particular for vulnerable populations such as pregnant women and children. It is widely reported that prenatal stress due to conflict has an impact on foetal development, pregnancy complications, and pregnancy outcomes (J. Keasley et al., 2017). Such a situation can be exacerbated by limited access to healthcare, including antenatal care, hospital deliveries, and access to key services such as Caesarean sections and assisted delivery, as seen in the armed conflict in Uganda (A. Namasivayam et al., 2017). A similar situation could be present in Palestine.

The intensity of the conflict has an impact on Palestinian women, regardless of their socio-economic status. Neither education nor household wealth show significant correlations with health outcomes (Rita Giacaman et al., 2005). The impact of conflict on infant immunisation reflects findings from Iraq, with increased conflict delaying or impeding access to immunisation (Valeria Cetorelli, 2015). The closer association between vaccination and intensity of conflict as compared to maternal health outcomes might result from decisions to avoid potential risk (e.g., checkpoint crossing) for non-urgent healthcare, or it could reflect reduced supplies and services during periods of increased conflict (Emma Keelan, 2016).

1.2.2 Geography

The population of Palestine in 2021 was 5 290 925 people, with a population density of 878 people per square kilometer. Palestine covers an area of 6 025 square kilometers of land at the end of 2021. It is in Western Asia and comprises the territories of the West Bank and the Gaza Strip (see Figure 1.1). It is located to the north of Jerusalem in the central part of the West Bank. Palestine is divided into sixteen administrative divisions, which are Bethlehem, Deir al-Balah, Gaa, Hebron, Jenin, Jericho & al Aghwar, Jersualem, Khan Yunis, Nablus, North Gaza, Qalqiliya, Rafah, Ramallah and Al-Bireh, Salfit, Tubus, and Tulkarm.

Figure1.1: Map of the State of Palestine

Source: https://www.worldatlas.com/maps/palestine

1.3 History and geography of Malawi

1.3.1 History

Ancient tribes have lived in Malawi since around 8000 BC. Over the next millennia and centuries, various and successive Bantu speakers settled in northern, central, and southern Malawi. Later, during the 19th century, the Ngoni, Yao, Lomwe, and Sena settled in Malawi. It was also during this period that Europeans arrived in Malawi. In 1891, the British declared the country a British Protectorate under the name of “Nyasaland District Protectorate,” which was then changed to “British Central African Protectorate” in 1893. Opposition to colonial administration culminated in the uprising led by John Chilembwe in 1915. In 1953, the Federation of Rhodesia and Nyasaland, which was also known as the Centred African Federation, was instituted, comprising three countries, namely, Zimbabwe (then Southern

Rhodesia), Zambia (then Northern Rhodesia) and Malawi (then Nyasaland) despite protests from Africans in Malawi through the Nyasaland African Congress, which was a nationalist movement founded in 1944. In 1966, Malawi became a republic and a one-party state, but in 1993, the country became a multiparty state.

A national population policy for Malawi was prepared that aims to achieve lower population growth rates and reduce morbidity and mortality among mothers and children. It aims at improving the status of mothers and children in all spheres of development as well as improving information, education, and communication on the use of contraceptives and the benefits of small family sizes. In the education sector, the policy will enhance the relevance of formal and informal education. The policy stresses the importance of creating employment and food security, especially for pregnant and lactating mothers as well as children. Health Priorities and Programmes Health services in Malawi are provided by the Ministry of Health, the Ministry of Local Government, and NGOs, particularly mission organisations. The Ministry of Health is responsible for planning and developing health policies and for providing health care in all government hospitals. The Ministry of Local Government is in charge of health care delivery at the district level and below. NGOs provide services to both hospitals and smaller medical units. In Malawi, the provision of curative services takes up a large proportion of the total government funds allocated to the health sector. The lack of an effective outreach capacity in the system has been recognised by the Ministry of Health, and strategies for creating a community-based distribution system are being implemented despite a severe lack of trained medical personnel in the country. Currently, the government is developing a health policy with the goal of achieving health for all.

1.3.2 Geography

Malawi is a landlocked country bordered to the north and northeast by Tanzania, to the east by Mozambique, and to the west by Zambia. The total area of the country is 118 484 square kilometers, of which 94 276 square kilometers are land and 56% of the land is arable. Malawi's most striking topographic feature is the Rift Valley, which runs through the entire length of the country, passing through Lake Malawi in the northern and central parts of the country (see Figure 1.2). The country is divided into three administrative regions: Northern, Central, and Southern, with twenty-eight districts, which are Balaka, Blantyre, Chikwawa, Chiradzulu, Chitipa, Dedza, Dowa, Karonga, Kasungu, Likoma, Lilongwe, Machinga, Mangochi, Mchinji, Mulanje, Mwanza, Mzimba, Neno, Ntcheu, Nkhata Bay, Nkhotakota, Nsanje, Ntchisi, Phalombe, Rumphi, Salima, Thyolo, and Zomba. In each district, there are traditional authorities (or chiefs), and the smallest administrative unit is the village. Rainfall and temperature in Malawi are greatly influenced by the lake and altitude, which varies from 37 to 3 050 meters above sea level. From September to November, average temperatures rise, and the rainy season begins towards the end of this period. The rainy season extends to April or May. Malawi is predominantly an agricultural country. One of the chief crops in Malawi is the growing of tobacco.

Figure1.2: Map of Malawi

Source: https://www.worldatlas.com/maps/malawi

1.4 Significance of the Study

1. Children under-five are one of the most vulnerable groups within all populations, as they depend on the socio-economic conditions of their immediate environment for survival. It is thus important to determine which variables in Palestine and Malawi increase under-five children's vulnerability, as it can be valuable to look at how to treat or address factors that can be prevented.

2. According to the UN IGME report for 2022, children continue to endure vastly different survival odds dependent on where they are born. The global infant mortality rate was 38 per 1 000 live births. Children born in low-income nations, where the U5MR in 2021 was 67 deaths per 1000 live births, were 14 times more likely to die before the age of five than those born in high-income countries, where the U5MR was just 5 deaths per 1 000 live births (UN IGME, 2022).This study aims to provide new insight into which demographic and socio-economic factors in the two countries have an effect on under-five child mortality, and we will be able to compare which of these factors are the same or different across the two countries.
3. This study also makes use of the most recent data from both Malawi and Palestine. This is important to make relevant conclusions and recommendations.
4. Data and research on under-five mortality in countries with political instability, conflict and war and its effects are also not heavily researched.

1.5 Motivation of the Study and Problem Statement

The survival and well-being of children are the most crucial objectives of communities, countries, and nations around the world (Bornstein et al., 2012). Even though there has been a significant decline in child mortality globally, especially in some of the poorest countries such as Bangladesh, Ethiopia, and Malawi, the levels of U5M still remain too high in low and middle income countries and throughout the world, despite the UN and its signatory countries' efforts to reduce U5M by two thirds by 2015. Projections made by David Sharrow et al. (2022) show that 63 countries are at risk of missing their SDG target. In Palestine, the under-five mortality rate is much lower than in Malawi, but it is still the highest in the Middle-East region. The Palestine rate is well above that of other Middle Eastern and neighbouring countries such as Egypt (10.30), Israel (1.9), Jordan (8.8), and Lebanon (4.0) in 2020 (World Bank, 2020). The U5MR continues to be a major concern for the governments of Malawi in Southern Africa and Palestine in the Middle East. Despite determined efforts made to reduce these mortality rates in 2020, the U5MR in Malawi was 38.6 deaths per 1 000 live births, and in the same year, the U5MR for the State of Palestine was 16.5 deaths per 1 000 live births. Despite the huge reduction in under-five child mortality rates in the two countries, measures are still being taken to lower the under-five mortality rate. The UN IGME (2022) states that children around the world face vastly different chances of survival. Not much is known about the socio-economic and demographic factors that can have an impact on under-five child mortality in the two countries. A research paper on the determinants of under-five child mortality has never been completed in Palestine.

1.6 Aims and objectives of the study

The aims and objectives of this study it to:

1. Determine which socio-economic factors influence under-five child mortality in Malawi and Palestine;

2. Determine which demographic factors have an effect on under-five child mortality in Malawi and Palestine.

1.7 Research questions

1. This study aims to answer the question off which socioeconomic factors can influence the mortality of children under-five in Malawi and Palestine.
2. This study aims to answer the questions of which demographic factors can influence the mortality of children under-five in Malawi and Palestine.
3. In addition, this study also aims to determine which factors influencing the mortality of children under the age of five are comparable between the two countries.

1.8 Research hypotheses

The following research hypotheses will be tested:

- Socio-economic factors influence under-five child mortality in Malawi and the State of Palestine.

- Demographic factors influence under-five child mortality in Malawi and the State of Palestine.

The demographic factors and the socio-economic factors are discussed in detail in Chapter Three.

1.9 Organisation of the remainder of the report

The first chapter was used to introduce the research topic of under-five mortality in the state of Palestine and Malawi and provides the foundation on which the research will be built by looking at the rationale behind the research paper, history and geography, aims and objectives, and hypothesis, among other things. In Chapter Two of the report, the literature review on the topic is provided. The literature review has all the relevant studies that have been done on the topic in different countries and various approaches that are helpful in shedding light on the determinants and various issues on the topic. Chapter Three provides a description of the research design and methodologies employed by the researcher in this research study.

The emphasis is placed on:

- The key concepts and variables;
- The research instruments;
- The data collection process or sources of data and methods;
- The rationale behind the selection of data analysis procedures as well as the actual procedures used; and

The researcher uses Chapter Four to report on the results of the study after doing the data analysis. Chapter Five continues with the results by doing the analysis on the life tables. The implications of the findings are discussed in Chapter Six. Chapter Seven embarks on the conclusions and recommendations that are applicable to the results.

Chapter Two

Review of Related Literature

2.1 Introduction

This chapter provides an overview of under-five child mortality (U5MR) and the theories which explain the reasons under-five mortality rates in developing countries vary from one another. The Sustainable Development Goals (SDGs) and the Millennium Development Goals (MDGs) will also be discussed to see if countries have had success in achieving goals pertaining to child mortality. A child born into poverty is twice as likely to die before the age of five compared to a child from a wealthier family. In this respect, the determinants of under-five mortality will be explored and the socio-economic and demographic factors will be discussed which influence mortality in both Malawi and Palestine.

2.2 Background of U5MR

The U5MR is a complex analysis since the incidence of mortality depends strongly on the age of the child. It is therefore necessary to check the terminology used in this analysis. The U5MR is characterised by different stages of life and different levels of intensity, and plus by different causes of deaths.

To calculate the outcomes of death, epidemiologists and demographers often split the five years of life into phases which have a critical effect on the survival rate of a child (Dupaquier, 1997):

a. Neo-natal mortality covers the first month of life, which also includes perinatal mortality (foetal mortality over the first week of life);

b. Post-neonatal mortality covers the time from one month to twelve months of life;

c. Infant mortality is a broad term used to embrace mortality over the whole first year of life, and

d. Early childhood denotes to the period between the first birthday and fifth birthday of the child.

These periods differ not only in the intensity of events (deaths), but also in the causes of the events. In the case of *neo-natal* and *perinatal* mortality, deaths mostly result from foetal malformation, low birth weight, high susceptibility to infections, or abnormalities of body functions.

The causes of death during the first months and years of life may be divided approximately between endogenous and exogenous factors (Lalou, 1997). The term endogenous refers to deaths caused by factors that are independent of pathological socioeconomic and cultural conditions into which a child is born. The endogenous causes are therefore associated with biological and genetic factors influencing the survival chances after birth. It must be noted that the endogenous factors are strongly influenced by environmental factors such as poor hygienic conditions. It is quite difficult to imagine an exogenous factor which would not operate through endogenous causes of a child's death. Such a solely exogenous cause is preferential infanticide, which is determined culturally, and is not affected by any biological mechanisms (Krzysztof Tymicki, 2009). However, the biological (endogenous) factors are closely related and influenced by cultural (exogenous) factors.

A child's health status might also be influenced directly by demographic variables like sex, survival status of adjacent siblings, season of birth, survival of parents, or presence of extended family. Especially the sex of the new-born child greatly influenced its fate. Male infants are much more likely to die within the first 24 hours after delivery than female infants. It must be noted that exogenous (environmental) factors affect not only the mother's health, but also the child's health. Apart from the bio-genetic factors, exogenous factors—such as epidemics, wars, and famines—determined child survival to a large extent. These factors are present in both Palestine and Malawi.

2.3 Trends and levels of under-five child mortality

Millions of deaths since the 1990s have been prevented due to the various initiatives and target that have been set. However, according to Sharrow et al. (2022), the task of ending all preventable child deaths is not done, and millions more deaths could be averted by meeting international targets. According to the UNICEF 2021 report, five million under-five children died in 2020 even without an increase in mortality attributed to COVID-19. Approximately half of those deaths occurred among new-borns in the first 28 days of life and most deaths were due to preventable causes. According to the report, children are still facing widely divergent chances of leading a healthy life based on where they are born and the economic circumstances they are born into. The global U5MR fell to 37 deaths per 1 000 live births in 2020 (WHO, 2020). However, children in the sub-Saharan region continue to experience the highest rates of mortality in the world with 74 deaths per 1 000 live births. This is fourteen times higher than the risk for children in Europe and North America. The leading causes of these deaths in children under-five are pre-term birth complications, birth asphyxia/trauma, pneumonia, diarrhoea and malaria which are all treatable and can be prevented with access to affordable interventions in health and sanitation. Even though there continues to be global downtrend in U5MR, it has been determined that fifty-four countries will not meet the SDGs target. However, according to the UNICEF 2021 report, achieving the target in countries is hindered by large and persistent regional and income class disparities in mortality.

2.4 Global under-five child mortality

The U5MR can be used as an indicator to determine the state of healthcare in a particular country and how the government or healthcare system is able to look after the health needs of their citizens. Essentially the U5MR indicator is used to determine the level of child health in a population. There have been large reductions in the under-five mortality rate, globally. Since 1990s, Sharrow et al. (2022) found that the global U5MR decreased by 59% which was 93 deaths per 1 000 live births in 1990 to 37.7 deaths per 1 000 live births in 2019. Additionally, they found that as of 2019, 122 of 195 countries have achieved the SDG U5MR target and 20 countries are on track to reach that target by 2030. Despite the large number of reductions in the under-five child mortality, globally, 5.2 million children died before reaching the age of five years in 2019 alone of which the majority died from preventable or treatable causes. Children ages 1-11 months accounted for 1.5 millions of these deaths while children ages 1-4 years accounted for 1.3 million deaths. New-borns under 28 days accounted for the remaining 2.4 million deaths, according to the World Health Organisation (WHO) in 2020. Additionally, Sharrow et al. (2022) says that globally 48.1 million under-five deaths are projected to occur between 2020 and 2030 but the number can be reduced by almost 11 million deaths if all countries met the Sustainable Development Goals (SDGs) target on under-five mortality.

2.5 Global child and maternal mortality trends

The Millennium Development Goals (MDGs) ended in 2015 and the SDGs developed out of and superseded the MDGs. Two of the MDGs were to improve maternal health and reduce child mortality rates by 2015 (United Nations, 2015). The target was to reduce child mortality by two thirds between 1990 and 2015. In 2013, approximately 6.3 million children died under the age of 5 years which is less than the 12.7 million who died in 1990 (United-Nations-millennium-declaration-2000). Thus the target rate was exactly halved.

A further goal was to reduce maternal mortality by three quarters between the years 1990- 2015 as maternal mortality is linked to the under-5 mortality rate. To reduce the maternal mortality rate, the premium quality of doctors and health care services are required. The proportion of the births attended by the skilled health care professionals is above 90% in three out of six World Health Organisation (WHO) regions while it is only 51% in the African region. Therefore, the United Nations and MDGs fell short of this target in 2015.

The Sustainable Development Goals or Global Goals are a collection of seventeen interlinked global goals designed to be a "blueprint to achieve a better and more sustainable future for all". The SDGs were set up in 2015 by the United Nations General Assembly and is intended to be achieved by 2030. In terms of health, by 2030, the SDGs wish to reduce the global maternal mortality ratio to less than 70 per 100 000 live births. The organisation also hopes to end preventable deaths of new-borns and children under 5 years of age, with all countries aiming to reduce neonatal mortality to at least as low as 12 per 1 000 live births and under-5 mortality to at least as low as 25 per 1 000 live births by 2030 (United Nations, 2016).

Currently we will exam the under-five mortality rates of Malawi and Palestine and observe whether these two countries have managed to reach the SDGs in 2019. We can see that Palestine has reach the goal of staying below the estimated goal of 25 deaths per 1 000 live births with 16.97 deaths per 1 000 live births in total in 2019 (see Table 2.1). In contrast, Malawi has a high under-5 mortality rate of 40.55 deaths per 1 000 births in 2019 (UNICEF, 2019). The reduction in the U5MR in Palestine can be due to the implementation of various health initiatives compared to Malawi. However, the rate in Palestine is still higher than the neighbouring territories and countries. Therefore, it would be interesting to compare the demographic and socio-economic conditions in both countries.

Since global trends in under-five mortality has significantly declined we can see that a country like Malawi has made improvements in achieving the Millennium Development Goals which put a target of 76 deaths per 1 000 live births. Lungu et al., (2020) state that it is important to note that Malawi was able to register an U5MR of 63 deaths per 1 000 live births according to MDGs, despite having a health system with multiple constraints which include inadequate health force, limited infrastructure, equipment and essential supplies and consistently low levels of health financing.

Table 2.1: Under-five mortality rates in 2019 and 2020 in Malawi and Palestine

Geographic area	Sex	2020	2019
Malawi	Female	34.26	36.15
	Male	42.69	44.94
	Total	38.48	40.55
State of Palestine	Female	15.01	15.48
	Male	17.92	18.46
	Total	16.46	16.97

Source: UN_IGME at: https://data.unicef.org/resources/data_explorer/unicef_f/?ag=UNICEF&df=GLOBAL_DATAFLOW&ver=1.0&dq=MWI+PSE.CME_MRY0T4+CME_TMY0T4..&startPeriod=2019&endPeriod=2022

The data from Tables 2.2 and 2.3 below shows that there has been a decline in the under-five mortality in both countries. Most importantly the data shows that there is a difference in the under-five morality rates depending on the sex of the child. The under-five mortality rate reduces from 45 deaths per 1 000 live births in 1990 to 17 deaths per 1 000 live births in 2020, in the State of Palestine. The sex-specific under-five mortality rate reduce from 48 deaths per 1 000 live births in 1990 among males and 42 deaths per 1 000 live births among females and in 2020, there were 18 deaths among males and 15 deaths among females, both per 1 000 live births.

Table 2.2: Estimates of mortality among children under-5 in the State of Palestine

Under-five mortality rate (U5MR) (deaths per 1 000 live births			Annual rate of reduction (ARR) (per cent)	Sex-specific under-five mortality rate (deaths per 1 000 live births)			
				1990		2020	
1990	**2000**	**2020**	**1990-2020**	**Male**	**Female**	**Male**	**Female**
45	30	17	3.3	48	42	18	15

Source: **https://data.unicef.org/resources/levels-and-trends-in-child-mortality/**

Table 2.3: Estimates of mortality among children under-5 in Malawi

Under-five mortality rate (U5MR) (deaths per 1 000 live births			Annual rate of reduction (ARR) (per cent)	Sex-specific under-five mortality rate (deaths per 1 000 live births)			
				1990		2020	
1990	**2000**	**2020**	**1990-2020**	**Male**	**Female**	**Male**	**Female**
246	175	39	6.2	257	234	43	34

Source: **https://data.unicef.org/resources/levels-and-trends-in-child-mortality/**

In Malawi, the country was able to reduce their under-five mortality rate by two-thirds. In 1990 the under-five mortality rate was 246 deaths per 1 000 live births and was reduce to 39 deaths per 1 000 live births in 2020. Based on the sex-specific under-five mortality rate in 1990, the U5MR was 257 deaths per 1 000 live births among males and 234 deaths per 1 000 live births among females and was reduces to 43 deaths per 1 000 live births for males and 34 deaths per 1 000 live births for females in 2020.

In many studies, inequalities in mortality between males and females have been observed. According to Van Malderen et al. (2019) an excess male child mortality can be explained by biological factors (such as lower resistance to infection, higher risk of premature birth, difficult labour related to a larger average body size and head circumference), gender discrimination (such as different feeding and medical care practices, or response to HIV-related drugs). The authors also state that after adjusting for a range of individual, household and community variables including age, birth order, household wealth, maternal education but also skilled birth attendance and other factors, the excess male mortality remained significant in several countries. This research study looks to explore the Multiple Indicator Cluster Surveys (MICS6) (2019-2020) data from both these countries in order to determine the factors that affect under-five mortality. Firstly, we will explore the theories that underpin mortality.

2.6 Under-five child mortality theories

2.6.1 Modernisation theory

From the above Table 2.1, we can see that under-five child mortality rates vary between the two countries. There are various reasons and theories as to why the U5MR varies across Least Developed Countries. Least developed countries (LDCs) are low-income countries who are confronting severe structural impediments to sustainable development. They are highly vulnerable to economic and environmental shocks and have low levels of human assets (United Nations, 2021). Malawi falls in the category of an LDC. Although the Palestinian economy's main performance indicators rank it within the category of middle-income developing countries, its sustained development is obstructed by structural impediments that are common to Least Developed Countries (UN, 2001).

Modernisation theory refers to a body of theory that became prominent in the 1950s and 1960s in relation to understanding issues of economic and social development and in creating policies that would assist economic and social transitions in poorer countries (Andrew Webster, 1990: 41-64). The Modernisation theory argues that economic development reduces infant mortality through improving healthcare and nutrition. Modernisation theory, according to Frey and Cui (2016), contend that industrialisation and the attendant economic development reduce infant mortality through improvements in health care, education, nutrition, and the like. Frey and Cui (2016) continue to quote different authors who have confirmed the validity of the Modernisation theory and concluded that infant and child mortality as well as gender imbalances in infant mortality vary in a negative fashion with the level of industrialisation and alternative measures of economic development. Also, the Modernisation theory according to Frey and Field (2000), argues that industrialisation promotes human well-being and reduces infant mortality. Industrialisation has brought about a lot of improvements in terms of education, nutrition, hygiene and sanitation which are important factors that have an effect on infant mortality. Industrialisation has brought about advancements in technology and overall and due to technology, we have seen a reduction in mortality. Infant mortality rates are lower in more industrialised nations and one of the reasons for this is that industrialisation and economic growth may bring higher standard of living and advanced medical technology which may lead to a lower mortality rate (Frey and Cui, 2016).

Federman and Levine (2005) note that factories emit pollutants into the air and water and such emissions are often heavy in poor nations, especially when pollution regulations are not strictly enforced by the authorities or governments. These factories are also often situated in rural areas and children under-five can get exposed to these pollutants in the air that they breathe or water that they drink. Federman and Levine (2005) further state that air pollution is a major contributor to acute respiratory infections, such as pneumonia which is one of the most common causes of infant mortality. According to Federman and Levine (2005), death is also common when children who have lower resistance due to malnutrition and lack of immunisation, get exposed to new pathogens as they lack proper access to healthcare after becoming ill.

The study done by Hayat et al. (2020) looked to test the hypotheses of the Modernisation theory related to child mortality in Pakistan. Their study also found that the level of economic growth proxy by real Gross Domestic Product (GDP) per capita is a significant variable responsible for decline in child mortality which confirms the hypothesis of the Modernisation theory. GDP per capita is the sum of gross value added by all resident producers in the economy plus any product taxes (less subsidies) not included in the valuation of output, divided by mid-year population (World Bank, 2022). However, there have been criticisms of this theory as noted by Shen et al. (2008) who state that the theory overemphasises the effects of economic development, and overlooks the structural relations among countries at different levels of development. It also ignores the political dimensions of the international economy. Additionally, the authors quote Ake (1988) and Pai (1991) who state that the theory does not give adequate attention to the role of the state as well as to inequality within societies, including gender and class stratification. The study done by Shen et al. (2010), where they test if economic development has a direct negative effect on child mortality was confirmed and the tests show that economic development has a direct dampening effect on child mortality among less developed countries and that the effect is quite substantial.

Industrialisation, according to Federman and Levine (2005), may bring improvements in housing quality, sanitation and household pollution which can improve health outcomes. Industrialisation also brings jobs and raising incomes which according to the authors can improve nutrition for both mothers and children and in turn can also increase access to health care. The authors also discuss how factories are associated with urbanisation as living in close proximity to others can increase person-to-person and water-borne pathogens which are easily transmitted. In cities, air pollution is also much worse which again can have an impact on children's respiratory health.

Modernisation also ties up with the Demographic Transition Theory (DTT) because the theory deals with two situations of stability and one of change as a given population moves from a pre-industrial agricultural economy into an urban industrial market economy (William Agyei, 1978). According to EA Wrigley (1972), there are two parts of the modernisation process which are both cultural and industrial. The cultural feature is literacy, conscious control of fertility and an expanded view of the world. The industrial feature incorporates an increase in per capita of Gross National Product (GNP) and the use of modern industrial methods (Wrigley, 1972). The DTT also explains that as countries become more industrialised, the death rates go down and subsequently through the introduction of modern contraceptives and the reduction of cultural practices of having more children, birth rates also decline. However, in developing countries such as Malawi, the cultural feature as explained by Wrigley, is fragile among the country's population.

2.6.2 Dependency/World-Systems theory

The Dependency/World-Systems theory counters the Modernisation theory because the Modernisation school assumes that there is something wrong inside the Third World countries, such as traditional culture, overpopulation, little investment, lack of achievement, motivation and this is why the Third World countries are backward and stagnant (Andre Gunder Frank, 1967). This is expressed further by Immanuel Wallerstein (2004) who argued that a fixed division of the world into core, semi-periphery and periphery is an inherent feature of World-

System theory. Frey and Cui (2016) state that the proponents of the Dependency/World-Systems theory contend that dependent relations between core and peripheral countries foster resources and surplus extractions, resulting in limited resources for investment in public health, family planning, nutrition, education, pre-natal and post-natal care programs, and others factors that reduce infant and child mortality. Shandra et al. (2011) quotes Amin (1976) who argues that the economic relationships between rich and poor nations are structurally detrimental to the poor nations because of the inherent dynamics of international capitalism. Many attempts by developing countries to improve their healthcare are hindered by more developed countries because they are often exploited when trading with developed countries. This leads to developing countries not having enough funds to invest more money to improve their healthcare system. Shandra et al. (2011) also state that rich nations become wealthy by exploiting the surplus labour and resources from poor nations.

When countries take out loans from the World Bank, the countries have to make adjustments which include devaluing their currency, reducing government spending, and privatising government assets which are all an attempt to help stimulate economic growth and generate currency in order for the countries to repay their debt. Shandra et al. (2011) quotes Bradshaw and Wahl (1991) who state although the 'earn more and spend less' model may facilitate debt repayment, Dependency theory hypothesises that structural adjustments and associated debt servicing adversely affect child mortality. The adjustment can affect child mortality because the loans require governments to cut their spending for health, education, nutrition and family planning which often translates into health facilities closing, not being fully staffed, or being staffed by inexperienced health providers (Shandra et al., 2011). In addition, the authors state the requirement for the government to devalue their currency often leads to increases in the prices of imports especially drugs, medical supplies, food and fuel. Another requirement is that countries have to liberalise trade by providing economic incentives like tax breaks and regulatory concession like exemptions to environmental, health and labour laws to foreign investors. These exemptions lead to governments being deprived of revenue that could have been invested in health, according to Shandra et al. (2011). The World Bank also forces poor nations to privatise government assets which reduces access to essential services due to higher fees being charged (Shandra et al., 2011). The authors also quote George (1992) who states that when government repays their debts, it reduces the amount of money they have to invest in health, education, family planning and nutrition.

Shandra et al. (2011) conducted a cross-national analysis that seeks to test the Dependency theory's hypotheses that the World Bank structural adjustments adversely affects child mortality in sub-Saharan Africa and also to evaluate the effect of access to clean water and basic sanitation on child mortality. The study found substantial support for the Dependency theory hypothesis regarding the harmful impact of structural adjustments on child mortality in sub-Saharan Africa.

2.6.3 Gender stratification theory

The Gender stratification theory, according to Fred and Field (2000), focus attention on disparities in power and privilege between males and females. It has been argued that women's status especially in terms of their education can foster better infant care which will result in the reduction of infant deaths. Wang (2014) states the Gender stratification theory enhances women's status, especially through education and other means and will greatly increase women's ability to access the socio-economic resources and knowledge required for proper infant nutrition and care; this will result in the reduction of infant deaths. Further, York and Ergas (2011) state that educated mothers are not only more probable to delay and space births, but they are also more likely to have fewer children which reduces infant mortality. Much of the existing research has found that there is a negative link between gender equity and infant mortality rates.

There is a focus on improving female status which has proven to have an effect on infant and child mortality. When females are provided the opportunity to access employment, education, nutrition and health care, they are more likely to seek medical attention for their under-five child. When a women's status is improved in society and they become part of political and other decision-making entities, it can also reduce under-five mortality. Shen et al. (2010) states that this theory can be used to argue that in societies where women have higher status and more autonomy will generally be societies in which child mortality is lower. When women have access to education and other empowering resources it is argued or expected that they may decide to have fewer children and possibly delay the intervals between births as well as increase their use of family planning services available to them which can result in improving the health of children and lowering mortality. Bagade et al. (2021) highlight how female children are not given the same amount of care and attention to nutrition and health need by parents in strong son-bias families can affect their long-term health.

Modernisation theory argue that a nation's economic development will automatically enhance women's status as less developed countries with higher levels of modernisation and industrialisation which provide more labour participation opportunities to women and increases women's access to and control over many resources like education and health services (Shen et al., 2010). The authors' further state that the Modernisation theory suggests that when economic development is taken into account, gender inequality should either play no role or serve as a mediating factor for the effects of modernisation on child mortality. However, these claims have been challenged and arguments against it declare that a large number of women in developing countries are victims of development because they have been relegated to jobs in the backward sectors of the economy. Shen et al. (2010) supported a hypothesis that gender inequality has a detrimental effect on child mortality. The authors further discuss how their test confirmed arguments made by the Modernisation theory which claimed that economic development plays a large role in allocating more resources to healthcare services as well as in reducing gender inequality. The Gender stratification theory reiterates the idea that female education is one of the most important ways that governments and organisations can reduce infant and child mortality, globally.

