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International and national data on maternal, neonatal, and child mortality rates and policies to reduce the high in the Middle East and Morocco: a multilevel meta-analysis.

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Abstracts:

Introduction: Every year in the world, 530000 women die from causes related to maternity, 4000000 infants die in the neonatal period, and the same number of stillbirths are born, especially in the Middle East and Morocco, the millennium development goals of reduction.

Objective: a meta-analysis based on literature studies on the health status, maternal, and neonatal child, mortality, and its causes in the Middle East and Morocco.

Method: 617 articles in the databases (189, 177, 113,101, and 37 articles obtained in Scopus, Elsevier, PubMed, Google Scholar, and other engines).

Results: The maternal mortality rate recorded in Yemen is the highest, reaching 8.900% in 2019, the percentage was the lowest in all of Lebanon, Iran accounted for 0.023% in 2018. The neonatal mortality rate was the highest in Iraq it reached 32.10% in 2022, and the death rate was the lowest in Egypt at 5.00%. The child mortality rate was the highest in Syria (23.1%) in 2021, and Jordan had the lowest (6.7%) in 2022. The policies seek to reduce maternal, neonatal, and child mortality by increasing health awareness, health care quality, competencies of equipment, supplies, manpower, and media for education and recording epidemiological data. Morocco and Turkey, in 2030 seek to reduce MMR to 71 deaths per 100,000 births.

Conclusion: The health policies followed in the countries limit the rise of maternal, neonatal, and child mortality rates, hence the importance of conducting more studies and in-depth research and applying future policies and strategies to reduce the mortality rate.

Keywords: Mortality, Maternal, Neonatal, child, Rate, policies, Middle East, Morocco.

I. Introduction:

Every year in the world, 530000 women die from causes related to maternity, 4 million infants die in the neonatal period, and the same number of stillbirths are born, especially in the Middle East and Morocco, despite a large number of newly validated interventions, the millennium development goals of reducing maternal mortality by three-quarters, child mortality by two-thirds are unlikely to be achieved, the United Nations has set a target rate per 1000 live births of 12 for neonatal mortality and 25 for mortality of child under age five to reduce preventable mortality of neonatal and child [1].

Maternal mortality rate (MMR) is defined as "death occurring a woman directly due to obstetric difficulties or indirectly due to pregnancy-induced worsening pre-existing medical disorders, but not from unintentional or coincidental reasons" [2]. MM is typically seen as a reliable indicator of the effectiveness of the nation's healthcare system. Both at once, socioeconomic theories have contributed to the explanation decline in MM among populations with increased affluence and education. A well-known social, structural factor in health is the trio of money, education, and health. Between 1990 and 2017, MM ratios decreased worldwide by 38.4%, but they decreased by 46.6% in the Northern Africa and Western Asia region, which serves as a proxy for the Middle East and North Africa region. In 2017, the global point estimated maternal mortality was 211/100000 live births, while it was 81/100000 live births in Northern Africa and Western Asia [3]. Globally, hemorrhage, hypertensive disorders, and sepsis accounted for more than half of maternal fatalities between 2003 and 2009; maternal mortality's common causes differed by area.: in Northern Africa, hemorrhage caused 36.9% of deaths compared to 16.3% in high-income countries; deaths from hypertensive disorders were most prevalent in Latin America, Caribbean, accounting for 22.1% of deaths;

and the vast majority of sepsis-related deaths occurred in low and middle-income countries [4], nevertheless, unequal. Although some countries have made remarkable progress over the past two decades, improvement in further reduction of maternal mortality rate slowed significantly in recent years, but the progressive decline in maternal mortality in some Middle Eastern and North African countries relative to others offers a chance for those who are currently lagging to examine factors for success and lessons learned in other North African and Middle Eastern countries, regional estimates vary greatly [3].

Neonatal mortality rate (NMR): Measured as the number of fatalities in the first twenty-eight days of life for every 1000 live births in a particular year or other, has decreased significantly since 1990. On a global scale, the count of NM decreased from five million in 1990 to 2.4 million in 2020. Nevertheless, the reduction in NMR between 1990 and 2020 has shown a slower pace compared to a decline in post-NMR among children under 5. Furthermore, the likelihood of a child's survival from birth varies significantly depending on the geographic location of their birth. Sub-Saharan Africa had the highest NMR in 2020 at 27 (25-32) fatalities per 1000 live births, followed by central and southern Asia with 23 (21-25) fatalities per 1000 live births. A child born in sub-Saharan Africa is ten times more likely to die in the first month than a child born in a high-income country, most neonatal fatalities (75%) occur during the first week of life, and in 2019, Within the first 24 hours, approximately a million neonatal died. Preterm birth, childbirth-related complications (lack of breathing at birth or birth asphyxia), infections, and birth defects caused most neonatal fatalities in 2019, for the neonatal phase and during the initial five years of life, the primary factors contributing to mortality include pneumonia, diarrhea, birth defects, and malaria. Malnutrition serves as a fundamental factor that

heightens the susceptibility of children to severe diseases [5].