2.6.4 Economic Disarticulation theory

The Economic Disarticulation theory is another theory that can explain why mortality rates differ in some countries. This theory, according to Fred and Field (2000), argues that the Economic disarticulation has adverse effects on human well-being and that disarticulation exist when the various sectors of a country's economy are disconnected and unevenly developed. Economic disarticulation can reduce well-being and increase child mortality due to economic stagnation and the economy not developing due to it weakening and being disconnected and unevenly developed. Malawi has a prosperous tobacco industry but the rest of the country's economy is not well developed. Even in Palestine, the economy remains fragmented and unsustainable (Leila Farsakh, 2016).

2.6.5 Developmental state theory

The Developmental state theory, according to Frey and Cui (2016), who quotes Evans (1995), contends that strong states can act in ways that promote human well-being and reduce infant mortality. The idea is that developed states share their wealth with their citizens because they know that this will increase development further in different sectors. According to the authors, government actions may include direct efforts to reduce infant mortality through pre-natal and post-natal care programs, as well as indirect programs such as investment in public health and welfare programs; these actions can reduce inequalities to proper nutrition, healthcare, and the like. The Developmental state theory contends that the government is an important player in national economies. According to Fred and Field (2000), governments can operate in ways that increase human well-being by engaging in reproductive efforts such as providing educational, public health and other services. However, Fred and Field (2000) notes that many theorists have argued that strong governments are more likely to pursue policies which promote human well-being whereas other argue that strong governments are opponents of the poor. The findings of several sub-national and cross-national studies of infant and child mortality support the contentions that strong governments increase human-well-being.

So, even though developed states are more likely to share the wealth of the development with their citizen we also have to note that it is harder for developing countries to do the same as they have to invest their funds in programs or projects that can help their country develop more. However, we also see that in Palestine the citizens receive limited access to their services as the occupation government require permits from them to access healthcare, and in this case a share in the healthcare.

2.6.6 Economic dependence

According to Fred and Field (2000), the Economic dependence theorists contend that economic dependence reduces human well-being and increases child and infant mortality. For example, according to Kulik et al. (2016), the negative impact of tobacco is not limited to consumption but also includes its production which has mostly been moved to Least Middle Income Countries (LMICs) and has effects beyond health. For example, Malawi is the world’s largest producer of burley tobacco and also one of the poorest countries in the world. Malawi’s tobacco production has increased the country’s economic dependence on tobacco. This has a negative health impact related to tobacco growing; families get trapped in a cycle of poverty and causes environmental degradation, according to Kulik et al. (2016). The latter is all factors which can have an effect on U5M and child survival.

2.7 Gender equality

In Malawi women and girls have it far worse than their male counterparts in terms of education, wage equality and political participation. Women in the country also have little control over land even when it is their own. The lack of access to productive economic resources, according to USAID, is cited as a major impediment to gender equality and women's empowerment. In the occupied Palestinian territories there are many issues of poverty and strongly gendered social roles which have increased the burden of women's household responsibilities, especially after the deaths of male relatives. According to Khan (2009), women have been obligated to take on additional roles as head of households. However, women's rates of participation in politics and in the labour market remain very low despite their extremely high levels of education.

Gender equality, according to Fred and Field (2000) has been found to reduce infant mortality. Research done by Bagade et al. (2021) found that gender equality was significantly associated with under-five mortality rates and that improvement in gender equality significantly reduced under-five mortality rates. Women's socio-economic positions are important variables in explaining infant/child mortality (Kürkcü and Kandemir, 2017). Increasing women's participation in the economy and increasing their overall access to resources and opportunities can help to reduce under-five child mortality. Kürkcü and Kandemir (2017) conclude in their paper that mortality rates may decrease as a result of the increase in labour force participation rates of women. They conclude further
that there is a negative relationship between the labour force participation of women and gender inequality, so when gender inequality decreases so does infant/child mortality rates.

2.8 State strength

State strength according to Frey and Field (2000) is thought by some Developmental state theorists and researchers to foster human well-being and reduce infant mortality. To measure state strength Frey and Field (2000) assert that they used central government revenue as a percent of the GDP in 1978, however, the preferred measure which was not available would have been some form of state investment in public health. Scott and Cui (2016) used the sum of the central governmental expenditures for public health and military and public education as a percent of the GDP in 2010 to measure state strength and found that state strength had little net impact on infant mortality.

There are many factors that we need to consider when looking at Malawi and Palestine that can contribute to a high infant mortality rate. Those characteristics may include the environmental condition like access to clean water and basic sanitisation, the structural adjustments policies of the World Bank, the legacy of colonialism and the slave trade in Africa and the HIV/Aids epidemic. In Palestine, the political instability and violence are cause for concern.

2.9 Socio-economic factors

2.9.1 Mother's education

Various studies have been completed with a focus on finding the determinants of infant and child mortality. A mother's education is an important variable or factor to look at as a child's mother is in most cases the child's primary caregiver who takes responsibility for ensuring the child health and survival. The dropout rate for students in Palestine is low with the primary data for the 2019/2020 school year showing that the number of students in Palestine reached about 1.309 million students. Out of this number, 1.061 million were students in the basic stage with 49.3% being females. In the secondary stage, there were 248 000 students of which 55% were females. The percentage of literate females is significantly higher than males in Palestine.

A mother's education has also been associated with child mortality and it has been argued that a mother's educational level is critical to a child's survival. The latter is because a mother's education has been associated with a greater probability to seek advice or treatment from a healthcare provider for her child with symptoms of a disease (Stallings, 2004). Buor (2002) also examined the effect that a mother's education has on child mortality in Ghana and the author found that a mother's education is related to childhood mortality which shows an inverse relationship with childhood mortality. The author further states that children of mothers with higher education show a low mortality rate.

The educational attainment of a mother can positively influence her reproductive decisions in terms of healthcare, nutrition, contraception, birth spacing and disease management. Women with a higher level of education can access better work opportunities which will lead to better access to water, sanitation and medical services, the latter which will all help to reduce child mortality. However, mothers who are educated often are more likely to have a job which separates them from their children. This forces them to leave their child in the care of other people who might not have the knowledge needed to take care of children.

A mother's education can also influence her decision in terms of birth and marriage. Studies have found that child mortality is high among adolescent mothers who are school failures and unemployed. Education of women is thus important as it gives women the freedom to seek healthcare for themselves and their children because educated women can delay marriage and birth. A study done by Aheto (2019), based on the 2014 Ghana Demographic and Health Survey (GDHS), produced a predictive model and identified increase in number of total children ever born, number of births in last five years, and mother who did not intend to use contraceptives as critical risk factors that increase the odds of under-five mortality. Additionally, Aheto (2019) found that maternal education and being a female child decreased the odds of under-five mortality.

Research done by Adetunji (1995) counters the claims that child mortality is lower in educated mothers and found with his research using the GDHS birth history data from 2 635 women aged 15-49 years show that infant mortality is higher with mothers with secondary education compared to uneducated mothers. Adetunji (1995) states that among infants, the risk of death increases through economic hardships on young secondary school graduates who become mothers. From the evidence available so far breastfeeding duration and maternal age at child birth seemed to play a very important explanatory role in the relationship.

A population-based cross-sectional study done by Lungu et al. (2020) looked at 543 caregivers of under-five children and found that despite the geographical proximity to healthcare services, caregivers in urban slums of Malawi may not seek healthcare or when they do so the majority may not do so on time. Caregivers often report or seek healthcare services late when they have good knowledge of child danger, according to Lungu et al. (2020). It is important that caregivers have knowledge about child danger or symptoms but it becomes problematic when healthcare services are not sought to get a proper diagnosis for the child. According to Root (2001), a well-educated mother will not be able to reduce the risk of factors beyond her control but with her knowledge, it may help her to use health services more effectively than a mother who is not educated.

As mentioned previously, studies have shown that educated mothers are more likely to access and make use of facilities that promote the health of their child. The health of the mother is just as important to ensure that her child is healthy. According to Buor (2002), to analyse childhood mortality the health of the mother need to be considered as well. The author further states that one of the health problems that affects mother and child is tetanus. The percentage of births to mother who received two doses or more tetanus toxoid injections during pregnancy was higher for those with secondary education and above than for other levels of education. Tetanus is a serious bacterial infection that causes painful muscle spasms and convulsions/seizures and can lead to death. The tetanus toxoid injection is used to prevent this. Vaccinations, according to Buor (2002), show a significant difference by the mothers'
education and shows a steep no education-education gradient irrespective of the immunisation campaigns mounted by government for the last two decades.

A study done by Andriano and Monden (2019) looking at the causal effect of maternal education on child mortality found that in Malawi for each additional year of maternal education, children had a 10% lower probability of dying. The authors further explored which pathways might explain this and states that the estimates suggest that financial barriers to medical care, attitudes towards modern health services, and rejection of domestic violence may play a role. Additionally, they state that being more educated seems to confer enhanced proximity to a health facility and knowledge about the transmission of AIDS in Malawi. Another study done by Abuqamar et al. (2010) on the impact of parental education on infant mortality in the Gaza Strip found that families with lower educational level had much higher risk of infant mortality and the data showed a positive statistical association between parental education and survival of infants.

Due to an increase in the education levels of women more and more mothers choose to go out and work to be more independent and earn their own money. Ko et al. (2017) identified socio-economic factors having an impact on child mortality of Myanmar in 2014 which were inverse relationships between urbanisation, electricity supply, safe latrine, drinking water, and child mortality while smoky cooking fuel has positive relationships with child mortality. Additionally, the authors found that maternal literacy and female unemployment had no impact on either infant or under-five mortality in Myanmar. Possible explanations for the latter findings were that mothers who are not working have more time for child bearing and child rearing practices. When a child becomes sick household members or parents particularly mothers take the responsibility of care giving to their child, and in the case of wealthier maternal status, there is no need to earn money and they can purchase high quality food and medical services for their children (Ko et al., 2017). Kishor and Parasuraman (1998) state that despite the many advantages of the employment of women in economic activity, in India these have been associated with increased mortality for infants and young children. The authors conclude that infant mortality does not vary by whether a mother is employed or not but mother's employment does have negative consequences for infant survival if the mother works away from home for cash or lives in an urban area.

2.9.2 Wealth

There are various socio-economic factors that can have an impact on under-five child mortality. It is thus important to look at the wealth index of the family and in this case the parents of the child. Household income and wealth is important as mothers who do not have money to go to a clinic or hospital to see a professional are placed in a dangerous situation when they are not able to take sick children to a hospital. It was found that child mortality is higher within poor or low income families than in richer or middle and high income households. A study done by Chao et al. (2018) looked at the country-year-specific under-five mortality rates by wealth quintile on the basis of household wealth indices for 137 Low and Low Middle Income Countries (LMIC) from 1960 to 2016 and found that absolute disparities in under-five mortality rate between the poorest and richest households have narrowed significantly since 1990, whereas relative differences have remained stable. Despite the significant reduction in under-five child mortality, mortality rates still remain the same with under-five children in the poorest quintile being twice as likely to die before their fifth birthday compared with those in the richest quintile, according to Chao et al. (2018).

The U5MR in African countries are less affected by household wealth which is possibly due to the high levels of poverty still in the majority of its countries. Nattey et al. (2013) argue that there are differentials between wealth quintiles and child mortality with under-five mortality declining gradually with increasing wealth. Appunni and Hamisi (2012) state in their study done on under-five mortality in Tanzania, households with the highest wealth quintile had the lowest under-five mortality while households with the lowest wealth quintile had the highest under-five mortality. The authors state further that a strong association of high under-five mortality rate with low socio-economic status is prevalent in rural areas. According to Antai (2010), a low socio-economic status has been associated with health problems like an increase in chronic diseases and low birth weight. Van Malderen et al. (2019) also state that socio-economic factors such as place of residence, mother's educational level or household wealth is strongly associated with risk factors of under-five mortality such as health behaviour or exposure to diseases and injuries. They further contend that their findings show that among the eleven countries they investigated, household wealth contributed to more than 25 percent of the variability in U5MR. According to Houweling and Kunst (2010), in LMICs the probability of dying in childhood is strongly related to the socio-economic position of parents or household in which the child is born and state that childhood mortality is systematically and considerably higher among lower socio-economic groups within countries.

2.9.3 Place of residence

The place of residence is another factor which can influence child mortality. In Malawi we see that most of the citizens live in rural areas with inadequate infrastructure like clean water, which can have an effect on child survival. Many children in Palestine are living in housing that are not ideal due to the current ongoing conflict and are being displaced. The violence in the place of residence experience by children by the hands of the authorities can lead to child mortality. Many households also don't have adequate access to water and sanitation. In 2020, 28% of Palestinian households were exposed to a shortage of water with 37.5% coming from the Gaza Strip and 21.6% from the West Bank region.

The place of residence has an impact on survival as it was confirmed by Mahmood (2002) that parents who live in urban areas mostly receive better health services than those who live in rural areas. The author further explains that more primary health services are available in urban areas than in rural areas. According to Mahmood (2002), rural areas are characterised by poor health services and shortages of skilled staff. According to Waterston and Nasser (2017), morbidity is greatly affected by the occupation which has increased violence towards children, mental health problems and poor nutrition, particularly in Gaza which is experiencing a health crisis. Furthermore, Waterson and Nasser, (2017) state that access to healthcare for children in Palestine is constrained by difficulties with ambulance transfers, by shortages of equipment in hospitals and lacks of trained staff and as a result of the requirement for visas to travel into Jerusalem where specialist hospitals are sited. Van Malderen et al. (2019) also observed inequalities related to place of residence and found that in certain countries U5MRs was lower in urban areas while and in other countries it was lower in rural areas. However, the authors state that even though the urban-rural difference is narrowing or even reversing in some countries due to a more rapid mortality decline in rural areas than in urban areas and deplorable living conditions in urban slums, an urban advantage still persists in many countries. According to Van Malderen et al. (2019), these urban advantages can be attributed to access to health services and better economic opportunities for families.

2.10 Demographic factors

2.10.1 Age of the mother

The age of the mother can play a significant role in child mortality. In a study done by Akoto and Tambashe (2003) they found that the older the mother is the higher the child's chances are of survival. The latter can be due to older women being more experienced or educated and having resources that better their chances of seeking enhanced healthcare advice and treatment and being able to afford healthcare. Ribeiro et al. (2014) state that mothers aged younger than 15 years or aged 35 and above have experienced a higher risk of child mortality. Additionally, they state that the 25% of women in the world have their first baby before the age of 20 years and most of these women reside in developing countries. However, in a study done by Rutstein (2000) he states that the percentage of births to mothers who are 35 years or above was associated with higher infant mortality rates while the percentages increase when births to mothers aged 18 years was also associated with higher neonatal deaths but a lower under-five mortality rate.

The study done by Finley et al. (2011) examines the association between maternal age at first birth and infant mortality, stunting, underweight, wasting, diarrhoea and anaemia in children in LMICs. The authors' study revealed two salient findings, according to them, in the sample of women who had their first birth between the age of 12 and 35, the risk of poor child health outcomes is lowest for women who have their first birth between the ages of 27 and 29. Additionally, the results show that both biological and social mechanisms play a role in an explanation as to why children of young mothers have poorer outcomes. The authors conclude that the first born children of adolescent mothers are the most vulnerable to infant mortality and poor child health outcomes and first time mothers up to the age of 27 have a higher risk of having a child who has stunting, diarrhoea and moderate or severe anaemia. Maternal and child health programs should take account of this increased risk even for mothers in their early 20s and increasing the age at first birth in developing countries may have large benefits in terms of child health, according to Finley et al. (2011). The main messages from the study is that the age of the mother at their first birth is a key to correlate of child health outcomes and teen mothers who have children of mothers who have had their first birth in early 20s, are also at risk of poor health outcomes compared to first time mothers in their late 20s.

According to Nadeem et al. (2021), the young age of the mother increases the under-five mortality due to the reason that young mothers have premature reproductive systems which leads to underweight and vulnerable children. Their results show that if a mother is less than 20 years of age a child is 2.38 times more likely to die. However, the authors also state that some studies are claiming that after a certain age limit and an increase in maternal age may be associated with high infant/under-five mortality due to the reason that older mothers have declining maternal resources due to aging.

2.10.2 Birth interval

There are a few studies that have been done to find out what the most favourable birth interval is as well as to determine the relationship between birth interval and mortality. One such study was done by Rutstein (2005) where the authors state that there are different ways in which birth intervals might affect childhood mortality and contend that shorter birth intervals related to severe pregnancy complications increase morbidity during pregnancy and increase the risk of infant and maternal deaths. Budu et al. (2021) examined the association between birth interval and under-five mortality and found that children born to mothers who had >2 years birth interval were less likely to die before the age of five compared to mothers with ≤2 years birth interval. Budu et al. (2021) concluded their study and found that shorter birth intervals are associated with higher under-five mortality. According to Nadeem et al. (2021), the rapid succession of births destroys the mother's reproductive and nutritional resources which can lead to premature and harmful births.

Shifti et al. (2021) looked at the effects of short birth intervals on neonatal, infant and under-five mortality in Ethiopia. The study findings revealed that neonatal mortality were about 85 percent higher among women with a short birth interval (SBI) than those without. The odds of infant mortality were twofold higher among women with SBI and the odds of under-five mortality were also about two times higher among women with SBI, according to Shifti et al. (2021). Shifti et al. (2021) also note that some of the effects of SBI may include but are not limited to preterm birth, low birth weight, small size for gestational age, congenital anomalies, autism, miscarriage, pre-eclampsia and premature rupture of membranes.

2.10.3 Birth order

The birth number or order in which a child is born can also influence child survival. The study like the one done by Dunasekaran (2008) found that the chances of a child dying due to being first or of a higher birth number is much higher than children born in between. Lundberg and Svaleryd (2017) quotes Brenoe and Molitor (2015) who state that firstborns are disadvantaged at birth, measured by a number of different birth outcomes compared to later born siblings and that this is unlikely to depend on the behaviour of the mother. Fagbamigbe et al. (2022) also state that there have been conflicting reports on how birth order can affect the under-five death rate and note Sahu et al. who reported that the risk of under-five deaths was higher among the birth order four and above, in rural communities.

Lundberg and Svaleryd (2017) state that if a mother has lost a child, the probability that she has another child increases, and the effect of a child's death in infancy are larger for the probability to have a third or fourth child. They conclude that their results strongly indicate that the endogenous fertility response of a child's death could give rise to negative birth order effects on mortality which means lower birth order children are more likely to die.

2.10.4 Sex of the child

As noted in this chapter, there are clear inequalities between male and females in terms of the under-five mortality. Costa et al. (2017) state that the inequalities are due to biological reasons as boys is more likely to die than girls. Even in countries where girls and boys have the same access to resources and care Costa et al. (2017) notes that higher mortality rates still occur among boys due to their greater biological frailty. However, this is not always the case and gender disparities should be examined on a case by case basis. Hussein et al. (2021) found that although the sex of the child was significant it was negatively associated with under-five deaths in Kenya. The authors state that after considering the effects of other independent variables, the probability of female children dying before their fifth birthday decreased by 28 percent compared to that of male children which means that males under-fives were at a higher risk of mortality in Kenya.

2.10.5 Parity

High parity refers to those mothers who have had five or more births. High parity has been associated with having a higher risk of child mortality than mothers with lower parity births. The study done by Kozuki et al. (2013) examine the impact of high parity on under-five and neonatal mortality. The study found a statistically significant association between high parity and child mortality. However, they note that the association is most likely not physiological and can be largely attributed to the difference in background characteristics of mother who complete reproductions with high fertility versus low fertility. The authors conclude with their analysis and strongly suggest that the observed increased risk of mortality associated with high parity births is not driven by a physiological link between parity and mortality. The authors also found that at each birth order, children born to women who have high fertility at the end of their reproductive period are at significantly higher mortality risk than children of mother who have low fertility even after adjusting for available confounders.

The study done by Sonneveldt et al. (2013) investigate whether high parity is associated with lower coverage of key health interventions that might lead to increased mortality. The results show a significant relationship between coverage of maternal and child health services and birth order even when controlling for poverty. They state that the association between coverage and parity for maternal health was more consistently significant across countries while for child health interventions there were fewer overall significant relationships and more variation both between and within countries. The authors conclude that coverage of key health interventions is lower for high parity children and the pattern is consistent across countries. The latter, according to Sonneveldt et al. (2013), could be a partial explanation for the higher mortality rates associated with high parity. A study done by Girma and Berhane (2011) found that immunisation, breastfeeding and low parity mothers were independently to be protective from childhood death.

Majoko et al. (2004) conducted a study to compare pregnancy complications and outcomes among nulliparous, low (1-5) and high (≥6) parity women who registered for antenatal care and gave birth in Gutu District, Zimbabwe and classified in groups of parity. The study found that compared to low parity women, nulliparous (women who hasn't given birth to a child) and high parity women had an elevated risk of hypertensive complications. They also found that the risk of developing any pregnancy complications was higher in nulliparous women and conclude that nulliparous women had an increased risk of pregnancy complications and high parity women with no previous completed pregnancy were at low risk of complications. Nadeem et al. (2021) also concludes that the number of children of each mother is an important predictor for U5M and their Pearson Chi-Square test shows that they both are significantly associated with one another which shows that there is a chance of high U5M in cases where a mother has more children.

2.11 Health seeking behaviour

2.11.1 Place of delivery

The safest place to deliver babies is at health facilities for both mother and child as mothers who deliver in health facilities tend to have higher child survival rates. This is confirmed by Ettarh and Kimani (2013) who says that the likelihood of under-five mortality has also been linked to a place of delivery with evidence indicating that women who deliver at health facilities have lower probability of reporting child death compared with those delivering in home settings. The latter is due to many healthcare facilities having safety protocols in place to provide mothers with a much higher level of delivery care than they would receive at home where there are not skilled birth attendants and poor equipment which can lead to the death of the child. A study done by Whitworth and Stephenson (2002) state those women who deliver at health facilities could receive health advice from professionals and may be less likely to progress quickly to the next conception. Babies are also less likely to contract an infection at a hospital due to there being hygiene protocols in place to insure the safe delivery. However, the analysis done by Ettarh and Kimani (2013) revealed that the place of delivery of the child and postnatal visits to a healthcare facility two months after delivery were not significantly associated with under-five mortality in rural and urban areas. According to Ajaari et al. (2012), place of delivery is a significant predictor of neonatal mortality and pregnant women should be encouraged to deliver at health facilities as mothers who deliver outside a facility in their study experienced 1.85 times higher odds of experiencing neonatal deaths than those who deliver in a health facility.

2.11.2 Prenatal care

Prenatal care is important throughout a mother's pregnancy to ensure that both the mother and foetus are healthy. A study done by Pinzón-Rondón et al. (2015) look at low birth weight and prenatal care and according to them, worldwide more than 20 million infants are born each year with low birth weight which is alarming because it represents 15.5 percent of all live births. Low birth weight is one of the most important factors affecting child morbidity and mortality worldwide and according to Pinzón-Rondón et al. (2015) approximately one third of neonatal deaths are attributed to it. A low birth rate prevalence of 8.7 percent was found in their study with quality of prenatal care, number of prenatal visits and first prenatal visit during pregnancy were associated with low birth weight even after controlling for all the study variables.

Makate and Makate (2017) looked at the impact of prenatal care quality on neonatal and infant and child mortality in Zimbabwe and noted that a one-unit increase in the quality of prenatal care lowers the prospects of neonatal, infant, and under-five mortality by approximately 42.33%, 30.86% and 28,65%, respectively. The authors further noted that examining the effect of individual prenatal care components on child mortality revealed that women who receive information on possible complications arising during pregnancy are less liable to experience a neonatal death. Even women who had blood pressure checks and tetanus immunisations were less likely to experience an infant or under-five deaths, according to Makate and Makate (2017).

2.11.3 Delivery attendant

Titaley et al. (2012) stated that access to skilled birth attendants and emergency obstetric care are thought to prevent early neonatal deaths. With their study, they look at the type of delivery attendant, place of delivery and risk of early neonatal mortality. As mentioned before, the safest place to deliver a baby is in a health facility with a skilled birth attendant. Titaley's study found that there was no significant reduction in the risk of early neonatal deaths for home deliveries, assisted by trained attendants, compared to those assisted by untrained attendants. The risk of early neonatal deaths was higher for home deliveries in rural areas with trained attendants than home deliveries assisted by untrained attendants. Further, the data revealed that there was an increased risk associated with deliveries in public hospitals located in rural areas. Moreover, Titaley et al. (2012) stated that while skilled birth attendance has been claimed to be the key intervention to improve neonatal survival, the results from their study suggest that having trained attendants for home deliveries might not be a critical intervention to reduce neonatal mortality in Indonesia. Nadeem et al. (2021) also looked at how delivery attendants affected mortality and stated that their results indicate that there is an association between the U5MR and delivery assisted by skilled birth attendants. The authors state that the results may lead them to conclude that the mortality rate is higher when the delivery is not assisted by a skilled birth attendant and vice versa.

Muzyamba et al. (2018) looked at professional care delivery or traditional birth attending and how it impacts the type of care utilised by mothers in under-five mortality of their children. Due to the high under-five mortality rate in Zambia, their government adopted the WHO policy on child delivery which insists on professional maternal care. The authors state that the latter decision got a lot of criticism as the policy banned traditional birth attendants and was argued to be out of touch with the local reality in Zambia. The results from Muzyamba et al. (2018) study revealed that the use of professional care as opposed to traditional birth attendants in all three stages of maternal care increases the probability of children surviving beyond five years. The authors state that for women with HIV, professional care usage during antenatal, at birth, and during postnatal periods increased the probability of survival by 0.07 percentage points, 0.71 percentage points, and 0.87 percentage points, respectively.

2.11.4 Household food security and under-five child mortality

Food security is an especially important issue in Africa, especially in Malawi as the majority of the country is living in poverty. A country like Palestine under the current conflict also faces a lot of food insecurity due to many Palestinians being displaced. In a study done by Abdel Hamid El Bilbeisi et al. (2022) to identify the prevalence of household food security and its association with demographic and socioeconomic factors in the Gaza Strip, the researchers found that the overall prevalence of household food insecurity was 71.5%. Poverty can lead to children experiencing food insecurity which can result in them having inadequate food intake and that can lead to malnutrition and ultimately death.

Table 2.4: The percentage of children under five years by nutritional status and sex in Palestine, 2019-2020

Malnutrition indicators	**Male**	**Female**
Stunting	8.6	8.8

Underweight	2.6	1.6
Wasting	1.3	1.3

Source:https://www.pcbs.gov.ps/portals/_pcbs/PressRelease/Press_En_5-4-2021-child-en.pdf

The Malawi Fifth Integrated Household Survey 2020 collected data on household food consumption. In Malawi consumption of three or more meals in a day is customary. However, according to their Integrated Household Survey (IHS) household food rationing in the face of food shortages include reduction in the number of meals consumed by both adults and children. The data from the survey shows that overall 48.7 percent of the households reported that children aged 6-59 months were taking two meals per day followed by 48.2 percent of them taking three or more meals per day. Based on the place of residence, 83 percent of households in urban areas reported that children aged 6-59 months were taking three or more meals a day compared to 42 percent of household in rural areas.

Nutritional programmes were introduced in the country to address problems of morbidity and mortality among malnourished children aged less than five years by improving their nutritional status through an appropriate and sustainable rehabilitation programs. Analysis by place of residence shows that 3.8 percent of children in rural areas and 3.6 percent in urban areas were beneficiaries of the programmes and by level of education of the mother, 3.9 percent among children of mothers with no education participated in the nutritional programmes compared to 4.2 percent among children whose mothers had primary education, according to the survey data.

2.12 Hygiene

2.12.1 Water

Clean drinking water is another factor that can influence child mortality. The study done by Mahmood (2002) states that households with an improved source of water connected to their house, have a lower U5MR than those household that depend on wells for drinking water. Children having access to clean water are less likely to get diseases like cholera and diarrhoea. For example, Nadeem et al. (2021) state that if the mother or the child does not have access to clean drinking water there are more chances of mortality. The authors further state that their test revealed a strong association between the two variables and that it is evident that households who are using improved sanitation facilities face fewer U5M as compared to those who do not possess improved sanitation facilities and vice versa, that is, U5M is significantly associated with the improved sanitation facility. Cheng et al. (2012) study findings support the latter statement as their analysis revealed that access to water and sanitation independently contributes to child and maternal mortality outcomes. Their study revealed that the U5MR decreased by 1.17 deaths per 1 000 live births for every quartile increase in population water access.

Pickering and Davis (2012) look at freshwater availability and water fetching distance and how these affect the health of a child. The authors state that two-thirds of the population in Africa must leave their home to fetch water for drinking and domestic use which
can be a time burden and can influence the volume of water collected by households as well as time spent on income generating activities and child care. The authors found that time spent walking to a household's main water source was found to be a significant determinant of under-five child health. Their findings revealed that a 15-min decrease in one way walk time to water source is associated with a 41 percent average relative reduction in diarrhoea prevalence, improved anthropometric indicators of child nutritional status and a 11 percent related reduction in under-five child mortality.

2.12.2 Diarrhoea

Diarrheal-related diseases are one of the leading causes of post neonatal deaths in children under-five years worldwide, according to Chattopadhyay et al. (2016). Diarrhoea is luckily preventable and treatable. However, in countries, especially LMICs, where countries struggle with water and sanitation, this can become a bit more problematic when we talk about access to adequate sanitation and hygiene. Globally, according to WHO, there are nearly 1.7 billion cases of childhood diarrhoeal disease every year. The study done by Moon et al. (2019) look at the social-demographic characteristics, household living conditions and water, sanitation and hygiene (WASH)-related characteristics to investigate if there is an association between the direct and indirect risk factors and children's diarrhoea in Malawi. According to Moon et al. (2019), diarrhoea accounted for 7% of under-five mortality in 2017 for Malawi. Moon et al. (2019) found that in their study of risk factors of diarrhoea among under-five children, a child's socio-demographic characteristics as well as poor conditions of WASH increased the diarrheal risk of young children. In developing countries, according to Abuzerr et al. (2020), it has been estimated that 1.8 million people die annually due to diarrheal diseases and more than 80% of them are children aged under-five years mainly due to poor WASH conditions in households.