Child mortality rate: is defined as the MR of a child aged under five years (the likelihood that a child born in a particular year or timeframe will experience mortality either before turning 5 years old or exactly at the age of 5 years), subject to the age-specific mortality rates of that period, expressed per 1000 live births, in 2020, 5.0 million children under five years of age died. This translates to 13800 children under the age of 5 dying every day in 2020. Worldwide, infectious illnesses, including malaria, pneumonia, and diarrhea, remain a leading cause of under-5 fatalities, along with preterm birth and intrapartum-related complications, global under-5 MR declined by 61 percent, from 93 fatalities per 1000 live births in 1990 to 37 in 2020, Notwithstanding significant advancement, there is still a pressing need to improve child survival [6].

Policies to reduce the high maternal, neonatal, and child mortality rate in the Middle East: Policies are the basic step to reduce the high maternal, neonatal, and child mortality rate in general in the world, high-quality maternal, neonatal and child healthcare and fundamental health services, which must be sustained to protect the lives and health of maternal, neonatal and child, these essential services must be further strengthened to withstand shocks, and make the progress agreed to in global goals for maternal, neonatal and child health, coverage targets, milestones for neonatal health and ending preventable stillbirths presented must be attained to accelerate progress toward the sustainable development goals (SDGs), just seven years left until the 2030 deadline for achieving the SSDGs, without immediate investment in maternal and neonatal health, the global objectives for child health will remain unattainable by that time. In addition, the post-2015 UN agenda calls for specifics Paying attention to maternal, neonatal, and child health in fragile and conflict-affected situations (FCS), evidence suggests that without maternal, neonatal, and child health service improvement quality and use in conflict-affected situations and maternal, neonatal and child health Indicators will not improve enough to achieve them Sustainable development Goals, to implement Strategic interventions for health, obstetrics, and in-country FCS lack basic information on the use of maternal, neonatal and child health services, also factors affecting access to take care of maternal, neonatal and child health [7].

Worldwide, 1.2 billion people live in fragile countries, while more than 800 million people live in conflict situations. Conflict-affected situations are defined differently by different agencies. nevertheless, key the criteria include the government's failure to provide basic social services, unstable governance with weak institutionalization and accountability, lower social, economic, and human development indicators, and threats to security and righteousness of life from internal and external routine struggles. Fragility Conflict coexists in numerous countries (such as Iraq, Yemen, Syria, Palestine, Afghanistan, and Libya) [8], while post-conflict classifications (eg Nepal), vulnerability-related fragility because of vulnerability Governance and offering social care [9]. Poor judgment, violent political conflict adverse living conditions the difficulty of essential enhancements to health and living Standards in conflict-affected situations, the global economy is gradually hampering momentum [7]. Concerning the policies pursued by Morocco for the goals of sustainable development to reduce maternal and neonatal mortality, obstetric care emergencies strategic priority reduce maternal deaths. In 2008, strategies to reduce maternal mortality in 2010: Access to neonatal care, waiver of cesarean section fees, improvement of prenatal and obstetric care, improvement of the maternity program, and implementation of a maternal mortality monitoring system, to show the results of these strategies in 2030

to reduce mortality by 70 fatalities per 100000 births [10], [11].

Our work aims to make a meta-analysis from literature studies on maternal, neonatal, and child mortality rates and policies to reduce its rise in the Middle East and Morocco historically, over the past 10 years (2012-2022).

II. Materials and methods

A systematic meta-analysis of studies found in the literature on international and national data on health status and maternal, neonatal, and child mortality in the Middle East and Morocco.

II.1 Type and duration of the research:

Meta-analysis on international and national data on health status and maternal, child, and neonatal mortality and policies in the Middle East are multilevel studies of the literature in the last 10 years found a total of 16 in the Middle East countries and Morocco (2012 – 2022).

II.2 Study Selection Criteria and Search Strategy:

The databases used were: Scopus, Elsevier, PubMed, Google Scholar, and other engines. Search words: (maternal *or neonatal* or child*) and (mortality rate* or health care *or policies* or Middle East*, Morocco*). The searches included studies published in all languages. The Scopus database search options were: "title, abstract, and keywords". Found a total of 617 articles in the databases (189, 177, 113.101, and 37 articles found in Scopus, Elsevier, PubMed Google Scholar, and other engines)[12],[13]. To analyze the global data 510 articles were excluded (Figure 3), and after processing information, 264 participants and 39 articles were ultimately chosen.

II.3 Operating criteria:

Publications with the following keywords for meta-analysis: mortality rate, maternal, neonatal, child, policies, Middle East, and Morocco. We searched for studies and articles in the literature regarding maternal, neonatal, and child mortality rates

and policies to reduce the high in the Middle East historically and between (2012 and 2022), and no distinction on the language used for publishing.