Diarrhoea, according to WHO, is also a leading cause of malnutrition in children under-five years old. Diarrhoea can be transmitted within the household and community environments, according to Root (2001). According to Chattopadhyay et al. (2016), mothers who teach each other proper techniques for hand washing and food preparation may mitigate known childhood diarrheal risk factors as most women in their study were eager to learn how to prevent diarrhoea. The WHO emphasised safe water, improved sanitation facilities, and hand washing behaviour using soap to prevent diarrhoea (Moon et al., 2019). In the Gaza Strip, the high population density combined with a severe poverty rate creates a high risk environment for the spread of diseases, according to Abuzerr et al. (2020). Due to the conflict in Palestine, the current situation is dire with severe fuel shortages, according to Abuzerr et al. (2020). The fuel is needed to stimulate the power wastewater which causes raw sewage to flood into residential neighbourhoods. The latter combined with ineffective sewage management makes the Gaza Strip the worst-cases scenario in respect of WASH-related diseases, according to Abuzerr et al. (2020).

Abuzerr et al. (2020) state that further improvements in the existing sewerage system and the intensification of sanitation and hygiene promotion programs at the household levels may reduce the risk of acute diarrhoea among children under-five years in the Gaza Strip (Semba et al., 2011). According to the WHO (2017), about 1.748 million people still use unimproved shared toilets such as bucket latrines and pit latrines. A study done by Van der Klaauw and Wang (2004) in India, revealed that having access to toilet facilities can reduce the U5MR and continued to say that post-neonates in households with no toilet facilities experience a higher risk of death compared to those households with a toilet facility. The study by Semba et al. (2011) looked at the relationship of the presence of a household improved latrine with diarrhoea and under-five child mortality in Indonesia and found the presence of toilets or latrines was associated with lower child mortality.

2.12.3 Premature births

Children still face the greatest risk of death in their first twenty-eight days, according to the WHO (2020). Globally, preterm birth is one of the leading causes of child deaths under the age of five, according to UNICEF as almost fifteen million babies in the world are born prematurely and nearly one million die due to related complications. The organisation states that in 2019, 47% of all under-five deaths occurred in the new-born period with about one third dying on the day of birth and close to three quarters dying within the first week of life. The children who die within the first twenty-eight days of birth suffer from conditions and diseases associated with lack of quality care at birth or skilled care and treatment immediately after birth and in the first day of life, according to the WHO. According to Nadeem et al. (2021), their results show a strong association between premature births and the U5MR and therefore premature birth can be a potential predictor of U5M.

2.12.4 Strategies employed to combat child mortality

Reducing child mortality is one of most strongly supported goals in the world as it affects even the most developed countries. However, despite the progress made with reducing child mortality worldwide, there is still a wide gap between developing and developed countries in terms of under-five mortality rates. There are often problems with calculating the U5MR in less developed countries where vital registration may not be as efficient. In Malawi, under-five clinics are an important part of their comprehensive health care programs which was established to monitor growth and development of children up to five years of age and to identify factors that may hinder their growth potential. Based on Malawi's Fifth IHS report in 2020, 71.7 percent of children aged 0-59 months attended these under-five clinics with 73.8 percent coming from rural areas compared to the 60.2 percent in urban areas.

As mentioned before, water and sanitation has been found to be one of the main factors associated with child mortality. The United Nations (UN) has developed several MDGs which Malawi and Palestine are signatories to. The MDGs have been employed to combat child mortality. One of the goals is to make the environment in which children live more sustainable. Studies have found that with proper investment in water and sanitation, child mortality could be reduced. Water is very important for any person to maintain a healthy life. However, water pollution is a very big issue and a study done by Wahab et al. (2015) in Malaysia, found that river pollution has a strong correlation with under-five child mortality. The water resources in Palestine are relatively limited and scarce and have an effect on food security as well. The study done by Shandra et al. (2011) also found that improved water sources and sanitation facilities are associated with lower levels of child mortality in Sub-Saharan African nations.

Sharrow et al. (2022) conclude that it is undeniable that investments into immunisation projects, access to nutrition and micronutrients, skilled attendants around birth and postnatal care, and expanded access to safe water, sanitations and hygiene has helped with the reductions in under-five mortality since 1990. However, they note that a large number of deaths still remain and that children still face widespread geographical and income disparities. The study by Aheto (2019) identified critical risk factors for under-five mortality and strongly highlights the needs for family planning, improvement in maternal education and addressing regional disparities in child health which could help inform health policy and intervention strategies aimed at improving child survival. To reduce the under-five child mortality in Bangladesh, Mohammad and Tabassum (2016) suggest that female participation in the education programs need to be increased because it consequently bring improvement in child health, use of contraception to limit and space births, vaccinations and treatments. Additionally, Mohammad and Tabassum (2016) suggest that governments should provide high impact health and nutrition interventions, arrange family and social awareness programs as well as health related programs for women so that they are discouraged to take child at their young age.

As stated before diarrhoea is one of the leading causes of under-five mortality due to poor WASH conditions. According to Abuzerr et al. (2020), in order to mitigate morbidity and mortality due to diarrheal diseases, it is necessary to direct global attention to improving access to safe drinking water and enhance the sanitation and hygiene conditions among vulnerable communities.

2.13 COVID-19 impact on under-five mortality

Covid-19 caused disruptions in the everyday lives of people worldwide. The virus caused many disruptions in service delivery, especially in hospitals where healthcare systems literally crashed in the majority of countries. Due to the healthcare services being used at capacity, and in some cases depleting, many hospitals have had to ask patients to only access healthcare services if it is essential. It is inevitable that the Covid-19 virus has increase under-five mortality whether it is due to service disruptions or decreased access to food caused by parents losing their incomes or children contracting the virus. The pandemic increased the concern for an increase in indirect deaths among children and youth due to disruptions of specific interventions and services that have proven to be critical in saving children and women's lives in low-and middle-income countries.

In a study done by Robertson et al. (2020) they modelled hypothetical scenarios in which the coverage of essential maternal and child health interventions is reduced by 9.8-51.9% (first scenario) and the prevalence of wasting is increased by 10 – 50% (second scenario) and used the lives saved tool to estimate additional maternal and under-five deaths under each scenario. The study findings found that over six months would result in 253 500 additional child deaths if there was a coverage reduction of 9.8-18.5% and wasting increase of 10% (first scenario). Additionally, they found that there would be another 1 157 000 additional deaths over six months if coverage reductions of 39.3-51.9% and wasting increase of 50% (second scenario). The findings show that if routine health care is disrupted and access to food is decreased due to unavoidable shocks, health system collapse, or intentional choices made in responding to the pandemic, the increase in child and maternal deaths will be devastating (Robertson et al., 2020). While the latter study looks at the effect that service disruptions and the decreased access to food have on child mortality, the study by G. Shapira et al. (2021) looks at the potential impact of the 2020 economic downturn due to Covid-19 pandemic on infant mortality. The findings from Shapira et al. (2021) highlight the vulnerability of infants to the negative income shocks due to Covid-19. Income shocks in the form of job loss or having to accept a lower wage can have an impact on food security, especially in countries like Malawi and Palestine where food insecurity is currently very high. However, the 2021 UNICEF child mortality report claims that data from over eighty countries and areas do not show any reversal in child mortality gains in 2020 which was projected by some early modelling based on assumed service disruptions. Furthermore, the organisation states that the evidence on deaths directly attributed to Covid-19 infection is strongly age dependent with children and adolescents the least affected. The organisation continues and states that investments in data collections systems and concerted robustness of mortality data must be continued for greater accuracy and timeliness in monitoring the survival situation for children, adolescents and youth.

2.14 Conclusion

This chapter provided a review of theories that explained why under-five mortality rates varied among developing countries. It was discussed how among all the countries about 45% of them have cut their under-five mortality by at least two-thirds with thirty-nine of the countries being from low-or lower-middle-income countries which shows us that even though the burden of child mortality is unevenly distributed throughout the world, improving the under-five mortality or child survival is possible regardless of resource-constraints (UNICEF, 2021). In this chapter, a discussion and review of the literature in terms of demographic and socio-economic determinants of U5MR was also provided. It is evident that depressing socio-economic variables can have a negative influence on U5M. The next chapter looks at the research design and methodology which will be examined.

Chapter Three

Research design and methodology

3.1 Introduction

The goal of this study is to look into the factors that influence under-five child mortality in Malawi and the State of Palestine. This chapter outlines the data sources, sample selections, data quality, and analytical tools, among other things, that will be utilised for analysis in Chapter Four.

3.2 Site selection

Two geographical regions are selected for this study. The two regions are Malawi and Palestine. Malawi is divided into twenty-nine districts which are as follows: Chitipa, Karonga, Nkhata Bay, Rumphi, Mzimba, Likoma, Kasungu, Nkhotakota, Dowa, Salima, Ntchisi, Dowa, Lilongwe, Mchinji, Dedza, Ntcheu, Balaka, Mangochi, Machinga, Zomba, Phalombe, Mulanje, Thyolo, Chiradzulo, Blantyre, Mwanza, Neno, Chikwawa and Nsanje (see Fig.1.1). The study looks at all twenty-nine districts. In Palestine, the Northern West Bank, Central West Bank, South West Bank, and Gaza Strip are the geographical areas that are included in the study (see Fig. 1.2).

3.3 Data sources

The MICS6 gives us data on household living conditions, the results of interviews with women aged 15 to 49, data on children under the age of five from mothers or other caregivers, and disaggregated data by sex, wealth, urban and rural areas, and, in some cases, sub-national level. The survey gathered data on fertility, early childbearing, contraceptive use, antenatal care, delivery care, birth weight, immunisation, diarrhoea, malnutrition, infant and young child feeding, as well as demographic information such as respondents' age, literacy, household composition, and other factors. Data was also collected on drinking water, hand washing, and sanitation among other things.

3.4 Sample design and study data

The Global Multiple Indicator Cluster Survey (MICS) Programme was developed by UNICEF in the 1990s as an international multi-purpose household survey programme to support countries in collecting internationally comparable data on a wide range of indicators on the situation of women and children (National Statistical Office, 2021). Because the surveys are routinely conducted every five years, we can compare data across time and draw comparisons between nations like Malawi and Palestine. These surveys were conducted in December 2019/August 2020.

The sample frame for Malawi is based on the 2018 Population and Housing Census. The number of households in each enumeration area from the 2018 Population and Housing Census frame in Malawi was used to select census enumeration areas (EA) from each of the sampling strata using systematic probability proportional to size (pps) sampling procedures. The sample for the Malawi MICS6 2019-20 was designed to provide estimates for a large number of indicators on the situation of children and women at the national level, for urban and rural areas, and for the twenty-eight districts. The urban and rural areas within each district were identified as the main sampling strata and the sample of households was selected in two stages. Within each stratum, a specified number of census enumeration areas were selected systematically with probability proportional to size. After a household listing was carried out within the selected enumeration areas, a systematic sample of twenty-four households was drawn in each sample enumeration area. A total of 1 112 sample EAs and 26 904 households were selected at the national level. In the case of the small island district of Likoma, a one stage selection of households from the combined listing for all Eas of the urban and rural areas was done. A total of ninety-six households across the two urban Eas and 504 sample households across the fourteen rural Eas of Likoma were selected.

The Palestine MICS6 was carried out in 2019-2020 by the Palestinian Central Bureau of Statistics in partnership with the Ministry of Health. This was all part of the Global MICS Programme and technical support was provided by UNICEF and UNFRA. The sample frame is based on the Population Housing and Establishment Census 2017 and the Household Listing 2019. For Palestine, the same sample design was selected as the case in Malawi, but at the national level a total of 420 sample Eas and 10 080 sample households were selected in the four areas. The listing teams in the field created household lists for each enumeration region.

At the Palestinian Central Bureau of Statistics and the National Statistical Office in Malawi, the households were sequentially numbered from one to M_{hi} (the total number of households in each enumeration area), and twenty-four households in each enumeration area were selected using random systematic selection procedures. The selection procedures were accomplished using the MICS6 spreadsheet template for systematic random selection of households.

3.5 Research design and instruments

Using UNICEF's MICS6 2019/2020 data, this study tries to uncover the predictors of under-five infant mortality in Malawi and Palestine. Both countries' MICS6 employed interviews to collect data on women aged 15 to 49 years and children under the age of five. Both Malawi and Palestine's MICS6 for 2019/2020 was designed to offer estimations for a broad variety of indicators on the status of children and women at the national level, in both urban and rural regions. The surveys were based on the MICS6 standard questionnaires and translated into each country or region's native language. In addition to administering questionnaires, fieldwork teams observed hand washing stations, examined the weights and heights of children under the age of five, and tested E. coli levels in home and source water.

For the Malawi survey, six sample independent data sets were collected through questionnaires. These datasets were: households, women (age 15-49), men (age 15-49), children under-5, children (age 5-17), water quality testing and lastly a dataset on birth history. The average household size was 4.28 persons. The percentage under age five was 14.3 and the percentage of women age 15-49 years with at least one live birth in the last two years was 50.90. The composition of the population living in the urban area was 15.5% and in the rural area it was 84.5%.

The sample size for Malawi was N=63 945 and the data set that was chosen for the analysis was birth history (bh.sav) data set which reflected the combined birth histories of both the mother and the child under-5. After the cases for children over the age of 4 years were filtered out in a statistical programme, the subset was then n=15 569 cases.

In summary, for the Palestine survey, five independent sample data sets were collected through questionnaires. The only difference was that data set for men was not in the survey. The average household size was 5.1 persons. The percentage under age five was 13.7 and the percentage of women age 15-49 years with at least one live birth in the last two years was 22.0. The composition of the population living in the urban area was 76.9%, in the rural area it was 15.2% and in the camps it was 7.9%.

The sample size for Palestine was N=25 482 and the data set that was chosen for the analysis was the bh.sav data set which reflected the combined birth history of the mother and the child under-5. After the variables for children over the age of 4 years were filtered out, the subset was n=6 329 cases.

3.6 Selected variables and definitions

The variables under scrutiny fall into two categories: socio-economic and demographic variables. These variables are:

3.6.1 Under-five mortality (child survival)

U5M is the main dependent variable that is used in this study. This study intends to measure the risk of the child dying before reaching their fifth birthday. The variable from the MICS6 survey is 'child alive' and 'child dead'.

U5MR Formula $=\frac{Number\ of\ deaths\ between\ the\ ages\ of\ 0-5\ years\ of\ age\ in\ year}{number\ of\ live\ births\ in\ the\ same\ year} \times\ 1000$

3.6.2 Mother's age at birth

Mother's or caregivers' age is an independent variable and refers to the mother's age at first birth. As discussed in Chapter Two of this study, it has been found in many cases that maternal age can have an effect on under-five mortality. Females aged 15-49 years who were in their reproductive ages were interviewed to gather data on the welfare of women and children. This variable is used to determine whether a mother's age has an effect on U5M in the two countries.

3.6.3 Birth order number

This variable refers to the order a child is born to a mother. Many studies have discovered that firstborn children had the highest chance of survival at birth, as mentioned in Chapter Two of this study. According to studies, the likelihood of dying rises as the birth order rises.

3.6.4 Sex of child

This variable refers to the sex of the child which is coded into two options which are either male or female. The sex of the child is an independent variable.

3.6.5 Mother's education

This variable looks at the mother's highest level of education and is classified into different categories ranging from primary to vocational training.

3.6.6 Birth interval

This variable refers to the duration of months between the one child's birth until the next pregnancy. This variable is coded into first birth, <2 years, two years, three years and 4+ years.

3.6.7 Area or type of place of residence

Inadequate provisions of services such as clean water, employment, sanitation and healthcare, which are important predictors of infant and child mortality, are common in rural areas. In contrast, metropolitan regions are more developed, with better access to clean water, proper sanitation and high-quality healthcare. As a result of these factors, children born to mothers who live in rural areas have a substantially higher risk of dying than children born to moms who live in urban areas.

3.6.8 Region

Infant and under-five mortality rates are typically greater in some places than others due to unequal development and resource distribution.

3.6.9 Wealth index

Children's survival and mortality risks are influenced by their families' financial position. For their children, wealthy families can afford the best possible education and healthcare. As described in Chapter Two of this study, children from the poorest homes are more likely than those from the richest to die before reaching the age of five. This variable is coded into classifications which are poorest, poorer, middle, richer and richest.

3.7 Data analysis and methods

The MICS6 data is analysed using the Statistical Package for Social Sciences (SPSS) version 28. The MICS6 datasets were analysed at three levels in this study: univariate, bivariate, and multivariate levels of analysis.

3.7.1 Univariate analysis

The goal of the univariate analysis is to describe the background features of the dependent and independent variables. The results of the univariate analysis include frequency and percentage distributions for each variable. This is a strategy for summarising the study's variables. The study also makes use of graphs to show the display of various variables; in respect of this, charts such as pie charts and bar charts will be used to show categorical data. For continuous ratio data, the histogram and line charts will be utilised.

3.7.2 Bivariate analysis

The bivariate analysis is the second part of the study which involves determining how closely the dependent variable (under-five mortality) is related to each independent variable. Pearson's Chi-square test for Independence can be used to calculate the relationship between the independent and dependent variables. Based on the Pearson Chi-square test of association, bivariate analysis is used to determine whether traits were independently connected to under-five mortality.

In this way, we can run cross-tabulations between the variables to test the hypotheses of the research. We will use a significant level of 5% for our results. If the p-value of the Chi-square test is greater than 0.05, then it will mean that the relationship is not significant and we will accept the null hypothesis and vice-versa. The research will also use Lambda, Phi and Cramer V tests to further check if there is a strong, moderate or weak association between the variables if the relationship between the variables is significant.

3.7.3 Survival analysis

For survival analysis, Cox Regression, Kaplan-Meier Estimate and Life Tables, were used.

3.7.3.1 Kaplan-Meier method

The Kaplan-Meier method is a nonparametric methodology used to predict the chance of surviving past specific time points (i.e. it creates a survival distribution). Additionally, the survival distributions of two or more groups of a between-subjects factor can be compared to determine if they are equivalent. This type of analysis can also help us understand why survival rates vary among unique patient groups, such as children under-five of different races or ethnicities. In addition, it may be important for the purpose of this study to identify whether or not the various groups have distinct overall survival curves or trajectories. During the process of conducting the study, categorical characteristics such as race, ethnicity and gender are integrated to identify which component can accurately predict the survival rates of a variety of countries and populations. Using the Kaplan-Meier survival curve and the log rank test, the survival time of children under the age of five was estimated. In the analysis, variables with a p-value of 0.05 were deemed statistically significant. For all analyses, a significance level of 5% was employed.

3.7.3.2 Cox regression

Cox regression (or proportional hazards regression) is method for investigating the effect of several variables upon the time a specified event takes to happen. In the context of an outcome such as death, this is known as Cox regression for survival analysis.

3.7.3.3 Life tables

Life tables are some of the mortality measures utilised by demographers. A life table is intended to represent the death and survival experience of a cohort of newly born babies as they age over time until the last one dies. However, true cohort life tables are rare because there are very few instances where survival histories have been collected or recorded. Therefore, mortality specialists rely on current or cross-sectional life tables. Such tables use as their basic data the mortality risks at each age in a current population. Assumptions are made that new-borns will be subjected to certain mortal risks at each age as they proceed through life. The Life Tables are explored in Chapter Five.

3.8 Ethical issues

Secondary data was obtained from the UNICEF MICS website (https://mics.unicef.org/) for this study. The website requires you to register a profile and provide them with a brief summary of the research objective which they review within three business days. No ethical approval was required or requested from the different institutions or statistical departments of the respective countries. The respondents involved gave verbal consent and was informed of their right to refuse answering all or particular question as well as to stop the interview at any moment from the enumerator or whoever was involved during the surveying or interview process.

3.9 Limitations of the study

As previously mentioned, this study utilizes secondary data from the UNICEF MICS6. In addition, interview results are based on respondents' self-reporting and recollection of events, which may be biased or inaccurate because respondents may not always recall specific events properly. In addition, this analysis utilizes only a subset of the socioeconomic and demographic variables present in the birth history datasets of both countries. Biological variables are beyond the scope of this investigation and thus not included in the analysis. Access to variables like knowing whether the child was vaccinated or had access to WASH services was not available for individual children in the birth history dataset that was used.

3.10 Conclusion

The research strategy and methodologies that will be employed in this study were discussed in this chapter. The backdrop of the secondary data used in this research study was also presented in this chapter. The results of the data analysis are presented in Chapter Four.

Chapter Four

Data Analysis

4.1 Introduction

The results of the MICS6 Malawi and Palestine 2019/2020 data sets and analyses are presented in Chapter Four. The results include a univariate analysis with frequency and percentage distributions for the variables and a bivariate analysis, which are included in this study. Through cross-tabulation, Chi-square, Phi, and Cramer's V were utilised to calculate the relationship and significance of the relationship between the variables. The chapter also contains the survival analysis outcomes, which include Kaplan-Meier curves and Cox regression analysis. Life-table analysis is also taken into account but will be discussed in Chapter Five.

4.2 Mortality rates according to selected explanatory variables

The mortality rates shown in the tables below are indicators that are used to monitor a countries progress in ensuring that children’s rights in terms of their right to life, access to health care services and protection are met.

The neonatal mortality rate is summarised in Table 4.1, which reveals that the overall neonatal mortality rate in Palestine is 13.735 deaths per one thousand live births. In Palestine, the post-neonatal mortality rate was 6.318 deaths per one thousand live births. According to Table 4.1, the infant mortality rate in Palestine was 18.837 per one thousand live births, and the under-five mortality rate was 21.427 per one thousand live births.

Table 4.1 also displays the mortality rates based on the gender of the children, revealing that the neonatal mortality rate for males was 15.623 deaths per one thousand live births, while the neonatal mortality rate for females was 11.731 deaths per one thousand live births. The post-neonatal mortality rate was 6.630 per one thousand live births for males and 5.987 per one thousand live births for females. Males had a higher infant mortality rate, with 20.729 deaths per one thousand live births, than females of the same age, who had a mortality rate of 16.829 deaths per one thousand live births. Males in the under-5 age group had a mortality rate of 23.472 per one thousand live births, while females in the under-5 age group had a rate of 19.256 per one thousand live births.

The neonatal mortality rate in Malawi was 30.057 per one thousand live births. Malawi had a post-neonatal mortality rate of 28.181 deaths per one thousand live births in the population, an infant mortality rate of 54.015 deaths per one thousand live births, and an under-five mortality rate of 79.052 deaths per one thousand live births. Considering mortality rates based on the gender of the children, the neonatal mortality rate for males in the population was 34.098 deaths per one thousand live births, which was higher than the neonatal mortality rate for females in the same age group, which was 25.958 deaths per one thousand live births.

The post-neonatal mortality rate for males in the population was 31.117 per one thousand live births, while the rate for females was 25.202 per one thousand live births. The infant mortality rate for males in the population was significantly higher than the rate for females, with 60.433 deaths per one thousand live births for males compared to 47.505 deaths per one thousand live births for females. The under-five mortality rate for males in the population was 86.985 per one thousand live births, while the rate for females was 71.006 per one thousand live births.

Table 4.1:Early childhood mortality rates, Malawi and Palestine, 2019-2020.

	Neonatal mortality rate	**Post-neonatal mortality rate**	**Infant mortality rate**	**Under-five mortality rate**
Palestine				
Total	13,735	6,318	18,837	21,427
Sex				
Male	15,623	6,630	20,729	23,472
Female	11,731	5,987	16,829	19,256
Malawi				
Total	30,057	28,181	54,015	79,0523
Sex				
Male	34,098	31,117	60,433	86,985
Female	25,958	25,202	47,505	71,006

Sources: Malawi and State of Palestine MICS6, 2019/2020, bh_datasets

The under-five mortality rates were also calculated for Malawi and Palestine based on the demographic variables (Mother's age at birth, Birth order and Previous birth interval), as shown in Table 4.2 below. In Malawi, the under-five mortality rate for mothers younger than 20 years old was 107.783 per one thousand live births, while in Palestine it was 36.091 per one thousand live births. In Malawi, the under-five mortality rate for mothers aged 20-34 years was 68.933 per one thousand live births, while in Palestine it was 19.080 per one thousand live births. In Malawi, the U5MR for mothers aged 35-49 years was 60.870 per one thousand live births, while in Palestine it was 18.244 per one thousand live births.

In the first birth order, the U5MR in Malawi was 91.934 deaths per one thousand live births and in Palestine it was 19.731 deaths per one thousand live births. The U5MR for birth order 2-3 in Malawi was 73.745 per one thousand live births, which is still high but lower than the first birth order. The U5MR for birth order 2-3 in Palestine was 21.777 deaths per one thousand live births. In the birth order 4-6, the U5MR in Malawi was 71.529 per one thousand live births and in Palestine it was 21.226 per one thousand live births. In Malawi, the birth order 7+ mortality rate was 84.363 per one thousand live births, while in Palestine it was 27.220 per one thousand live births. So, the U5MR in Malawi is lower in the 2-3 birth order than in the first birth order. However, the U5MR in Palestine is higher in the 2-3 birth order than in the first birth order.

In Malawi, the birth interval <2 years had a U5MR of 139.631 deaths per one thousand live births, which is significantly higher than Palestine's U5MR of 30.844 deaths per one thousand live births. In the two-year birth interval in Malawi, the U5MR was 80.964 per one thousand live births, while in Palestine it was 14.400 per one thousand live births. The mortality rate was 52.612 deaths per one thousand live births in Malawi and 10.749 deaths per one thousand live births in Palestine based on the 3-year birth interval. In the most recent birth interval, which spanned four or more years, the mortality rate in Malawi was 44.469 deaths per one thousand live births, whereas the mortality rate in Palestine was 17.533 deaths per one thousand live births.

Table 4.2: Under-five mortality rates based on demographic variables in Malawi and Palestine,

Variable	**Under-five mortality rate per 1 000**	
	Malawi	**State of Palestine**
Mother's age at birth		
Less than 20	107,783	36,091
20-34	68,933	19,080

35-49	60,870	18,244
Birth order		
1	91,934	19,731
2-3	73,745	21,777
4-6	71,529	21,226
7+	84,363	27,220
Previous birth interval		
< 2 years	139,631	30,844
2 years	80,964	14,390
3 years	52,612	10,749
4+ years	44,469	17,533

Sources: Malawi and State of Palestine MICS6, 2019/2020, bh_datasets

The under-five mortality rates based on socio-economic variables (Area, Region, Mother's education and Wealth index quintile) were also calculated and displayed in Table 4.3 for both countries. The under-five mortality rate in urban areas of Malawi was 61.386 deaths per one thousand live births, while in rural areas it was 81.608 deaths per one thousand live births. In Palestine, rural areas had the highest mortality rate with 26.982 deaths per one thousand live births, followed by urban areas with 19.946 deaths per one thousand live births and camp areas with a mortality rate of 18.897 deaths per one thousand live births.

In the Northern regions of Malawi, the U5MR was 56.937 deaths per one thousand live births, while in the Central and South regions, the U5MR was 80.849 and 87.309 deaths per one thousand live births, respectively. According to Table 4.3, the U5MR in the West Bank region of Palestine was 21.163 deaths per one thousand live births, whereas in the Gaza Strip it was 22.035 deaths per one thousand live births.

Education of the mother is another factor that can influence under-five mortality, and according to the table below, among mothers with a primary education or no education in Malawi, the U5MR was 109.255 per one thousand live births. The U5MR was 79.347 per one thousand live births for mothers with a primary education, 53.215 per one thousand live births for mothers with a lower secondary education, 48.958 per one thousand live births for mothers with an upper secondary education, 38.156 per one thousand live births for mothers with a higher education, and 105.263 per one thousand live births for mothers with an educational level equivalent to vocational training. In Palestine, mothers with no or minimal education had an under-5 mortality rate of 28.010 per one thousand live births, mothers with secondary education had a mortality rate of 20.078 per one thousand live births, and mothers with a level of education equal to or higher, had a U5MR of 15.274 per one thousand live births.

In terms of the wealth index quintile, the U5MR among Malawi's poorest quintile was 81.418 deaths per one thousand live births, while in Palestine it was 24.930 deaths per one thousand live births. Malawi's U5MR was 90.598 per one thousand live births in the second wealth quintile, while in Palestine it was 24.430 per one thousand live births. Malawi had a U5MR of 85.056 deaths per one thousand live births in the middle quintile, while Palestine had a U5MR of 23.716 deaths per one thousand live births. In the fourth quintile, the U5MR was 76.632 for Malawi and 16.804 for Palestine. Malawi had a U5MR of 59.684 deaths per one thousand live births and Palestine had 19.167 deaths per one thousand live births among the wealthiest wealth index quintiles.

Table 4. 3:Under-five mortality rates based on socio-economic variables in Malawi and Palestine, 2019-2020.

Variable	**Under-five mortality rate per 1 000**	
	Palestine	**Malawi**
Area		
Urban	19,946	61,386
Rural	26,982	81,608
Camp	18,897	
Region		
West Bank	21,163	
Gaza Strip	22,035	
Northern		56,937
Central		80,849
South		87,309
Mother's education		
None or basic	28,010	
Secondary	20,078	
Higher	15,274	
Pre-primary or none		109,255

Primary		79,347
Lower secondary		53,215
Upper secondary		48,958
Higher		38,156
Vocational training		105,263
Wealth index quintile		
Poorest	24,930	81,418
Second	24,430	90,598
Middle	23,716	85,056
Fourth	16,804	76,631
Richest	19,167	59,684

Sources: Malawi and State of Palestine MICS6, 2019/2020, bh_datasets

4.3 Univariate and bi-variate analysis

4.3.1 Mother's age

Multiple studies have shown a significant correlation between mother age and child survival. In comparison to young adolescents between the ages of 15 and 19, women over the age of 20 are more aware and knowledgeable about how to care for their newborns. According to Nadeem et al. (2021), the young age of the mother increases the death rate among children under the age of five because young women have immature reproductive systems, which results in underweight and fragile offspring.

The frequency distribution of under-five mortality in Malawi and Palestine are represented in Table 4.4. The frequency distribution reveals that the majority of deaths in both Malawi and the Palestine occurred among mothers between the ages of 20 and 34, accounting for 56.8% and 70% of the total deaths, respectively. In Malawi, mothers younger than 20 years old accounted for 37.5% of all deaths, while mothers aged 35 years and older accounted for 5.7%. In Palestine, 24.6% of the deaths occurred in mothers under the age of 20 and 5.3% occurred in mothers aged 35 and older. There was not much difference in the under-5 mortality rates for mothers aged 35 and older between the two countries.

Table 4.4:Under-five mortality by mother's age at birth, in Malawi and Palestine, 2019-2020.

Variable	**Malawi**			**Palestine**		
Mother's age at birth	Deaths	%	Total	Deaths	Deaths %	Total
<20	1174	37.5	3854	83	24.6	560
20-34	1777	56.8	10265	236	70.0	5347
35+	180	5.7	2613	18	5.3	772
Total	3131	100	17798	337	100	6679

Sources: Malawi and State of Palestine MICS6, 2019/2020, bh_datasets

(Malawi, n= 3 131; State of Palestine, n= 337)

The significance of the results was evaluated using the Chi-square, Phi, Cramer's V, and Lambda tests, as shown in Table 4.5. The results indicate that in Malawi, $p > 0.291$, which is more than our selected significance level of 0.05, exists. Since the p-value is greater than 0.05, we can conclude that there is no significant association between under-five child mortality in Malawi and the age of the mother at birth. The significance level in Palestine was found to be $p > 0.092$, which is likewise greater than 0.05. Thus, we can conclude that there is no substantial correlation between under-five mortality and the age of the mother in Palestine.

Table 4.5: Under-five mortality by mother's age at birth significance test results.

Significance	**Malawi**	**Palestine**
Chi-square	0.291	0.092
Phi	0.291	0.092
Cramer's V	0.291	0.092
Lambda		

Sources: Own calculation with SPSS, MICS6 2019/2020; bh_datasets

4.3.2 Sex of child

In a number of studies, the sex of a child was also shown to be associated with under-five mortality, with males having a greater mortality rate than girls.

There were a total of 17 798 children under age five in the population in Malawi and 6 679 in Palestine. The frequency distribution of child mortality by gender under the age of five is shown in Table 4.6. Boys accounted for 54.97% of all deaths in Malawi, while females accounted for 45.03%. In Palestine, boys were likewise responsible for the majority of deaths. From the table, we can see that 56.4% of the deaths in the population were male and 43.6% were female.

Table 4. 6:Under-five mortality frequency distribution by sex of child in Malawi and Palestine, 2019-2020.

Variable	**Malawi**			**Palestine**		
Sex of child	Deaths	Deaths%	Total	Deaths	Deaths %	Total
Boy	1721	54.97	8991	190	56.4	3493
Girl	1410	45.03	8807	147	43.6	3186
Total	3131	100	17798	337	100	6679

Sources: Malawi and State of Palestine MICS6, 2019/2020, bh_datasets

(Malawi, N= 3 131; Palestine, N= 337)

Upon doing the cross-tabulation, a significant test result for Malawi was discovered: p = 0.49 and since the p-value is greater than 0.05, we can conclude that there is no significant relationship between the sex of the child and mortality among children under the age of five in Malawi. Finding a significance threshold of p = 0.636 in Palestine, we may conclude that there is no statistically significant link between the sex of the child and under-five mortality in Palestine (see Table 4.7).

Table 4.7: Under-five by sex of child significance test results

Significance	**Malawi**	**Palestine**
Chi-square	0.490	0.636
Phi	0.490	0.636
Cramer’s V	0.490	0.636
Lambda		0.705

Sources: Own calculation with SPSS, MICS6 2019/2020; bh_datasets

4.3.3 Place of residence

In Malawi, the majority of the deaths occurred in rural areas of the country with 89.6% of the under-five deaths. 10.4% of the under-five deaths in the population occurred in urban areas of the country (see Table 4.8).

Table 4.8: Under-five child mortality by area in Malawi, 2019-2020.

Place of residence	Deaths	Death %	Total
Urban	326	10.4	2146
Rural	2805	89.6	15652
Total	3131	100	17798

Sources: Malawi MICS6, 2019/2020, bh_dataset

(Malawi, n= 3 131)

In Palestine, the majority of the deaths occurred in urban areas with 52.8% of the deaths. In the rural areas, 30.3% of the under-five deaths occurred and in the camp areas of Palestine, 16.9% of deaths occurred (see Table 4.9).

Table 4.9: Under-five child mortality by area in Palestine, 2019-2020

Place of residence	Deaths	Death %	Total
Urban	178	52.8	3840
Rural	102	30.3	1713
Camp	57	16.9	1126
Total	337	100	6679

Sources: Malawi and State of Palestine MICS6, 2019/2020, bh_dataset

(Palestine, n= 337)

From Table 4.10 below we can see that in Malawi, the Chi-square test found a significant level of $p < 0.006$ which is less that the chosen statistical level of 0.05. We can thus conclude that area and under-five mortality have a statistically significant relationship in Malawi. In Palestine a p-value of $p > 0.386$ was found which is greater than the 0.05 chosen statistical level. We can thus conclude that under-five mortality and area does not have a statistically significant relationship.

Table 4.10: Under-five by area significance test results

Significance	Malawi	State of Palestine
Chi-square	0.006	0.386
Phi	0.006	0.386
Cramer's V	0.006	0.386
Lambda		

Sources: Own calculation with SPSS, MICS6 2019/2020; bh_datasets

4.3.4 Region

From Table 4.11 below we can see that the majority of the deaths occurred in the South region of Malawi with 51.2% of the deaths in the population. in the central regions of Malawi 33.3% of the deaths occurred and 15.4% of the under-five deaths occurred in the North regions of the country.

Table 4.11: Under-five mortality by region in Malawi, 2019-2020

Variable	Deaths	Deaths %	Total
Region			
North	483	15.4	3389
Central	1044	33.3	5983
South	1604	51.2	8426
Total	3131	100	17798

Source: Malawi MICS6, 2019/2020, bh_dataset.

(Malawi, n= 3 131)

In Palestine, 69.1% of the under-five deaths occurred in the West Bank region and 30.9% of the deaths occurred in the Gaza Strip (see Figure 4.12).

Table 4.12: Under-five mortality by region in Palestine, 2019-2020

Variable	Deaths	Deaths %	Total
Region			
West Bank	233	69.1	4685
Gaza Strip	104	30.9	1994

Total	337	100	6679

Source: State of Palestine MICS6, 2019/2020, bh_dataset

(State of Palestine, n= 337)

The Chi-square test results illustrated in Table 4.13 below reveal a p-value less than 0.001 which is less than the chosen significance level of 0.05. We can thus conclude that region and under-five mortality have a significant relationship in Malawi. In Palestine, a p-value equals to 0.162 was found which is greater than the 0.05 chosen significance level. We can conclude that under-five mortality and region does not have a significant relationship in Palestine.

Table 4.13: Under-five mortality by region significance test result

Significance	Malawi	State of Palestine
Chi-square	<0.001	0.162
Phi	<0.001	0.162
Cramer's V	<0.001	0.162
Lambda	1.000	0.701

Source: Own calculation with SPSS, MICS6 2019/2020; bh_datasets

4.3.5 Mother's education level

According to studies, a mother's education might impact the death rate of her children. Educated mothers are shown to be more knowledgeable about healthy habits and more inclined to seek out healthcare services. According to John et al. (2015), even mothers with minimal health education can help to increase vaccination coverage.

In Table 4.14 below under-five deaths based on the mother's education level is illustrated. From the table we can see that the majority of the deaths in Malawi occurred to mothers who had an education level equal to primary with 69.87% of the under-five deaths. Mothers who had only pre-primary, or no level of education accounted for the second highest under-five mortality with 19.8% of the deaths. Mothers with a lower-secondary education level had 5.5% of the deaths, mothers with upper-secondary education had 4.3%, mothers with higher education level had 0.4% of the deaths, and mothers who had an educational level equal to vocational training had 0.0% (or one death) of the under-five deaths in the population. It is important to note that only one death occurred to a mother who had vocational training in Malawi.

Table 4.14: Under-five mortality by mother's education level in Malawi, 2019-2020

Variable	Deaths	Deaths %	Total
Education			
Pre-primary or none	619	19.8	1899
Primary	2190	69.87	12170
Lower-secondary	171	5.5	1858
Upper-secondary	136	4.3	1644
Higher	14	0.4	206
Vocational training	1	0.0	20
Total	3131	100	17798

Source: Malawi MICS6, 2019/2020, bh_dataset

(Malawi, n= 3 131)

In Palestine, the majority of the deaths occurred to mothers with none or basic education (47.2%). Mothers with an educational level equal to secondary in Palestine experienced 30.3% of the deaths and mothers with higher education experienced 22.6% of the under-five deaths in the population.

Table 4.15: Under-five mortality by mother's education level in Palestine, 2019-2020

Variable	Deaths	Deaths %	Total
Education			
None or basic	159	47.2	1408
Secondary	102	30.3	2175
Higher	76	22.6	3004
Total	337	100	6679

Source: State of Palestine MICS6, 2019/2020, bh_dataset

(State of Palestine, n= 337)

The Chi-square test found a significance level of p = 0.023 which is less than the chosen 0.05 level of significance. We can thus conclude that a mother’s education level and under-five mortality does have a statistically significant relationship in Malawi. In the State of Palestine, the Chi-square test found a significance level of p = 0.156 which is greater than the 0.05 chosen. We can conclude that no statistically significant relationship exists between a mother's education level and under-five mortality in the State of Palestine.

Table 4.16: Under-five mortality significance test results by mother's education level

Significance	**Malawi**	**State of Palestine**
Chi-square	0.023	0.156
Phi	0.023	0.156
Cramer's V	0.023	0.156
Lambda	0.283	

Source: Own calculation with SPSS, MICS6 2019/2020; bh_datasets

4.3.6 Birth order

Generally speaking, firstborns have a greater mortality risk. Some studies have indicated that the chance of dying in infancy and childhood is greater for first-born children of extremely young mothers, while others have found that the danger is higher for first-born or lower-ranked children (Kamal, 2012).

In Malawi, the majority of the deaths occurred in the 2-3 birth order with 36.4% of the under-five deaths. In the first birth order 34.9% of the deaths occurred, in the 4-6 birth order 22.7% occurred and in the 7+ birth order 5.97% of the deaths occurred. In Palestine, the majority of the deaths occurred in 2-3 birth order as well with 42.4% of the deaths. In the birth order 4-6, 26.7% of the under-five deaths occurred, 24.3% occurred in the first birth order and 6.5% of deaths occurred in the 7+ birth order (see Table 4.17).

Table 4.17: Under-five mortality by birth order in Malawi and Palestine, 2019-2020

	Deaths	**Deaths %**	**Total**	**Deaths**	**Deaths %**	**Total**
	Malawi			**State of Palestine**		
Birth order						
1	1092	34.9	15417	82	24.3	1672

2-3	1140	36.4	6672	143	42.4	2741
4-6	712	22.7	4562	90	26.7	1873
7+	187	5.97	1147	22	6.5	393
Total	3131	100	17798	337	100	6679

Sources: Malawi and State of Palestine MICS6, 2019/2020, bh_datasets

(Malawi, n= 3 131; State of Palestine, n= 337)

Table 4.18: Under-five significance test results by birth order

Significance	**Malawi**	**State of Palestine**
Chi-square	0.036	0.188
Phi	0.036	0.188
Cramer’s V	0.036	0.188
Lambda	0.157	0.611

Source: Own calculation with SPSS, MICS6 2019/2020; bh_datasets

In Table 4.18 above, we can see that the Chi- square test for significance was p > 0.036 and we can conclude that a significant relation does exist between under-five mortality and birth order in Malawi. From the Chi- square test for significance we found a p <0.188 and we can conclude that a significant relation does not exist between under-five mortality and birth order in Palestine.

4.3.7 Previous birth interval

Multiple studies on under-five mortality have shown that children with short birth intervals have a significant risk of death, while those with longer birth intervals had the lowest risk.

From Table 4.19 below we can see that the majority of the under-five deaths occurred in the first birth order. In the birth order less than two years, 20.7% of the deaths occurred and in the two-year birth interval 20.5% of the deaths occurred. In the 3 year and 4+ years birth interval 11.2% and 11.6% of the under-five deaths occurred, respectively. In Palestine, the majority of the deaths occurred in the birth order less than two-year and in the first birth order 29.4% of the deaths occurred. In the 2-year birth interval 16% of the deaths occurred, 4.7% of the deaths occurred in the 3-year birth interval, and 8% of the deaths occurred in the 4+ years birth interval.

Table 4.19: Under-5 mortality by previous birth interval in Malawi and State of Palestine, 2019-2020

Variable	**Deaths**	**%**	**Total**	**Deaths**	**%**	**Total**
Previous birth interval	**Malawi**			**State of Palestine**		
First birth	1127	35.99	5481	99	29.4	1723
<2 years	647	20.7	1438	141	41.8	1645
2 years	642	20.5	2599	54	16.0	1347
3 years	351	11.2	2755	16	4.7	763
4+ years	364	11.6	5525	27	8.0	1201
Total	3131	1000	17798	337	100	6679

The Chi-square test results in Table 4.20 found a significance level of 0.008 which means that we can conclude that a statistically significant relationship exists between previous birth interval and under-five child mortality in Malawi. In the State of Palestine, a statistically significant relationship between previous birth interval and under-five mortality was also found with a p-value equals to 0.026.

Table 4.20: Under-five mortality significance test results, by previous birth interval

Significance	**Malawi**	**State of Palestine**
Chi-square	0.008	0.026
Phi	0.008	0.026
Cramer's V	0.008	0.026
Lambda	0.701	0.077

Sources: Own calculation with SPSS, MICS6 2019/2020; bh_datasets

4.3.8 Wealth index

Families and mothers with a higher wealth index are usually thought to be able to afford healthcare and have access to cleaner water and safer areas, which may lower mortality among children under five.

Looking at the under-five mortality we can conclude from Table 4.21 below that the majority of the deaths occurred in the second wealth quintile with 23.7% of the deaths occurred in

Malawi. 23.1% of the deaths occurred in the middle wealth quintile, 20% in the fourth, 19.1% in the poorest, and 14% in the richest in Malawi. In the State of Palestine, the majority of the deaths occurred in the middle wealth index with 23.2% of the deaths. 20.2% of the deaths occurred in the richest wealth quintile, 19.3% in the second, 19.3% in the fourth and 17.5% in the poorest wealth index quintile in Palestine by 2019. 19.9% of deaths occurred in the second quintile.

Table 4.21: Under-five child mortality by wealth index in Malawi and State of Palestine, 2019-2020

Variable	**Malawi**			**State of Palestine**		
Wealth index quintile	**Deaths**	**Deaths %**	**Total**	**Deaths**	**Deaths %**	**Total**
Poorest	599	19.1	4150	59	17.5	1253
Second	742	23.7	3879	67	19.9	1068
Middle	724	23.1	3586	78	23.2	1475
Fourth	627	20.0	3381	65	19.3	1648
Richest	439	14.0	2802	68	20.2	1235
Total	3131	100	17798	337	100	6679

Sources: Malawi and State of Palestine MICS6, 2019/2020, bh_datasets

(Malawi, n= 3 131; State of Palestine, n= 337)

Table 4.22: Under-five mortality significance test results, by wealth index

Significance	**Malawi**	**State of Palestine**
Chi-square	0.693	0.123
Phi	0.693	0.123
Cramer’s V	0.693	0.123
Lambda	0.619	0.080

Source: Own calculation with SPSS, MICS6 2019/2020; bh_datasets

When conducting the Chi-square analysis, no statistically significant relationship was found between wealth index quintile of mothers and under-five child mortality with a p-value = 0.693 in Malawi. In the State of Palestine, there was also no statistically significant relationship found between wealth index quintile and under-five child mortality when running a Chi-square test. A p-value of 0.123 was found in Palestine.

4.4 survival Analysis

4.4.1 Cox regression

The cox regression analysis in tables 4.23 and 4.24 enables us to investigate the association between a child's survival and many explanatory factors. This survival analysis examines the period between a child's birth and a following event, which in this instance is death.

Tables 4.23 and 4.24 show the results of the Cox regression analysis that was fitted for under-five mortality in Palestine and Malawi. The model includes all the variables that were found to be significantly or not significantly associated with under-five mortality. The tables include the hazard ratios, the p-values and the 95% confidence intervals (CI) in the model and a likelihood ratio test of 0.05 level of significance.

When looking at Sex of the child in Table 4.23 for Palestine, the hazard ratio is 1.071 which is above 1.00 and this means that being a boy increases the risk of death. The hazard (mortality) rate is 7.1% higher for boys compared to girls. However, the p-value and CI suggest that this could be due to chance and is not significant. [P=0.436, CI 95% (0.901-1.274)].

When looking at Area variable in Palestine, camp is a reference category but is not significantly associated with under-five mortality. The table below shows a hazard ratio of 1.033 for under-five children living in urban areas of Palestine which is above 1.00 and this means that living in urban areas of Palestine increases the risk of death of under-five children compared to those children living in camp areas of Palestine. The hazard ratio for under-five children living in urban areas are 3.3% higher than that of the under-five children living in camp areas of Palestine. However, the p-value and CI suggest that this could be due to chance and is not significant. [P=0.801, CI 95% (0.805-1.324)]. For under-five children living in rural areas of Palestine a hazard ratio of 1.019 was found which means that under-five children living in rural areas of Palestine has an increased risk of death compared to those children living in camp areas of Palestine. The hazard ratio for under-five children living in urban areas are 1.9% higher than that of the children living in camp areas. However, the p-value and CI suggest that this could be due to chance and is not significant. [P=0.899, CI 95% (0.763-1.362)].

When looking at the Region variable in Palestine, a hazard ratio of 0.859 is found which is below 1.00 which means that under-five children living in the West Bank decreases the risk of death. The hazard rate is 14.1% higher for children under-five living in the West bank compared to children living in the Gaza Strip. The p-value and CI suggest that this is however not significant and could be due to chance. [P=0.315, CI 95% (0.639-1.155)].

When looking at the mother's education level in Palestine, a hazard ratio of 1.012 is found which is above 1.0 which means that children with mother who have none or basic education has an increased exposure to the risk of death. The hazard rate is 1.2% higher for children under-five with mothers with none or basic education compared to children with mothers who have higher education. The p-value and CI suggest that this is however not significant and could be due to chance. [P=0.922, CI 95% (0.792-1.295)]. When looking at the mother's education level equal to secondary in Palestine, a hazard ratio of 1.022 is found which means that children with mother who has secondary education has an increased exposure to the risk of death. The hazard rate is 2.2% higher for children under-five with mothers with secondary education compared to children with mothers who have higher education. The p-value and CI suggest that this is however not significant and could be due to chance.
[P=0.863, CI 95% (0.797-1.310)].

For the variable, Birth order, in the 7+ birth order, no statistically significant relationship was found between under-five mortality. A hazard ratio of 0.735 was found for the first birth order which means that there is a decreased risk of exposure to deaths compared to children in the 7+ birth order. The hazard rate is 26.5% higher for children living in the first birth order than children in the 7+ birth order. The p-value and CI suggest that this is, however, not significant, and probably due to chance. [P=0.296, CI 95% (0.413-1.309)]. In the 2-3 birth order a hazard ratio of 1.176 was found which indicates that there is an increased risk of exposure to deaths compared to the children in the 7+ birth order. The hazard rate is 17.6% higher for children in the 2-3 birth order than the children in the 7+ birth order. However, the p-value and CI suggest that is not significant and could be due to chance. [P=0.394, CI 95% (0.810-1.708)]. Children in the 4-6 birth order had a hazard ratio of 1.138 which means that they have an increased risk of death compared to children in the 7+ birth order. The hazard rate is 13.8% higher for children in the 4-6 birth order than the children in the 7+ birth order. However, the p-value and CI suggest that this is not significant and could be due to chance.
[P=0.488, CI 95% (0.790-1.640)].

For the variable, Mother's age at birth, mothers younger than 20 years has a hazard ratio of 1.229 which means that their under-five children have an increased risk of death compared to under-five children born to mothers aged 35 and older. The hazard rate is 22.9% higher for children born to mothers who are younger than twenty years compared to under-five children born to mothers aged 35 and older. the p-value and CI suggest that this is however not significant and due to chance. [P=0.386, CI 95% (0.771-1.957)]. Mothers between the ages of 20 and 34 had a hazard ratio of 1.150 which indicated that their children have an increased risk of death compared to children whose mothers are aged 35 and older. The hazard rate is 15% higher for under-five children born to mothers aged 20-34 compared to children born to mothers aged 35 and older and therefore not significant and due to chance. [P=0.498, CI 95% (0.768-1.723)].

For the variable, Previous birth interval, children born in the first birth interval had a hazard ratio of 1.349 which indicates that they have an increased risk of death compared to children born in the 4+ year birth interval. The hazard rate is 34.9% higher for under-five children born in the first birth interval compared to children born in the 4+ years interval. However, the CI and p-value suggest that this is not significant and probably due to chance. [P=0.256, CI 95% (0.805-2.261)]. Under-five children born in the <2-years birth interval has a hazard ratio of 0.835 which means that they have a decreased risk of death compared to children born in the 4+ birth interval. The hazard rate is16.5% higher for under-five children born in the <2-years birth interval compared to children born in the 4+ years. This is however based on the CI and p-value not significant and due to chance. [P=0.264, CI 95% (0.608-1.146)]. Children born in the 2-years birth interval had a hazard ratio of 0.939 which indicates that they have a decreased risk of death compared to children born in the 4+ year birth interval. The hazard rate is 6.1% higher for under-five children born in the 2-year interval compared to children born in the 4+ years interval. However, the CI and p-value suggest that this is not significant and probably due to chance. [P=0.732, CI 95% (0.656-1.345)]. Under-five children born in the 3-years birth interval have a hazard ratio of 0.783 which means that they have a decreased risk of death compared to children born in the 4+ birth interval. The hazard rate of 21.7% is higher for under-five children born in the 3-years birth interval compared to children born in the 4+ years. This is however based on the CI and p-value not significant and due to chance. [P=0.306, CI 95% (0.491-1.250)].

For the variable, Wealth index quintile, Children born in the poorest wealth index quintile had a hazard ratio of 1.139 which means that they have an increased risk of death compared to children born in the richest wealth index quintile. The hazard rate is 13.9% higher for children born in the poorest quintile compared to children born in the richest quintile. However, the p-value and CI suggest that this is not significant and probably due to chance. [P=0.473, CI 95% (0.798-1.622)]. Children born in the second wealth index quintile had a hazard ratio of 0.940 which means that they have a decreased risk of death compared to children born in the richest wealth index quintile. The hazard rate is 6% higher for children born in the second quintile compared to children born in the richest quintile. However, the p-value and CI suggest that this is not significant and probably due to chance. [P=0.724, CI 95% (0.669-1.322)]. Children born in the middle wealth index quintile had a hazard ratio of 1.162 which means that they have an increased risk of death compared to children born in the richest wealth index quintile. The hazard rate is 16.2% higher for children born in the middle quintile compared to children born in the richest quintile. However, the p-value and CI suggest that this is not significant and probably due to chance. [P=0.275, CI 95% (0.887-1.522)]. Children born in the fourth wealth index quintile had a hazard ratio of 1.040 which means that they have an increased risk of death compared to children born in the richest wealth index quintile. The hazard rate is 4% higher for children born in the fourth quintile compared to children born in the richest quintile. However, the p-value and CI suggest that this is not significant and probably due to chance. [P=0.781, CI 95% (0.787-1.375)].

Table 4.23: Multivariate analysis based on selected explanatory variables in the State of Palestine, 2019-2020

Variable	SE	Sig.	Exp(B)	95,0% CI for Exp(B)	
				Lower	Upper
Sex of child					
Girl (ref.)			1.00		
Boy	0.088	0.436	1.071	0.901	1.274
Area					
Camp (ref.)		0.967	1.00		
Urban	0.127	0.801	1.033	0.805	1.324
Rural	0.148	0.899	1.019	0.763	1.362

Region					
Gaza Strip (ref.)			1.00		
West Bank	0.151	0.315	0.859	0.639	1.155
Mother's education level					
Higher (ref.)		0.985	1.00		
None or basic	0.125	0.922	1.012	0.792	1.295
Secondary	0.127	0.863	1.022	0.797	1.310
Birth order					
7+ (ref.)		0.204	1.00		
1	0.294	0.296	0.735	0.413	1.309
2-3	0.190	0.394	1.176	0.810	1.708
4-6	0.186	0.488	1.138	0.790	1.640
Mother's age at birth					
35+ (ref.)		0.681	1.00		
<20	0.237	0.386	1.229	0.771	1.957
20-34	0.206	0.498	1.150	0.768	1.723
Previous birth interval					
4+ years (ref.)		0.206	1.00		
First birth	0.264	0.256	1.349	0.805	2.261
<2 years	0.162	0.264	0.835	0.608	1.146
2 years	0.183	0.732	0.939	0.656	1.345
3 years	0.238	0.306	0.783	0.491	1.250
Wealth index quintile					
Richest (ref.)		0.520	1.00		
Poorest	0.181	0.473	1.139	0.798	1.625
Second	0.174	0.724	0.940	0.669	1.322
Middle	0.138	0.275	1.162	0.887	1.522
Fourth	0.142	0.781	1.040	0.787	1.375

Source: The State of Palestine MICS6, 2019/2020, bh _dataset

When looking at Sex of the child in the Table 4.24 for Malawi below, the hazard ratio is 1.034 which is above 1.00 which means that being a boy increases the risk of death. The hazard (mortality) rate is 3.4% higher for boys compared to girls however, the p-value and CI suggests that this could be due to chance and is not significant. [P=0.238, CI 95% (0.978-1.093)].

When looking at the variable Area in Malawi, the table below shows a hazards ratio of 0.945 for under-five children living in urban areas of Malawi which is below 1.00 which means that living in urban areas of Malawi decreases the risk of death of under-five children compared to those children living in rural areas of Malawi. The hazard ratio for under-five children living in rural areas are 5.5% higher than that of the under-five children living in urban areas of Malawi. However, the p-value and CI suggest that this could be due to chance and is not significant. [P=0.293, CI 95% (0.850-1.050)].

When looking at the variable Region in Malawi, a hazard ratio of 1.046 is found which is above 1.00 which means that under-five children living in the North increases the risk of death compared to children living in the South. The hazard rate is 4.6% higher for children under-five living in the North compared to children living in the South. The p-value and CI suggest that this is however not significant and could be due to chance. [P=0.299, CI 95% (0.961-1.138)]. Under-five children born the Central region of Malawi had a hazard ratio of 0.999 which indicates that they have a decreased risk of exposure to the risk of death. A hazard rate of 0.1% is higher for children under-five living in the Central region compared to under-five children living in the South. The p-value and CI suggest that this is however not significant and could be due to chance. [P=0.963, CI 95% (0.939-1.062)].

When looking at the variable, Mother's education level in Malawi, a hazard ratio of 1.131 is found which is above the 1.00 which means that children with mothers who have none or pre-primary education have an increased exposure to the risk of death. The hazard rate is 13.1% higher for children under-five with mothers with none or pre-primary education compared to children with mothers who have vocational training. The p-value and CI suggest that this is however not significant and could be due to chance. [P=0.766, CI 95% (0.503-2.543)]. When looking at the mother's education level equal to primary, a hazard ratio of 1.220 is found which means that children with mothers who have primary education have an increased exposure to the risk of death. The hazard rate is 22% higher for children under-five with mothers with primary education compared to children with mothers who have vocational training. The p-value and CI suggest that this is however not significant and could be due to chance. [P=0.629, CI 95% (0.544-2.736)]. When looking at the mother's education level with a lower secondary level, a hazard ratio of 1.382 is found which is above 1.00 which means that children with mothers who have lower secondary education have an increased exposure to the risk of death. The hazard rate is 38.2% higher for children under-five with mothers with lower-secondary education compared to children with mothers who have vocational training. The p-value and CI suggest that this is however not significant and could be due to chance. [P=0.435, CI 95% (0.613-3.116)]. When looking at the mother's education level equal to upper secondary, a hazard ratio of 1.561 is found which means that children with mothers who have upper secondary education have an increased exposure to the risk of death. The hazard rate is 56.1% higher for children under-five with mothers with upper secondary education compared to children with mothers who have vocational training. The p-value and CI suggest that this is however not significant and could be due to chance. [P=0.284, CI 95% (0.691-3.528)]. When looking at the mother's education level equal to higher level, a hazard ratio of 1.810 is found which means that children with mothers who have higher education have an increased exposure to the risk of death. The hazard rate is 81% higher for children under-five with mothers with upper secondary education compared to children with mothers who have vocational training. The p-value and CI suggest that this is however not significant and could be due to chance. [P=0.195, CI 95% (0.738-4.438)].

For the variable, Birth order, in the 7+ birth order, there is a statistically significant relationship found between under-five mortality with a p-value of 0.014. A hazard ratio of 0.663 was found for birth order 1, which means that there is a decreased risk of exposure to deaths compared to children in the 7+ birth order. The hazard rate is 33.7% higher for children living in the first birth order than children in the 7+ birth order. The p-value and CI suggest that this is significant, and not due to chance. [P=0.008, CI 95% (0.489-0.900)]. In the 2-3 birth order, a hazard ratio of 0.892 was found which indicates that there is a decreased risk of exposure to deaths compared to the children in the 7+ birth order. The hazard rate is 10.8% higher for children in the 2-3 birth order than the children in the 7+ birth order. However, the p-value and CI suggest that is not significant and could be due to chance. [P=0.128, CI 95% (0.769-1.034)]. Children in the 4-6 birth order had a hazard ratio of 0.977 which means that they have a decreased risk of death compared to children in the 7+ birth order. The hazard rate is 2.3% higher for children in the 4-6 birth order than the children in the 7+ birth order. However, the p-value and CI suggest that this is not significant and could be due to chance. [P=0.747, CI 95% (0.846-1.128)].

For the variable, Mother's age at birth, mothers <20 years has a hazard ratio of 1.002 which means that their under-five children have an increased risk of death compared to under-five children born to mothers, 35+ years. The hazard rate is 0.2% higher for children born to mothers who are <20 years compared to under-five children born to mothers 35+. The p-value and CI suggest that this is however not significant and due to chance. [P=0.981, CI 95% (0.850-1.182)]. Mothers between 20-34 had a hazard ratio of 0.906 which indicated that their children have a decreased risk of death compared to children whose mothers are aged 35+. The hazard rate is 9.4% higher for under-five children born to mothers aged 20-34 compared to children born to mothers aged 35+. The p-value and CI suggest that this is however not significant and due to chance. [P=0.185, CI 95% (0.783-1.049)].

For the variable, Previous birth interval, children born in the first birth interval had a hazard ratio of 1.402 which indicates that they have an increased risk of death compared to children born in the 4+ year birth interval. The hazard rate is 40.2% higher for under-five children born in the first birth interval compared to children born in the 4+ years interval. However, the CI and p-value suggest that this is significant and not due to chance. [P=0.018, CI 95% (1.059-1.855)]. Under-five children born in the <2-years birth interval have a hazard ratio of 1.069 which means that they have an increased risk of death compared to children born in the 4+ birth interval. The hazard rate of 6.9% is higher for under-five children born in the <2-years birth interval compared to children born in the 4+ years. This is, however based on the CI and p-value not significant and due to chance. [P=0.213, CI 95% (0.963-1.186)]. Children born in the 2-years birth interval had a hazard ratio of 0.945 which indicates that they have a decreased risk of death compared to children born in the 4+ year birth interval. The hazard rate is 5.5% higher for under-five children born in the 2-years interval compared to children born in the 4+ years interval. However, the CI and p-value suggest that this is not significant and probably due to chance. [P=0.277, CI 95% (0.854-1.046)]. Under-five children born in the 3-years birth interval has a hazard ratio of 0.961 which means that they have a decreased risk of death compared to children born in the 4+ birth interval. The hazard rate of 3.9% is higher for under-five children born in the 3-years birth interval compared to children born in the 4+ years. This is, however based on the CI and p-value not being significant and due to chance. [P=0.502, CI 95% (0.855-1.080)].

For the Wealth index quintile, children born in the poorest wealth index quintile had a hazard ratio of 1.046 which means that they have an increased risk of death compared to children born in the richest wealth index quintile. The hazard rate is 4.6% higher for children born in the poorest quintile compared to children born in the richest quintile. However, the p-value and CI suggest that this is not significant and probably due to chance. [P=0.436, CI 95% (0.934-1.171)]. Children born in the second wealth index quintile had a hazard ratio of 0.942 which means that they have a decreased risk of death compared to children born in the richest wealth index quintile. The hazard rate is 5.8% higher for children born in the second quintile compared to children born in the richest quintile. However, the p-value and CI suggest that this is not significant and probably due to chance. [P=0.289, CI 95% (0.844-1.052)]. Children born in the middle wealth index quintile had a hazard ratio of which 0.979 means that they have a decreased risk of death compared to children born in the richest wealth index quintile. The hazard rate is 2.1% higher for children born in the middle quintile compared to children born in the richest quintile. However, the p-value and CI suggest that this is not significant and probably due to chance. [P=0.704, CI 95% (0.878-1.092)]. Children born in the fourth wealth index quintile had a hazard ratio of 0.972 which means that they have a decreased risk of death compared to children born in the richest wealth index quintile. The hazard rate is 2.8% higher for children born in the fourth quintile compared to children born in the richest quintile. However, the p-value and CI suggest that this is not significant and probably due to chance. [P=0.599, CI 95% (0.875-1.080)].

Table 4.24: Multivariate analysis based on selected explanatory variables in Malawi, 2019-2020

Variable	SE	Sig.	Exp(B)	95,0% CI for Exp(B)	
				Lower	Upper
Sex of child					
Girl (ref.)			1.00		
Boy	0.028	0.238	1.034	0.978	1.093
Area					

Rural (ref.)			1.00		
Urban	0.054	0.293	0.945	0.850	1.050
Region					
South (ref.)		0.549	1.00		
North	0.043	0.299	1.046	0.961	1.138
Central	0.031	0.963	0.999	0.939	1.062
Mother's education level					
Vocation training (ref.)		<0,001	1.00		
Pre-primary or none	0.413	0.766	1.131	0.503	2.543
Primary	0.412	0.629	1.220	0.544	2.736
Lower secondary	0.415	0.435	1.382	0.613	3.116
Upper secondary	0.416	0.284	1.561	0.691	3.528
Higher	0.458	0.195	1.810	0.738	4.438
Birth order					
7+ (ref.)		0.014	1.00		
1	0.156	0.008	0.663	0.489	0.900
2-3	0.075	0.128	0.892	0.769	1.034
4-6	0.074	0.747	0.977	0.846	1.128
Mother's age at birth					
35+ (ref.)		0.013	1.00		
<20	0.084	0.981	1.002	0.850	1.182
20-34	0.075	0.185	0.906	0.783	1.049
Previous birth interval					
4+ (ref.)		0.005	1.00		
First birth	0.143	0.018	1.402	1.059	1.855
<2 years	0.053	0.213	1.069	0.963	1.186
2 years	0.052	0.277	0.945	0.854	1.046
3 years	0.059	0.502	0.961	0.855	1.080
Wealth index quintile					
Richest (ref.)		0.184	1.00		

Poorest	0.058	0.436	1.046	0.934	1.171
Second	0.056	0.289	0.942	0.844	1.052
Middle	0.056	0.704	0.979	0.878	1.092
Fourth	0.054	0.599	0.972	0.875	1.080

Source: Malawi MICS6, 2019/2020 bh_dataset

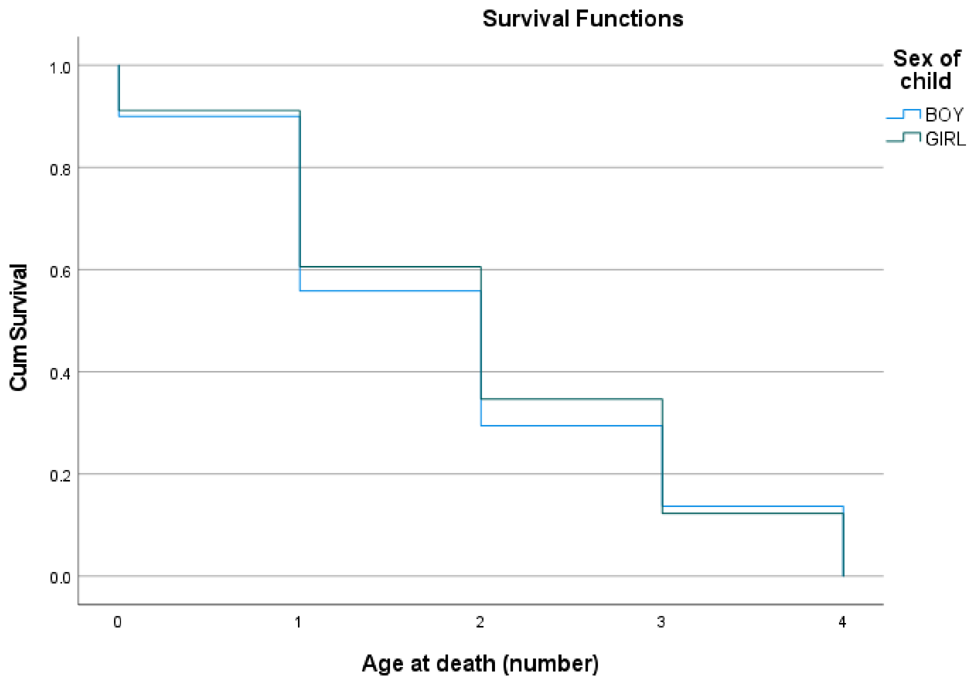
4.4.2 Kaplan-Meier survival analysis

Correlates of under-five mortality differentials by age at first birth, sex of child, mother's educational level, place of residence, region, previous birth interval, birth order and wealth indices in Malawi and Palestine are depicted by the Kaplan-Meier survival curves shown in the figures below.

4.4.1.1 Sex of child

Figure 4.1 illustrates the cumulative survival of girls and boys in Palestine. The figure shows that under-five boys in Palestine were more likely to die at each stage than girls in the population. Table 4.25 shows the cumulative proportion surviving at the end of each age interval for girls and boys in Palestine. From age 3 years, we see that boys in the population had a higher chance of survival with a cumulative proportion surviving at the end of the interval at 0.14 for boys and 0.12 for girls as found in Table 4.25.

Figure 4.1: Kaplan-Meier-survival curve classified by sex of child in the State of Palestine, 2019-2020.



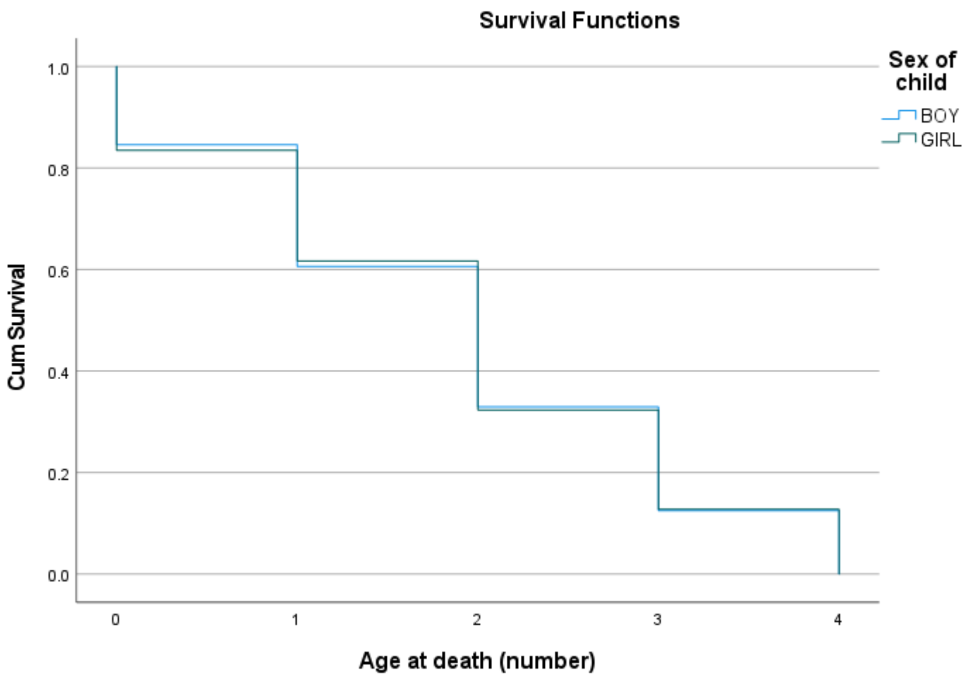
Source: State of Palestine MICS6 2019/2020 (n=337)

Table 4.25: Kaplan-Meier survival analysis curve information by sex of child in Palestine, 2019-2020

First-order Controls		Interval Start Time	Number Entering Interval	Number Exposed to Risk	Number of Terminal Events	Cumulative Proportion Surviving at End of Interval	Hazard Rate
Sex of child	BOY	0	190	190.000	19	.90	.11
		1	171	171.000	65	.56	.47
		2	106	106.000	50	.29	.62
		3	56	56.000	30	.14	.73
		4	26	26.000	26	.00	.00
	GIRL	0	147	147.000	13	.91	.09
		1	134	134.000	45	.61	.40
		2	89	89.000	38	.35	.54
		3	51	51.000	33	.12	.96
		4	18	18.000	18	.00	.00

In Figure 4.2 below we can also see that in Malawi boys in the population at age 0 to 1 year had a higher survival than girls in the population at the same age. The cumulative proportion surviving at age 0 to 1 years for boys were 0.90 and 0.85 for girls. Girls between the ages of 1 to 2 years in Malawi on the other hand had a higher chance of survival than boys at the same age. The cumulative proportion surviving at the end of the interval was 0.62 for girls and 0.61 for boys as per Table 4.26.

Figure 4.2: Kaplan-Meier survival curve classified by sex of child in Malawi, 2019-2020



Source: Malawi MICS6 2019/2020 (n=3 131)

Table 4.25: Kaplan-Meier survival analysis curve information by sex of child in Malawi, 2019-2020

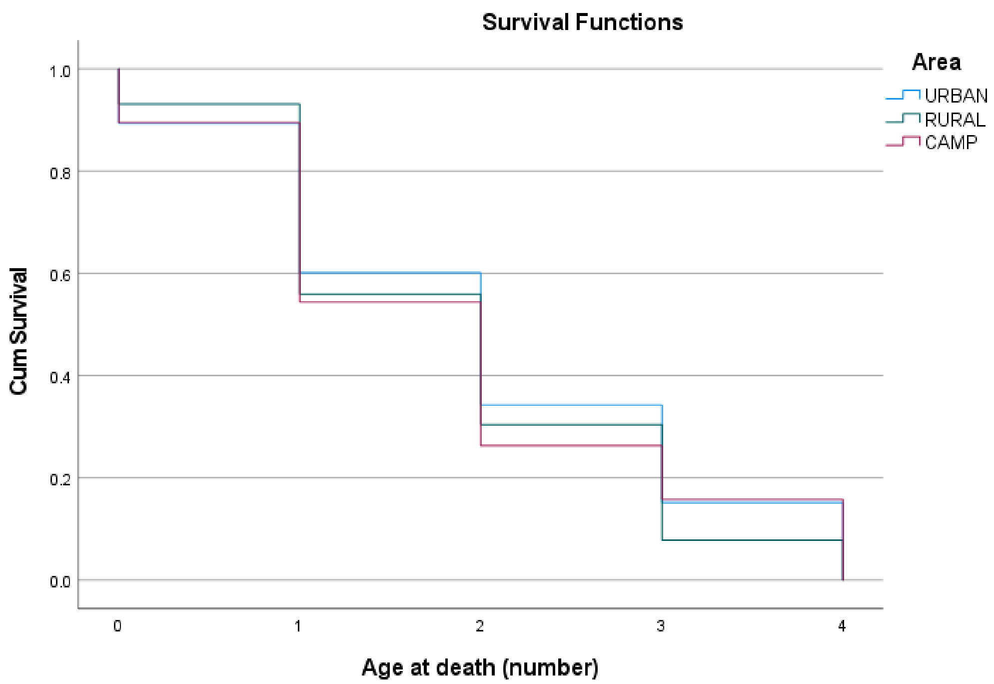
First-order Controls		Interval Start Time	Number Entering Interval	Number Exposed to Risk	Number of Terminal Events	Cumulative Proportion Surviving at End of Interval	Hazard Rate
Sex of child	BOY	0	1721	1721.000	265	.85	.17
		1	1456	1456.000	413	.61	.33
		2	1043	1043.000	476	.33	.59

	3	567	567.000	352	.12	.90
	4	215	215.000	215	.00	2.00
GIRL	0	1410	1410.000	233	.83	.18
	1	1177	1177.000	307	.62	.30
	2	870	870.000	414	.32	.62
	3	456	456.000	276	.13	.87
	4	180	180.000	180	.00	2.00

4.4.1.2 Place of residence (area)

Figure 4.3 below illustrates that between the ages of 0 to 1 year children living in rural areas have a higher chance of survival than children residing in camp areas of Palestine with a cumulative survival rate of 0.93 found in Table 4.27. Between the ages of 1 to 2 years the figure below shows that children living in urban areas have a higher chance of survival with a cumulative proportion surviving at the end of the interval at 0.60. Between the ages of 2 and 3 years, children living in urban and rural areas have a higher chance of surviving than children living in camp areas of Palestine with a cumulative survival of 0.26 for children living in camp areas at age 3. At age 4, children living in urban and camp areas have a higher chance of survival than children living in rural areas.

Figure 4.3: Kaplan-Meier survival curve classified by area in Palestine, 2019-2020



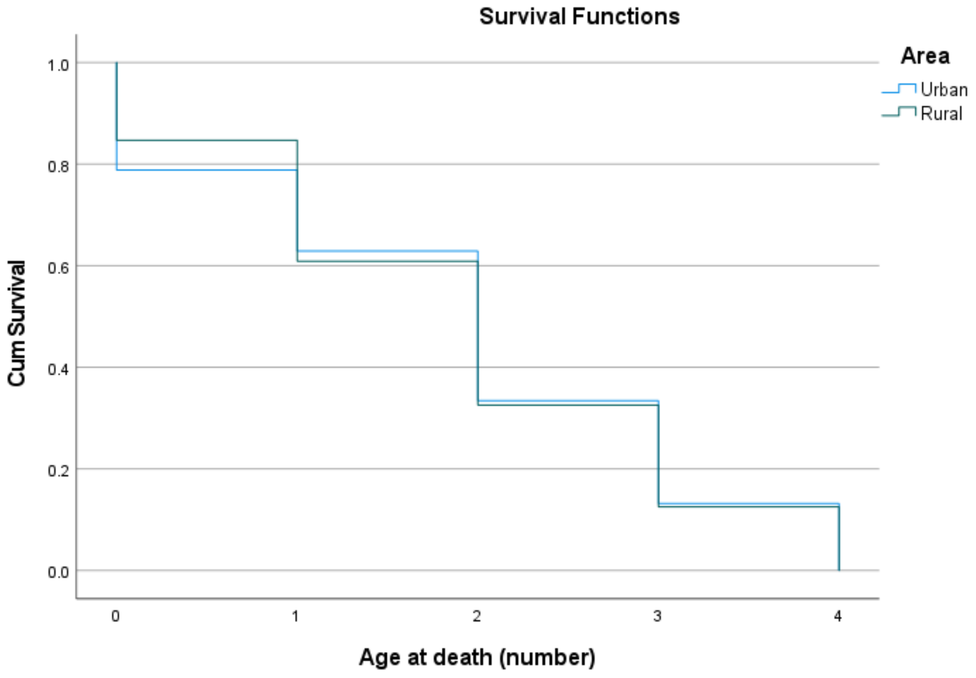
Source: State of Palestine MICS6 2019/2020 (n=337)

Table 4.26: Kaplan-Meier survival analysis curve information by area in Palestine, 2019-2020

First-order Controls		Interval Start Time	Number Entering Interval	Number Exposed to Risk	Number of Terminal Events	Cumulative Proportion Surviving at End of Interval	Hazard Rate
Area	URBAN	0	178	178.000	19	.89	.11
		1	159	159.000	52	.60	.39
		2	107	107.000	46	.34	.55
		3	61	61.000	34	.15	.77
		4	27	27.000	27	.00	.00
	RURAL	0	102	102.000	7	.93	.07
		1	95	95.000	38	.56	.50
		2	57	57.000	26	.30	.59
		3	31	31.000	23	.08	1.18
		4	8	8.000	8	.00	.00
	CAMP	0	57	57.000	6	.89	.11
		1	51	51.000	20	.54	.49
		2	31	31.000	16	.26	.70
		3	15	15.000	6	.16	.50
		4	9	9.000	9	.00	.00

At age 0 year children living in rural areas of Malawi have a higher chance of survival than children living in urban areas at the same age. A cumulative survival rate at age 0 year of 0.85 was found at age 0 in rural areas of Malawi found in Table 4.28. Further, we see from Figure 4.4 that at the age of one, children living in urban areas have a higher chance of survival than children living in rural areas of the country. Thereafter, from the ages of 2, 3 and 4, the cumulative survival rates are equal for both urban and rural. The cumulative survival rates are found in Table 4.28.

Figure 4.4: Kaplan-Meier survival curve classified by area in Malawi, 2019-2020



Source: Malawi MICS6 2019/2020 (n=3 131)

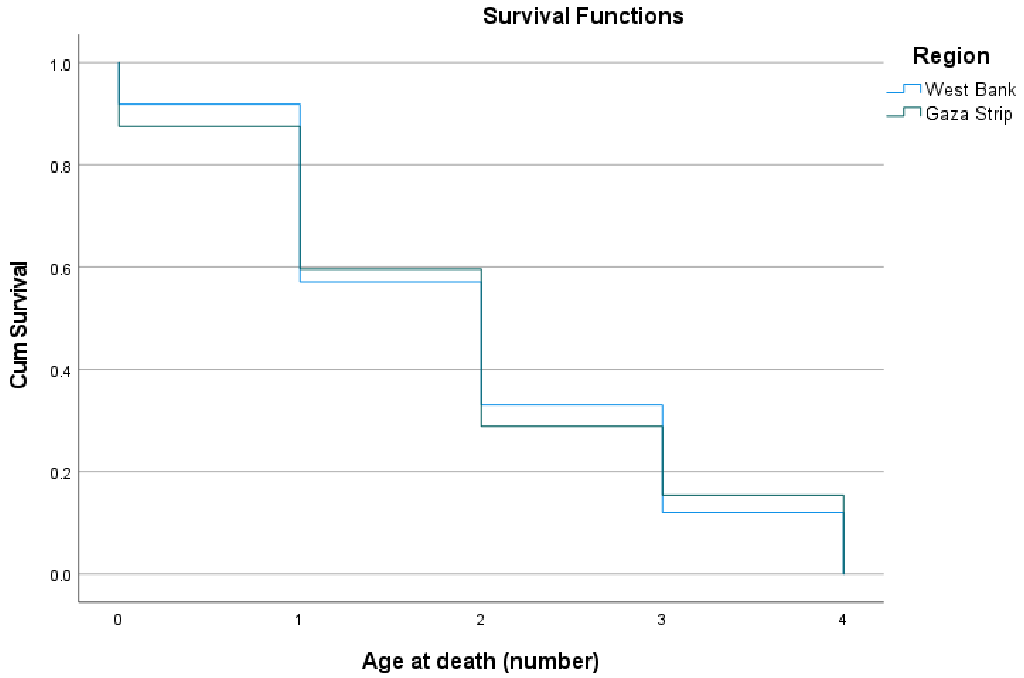
Table 4.27: Kaplan-Meier survival analysis curve information by area in Malawi, 2019-2020

First-order Controls		Interval Start Time	Number Entering Interval	Number Exposed to Risk	Number of Terminal Events	Cumulative Proportion Surviving at End of Interval	Hazard Rate
Area	Urban	0	326	326.000	69	.79	.24
		1	257	257.000	52	.63	.23
		2	205	205.000	96	.33	.61
		3	109	109.000	66	.13	.87
		4	43	43.000	43	.00	2.00
	Rural	0	2805	2805.000	429	.85	.17
		1	2376	2376.000	668	.61	.33
		2	1708	1708.000	794	.33	.61
		3	914	914.000	562	.13	.89
		4	352	352.000	352	.00	2.00

4.4.1.3 Region

Figure 4.5 shows that at age 0 year, children living in the West Bank have a higher chance of survival than those children living in the Gaza Strip. A cumulative survival rate of 0.92 was found as seen in Table 4.29. At age 1 year and 3 years, children living in the Gaza Strip have a higher chance of survival than children living in the West Bank.

Figure 4.5: Kaplan-Meier survival curve classified by region in Palestine, 2019-2020



Source: State of Palestine MICS6 2019/2020 (n=337)

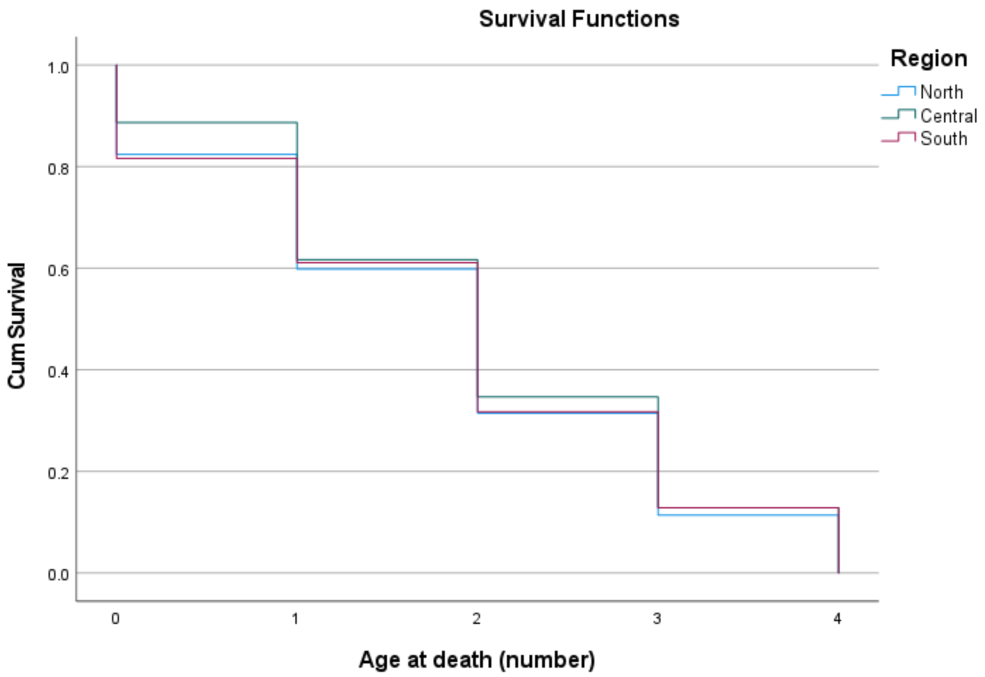
Table 4.28: Kaplan-Meier survival analysis curve information by region in Palestine, 2019-2020

First-order Controls		Interval Start Time	Number Entering Interval	Number Exposed to Risk	Number of Terminal Events	Cumulative Proportion Surviving at End of Interval	Hazard Rate
Region	West Bank	0	233	233.000	19	.92	.09
		1	214	214.000	81	.57	.47
		2	133	133.000	56	.33	.53
		3	77	77.000	49	.12	.93

	4	28	28.000	28	.00	.00
Gaza Strip	0	104	104.000	13	.88	.13
	1	91	91.000	29	.60	.38
	2	62	62.000	32	.29	.70
	3	30	30.000	14	.15	.61
	4	16	16.000	16	.00	.00

At age 0- and 2-years, Table 4.30 shows that children living in the Central region of Malawi have a better chance of survival than children living in the North and South regions of Malawi. The cumulative survival rates are found in Table 4.30.

Figure 4.6: Kaplan-Meier survival curve classified by region in Malawi, 2019-2020



Source: Malawi MICS6 2019/2020 (N=3 131)

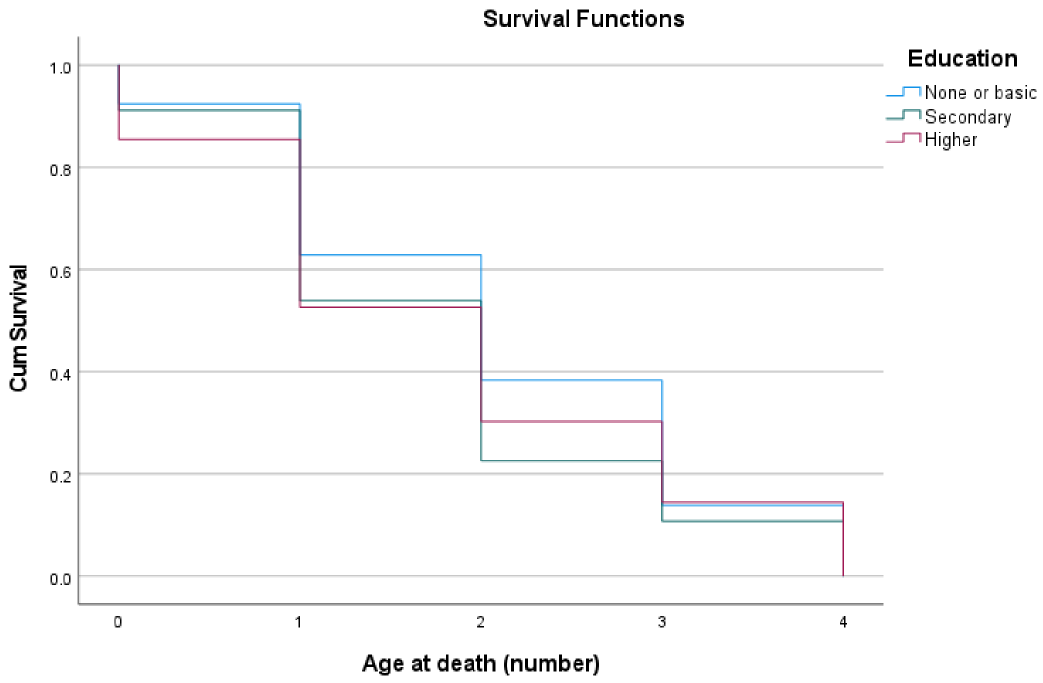
Table 4.29: Kaplan-Meier survival analysis curve information by region in Malawi, 2019-2020

First-order Controls		Interval Start Time	Number Entering Interval	Number Exposed to Risk	Number of Terminal Events	Cumulative Proportion Surviving at End of Interval	Hazard Rate
Region	North	0	483	483.000	85	.82	.19
		1	398	398.000	109	.60	.32
		2	289	289.000	137	.31	.62
		3	152	152.000	97	.11	.94
		4	55	55.000	55	.00	2.00
	Central	0	1044	1044.000	118	.89	.12
		1	926	926.000	282	.62	.36
		2	644	644.000	282	.35	.56
		3	362	362.000	228	.13	.92
		4	134	134.000	134	.00	2.00
	South	0	1604	1604.000	295	.82	.20
		1	1309	1309.000	329	.61	.29
		2	980	980.000	471	.32	.63
		3	509	509.000	303	.13	.85
		4	206	206.000	206	.00	2.00

4.4.1.4 Mother's education level

In the State of Palestine, Figure 4.7 and Table 4.31 show that children at age 0 whose mothers had an education level equal to none or basic had a higher chance of survival throughout. At age 1- and 2-years children whose mothers had an education level equals to secondary had a higher chance of survival than children whose mothers had higher education. The cumulative survival rates at each age interval is found in Table 4.31.

Figure 4.7: Kaplan-Meier survival curve classified by mother's education level in Palestine, 2019-2020



Source: State of Palestine MICS6 2019/2020 (n=337)

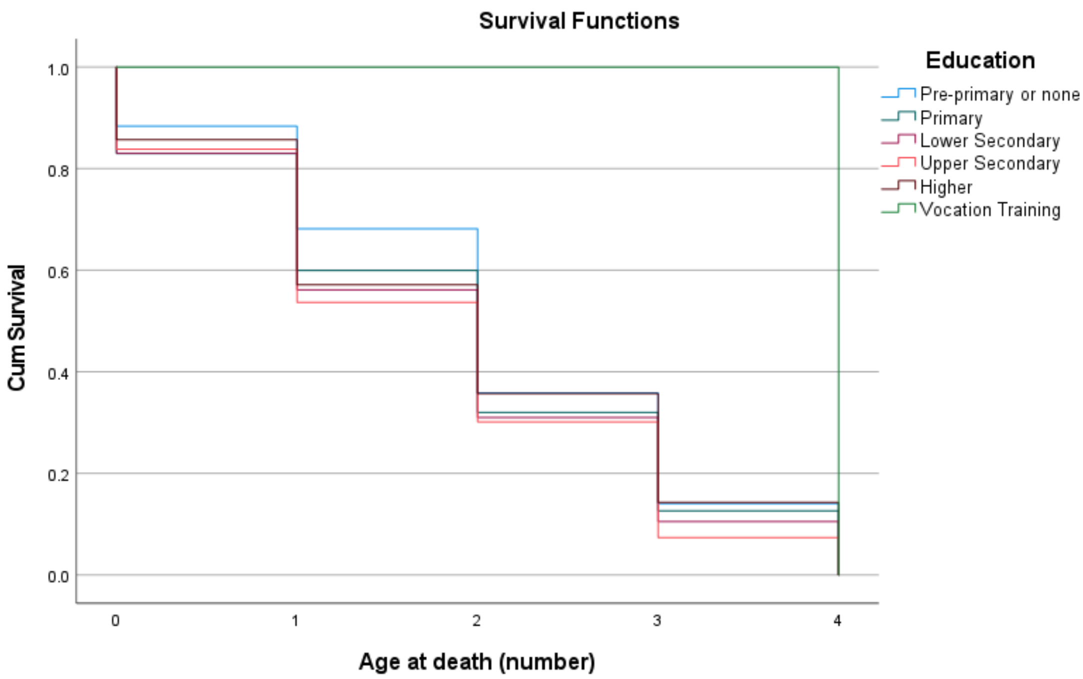
Table 4.30: Kaplan-Meier survival analysis curve information by mothers' education level in Palestine, 2019-2020

First-order Controls		Interval Start Time	Number Entering Interval	Number Exposed to Risk	Number of Terminal Events	Cumulative Proportion Surviving at End of Interval	Hazard Rate
Education	None or basic	0	159	159.000	12	.92	.08
		1	147	147.000	47	.63	.38
		2	100	100.000	39	.38	.48
		3	61	61.000	39	.14	.94
		4	22	22.000	22	.00	.00
	Secondary	0	102	102.000	9	.91	.09
		1	93	93.000	38	.54	.51
		2	55	55.000	32	.23	.82
		3	23	23.000	12	.11	.71
		4	11	11.000	11	.00	.00

	Higher	0	76	76.000	11	.86	.16
		1	65	65.000	25	.53	.48
		2	40	40.000	17	.30	.54
		3	23	23.000	12	.14	.71
		4	11	11.000	11	.00	.00

In Figure 4.8 we can see that children born to mothers with vocational training had a much higher chance of survival than mothers on every other level of education in Malawi. The cumulative survival rates at the end of each age interval is found in Table 4.32.

Figure 4.8: Kaplan-Meier survival curve classified by mother's education level in Malawi, 2019-2020



Source: Malawi MICS6 2019/2020 (n=3 131)

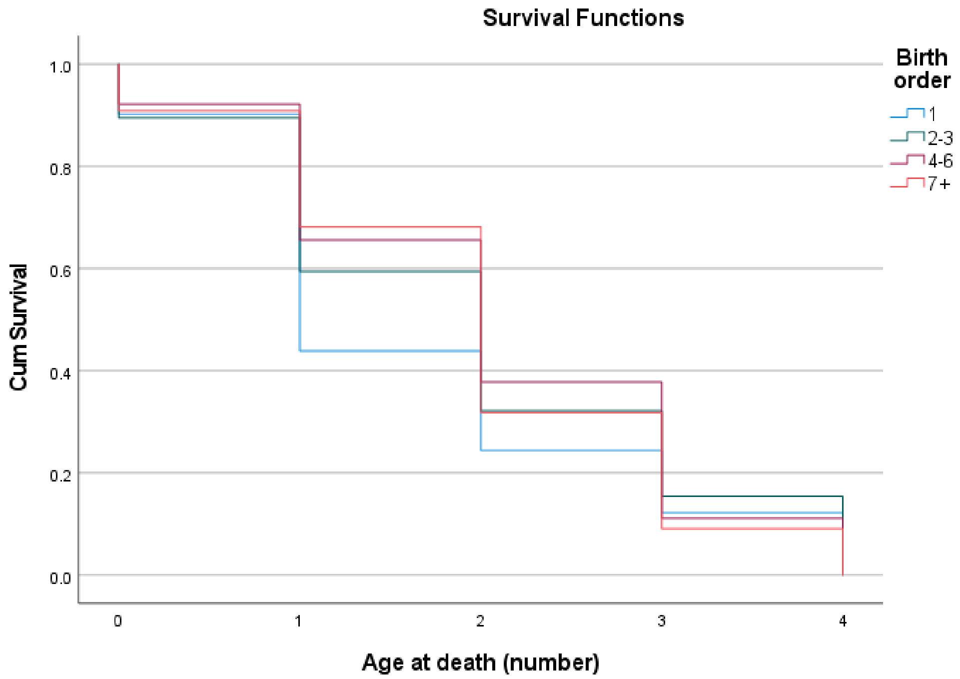
Table 4.31: Kaplan-Meier survival analysis curve information by mothers' education level in Malawi, 2019-2020

First-order Controls		Interval Start Time	Number Entering Interval	Number Exposed to Risk	Number of Terminal Events	Cumulative Proportion Surviving at End of Interval	Hazard Rate
Education	Primary	0	2190	2190.000	373	.83	.19
		1	1817	1817.000	504	.60	.32
		2	1313	1313.000	612	.32	.61
		3	701	701.000	424	.13	.87
		4	277	277.000	277	.00	2.00
	Lower Secondary	0	171	171.000	29	.83	.19
		1	142	142.000	46	.56	.39
		2	96	96.000	43	.31	.58
		3	53	53.000	35	.11	.99
		4	18	18.000	18	.00	2.00
	Upper Secondary	0	136	136.000	22	.84	.18
		1	114	114.000	41	.54	.44
		2	73	73.000	32	.30	.56
		3	41	41.000	31	.07	1.22
		4	10	10.000	10	.00	2.00
	Higher	0	14	14.000	2	.86	.15
		1	12	12.000	4	.57	.40
		2	8	8.000	3	.36	.46
		3	5	5.000	3	.14	.86
		4	2	2.000	2	.00	2.00
	Vocation Training	0	1	1.000	0	1.00	.00
		1	1	1.000	0	1.00	.00
		2	1	1.000	0	1.00	.00
		3	1	1.000	0	1.00	.00
		4	1	1.000	1	.00	2.00

4.4.1.5 Birth order

At age 0- and 2-years children born in the 4-6 birth order in Palestine had a higher chance of survival with a cumulative survival rate of 0.92 and 0.38, respectively. At age 1-year, children born in the interval 7+ had a higher chance of survival than other children in the population with a cumulative survival rate of 0.68 at the end of the age interval. At age 3- years children born in the 2-3 birth order had a higher survival rate of 0.15 based on Table 4.33.

Figure 4.9: Kaplan-Meier survival curve classified by birth order in Palestine, 2019-2020



Source: State of Palestine MICS6 2019/2020 (n=337)

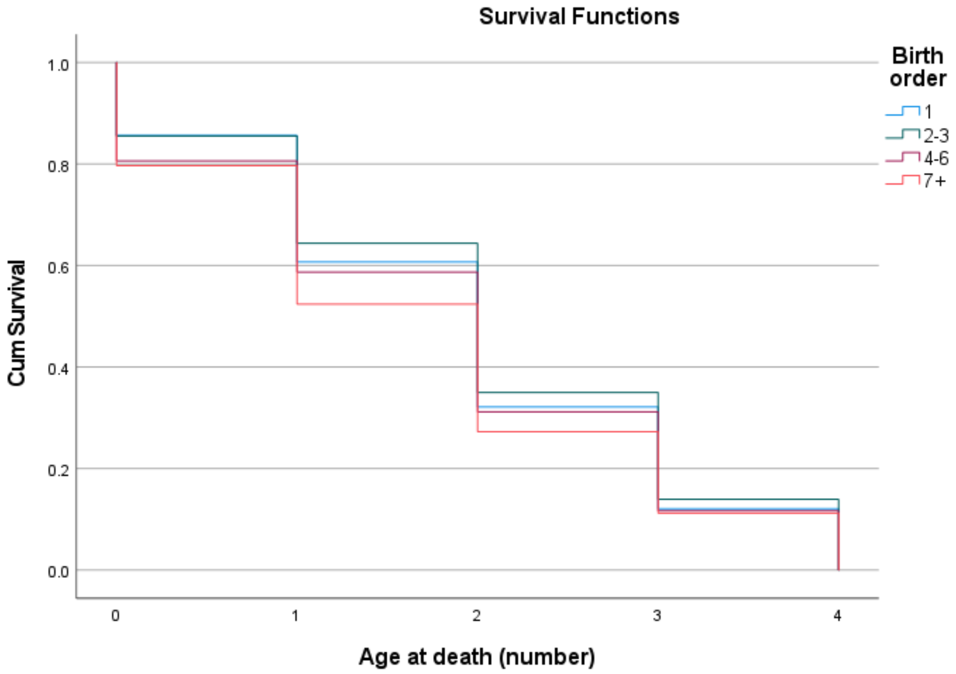
Table 4.32: Kaplan-Meier survival analysis curve information by birth order in Palestine, 2019-2020

First-order Controls		Interval Start Time	Number Entering Interval	Number Exposed to Risk	Number of Terminal Events	Cumulative Proportion Surviving at End of Interval	Hazard Rate
Birth order	1	0	82	82.000	8	.90	.10
		1	74	74.000	38	.44	.69
		2	36	36.000	16	.24	.57

	3	20	20.000	10	.12	.67
	4	10	10.000	10	.00	.00
2-3	0	143	143.000	15	.90	.11
	1	128	128.000	43	.59	.40
	2	85	85.000	39	.32	.60
	3	46	46.000	24	.15	.71
	4	22	22.000	22	.00	.00
4-6	0	90	90.000	7	.92	.08
	1	83	83.000	24	.66	.34
	2	59	59.000	25	.38	.54
	3	34	34.000	24	.11	1.09
	4	10	10.000	10	.00	.00
7+	0	22	22.000	2	.91	.10
	1	20	20.000	5	.68	.29
	2	15	15.000	8	.32	.73
	3	7	7.000	5	.09	1.11
	4	2	2.000	2	.00	.00

In Figure 4.10, children aged 0-year born in the first birth order and 2-3 birth order had a higher chance of survival than children born in other birth orders with both having a survival rate of 0.86. Children aged 1, 2 and 3 years that were born in the birth order 2-3 years had a higher chance of survival than other children with a cumulative survival rate at the end of the age interval of 0.64, 0.35, and 0.14, respectively.

Figure 4.10: Kaplan-Meier survival curve classified by birth order in Palestine, 2019-2020



Source: Malawi MICS6 2019/2020 (n=3 131)

Table 4.33: Kaplan-Meier survival analysis curve information by birth order in Malawi, 2019-2020

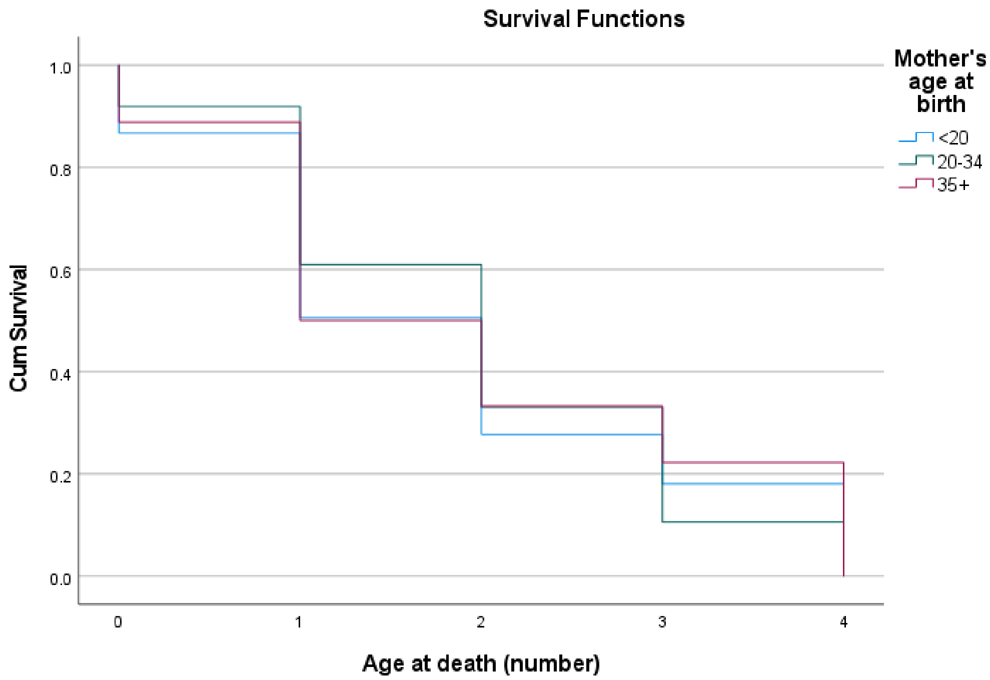
First-order Controls		Interval Start Time	Number Entering Interval	Number Exposed to Risk	Number of Terminal Events	Cumulative Proportion Surviving at End of Interval	Hazard Rate
Birth order	1	0	1092	1092.000	157	.86	.15
		1	935	935.000	272	.61	.34
		2	663	663.000	312	.32	.62
		3	351	351.000	219	.12	.91
		4	132	132.000	132	.00	2.00
	2-3	0	1140	1140.000	165	.86	.16
		1	975	975.000	241	.64	.28
		2	734	734.000	335	.35	.59
		3	399	399.000	240	.14	.86
		4	159	159.000	159	.00	2.00
	4-6	0	712	712.000	138	.81	.21

	1	574	574.000	156	.59	.31
	2	418	418.000	196	.31	.61
	3	222	222.000	139	.12	.91
	4	83	83.000	83	.00	2.00
7+	0	187	187.000	38	.80	.23
	1	149	149.000	51	.52	.41
	2	98	98.000	47	.27	.63
	3	51	51.000	30	.11	.83
	4	21	21.000	21	.00	2.00

4.4.1.6 Mother's age

Figure 4.11 illustrates that children born to mothers in the age group 35+ are more likely to survive than children born to mothers <20 and between the ages 2-34 years in Palestine. Additionally, children born to mothers between the ages of 20-34 years are more likely to survive than children born to mothers younger than 20 years. In Malawi, Figure 4.12 shows that children born to mothers in the age group 20-34 are more likely to survive than the children born to mothers in the other age groups. Additionally, in Malawi children born to mothers 35 years and older are less likely to survive.

Figure 4.11: Kaplan-Meier survival curve classified by mother's age at birth in Palestine, 2019-2020



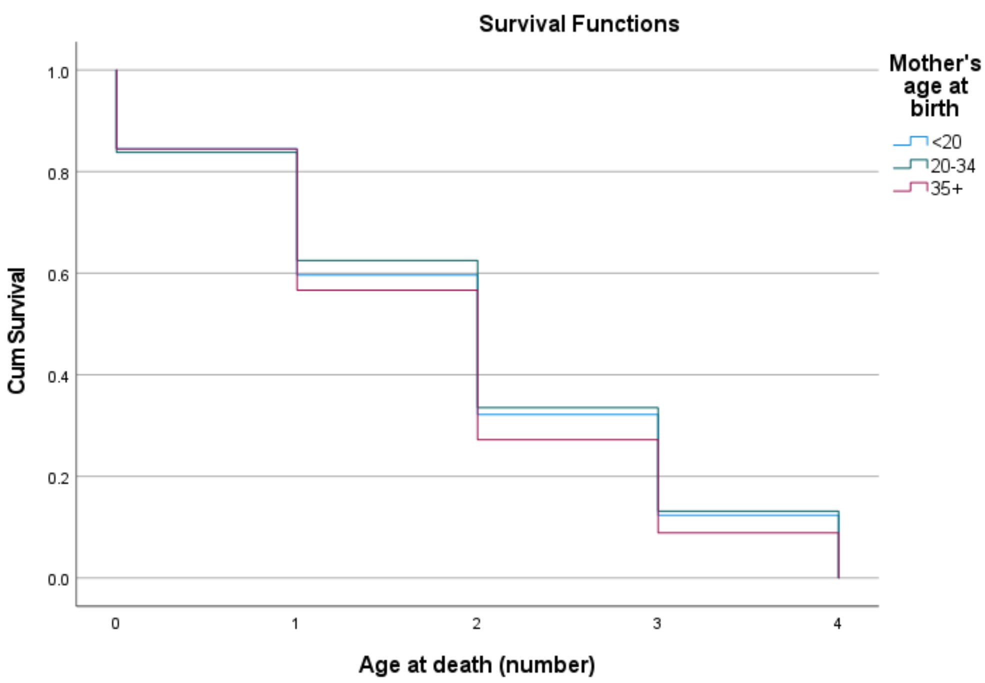
Source: State of Palestine MICS6 2019/2020 (n=337)

Table 4.34: Kaplan-Meier survival analysis curve information by mother's age at birth in Palestine, 2019-2020

First-order Controls		Interval Start Time	Number Entering Interval	Number Exposed to Risk	Number of Terminal Events	Cumulative Proportion Surviving at End of Interval	Hazard Rate
Mother's age at birth	<20	0	83	83.000	11	.87	.14
		1	72	72.000	30	.51	.53
		2	42	42.000	19	.28	.58
		3	23	23.000	8	.18	.42
		4	15	15.000	15	.00	.00
	20-34	0	236	236.000	19	.92	.08
		1	217	217.000	73	.61	.40
		2	144	144.000	66	.33	.59
		3	78	78.000	53	.11	1.03
		4	25	25.000	25	.00	.00
	35+	0	18	18.000	2	.89	.12
		1	16	16.000	7	.50	.56

	2	9	9.000	3	.33	.40
	3	6	6.000	2	.22	.40
	4	4	4.000	4	.00	.00

Figure 4.12: Kaplan-Meier survival curve classified by mother's age at birth in Malawi, 2019-2020



Source: Malawi MICS6 2019/2020 (n=3 131)

Table 4. 35: Kaplan-Meier survival analysis curve information by mother's age at birth in Malawi, 2019-2020

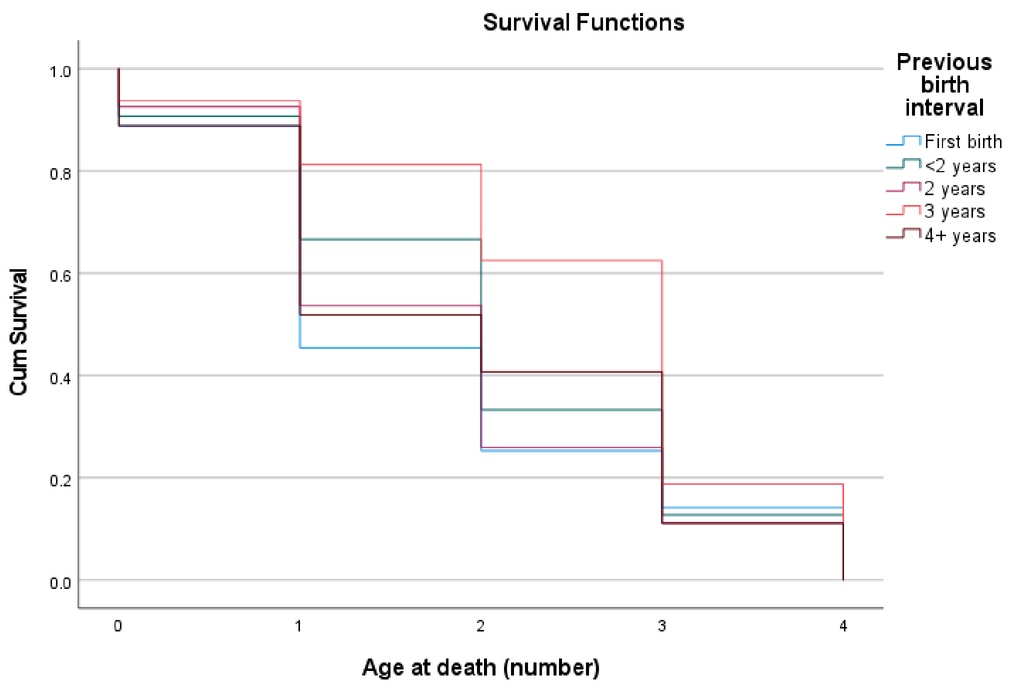
First-order Controls		Interval Start Time	Number Entering Interval	Number Exposed to Risk	Number of Terminal Events	Cumulative Proportion Surviving at End of Interval	Hazard Rate
Mother's age at birth	<20	0	1174	1174.000	182	.84	.17
		1	992	992.000	292	.60	.35
		2	700	700.000	322	.32	.60
		3	378	378.000	233	.12	.89
		4	145	145.000	145	.00	2.00
	20-34	0	1777	1777.000	288	.84	.18

	1	1489	1489.000	378	.63	.29
	2	1111	1111.000	515	.34	.60
	3	596	596.000	362	.13	.87
	4	234	234.000	234	.00	2.00
35+	0	180	180.000	28	.84	.17
	1	152	152.000	50	.57	.39
	2	102	102.000	53	.27	.70
	3	49	49.000	33	.09	1.02
	4	16	16.000	16	.00	2.00

4.4.1.7 Previous birth interval

In Palestine, Figure 4.13 illustrates that across the population, children born in the 3-year birth interval had a higher chance of survival than children born in other intervals in the population of Palestine. The cumulative survival rates at the end of each age interval is found in Table 4.37.

Figure 4.13: Kaplan-Meier survival curve classified by previous birth interval in Palestine, 2019-2020



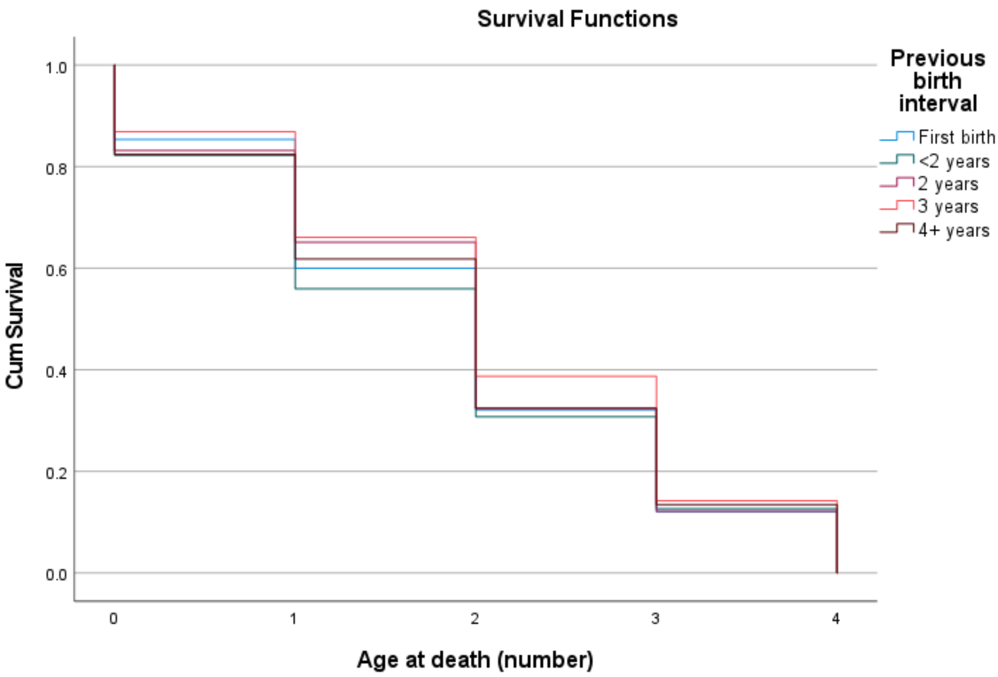
Source: State of Palestine MICS6 2019/2020 (n=337)

Table 4.36: Kaplan-Meier survival analysis curve information by previous birth interval in Palestine, 2019-2020

First-order Controls		Interval Start Time	Number Entering Interval	Number Exposed to Risk	Number of Terminal Events	Cumulative Proportion Surviving at End of Interval	Hazard Rate
Previous birth interval	First birth	0	99	99.000	11	.89	.12
		1	88	88.000	43	.45	.65
		2	45	45.000	20	.25	.57
		3	25	25.000	11	.14	.56
		4	14	14.000	14	.00	.00
	<2 years	0	141	141.000	13	.91	.10
		1	128	128.000	34	.67	.31
		2	94	94.000	47	.33	.67
		3	47	47.000	29	.13	.89
		4	18	18.000	18	.00	.00
	2 years	0	54	54.000	4	.93	.08
		1	50	50.000	21	.54	.53
		2	29	29.000	15	.26	.70
		3	14	14.000	8	.11	.80
		4	6	6.000	6	.00	.00
	3 years	0	16	16.000	1	.94	.06
		1	15	15.000	2	.81	.14
		2	13	13.000	3	.63	.26
		3	10	10.000	7	.19	1.08
		4	3	3.000	3	.00	.00
	4+ years	0	27	27.000	3	.89	.12
		1	24	24.000	10	.52	.53
		2	14	14.000	3	.41	.24
		3	11	11.000	8	.11	1.14
		4	3	3.000	3	.00	.00

In Malawi, children born in the 3-year birth interval also had a higher chance of survival than children born in other birth intervals.

Figure 4.14: Kaplan-Meier survival curve classified by previous birth interval in Malawi, 2019-2020



Source: Malawi MICS6 2019/2020 (n=3 131)

Table 4.37: Kaplan-Meier survival analysis curve information by previous birth interval in Malawi, 2019-2020

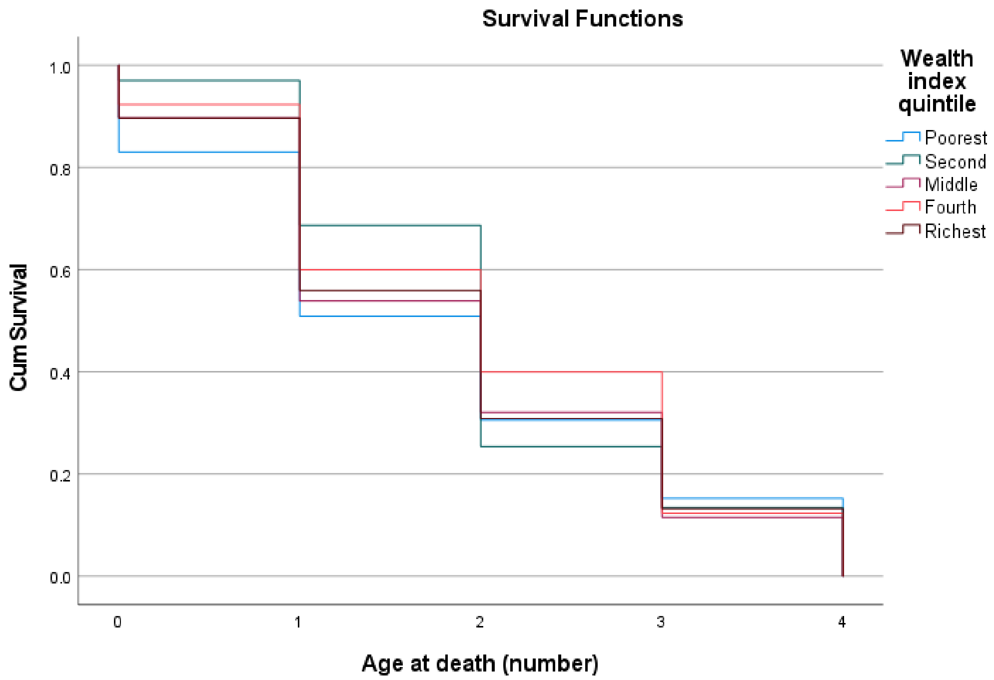
First-order Controls		Interval Start Time	Number Entering Interval	Number Exposed to Risk	Number of Terminal Events	Cumulative Proportion Surviving at End of Interval	Hazard Rate
Previous birth interval	<2 years	0	647	647.000	115	.82	.20
		1	532	532.000	170	.56	.38
		2	362	362.000	163	.31	.58
		3	199	199.000	117	.13	.83
		4	82	82.000	82	.00	2.00
	2 years	0	642	642.000	108	.83	.18

		1	534	534.000	116	.65	.24
		2	418	418.000	210	.32	.67
		3	208	208.000	130	.12	.91
		4	78	78.000	78	.00	2.00
	3 years	0	351	351.000	46	.87	.14
		1	305	305.000	73	.66	.27
		2	232	232.000	96	.39	.52
		3	136	136.000	86	.14	.92
		4	50	50.000	50	.00	2.00
	4+ years	0	364	364.000	64	.82	.19
		1	300	300.000	75	.62	.29
		2	225	225.000	107	.32	.62
		3	118	118.000	69	.13	.83
		4	49	49.000	49	.00	2.00

4.4.1.8 Wealth index

Table 4.39 shows us that in Figure 4.15 at ages 0- and 1-years children living in the second wealth index quintile in Palestine had a higher cumulative survival rate of 0.97 and 0.69, respectively than children born in other wealth quintiles at the same age. At age 2-years, children living in the fourth quintile had a higher chance of survival with a cumulative survival rate at the end of the interval of 0.40 according to Table 4.39. At age 3-years, children living in the poorest quintile had a higher survival rate of 0.15.

Figure 4.15: Kaplan-Meier survival curve classified by wealth index quintile in Palestine, 2019-2020



Source: State of Palestine MICS6 2019/2020 (n=337)

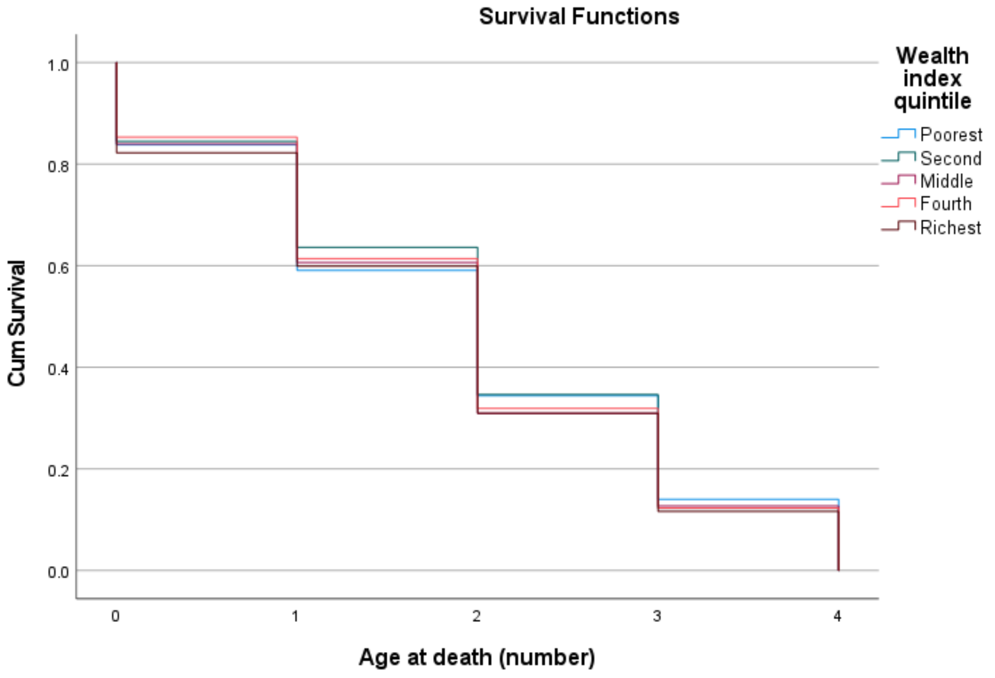
Table 4. 38: Kaplan-Meier survival analysis curve information by wealth index quintile in Palestine, 2019-2020

First-order Controls		Interval Start Time	Number Entering Interval	Number Exposed to Risk	Number of Terminal Events	Cumulative Proportion Surviving at End of Interval	Hazard Rate
Wealth index quintile	Poorest	0	59	59.000	10	.83	.19
		1	49	49.000	19	.51	.48
		2	30	30.000	12	.31	.50
		3	18	18.000	9	.15	.67
		4	9	9.000	9	.00	.00
	Second	0	67	67.000	2	.97	.03
		1	65	65.000	19	.69	.34
		2	46	46.000	29	.25	.92
		3	17	17.000	8	.13	.62
		4	9	9.000	9	.00	.00

	Middle	0	78	78.000	8	.90	.11
		1	70	70.000	28	.54	.50
		2	42	42.000	17	.32	.51
		3	25	25.000	16	.12	.94
		4	9	9.000	9	.00	.00
	Fourth	0	65	65.000	5	.92	.08
		1	60	60.000	21	.60	.42
		2	39	39.000	13	.40	.40
		3	26	26.000	18	.12	1.06
		4	8	8.000	8	.00	.00
	Richest	0	68	68.000	7	.90	.11
		1	61	61.000	23	.56	.46
		2	38	38.000	17	.31	.58
		3	21	21.000	12	.13	.80
		4	9	9.000	9	.00	.00

In Malawi, in Figure 4.16 below the figure illustrates that in the second and fourth wealth quintile children at age 0 had a higher chance of survival with a cumulative survival rate of 0.85. At age 1- and 2-year's children in the second quintile had a higher chance of survival than other children at the same age with a cum survival rate of 0.64 and 0.35 respectively. Children born in the poorest wealth index quintile at age 3 years had a higher chance of survival than other children based on Table 4.40.

Figure 4.16: Kaplan-Meier survival curve classified by wealth index quintile in Malawi, 2019-2020



Source: Malawi MICS6 2019/2020 (n=3 131)

Table 4.39: Kaplan-Meier survival analysis curve information by wealth index quintile in Malawi, 2019-2020

First-order Controls		Interval Start Time	Number Entering Interval	Number Exposed to Risk	Number of Terminal Events	Cumulative Proportion Surviving at End of Interval	Hazard Rate
Wealth index quintile	Poorest	0	599	599.000	97	.84	.18
		1	502	502.000	148	.59	.35
		2	354	354.000	148	.34	.53
		3	206	206.000	122	.14	.84
		4	84	84.000	84	.00	2.00
	Second	0	742	742.000	115	.85	.17
		1	627	627.000	155	.64	.28
		2	472	472.000	215	.35	.59
		3	257	257.000	166	.12	.95

	4	91	91.000	91	.00	2.00
Middle	0	724	724.000	116	.84	.17
	1	608	608.000	169	.61	.32
	2	439	439.000	215	.31	.65
	3	224	224.000	132	.13	.84
	4	92	92.000	92	.00	2.00
Fourth	0	627	627.000	92	.85	.16
	1	535	535.000	150	.61	.33
	2	385	385.000	185	.32	.63
	3	200	200.000	123	.12	.89
	4	77	77.000	77	.00	2.00
Richest	0	439	439.000	78	.82	.19
	1	361	361.000	98	.60	.31
	2	263	263.000	127	.31	.64
	3	136	136.000	85	.12	.91
	4	51	51.000	51	.00	2.00

Table 4.41 and table 4.42 illustrates the Kaplan-Meier survival analysis of the mean age at deaths in Malawi and Palestine based on selected explanatory variables used in this study.

Table 4.40: Kaplan-Meier survival analysis of mean age at death according to selected explanatory variables, 2019-2020

Variables	**Under-five mortality**			
	Mean age at death (in years)	**p-value**	**Mean age at death (in years)**	**p-value**
	Malawi		**State of Palestine**	
Sex of child				
Boy	1.906	0.968	1.889	0.596
Girl	1.903		1.986	
Total	1.905		1.932	
Area				
Urban	1.883	0.909	1.989	0.506

Rural	1.907		1.873	
Camp	n/a		1.860	
Total	1.905		1.932	
Region				
West Bank			1.940	0.956
Gaza Strip			1.913	
Total			1.932	
North	1.851	0.238		
Central	1.979			
South	1.873			
Total	1.905			
Education				
None or basic			2.075	0.158
Secondary			1.784	
Higher			1.829	
Overall			1.932	
Pre-primary or none	2.065	0.015		
Primary	1.876			
Lower secondary	1.807			
Upper secondary	1.750			
Higher	1.929			
Vocation training	4.000			
Total	1.905			
Birth order				
1	1.906	0.014	1.707	0.368
2-3	1.989		1.965	
4-6	1.822		2.067	
7+	1.706		2.000	
Total	1.905		1.932	
Mother's age at birth				
<20	1.887	0.128	1.831	0.905
20-34	1.930		1.966	

35+	1.772		1.944	
Total	1.905		1.932	
Previous birth interval				
First birth	1.895	0.142	1.737	0.211
<2 years	1.816		2.035	
2 years	1.928		1.833	
3 years	2.060		2.563	
4+ years	1.901		1.926	
Total	1.905		1.932	
Wealth index quintile				
Poorest	1.913	0.755	1.797	0.907
Second	1.950		2.045	
Middle	1.883		1.872	
Fourth	1.908		2.046	
Richest	1.847		1.897	
Total	1.905		1.932	

Sources: MICS6 2019, Malawi and the State of Palestine BH_datasets

According to the figures shown in the Table 4.41, the mean age at death for under-five year old boys in Malawi is 1.906 years and for girls it is 1.903. the mean age at death for boys in Palestine was 1.889 years and 1.986 years for girls. A log rank test was conducted to assess whether the survival distribution between the genders differed. The distributions of survival for the two sexes were not statistically significant (p= 0.968). With a p-value of 0.596, there was likewise no statistically significant correlation between the genders and child mortality in Palestine. The average death rate for boys under the age of five is significantly lower than the average death rate for females in Malawi. Again, the mean death rates for children under the age of five in the two countries differ, with the State of Palestine having the lower life expectancy.

In urban areas, the mean age at death in Malawi is 1.883 years and in Palestine it is 1.989 years, whereas in rural regions of Malawi it is 1.907 and in Palestine it is 1.873 years. In the camp areas of Palestine, the mean age at death was 1.860 which is lower than in other areas of Palestine and Malawi. Malawi has a p-value of 0.909, and Palestine has a p-value of 0.506, indicating that there is no statistically significant link between area and under-five mortality in both countries.

In terms of region, the median age at death in the West Bank is 1.940 years, while in the Gaza Strip it is 1.913 years. The table reveals a statistically significant correlation between Palestine's regions and under-five mortality. A p= 0.956 value indicates that there was no statistically significant association in Malawi between regions and under-five mortality. The average age at death in the northern region of Malawi is 1.851 years, 1.979 years in the central region, and 1.873 in the southern region. With a p-value of 0.238, there is no statistically significant association between education and under-five mortality in Palestine.

In Malawi, however, there is a statistically significant association between mother's education level and under-five mortality with a p-value of less than 0.015. the mean age at death for children born to mothers with pre-primary or no education is 2.065 years which is the second highest life expectancy other than mothers with a vocational training whose children had a mean age of 4 years at death. Mothers with primary level education children's mean aged at deaths is 1.876, mothers with lower education children had 1.807 years and upper secondary and higher education level had a 1.750 and 1.929 years respectively. Another variable with a statistically significant link to under-five mortality in Malawi is birth order, with a p-value of 0.014. children born in the first birth order had a mean age at death of 1.906, children born in the 2-3 birth order had a mean age at deaths of 1.989 and children in the 4-6 birth order had a mean age of death of 1.822 years. Children born in the 7+ birth order had a mean age at death of 1.706 years in Malawi.

In Palestine there was no significant relationship found between under-five child mortality and mother's education level (p = 0.158). the mean age at death for children born to mothers with none or basic level of education was 2.075, mothers with secondary education children lived to the mean age of 1.784 and children with mother who had higher education lived to the mean age of 1.829 years. However, there is no statistically significant correlation between birth order and under-five mortality in the State of Palestine (p = 0.368). children born in the first birth order mean age at death was 1.707 years, in the birth order 2-3 years children lived up to the mean age of 1.965, children in the birth order 4-6 years mean age at death was 2.67 and children in the 7+ birth order mean age at deaths was 2 years.

Considering the age of the mother at the time of birth, the median age at death in Palestine is 1.932 years. With a p-value of p 0.905, a log rank test revealed that there is no statistically significant link between mother's age at birth and under-five mortality in Palestine. The average age at death in Malawi is 1.905 years. The p-value for the log rank test indicates that the survival distributions for the mother's age at birth were statistically different, p-value = 0.128. the mean age at deaths for mother aged younger than 20 was 1.887 years in Malawi and 1.831 years in Palestine. Mother age between 20- and 34-years children's mean age at death was 1.930 in Malawi and 1.966 years in Palestine. Mother aged 35 years and older children had a mean age at death of 1.772 years in Malawi and 1.944 years in Palestine.

The preceding birth interval variable in Malawi demonstrates that the survival distributions were statistically different, p-value = 0.142. With a p-value of 0.211, the log rank test indicates that the survival distributions in Palestine are statistically different. Children born in the first birth interval had a mean age at deaths of 1.928 years in Malawi and 1.737 years in Palestine. Children born in the less than two-year birth interval had a mean age at death of 1.816 years in Malawi and 2.035 years in Palestine. Children born in the 2-year birth interval in Malawi had a mean age at death of 1.928 years and 1.833 years in Palestine. In the 3-year birth interval children had a mean age at deaths of 2.060 years in Malawi and 2.563 years in Palestine. In the 4+ years birth interval the mean age at death for children under-five was 1.901 years in Malawi and 1.926 years in Palestine.

Based on the family wealth index, the average age at death in Malawi is 1.905 years. Children born in the poorest wealth index quintile in Malawi mean age at death was 1.913 years and in Palestine it was 1.979 years. In the second quintile in Malawi the mean age at death was 1.950 and 2.045 years in Palestine. In the middle quintile the mean age at death for children in Malawi was 1.883 years and 1.872 years in Palestine. In the fourth quintile the mean age at death for under-five children in Malawi was 1.908 and 2.046 in Palestine. In the richest wealth index quintile, the mean age at death for under-five children in Malawi was 1.847 years and 1.897

years for children in Palestine. The log rank test revealed that there was not a statistically significant link between wealth index and under-five mortality, with a p-value of 0.755. In Palestine, the average age at death is 1.932 years, however there is no statistically significant correlation between the wealth index and the under-five mortality rate. The log-rank test yielded a p-value of 0.907, which exceeds the 0.05 threshold.

4.5 Conclusion

In this chapter, the descriptive results (percentage distribution of the variables) were presented. The results for the cross-tabulation and Chi-square tests were also illustrated and discussed. Additionally, variables used in the study were also included into the Kaplan-Meier survival analysis, Cox proportional hazard model as well as mean survival time to determine the relationship between survival time and the variables pertinent for this study. In Chapter Five, the under-five life tables are illustrated and discussed.

Chapter Five

Life tables

5.1 Introduction

Life table is a mathematical model which gives a scrutiny of mortality of a country and is the foundation for measuring the average life expectancy. It tells about the probability of a person dying at a certain age or living up to a certain age. Life tables that relate to maternal deaths and infant mortalities are important, as they help form family planning programs that work with particular populations. They also help compare a country's average life expectancy with other countries. When life expectancies of various countries are compared globally, this helps countries understand why life expectancy is rising considerably in some countries and by observing their healthcare, countries with low life expectancies can implement ideas to their own structures. Below are two tables, one for Malawi and one for Palestine. The tables are also sex-specific, one for female and one for male, for each country because males and females experience different mortality patterns.

5.2 Interpretation of the various column notations

1. **Age** – This column contains the age interval in years, *(x, x+ n)*.

2. **nqx –** Proportion of persons alive at the beginning of the age interval who die during the age interval.

3. **lx –** The starting number of new born in the life table (called the radix of the life table, usually set at 100 000) the number living at the beginning of the age interval (or the number surviving to the beginning of the age interval).

4. **ndx –** The number of persons in the cohort who die in the age interval *(x, x+ n).*

5. **px –** The probability of surviving from birth to age x, 1 – nqx;

6. **nLx –** Number of years of life lived by the cohort within the indicated age interval *(x, x+ n)* (or person-years of life in the age interval)

7. **Tx –** Total person-years of life contributed by the cohort after attaining age x

8**. ex –** Average number of years of life remaining for a person alive at the beginning of age interval x

Table 5.1: Probability of death before next birthday for under-five children in Malawi by sex of child, 2019-2020

Female/girl							
Age	**nqx**	**lx**	**ndx**	**px**	**nLx**	**Tx**	**ex**
0	0,00233	100000	233	0,99767	99883,5	447043	4,47043
1	0,00308	99767	307	0,99692	99613,5	347159,5	3,47970
2	0,00416	99460	414	0,99584	99253	247546	2,48890
3	0,00279	99046	276	0,99721	98908	148293	1,49721
4	0,00182	98770	180	0,99818	49385	49385	0,5
Male/boy							
Age	**nqx**	**lx**	**ndx**	**px**	**nLx**	**Tx**	**ex**
0	0,00265	100000	265	0,99735	99867,5	446397	4,46397
1	0,00414	99735	413	0,99586	99528,5	346529,5	3,47450
2	0,00479	99322	476	0,99521	99084	247001	2,48687
3	0,00356	98846	352	0,99644	98670	147917	1,49644
4	0,00218	98494	215	0,99782	49247	49247	0,5

Source: Malawi MICS6 data set, 2019-2020

Table 5.1 represents the life tables for the under-5 children in Malawi for both girls and boys. The symbol, ex is the average number of years of life remaining for a person alive at the beginning of age interval x. Therefore, a girl in Malawi at 0 age is expected to live another 4.47043 years to reach the age of 5 years. In contrast, a boy in Malawi at 0 age is expected to live 4.46397 years. Therefore, a girl's life expectancy at birth is higher than a boy's life expectancy at birth. At the age of 1-year, a girl is expected to live 3.47970 years and a boy 3.47450 years. At the ages 2 and 3 years, there is not much difference between the life expectancies of a girl and boy. At the age of 4-years, both girl and boy reach parity.

According to Table 5.1, the likelihood that a girl will live from birth to age 0 is 0.99867, but the probability that a male will survive to age 0 is px = 0.99735. In Malawi, the probability for girls to live from birth to age 1 was 0.99692, while for boys it was 0.99586. Girls had a 0.99584 chance of surviving to their second birthday, while boys had a 0.99521 chance. The likelihood of surviving from birth to age three was 0.99721 for girls and 0.99964 for boys in the same age range. For girls to survive from birth to age four, the probability was 0.99818, while for boys it was 0.99772.

Table 5.2: Probability of death before next birthday for under-five children by sex of child in the State of Palestine, 2019-2020

Female/girl							
Age	**nqx**	**lx**	**ndx**	**px**	**nLx**	**Tx**	**ex**
0	0,00013	100000	13	0,99987	99993,5	449704	4,49704
1	0,00045	99987	45	0,99955	99964,5	349710,5	3,49756
2	0,00038	99942	38	0,99962	99923	249746	2,49891
3	0,00033	99904	33	0,99967	99887,5	149823	1,49967
4	0,00018	99871	18	0,99982	49935,5	49935,5	0,5
Male/boy							
0	0,00019	100000	19	0,99981	99990,5	449599	4,49599
1	0,00065	99981	65	0,99935	99948,5	349608,5	3,49675
2	0,00050	99916	50	0,99950	99891	249660	2,49870
3	0,00030	99866	30	0,99970	99851	149769	1,49970
4	0,00026	99836	26	0,99974	49918	49918	0,5

Source: Palestine MICS6 data set, 2019-2020

Table 5.2 represents the life tables for the under-5 children in Palestine for both girls and boys. The symbol, ex is the average number of years of life remaining for a person alive at the beginning of age interval x. Therefore, a girl in Palestine at 0 age is expected to live another 4.49704 years to reach the age of 5 years. In contrast, a boy in Malawi at 0 age is expected to live 4.49599 years. Therefore, a girl's life expectancy at birth is higher than a boy's life expectancy at birth. At the age of 1-year, a girl is expected to live 3.49756 years and a boy 3.49675 years. At the ages 2 and 3 years, there is not much difference between the life expectancies of a girl and boy. At the age of 4-years, both girl and boy reaches parity.

In Table 5.2 below, the chance for girls to live from birth to age 0 is 0.99987, whereas the probability for boys at the same age to survive to age 0 is px = 0.99981. In Malawi, the likelihood of surviving from birth to age 1 was 0.99955 for girls and 0.99935 for boys in the same age range. From birth to age 2, the survival probability for girls was 0.99962 while for boys it is 0.99950. From birth to age three, the likelihood of survival for girls was 0.99967 and for boys it was 0.99970. For girls, the probability of surviving from birth to age 4 was 0.99982, while for boys it is 0.99974. According to the life tables, girls have a higher likelihood of surviving than boys at the same age interval in both Malawi and the State of Palestine.

5.3 Conclusion

Life tables are important in mortality analysis and show data on the probability of surviving from an age to the next as well as estimates on how long a child will live at the beginning of an age interval. The analysis shows that the girl or female child does have a biological advantage over the boy or male child in terms of survival in the first five years of life. In Chapter Six the discussion of the results will be given.

Chapter Six

Discussion

6.1 Introduction

This study aimed to determine which demographic and/or socio-economic factors consistently influenced child mortality among children under the age of five in both the State of Palestine and Malawi. Age, gender, mother's level of education, region and place of residence were considered. The study utilised secondary data, requested from the MICS6 survey data website of UNICEF. The data was analysed using version 28 of the SPSS statistical software.

This study was conducted using descriptive statistics and univariate analysis to investigate the distribution of the variables used. Cross-tabulations and bivariate analyses, such as Chi-square test statistics, Lambda, Phi, and Cramer's V, were used to determine the significance of relationships between independent and dependent variables. Existing theories such as the Modernization theory, Dependency/World Systems theory, Gender Stratification theory, Economic Disarticulation theory, Developmental State theory, Economic dependence, Gender equality and State Strength theories were reviewed in the study's literature. The conceptual framework for this study of the determinants of child mortality among children under the age of five in Malawi and the State of Palestine was developed using these theories from the literature.

6.2 Discussion

6.2.1 Mother's age at birth

The age of the mother plays a significant role in under-five mortality and is an important variable being tested in this study. When examining under-five mortality rates by mother's age at birth, mothers younger than 20 years of age had a U5MR of 107.78 per 1 000 live births, which is a high rate. The findings of the study by Nadeem et al. (2021) indicate that because young mothers have immature reproductive systems, this can result in underweight and vulnerable children, and that a child born to a mother younger than 20 years is 2.38 times more likely to die. Women between the ages of 20 and 34 in Malawi had a lower under-five mortality rate (68.933 deaths per 1 000 live births) than mothers under the age of 20. With 60.869 deaths per 1 000 live births, the U5MR was also lower among mothers aged 35 and older. The decrease in U5MRs is consistent with the findings of Akoto and Tambashe (2003), who discovered that the older the mother, the greater the child's chance of survival. This is because older women have greater experience, education and access to resources that increase their likelihood of seeking better healthcare advice and treatment. Just like in Malawi, the U5MR for mothers aged less than 20 years are also higher than the mortality rates for mothers in the other age groups with a U5MR of 36.091 deaths per 1 000 live births. The U5MR also reduces as the mother's age with those between the ages of 20 and 34 years had a U5MR of 19.079 deaths per 1 000 live births and mothers aged 35 and older had a U5MR of 18.244 deaths per 1 000 live births.

With 56.8% of the under-five deaths occurring to mothers between the ages of 20 and 34, these women accounted for most population deaths. In their 2011 study, Finley et al. argue that mothers up to the age of 27 have a higher risk of having children with stunting, diarrhea and moderate or severe anemia. Mothers under the age of 20 accounted for 37.5% of deaths among children under the age of five, while women aged 35 and older accounted for 5.7% of population deaths (see Table 4.4). The Chi-square test resulted in a significance level of p = 0.291, indicating that there was no statistically significant relationship between the age of the mother and infant mortality. 70% of the deaths in Palestine occurred to mothers between the ages of 20-34 years and 24.6% of the deaths occurred to mothers younger than 20 years. 5.3% of the deaths occurred to mother's older than 35 years. Again, the results are consistent with finding from the literature which state that the older women are, the higher chance of survival their children have. No statistically significant relationship exists between age of the mother and under-five mortality in Palestine as the Chi-square test found a p-value = 0.092.

The Kaplan-Meier analysis revealed that children of mothers younger than 20 years old die at a mean age of 1.887 years, those of mothers between the ages of 20 and 34 die at a mean age of 1.930 years, and those of mothers 35 and older die at a mean age of 1.772 years. With a p-value of 0.128, the Kaplan-Meier analysis of survival revealed that there is no statistically significant correlation between the age of the mother at birth and mortality among children under the age of five. For mothers less than 20 years of age in Palestine, children's mean age at death was 1.831 years, mothers between the ages of 20-34, the children's mean age at death was 1.966 years and mothers 35 and older, the children mean age at death was 1.944. A p-value of 0.905 was found when doing the Kaplan-Meier survival analysis which means that there is no statistically significant relationship between under-five mortality and mother's age at first birth.

The Cox regression analysis revealed that children born to mothers less than 20 years and mothers between the ages of 20 and 34 had an increased risk of exposure to death. However, no statistically significant relationship was found. In Malawi children born to mothers younger than 20 years had an increased risk of exposure to death. Children born to mothers 35 years and older had a hazard rate 9.4% higher compared to children born to mothers aged 35 and older.

6.2.2 Sex of child

In Malawi, the U5MR was higher for boys than for girls, with 86.985 deaths per 1 000 live births for boys and 71.006 deaths per 1 000 live births for girls. According to Costa et al. (2017), these disparities in mortality rates between males and females under the age of five are due to biological fragility. In the State of Palestine, the under-five mortality rate was also higher amongst boys than girls with boys having a U5MR of 23.472 deaths per 1 000 live births and girls having a rate of 19.256 deaths per 1 000 live births. Costa et al. (2017) also state that even in countries where girls and boys have the same access to resources and care, higher mortality rates still occur due to their biological frailty as mentioned before.

Boys accounted for 54.97% of the population's deaths, while girls accounted for 45.03 % of the population's deaths. With a p-value of 0.480, the Chi-square test also failed to demonstrate a statistically significant correlation between child gender and infant mortality. In Palestine, 56.4% of the deaths occurred to boys and 43.6% of the under-five deaths occurred to girls in the population. However, the Chi-square test found no statistically significant relationship between under-five mortality and the sex of the child with a p-value = 0.636.

According to the Kaplan-Meier survival analysis, the mean age at death for girls was 1.903 years and for boys it was 1.906s. The Chi-square test yielded a p-value of 0.909, indicating that there is no statistically significant relationship between under-five child mortality and sex of child in Malawi, as determined by the Kaplan-Meier survival analysis. The Kaplan-Meier survival analysis revealed that the mean at death for boys are 1.889 years and 1.986 years for girls. A p-value equals to 0.596 was found doing the Chi-square test which means that there is no statistically significant relationship between under-five child mortality and sex of child when doing the Kaplan-Meier survival analysis.

Even in countries where girls and boys have the same access to resources, Costa et al. (2017) noted that high mortality rates will still occur among boys due to their greater biological frailty. The life table analysis for both countries reflects that girls had a greater chance of survival than boys in the first five years of their lives.

6.2.3 Place of residence

In the urban areas of Malawi, a U5MR of 61.386 deaths per 1 000 live births was recorded and in rural areas the U5MR was 81.607 deaths per 1 000 live births. Even though the rural areas have the highest U5MR in Malawi, most of the urban areas can be defined as being rural as the country lacks adequate infrastructure like clean water for example, which can influence a child's survival and possibly increase under-five mortality. The U5MR in Palestine was also the highest in the rural areas of Palestine with 26.982 deaths per 1 000 live births. In the urban areas, the U5MR was 19.946 deaths per 1 000 live births and in the camps, the mortality rate was 18.897 deaths per 1 000 live births. Under-five mortality in rural areas is high and many more people will be displaced to the camp areas as the conflict continues to worsen within the country. Many children in Palestine are living in housing that are not ideal and access to WASH services are problematic and as in 2020, 28% of Palestinian households were exposed to a shortage water.

Majority of the deaths occurred in rural areas of the population with 89.6% of the deaths and 10.4% of the under-five deaths occurring in the urban areas. The Chi-square test of significance did reveal statistically significant relationship between under-five mortality and place of residence in Malawi with a p-value = 0.006. Mahmood (2002) states that parents who live in urban areas most likely receive better health services than those who live in rural areas and further states that more primary health services are available in urban areas than rural areas. Majority of the deaths in Palestine, however occurred in urban areas with 52.8% of the deaths. In the rural and camp areas, 30.3% and 16.9% of the under-five deaths occurred, respectively. The Chi-square test of significance did not reveal a statistically significant relationship between the place of residence and under-five mortality in Palestine, with a p-value of 0.386. The fact that most of the deaths in the population occurred in urban areas should make us aware of how dire the situation in Palestine is as many studies like the one done by Mahmood (2002) states that urban areas are characterised by having access to better health care services than rural areas which have poor health services and shortages of skilled staff. However, due to the ongoing conflict in the area many of the urban areas are also reduced to the status of rural or camp areas. On top of that, hospitals and healthcare services are not located in these areas but completely outside of the country and access to these services are only granted if Palestinians have permits which are checked at the borders and specialized hospitals are available only in Jerusalem. Waterson and Nasser (2017) also state that there are difficulties with ambulance transfers, shortages of equipment in hospitals and lack of trained staff.

The Kaplan-Meier survival analysis found that the mean age of death in urban areas is 1.883 years and 1.907 years in rural areas of Malawi. A p-value of 0.909 was found which means that there is no statistically significant relationship between areas and under-five mortality in Malawi. In Palestine, the Kaplan-Meier survival analysis revealed that the mean age of deaths in under-five children was 1.989 years in urban areas and 1.873 years in rural areas of Palestine. In the camp areas of Palestine, the mean age at death was found to be 1.860 years. However, no statistically significant relationship was found between under-five child mortality and area; a p-value = 0.506 was found.

The Cox regression analysis in Malawi revealed that children living in the rural areas of Malawi had a hazard ratio that was 5.5% higher than the children living in urban areas which is consistent with studies done that found that children living in rural areas are more exposed to death. Children living in urban and rural areas of Palestine are more exposed to the risk of death than children living in the camp areas of Palestine.

6.2.4 Region

In the North regions of Malawi, 56.936 deaths per 1 000 live births were recorded, in Central regions 80.849 deaths per 1 000 live births and in the South regions 87.309 deaths per 1 000 live births were recorded. In the West Bank, 21.163 deaths per 1 000 live births were recorded and, in the Gaza Strip the U5MR was 22.045 deaths per 1 000 live births.

Majority of the deaths in the regions happened in the South of Malawi with 52.2% of the total under-five deaths. In the Central regions, the second largest under-five deaths were recorded with 33.3% of the deaths and in the North of Malawi 15.4% of the deaths occurred. A statistically significant relationship was found to exist between region and under-five mortality in Malawi with a p-value of <0.001. In the Gaza Strip 30.9% of the under-five deaths occurred and 69.1% of the deaths occurred in the West Bank. No statistically significant relationship was found between region and under-five mortality in the State of Palestine with a p-value of 0.162.

In the North of Malawi, the mean age at deaths of children is 1.851 years, in Central Malawi the mean age at deaths is 1.979 years and, in the South, 1.873 years. A p-value of 0.238 was found which means that there is no statistically significant relationship between region and under-five mortality based on the Kaplan-Meier survival analysis log-rank test. The Kaplan-Meier survival analysis showed that the mean age of deaths for children in the West Bank was 1.940 years and 1.913 years in the Gaza Strip. A p-value of 0.956 was found which means that no statistically significant relationship exists between region and under-five mortality in Palestine.

The Cox regression analysis revealed that children born in the West bank had 14.1% higher risk of being exposed to death than children living in the Gaza Strip. In Malawi, children in the North and Central parts of Malawi had a 4.6% and 0.1% risk, respectively, of being exposed to death than children in the South region of Malawi.

6.2.5 Mother's education level

In Malawi, mothers who had none, or only pre-primary level of education had the highest mortality rate with 109.254 deaths per 1 000 live births. Women with primary level of education had a U5MR of 79.347 deaths per 1 000 live births and the U5MR continues to reduce as women's educational level increases. However, women with vocational training had 105.263 deaths per 1 000 live births. The high mortality rate to mothers with vocational training is not consistent with many studies like the one done by Buor (2002) who states that children of mothers with higher education show a low mortality rate and the study done by Andriano and Monden (2019), who looked at the causal effects of maternal education on children's mortality, and found that in Malawi for each additional year of maternal education, children had a 10% lower probability of dying. In Palestine, as women's education level increases the U5MR also decreases. Mothers with none or basic education had a U5MR of 28.009 deaths per 1 000 live births, secondary education level mothers had an U5MR of 20.078 deaths per 1 000 live births and higher education level mothers had a rate of 15.274 deaths per 1 000 live births. The latter mortality rates in Palestine are consistent with studies that have found that mothers with a higher education level reduces children's chances of under-five deaths as mothers who are educated are more likely to seek professional healthcare services.

Most of the deaths in Malawi occurred to mothers with only primary level of education with 69.87% of the under-five deaths. Mothers who have pre-primary or no education experienced 19.8% of the deaths. Mothers with lower-secondary, upper-secondary, higher, and vocational training had 5.5%, 4.3%, 0.4% and 0.1% of the deaths. A p-value of 0.023 was found when doing a Chi-square test which means that there is a statistically significant relationship between under-five mortality and a mother's education level in Malawi. In Palestine, 42.2% of the under-five deaths occurred to mothers with no or just basic level of education. Mothers who have secondary education experienced 30.3% of the under-five deaths and mothers with higher education experienced 22.6% of the deaths in the population. the Chi-square test revealed that there was no statistically significant relationship between under-five mortality and mother's education level in Palestine. A p-value of 0.156 was found.

The Kaplan-Meier survival curves illustrate that those children born to mothers with vocational training had a much higher chance of survival than mothers with a lower education level in Malawi. Based on the mothers education level, the Kaplan-Meier survival analysis found that the mean age at death for children when their mothers have a pre-primary or no education was 2.065 years, mothers with primary education children's mean age at deaths was 1.876 years, mothers with lower secondary, the children's mean age at death was 1.807 years, upper secondary level had 1.750 years, mothers with higher education children's mean age at deaths was 1.929 years and mothers with vocational training children's mean age at deaths was 4.000 years. A p-value of 0.015 was found doing the Kaplan-Meier survival analysis which means that a statistically significant relationship exists between under-five mortality and mother's education level in Malawi. The Kaplan-Meier survival curves in Palestine illustrate that those children whose mothers had an education level equal to none or basic had a higher chance of survival throughout the population which is consistent with the findings from Adetunji (1995) who counters the claims that child mortality is lower in educated mothers and states that his study found that infant mortality is higher with mothers with secondary education compared to uneducated mothers. In Palestine, mothers who had no or basic level of education, their children's mean age at deaths was 2.075 years, mothers with secondary education, the children's mean age at deaths was 1.784 years, and mothers with higher education, their children's mean age at deaths was 1.829 years. No statistically significant relationship exists between mother's education and under-five mortality in Palestine. A p-value of 0.158 was found.

The Cox regression analysis revealed that children born to mothers with pre-primary or none, primary, lower secondary, upper secondary, and higher had increased risks of being exposed to death than children born to mothers who had an education level equals to vocational training. This is consistent with many of the literature that states that mortality decreases, the higher a mother's education level is, however, none of the results were found to be statistically significant. In Palestine, the Cox regression analysis also revealed that children born to mothers with none, or basic and secondary education were at a higher risk of being exposed to death than children born to mothers who had an education level equals to higher. The results were however not statistically significant and could be due to chance.

6.2.6 Birth order

The U5MR for birth order one, is significantly high with a rate of 91.934 deaths per 1 000 live births, in Malawi. Finley et al. (2011) conclude in their study that the first-born children of adolescent mothers are the most vulnerable to infant mortality and poor child health outcomes. In the 7+ birth order the U5MR is 84.362 deaths per 1 000 live births and between the birth order 2-3 and 4-6 the U5MR was 73.744 and 71.529 deaths per 1 000 live births, respectively. In the State of Palestine, we can see that the U5MR increases with the birth order. In birth order one, the U5MR is 19.731 deaths per 1 000 live births, the 2-3 birth order has a rate of 21.777 deaths per 1 000 live births, 4-6 birth order has a rate of 21.226 and the 7+ birth order had a U5MR of 27.219 deaths per 1 000 live births.

In Malawi, 36.4% of the deaths in the population occurred in the 2-3 birth order and 34.9% of deaths occurred in the first birth order. In the birth order 4-6, 22.7% of the deaths occurred and, in the 7+ birth order, 5.97% of the under-five deaths occurred. A p-value of 0.036 was found which means that a statistically significant relationship exists between birth order and under-five mortality in Malawi. In Palestine, in the birth order 2-3, 42.4% of the deaths occurred, 24.3% occurred in the 1st birth order, 26.7% occurred I the 4-6 birth order, and 6.5% occurred in the 7+ birth order. However, no statistically significant relationship was found between birth order and under-five mortality in Palestine. A p-value = 0.188 was found.

The Kaplan-Meier survival curves in Malawi illustrate that children aged 0 year born in the first birth order and 2-3 birth order had a higher chance of survival than children born in other birth orders. Children aged 1, 2, and 3 years that were born in the birth order 2-3 had a higher chance of survival than other children. The Kaplan-Meier survival analysis revealed that children born in the first birth order have a mean age at deaths of 1.906 years, children in the 2-3 birth order had 1.989 years mean age at deaths, children in the 4-6 birth order had 1.822 years mean age at deaths and children in the 7+ birth order had 1.706 years mean age at death. A p-value of 0.014 was found when doing the Kaplan-Meier survival analysis which means that there is a statistically significant relationship between birth order and under-five mortality in Malawi. In Palestine, children aged 1 and 2 years born in the 4-6 birth order had a higher chance of survival and at age 1 year, children born in the interval 7+ had a higher chance of survival than other children in the population. At age 3 years, children born in the 2-year birth order had a higher chance of survival. The Kaplan-Meier survival analysis revealed that children born in the first birth order has a mean age at deaths of 1.707 years, children in the 2-3 birth order had 1.965 years mean age at deaths, children in the 4-6 birth order had 2.067 years mean age at deaths, and children in the 7+ birth order had 2.000 years mean age at death. A p-value of 0.320 was found doing the Kaplan-Meier survival analysis which means that there is no statistically significant relationship between birth order and under-five mortality in Palestine with a p-value of 0.368.

A further Cox regression analysis found that birth order 7+ had a significant relationship with under-five mortality. Children in the 1st birth order had a 33.7% higher chance of exposure to death than children born in the 7+ birth order in Malawi and is found to be statistically significant. In Palestine, children born in the 2-3 and 4-6 birth order had an increased risk of being exposed to death than children in the 7+ birth order which could support the findings of Lundberg and Svaleryd (2017) who state that their results in their study strongly indicate that the endogenous fertility response of a child's death could give rise to negative birth order effects on mortality which means lower birth order children are more likely to die however, none of the results was found to be statistically significant.

6.2.7 Previous birth interval

The study done by Rustein (2005) states that shorter birth intervals related to severe pregnancy complications and an increase in morbidity during pregnancy and increase risk of infant and maternal deaths. In the birth order less than two years, the U5MR is highest at 139.63 deaths per 1 000 live births, in the 2-year birth interval U5MR is at 80.964 deaths per 1 000 live births, in the 3-year birth interval deaths are at 52.612 deaths per 1 000 live births, and in the 4+ birth interval the U5MR is 44.469 deaths per 1 000 live births. In Malawi, the U5MR reduces as the birth intervals increases which is consistent with Rustein (2005). The same is true in Palestine since in the birth interval less than two-years the highest U5MR is also recorded with 30.84 deaths per 1 000 live births. In the 2-year birth interval 14.389 deaths per 1 000 live births, in the 3-year interval 10.749 deaths per 1 000 live births are recorded. However, in the 4+years birth interval 17.53 deaths per 1 000 live births were found.

In the first birth interval 35.99% of the under-five deaths occurred, in the less than two-year interval 20.7%, 20.5% in the 2-years interval, in the 3-years interval 11.2% occurred, and in the 4+ years birth interval 11.6% of the deaths occurred. A p-value equals to 0.008 was found which means that a statistically significant relationship exists between under-five mortality and previous birth interval in Malawi. In Palestine, in the first birth interval, 29.4% of the under-five deaths occurred, in the less than two-years interval 41.8% of the deaths occurred, 4.7% of under-five deaths occurred in the 3-years birth interval and 8.0% of the deaths occurred in the 4+ years birth interval. A p-value equal to 0.026 was found which means that a statistically significant relationship exists between under-five mortality and previous birth interval in Palestine. Badu et al. (2021) also examined the association between birth interval and under-five mortality and found that children who were born to mothers who had >2-years birth interval were less likely to die before the age of five compared to mothers with two years and less birth interval.

The Kaplan-Meier survival curves in Malawi and Palestine illustrate that child born in the 3-year birth interval had a higher chance of survival than children born in other birth intervals. The Kaplan-Meier survival analysis revealed that children born in the first birth interval had a mean age at deaths of 1.895 years, children in the less than two-years birth interval had 1.816 years mean age at deaths, children in the 2-years birth interval had 1.928 mean age at deaths, in the 3-year birth interval children's mean age at death was 2.060 years and 1.901 years in the

4+ years birth interval. A p-value of 0.142 was found which means that there is not a statistically significant relationship between previous birth interval and under-five mortality in Malawi.

The Kaplan-Meier survival analysis revealed that children born in the first birth interval in Palestine had a mean age at death of 1.737 years, children in the less than two-years birth interval had 2.0135 mean age at death, children in the 2-years birth interval had 1.833 years mean age at death, in the 3-year birth interval children's mean age at death was 2.563 years and 1.926 years in the 4+ years birth interval. A p-value of 0.211 was found which means that there is no statistically significant relationship between previous birth interval and under-five mortality in Palestine. Badu et al. (2021) concluded that shorter birth intervals are associated with higher under-five mortality as we can see here that children born in the first birth order in both Malawi and Palestine have the shortest mean age at death.

Cox regression analysis found that the 4+ birth interval also has a significant relationship with under-five mortality (p =0.005). children born in the first birth interval had a higher chance of experiencing death than children born in the 4+ birth interval. The latter was found to be statistically significant and is consistent with Badu et al. (2021) who found that shorter birth intervals are associated with higher under-five mortality. In Palestine, there was no significant relationship between previous birth interval and under-five mortality.

6.2.8 Wealth index

Research done by Houweling, and Kunst (2010) found that the probability of dying in childhood is strongly related to the socio-economic position of parents or households in which the child is born and further state that childhood mortality is systematically and considerably higher among lower socio-economic groups within countries. The finding from this study show that the under-five mortality rates by wealth index quintile in the second quintile have the highest mortality rates with 90.6 deaths per 1 000 live births. The middle quintile had the second highest U5MR with 85.06 death per 1 000 live births and the poorest had a mortality rate of 81.42 deaths per 1 000 live births. These U5MR are not significantly different as it is high across the wealth index categories. From Table 4.3 in Chapter Four we can see that even though the U5MR isn't highest in the poorest wealth quintile, we see a reduction in the U5MR from the second wealth quintile which is consistent with finding from Chao et al. (2018) who found that the absolute disparities in under-five mortality rates between the poorest and richest households have narrowed significantly since 1990. In Palestine, the U5MR is highest in the poorest wealth quintile with 24.93 deaths per 1 000 live births and decreases as wealth improves. This is consistent with many research studies referenced in the literature review. However, in the richest quintile there is a spike in the U5MR with 19.167 deaths per 1 000 live births. The latter is not consistent with the study done by Appunni and Hamisi (2012) who found that households with the highest wealth index had the lowest under-five mortality while households with the lowest had the highest under-five mortality.

Most of the under-five deaths occurred in the second and middle wealth index quintile with 23.7% and 23.1% of the deaths, respectively. In the poorest quintile, 19.1% of the deaths occurred, 20% of the deaths occurred in the fourth quintile and 14% in the richest quintile. A p-value = 0.693 was found when doing a Chi-square test which means that there is no statistically significant relationship between under-five mortality and the wealth index quintile. In Palestine, the poorest quintile experienced 17.5% of the deaths, 19.9% occurred in the second quintile, 23.2% in the middle, 19.3% in the fourth and 20.2% in the richest wealth quintile. However, a p-value = 0.123 was found which means that there is no statistically significant relationship between under-five mortality and wealth index quintile in Palestine. Here in both countries most of the deaths do not occur in the poorest wealth index quintile which is not consistent with the findings from Nattey et al. (2013) who found that there are differentials between wealth quintiles and found that under-five mortality declined gradually with the increase in wealth.

The Kaplan-Meier analysis curves also show that in Malawi in the second and fourth wealth quintile children aged 0-year had a higher chance of survival with a cumulative survival rate of 0.85. Furthermore, the curve also shows that at age 1- and 2-years children in the second wealth quintile had a higher chance of survival than other children at the same age with a cumulative survival rate at the end of the age interval of 0.64 and 0.35, respectively. The Kaplan-Meier survival analysis revealed that in the poorest wealth index quintile the mean age at deaths was 1.913 years, in the second quintile it was 1.950 years, in the middle quintile it was 1.883 years, in the fourth quintile it was 1.908 years and in the richest quintile the mean age at deaths was 1.847 years. A p-value of 0.755 was found which means that there is no statistically significant relationship between wealth index quintile and under-five mortality in

Malawi. A Cox regression analysis was also run which found that living in the poorest quintile children had increased risk of mortality. However, the test showed that it was not significant and probably due to chance. The Cox regression gives a more realistic picture of the situation found that there was also no statistically significant relationship between wealth index and under-five mortality.

The Kaplan-Meier survival analysis in Palestine revealed that in the poorest wealth index quintile, the mean age at death was 1.797 years, in the second quintile, it was 2.045 years, in the middle quintile, it was 1.872 years, in the fourth quintile, it was 1.908 and in the richest quintile, the mean age at death was 1.847 years. A p-value of 0.907 was found which means that there is no statistically significant relationship between wealth index quintile and under-five mortality in Palestine. The Cox regression analysis also revealed that children living in the poorest, middle, and fourth wealth index quintiles had a higher risk of dying than children born in the richest quintile which would have been consistent with the findings from studies referenced in the literature review. However, this was not statistically significant, and we can assume that it was just due to chance. There was also no statistically significant relationship found between wealth index quintile and under-five mortality in Palestine.

The fact that the mortality rates and death patterns not being consistent with the findings of some of the studies referenced in the literature review, could be due to African countries being less affected by household wealth and this is possibly due to the high level of poverty that is still prevalent in most of its countries.

6.3 Conclusion

In this chapter, the results of this study and literature were discussed. In Chapter Seven, the conclusions and recommendations based on the results will be done.

Chapter Seven

Conclusions and recommendations

Conclusions and recommendations

7.1 Conclusions

This study's primary objective was to identify the socio-economic and demographic drivers of under-five mortality in Malawi and the State of Palestine, as well as to identify variables that impact under-five mortality in both countries. This investigation included both qualitative and quantitative methods of analysis. In this study's second chapter, a review of relevant literature was written using qualitative analysis. This strategy proved effective for doing the literature review since it is adaptable, highly targeted, and intended to be done fast. Information might be misapplied or misconstrued, which is one of the drawbacks or limits of this approach to doing the literature review. In addition to using secondary data from the UNICEF MICS6, this research examined socioeconomic and demographic characteristics using secondary data. This research used version 28 of the SPSS program to do analysis on the MICS6 2019/2020 data. The program was used for univariate analysis, which included frequency and percentage distributions for each variable, and bivariate analysis, which included cross-tabulations and Chi-square tests to determine statistical significance. In addition to life tables, survival analysis employs the Kaplan-Meier technique and the Cox regression analysis. The survival analysis was performed to analyze the time between the birth and death of children under the age of five. The methodology enabled us to assess the child's mortality risk and hazard ratios. Kaplan-Meier analysis also falls into the category of univariate analysis, and additional multivariate analysis may be conducted using Cox regression, which, according to Teoh (2008), depicts a more realistic scenario.

The study found that birth interval was the only determinant that had a statistically significant relationship in both Malawi and the State of Palestine. Cox regression analysis found that the 4+ birth interval also has a significant relationship with under-five mortality ($p = 0.005$). children born in the first birth interval had a higher chance of experiencing death than children born in the 4+ birth interval. The latter was found to statistically significant and is consistent with Badu et al. (2021) who found that shorter birth intervals are associated with higher under-five mortality. Shifti et al. (2021) looked at the effects of short birth intervals on neonatal, infant and under-five mortality in Ethiopia. The study findings revealed that neonatal mortality were about 85 percent higher among women with a short birth interval (SBI) than those without. The odds of infant mortality were twofold higher among women with SBI, and the odds of under-five mortality were also about two times higher among women with SBI, according to Shifti et al. (2021).

The Modernisation theory argues that economic development reduces infant mortality through improving healthcare and nutrition. In Palestine, access to healthcare is limited to Palestinians having access to hospitals in Israel and even though Malawi had made improvement in their healthcare by making it free to all Malawians, they still have an unmet need for family planning services and qualified healthcare workers. There is a need for governments to invest in family planning and antenatal care services. However, in both countries investment into healthcare services might be hindered due to governments having to prioritise investment into other sectors. The Dependency/ World Systems theory argues that many attempts by developing countries to improve their healthcare are hindered by more developed countries because they are often exploited when trading with them. This is the case for Palestine and Israel where Israeli occupation forces have also bombed hospitals and healthcare facilities and making Palestine rely on Israel for their advanced health facilities. In Malawi, the growing population and constrained economic resources place a large burden on the country's healthcare system.

The study revealed that most of the deaths in the population occurred to mothers who had only primary education and primary or none in Malawi. Children whose mothers had higher education survived more than children whose mothers had none or primary education. Various studies referenced in the literature review argue that mother's education is important for a child's survival as it impacts various levels of a child's life. A mother who is educated is more likely to seek advice or treatment from a healthcare professional. A study done by Andriano and Monden (2019) looking at the causal effect of maternal education on child mortality found that in Malawi for each additional year of maternal education, children had a 10% lower probability of dying. The authors further explored which pathways might explain this and states that the estimates suggest that financial barriers to medical care, attitudes towards modern health services, and rejection of domestic violence may play a role. Additionally, they state that being more educated seems to confer enhanced proximity to a health facility and knowledge about the transmission of AIDS in Malawi. Mothers who are educated are also more likely to be able to afford healthcare and be able to afford to move their families to urban areas which are most often safer, closer to healthcare services and is equipped with adequate water and sanitation infrastructure. Gender Stratification theory argues that women's status especially in terms of their education can foster better infant care which will result in the reduction of infant deaths or under-five mortality. Overall women's education improves her standard of living and in effect will increase the standard of her children's lives which can reduce under-five mortality and child mortality overall. Education also improves women's status in society, and they can become part of political and other decision-making entities. Thus, these can improve policies on women's education and access to healthcare and prenatal and postnatal programs as well as bring upon investment in education and healthcare which will all reduce child mortality. The Cox regression analysis found that vocational training had a significant relationship with under-five mortality (p = <0.001). Gender Stratification theory argues that women's status especially in terms of their education can foster better infant care which will result in the reduction of infant deaths or under-five mortality.

Women in Palestine are highly educated, and a study done by Abuqamar et al. (2010) on the impact of parental education on infant mortality in the Gaza Strip, found that families with lower educational level had much higher risk of infant mortality and the data showed a positive statistical association between parental education and survival of infants. However, the ongoing violence and conflict is a deterrent to reducing child mortality rates.

Birth order in Malawi as stated before also has a statistically significant relationship with under-five mortality. Most of the deaths in Malawi occurred in the first birth order and 2-3 birth order. This is consistent with Lundberg and Svaleryd (2017) who concluded that the results of their study strongly indicate that the endogenous fertility response of a child's death could give rise to negative birth order effects on mortality which means lower birth order children are more likely to die. Gender Stratification theory can also be applied to birth order: when women are educated and occupy a higher status in society will have more autonomy over their lives. Studies have found that women generally tend to have fewer children and possibly delay having children. Women who are more educated also tend to make use of family planning services which can result in improving the health of children and lowering under-five mortality. The Kaplan-Meier survival analysis revealed that there is a significant relationship between under-five child mortality and birth order. Cox regression analysis found that birth order 7+ had a significant relationship with under-five mortality. Children in the 1st birth order had a 33.7% higher chance of exposure to death than children born in the 7+ birth order in Malawi and is found to be statistically significant. This is consistent with the findings of Lundberg and Svaleryd (2017) who quotes Brenoe and Molitor (2015) who stated that firstborns are at a disadvantage at birth.

The bivariate Kaplan-Meier analysis revealed that mother's age at first birth has a statistically significant relationship for under-five child mortality in Malawi. Tambashe (2003) states that the older the mother is, the higher the child's chances are of survival. This can be due to older women being more experienced or educated and having resources that increase their chances of seeking better healthcare advice and treatments as well as being able to afford it. Another study done by Nadeem et al. (2021) state that the young age of the mother increases the under-five mortality due to young mothers having premature reproductive systems which leads to underweight and vulnerable children. The authors also state that an increase in maternal age may be associated with high infant and under-five mortality due to older mothers having a decline in maternal resources due to aging.

In the literature review done in Chapter Two of this study, we discuss the impact that place of residence can have on under-five mortality. When looking at the State of Palestine we have to look at how the current political conflict in the country has an effect on the region. In Chapter Two we reference Waterson and Nasser (2017) who discussed how access to healthcare is currently constrained for children in Palestine as parents and children are required to have visas to travel to Jerusalem where specialist and hospitals are sited. Parents and children can be denied access to Jerusalem as there are military checkpoint that make sure that they do have all the necessary documentations. The authors also state that the current morbidity is affected by the occupation forces which have increased violence towards children. The region is also facing a health care crisis which is categorised by poor nutrition and inadequate access to water and sanitation in the region. Many Palestinian households have experienced a shortage of water. According to Development State theory, developed states share their wealth with their citizens because they know that this will increase their development further in different sectors. According to Frey and Cui (2016), government action may include direct efforts to reduce infant mortality through prenatal and postnatal healthcare programs as well as indirect programs such as investment in public health and welfare programs that reduce inequalities. However, due to the ongoing occupation and violence in Palestine, development has slowed down and dependence on the occupation government, especially for healthcare services have increased rapidly. The Economic Disarticulation theory is another theory that can explain why under-five mortality is significant in the West Bank and Gaza Strip. The theory, according to Fred and Field (2000), argues that the disarticulation exists when various sectors of a countries economy are disconnected and unevenly developed and further states that economic disarticulation can reduce well-being and increase child mortality due to economic stagnation and the economy not developing due to it weakening and being disconnected and unevenly developed. Again, the ongoing conflict in Palestine has weakened the economy and overall development in the country.

Many of the areas within the regions of the Gaza Strip and the West Bank have turned into camps with inadequate access to water and sanitation. Healthcare and overall nutrition for children which was discussed before can increase under-five mortality in the area. Dependency/World systems theory states that dependent relations between core and peripheral countries foster resources and surplus extraction which results in limited resources for investment in public health, family planning, nutrition and education. The relationship between Israel and Palestine has been very detrimental to Palestine and its regions as the occupied government has exploited their resources and in return, Palestinian regions have become underdeveloped, especially in terms of their healthcare and attempts to develop it more continues to be hindered by the continued violence and occupation.

The Economic Disarticulation theory is another theory that can explain why under-five mortality is significant in the areas of Malawi. The theory, according to Fred and Field (2000), argues that the disarticulation exists when various sectors of a country's economy are disconnected and unevenly developed. The theory further states that economic disarticulation can reduce well-being and increase child mortality due to economic stagnation and the economy not developing due to it weakening and being disconnected and unevenly developed. In Malawi urban areas are more developed than rural areas however, according to the World Bank data (2022), 82% of the population are rural. According to UN Habitat, the most significant urban sector challenges faced in Malawi today is the rapid urbanization and growing urban poverty which have led to a pressing demand for housing which exceeds the rate of new housing delivery. UN Habitat further state that due to the high demand for housing in urban areas, the demand is now being met through informal housing which results in insecure tenure, poor quality housing and overcrowding.

The analysis of the under-5 mortality rates in this study shows that both countries are making positive strides in reducing mortality rates for children. Palestine has met one of the SDGs conditions by reducing the under-5 mortality rate below the 25 deaths per 1 000 live births set out by the WHO. Although the country's under-5 mortality rates are between 15 and 18 live deaths per 1 000 live births, the rate is far too high if the rates are compared to countries and territories in the Middle East as most of these countries have mortality rates which are in the single digits.

7.2 Policy implications and recommendations

- When considering the age of the mother at the time of childbirth, the highest mortality rates are found among mothers under the age of twenty. In a study conducted by Nadeem et al. (2021), it was discovered that children are more at risk due to young mothers having precocious reproductive systems, which results in underweight and fragile children. Individual case-level data on birth weight of children were only available in the women's data set and not in the birth history data set, according to the MICS6 datasets. There is room for the governments of both countries and UNICEF to collect data on the birth weight of individual children to help improve or implement new policies and programs to reduce low birth weight and malnutrition among children in both countries and globally. The lack of data on birth weight of children is also a limitation of this study as in previous studies like the one done by Xu et al. (2011) found that children with preterm delivery/low birth weight was one of the top causes of deaths in infants less than one-year old.

- In Malawi, the Cox regression analysis revealed that children born in the first birth interval had a higher chance of death than children born in the 4+ years birth interval. In both Palestine and Malawi, previous birth interval was found to have a significant relationship. Shifti et al. (2021) notes that some of the effects of short birth intervals may include but are not limited to preterm birth, low birth weight, small size for gestational age, congenital anomalies, autism, miscarriage, pre-eclampsia, and premature rupture of membranes. In these cases, it is also important for mothers to have access to prenatal services than can help them to manage this risk. It is thus important for government in Malawi to invest in prenatal and antenatal services to help mothers manage this risk for current and future pregnancies to reduce some of the effects of short birth intervals listed by Shifti et al. (2021) on under-five child mortality. To lower the risk of adverse maternal, perinatal, and newborn outcomes, it is suggested that a minimum of 24 months pass before trying another pregnancy. In order to lower the risk of unfavorable maternal and neonatal outcomes, it is also advised that the minimum time between pregnancies after a miscarriage or induced abortion be at least six months.

- In both Malawi and Palestine, the age of the mother at her first birth was found to have a significant relationship with mortality among children under-five years. Numerous studies, such as the one conducted by Finley et al., examine the association between maternal age and a high risk of mortality in children under the age of five. It is crucial for the government to implement maternal and child health programs, such as maternal and neonatal health, immunization, and sexual and reproductive health services.

- Investing in women's and girls' education is crucial, as it has been shown to improve all facets of their lives and reduce infant mortality. Investing in educational programs such as family planning programs can also help educate women and reduce unintended pregnancies among women under the age of twenty. Governments must also examine and reevaluate existing policies and programs to reduce mortality among children under the age of five. Existing programmes can be improved, and policies can be adapted where they fail or excel to make them more pertinent to the factors that influence child mortality. Malawi needs to increase the level of education among the women in both urban and rural areas as this will bring down the under-5 mortality rates. According to WHO, the under-5 mortality rates in Malawi were far higher (more than double) than Palestine and the mothers in Malawi are far less educated than the mothers in Palestine. The role of education among women is therefore a huge driving force for the reduction of under-5 mortality rates, globally.

- Health services must be brought closer to communities with the greatest need. Residents of Palestine must travel far and obtain permission to access healthcare services. Improving access to adequate health care for children under the age of five has the potential to substantially reduce child mortality in Malawi and Palestine. Access to health care in both nations is affected by a variety of variables, including the distance to a health care provider and the cost of getting treatment. Additionally, while implementing strategies to expand children's access to health care, issues other than distance and cost must be considered.

- It is also important for both governments to look at current policies and programmes in place and assess what is working and improve or implement new policies and programmes that are better suited in the context of the countries' socio-economic and demographic situation.

- Continuing data gaps impede attempts to eliminate avoidable child mortality. Investing in data collecting procedures and processes, especially in conflict-affected areas such as Palestine, is crucial to lowering under-five mortality and reaching the SDGs at the same level as developed regions.

- Under-five mortality should be addressed on a case-by-case basis in Malawi and Palestine, even though both are LMICs, they operate at distinct cultural, political, and economic contexts. As each country has its own constraints, interventions, policies, and programs to reduce under-five mortality, in these two countries must be implemented and applied on a case-by-case basis. In terms of educational development, Malawi is less advanced than Palestine. Due to the conflict in Palestine, many people are homeless, displaced and living in camps.

In conclusion, our research demonstrates that no two nations are identical and that initiatives to minimise under-five mortality in Palestine and Malawi must be tailored to each individual situation. In both nations, just one variable, previous birth interval, was shown to have an influence on child mortality.

As previously indicated, children throughout the globe suffer radically varying survival odds. When children die from avoidable causes, such as malaria, diarrhoea, and acute respiratory infections, to name a few, it is often due to many health system failures. To overcome these issues, it is vital to combine treatments supported by empirical data with implementation strategies that guarantee successful rollout and population engagement. In addition, successful implementation requires consideration of contextual factors such as female empowerment, nutrition, and the availability of health systems resources. This research also highlighted the importance of a mother's education and women's empowerment in lowering infant mortality.

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