II.4 Elimination criteria:

Published mortality data, papers, or studies that are on adult men, outside the selected period, related to research but in different directions, and not on global data, were excluded. Analysis was performed using GraphPad Prisma (9).

II.5 Analytical statistics:

Two distinct programs were employed for the statistical analysis, each possessing its unique set of features and characteristics.

-GraphPad Prisma (9): for repeat and elimination criteria, and to graph years and regions of publication. A $p\ v.$ less than (0.05), is deemed as significant for statistical analyses with a 95% confidence interval (95% CI).

- Microsoft Excel for table creation, collecting, and comparing data.

III. Results:

III.1 Studies published in the period of (2012-2022) in the last 10 years in 16 Middle Eastern countries and Morocco on maternal, neonatal, and child mortality rates and policies to reduce the high in the Middle East and Morocco: Have graphically represented a number of studies published in the selected period (2012-2022), Most of studies were in 2022, followed by 2018, 2019, 2021, 2016, 2020, 2017, 2015, 2013 and 2012 (**Figure 1**). The number of studies published in the Middle East in the same period were found 4 studies in Jordan, 4 studies in Morocco, 3 studies included 14 countries and 3 in Iran, 2 studies included 15 Countries, 2 studies in each of Cyprus, Egypt and Iraq, Oman, Palestine, Syria, Turkey and Yemen, one in each of studies included 10 countries, 6 countries, 4 countries and one each in Kuwait, Lebanon, Qatar and Saudi Arabia (**Figure 2).**
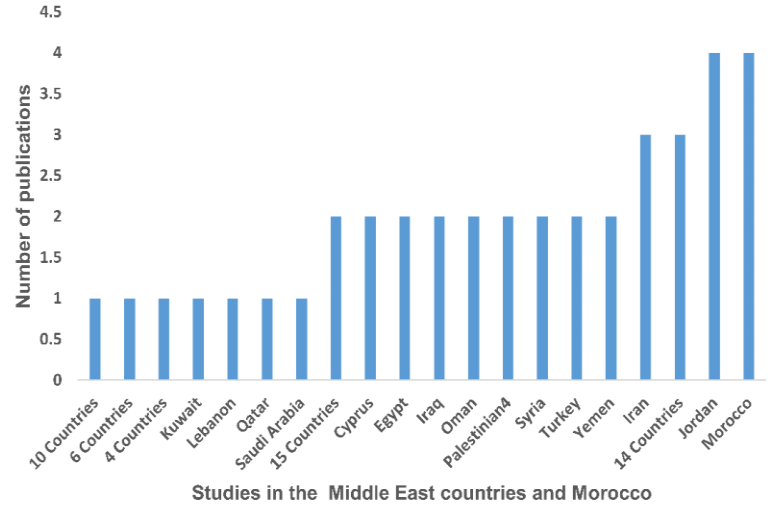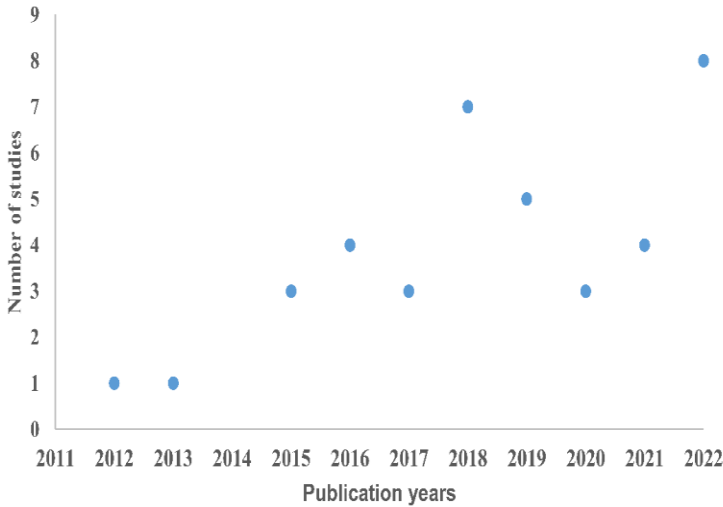
Figure (1) : Number of studies published in 16 countries on maternal, neonatal and child mortality rate and policies to reduce the high in the Middle East and Morocoo in the period of 2012 - 2022.

Figure (2): Number of studies published in 16 countries both alone and together during the period of 2012-2022 on maternal, neonatal and child mortality rate and policies to reduce the high in the Middle East and Morocoo.

III.2 Characteristics of the studies incriminated in meta-analysis: The 39 studies' primary traits and 264 participants (A total of 16 in the Middle Eastern countries and Morocco) were included in this systematic review. These studies mostly relied on surveys, epidemiological data, literary studies, analytical studies, and diagnostic surveys and policies in the Middle East and Morocco **(Figure 3)**.
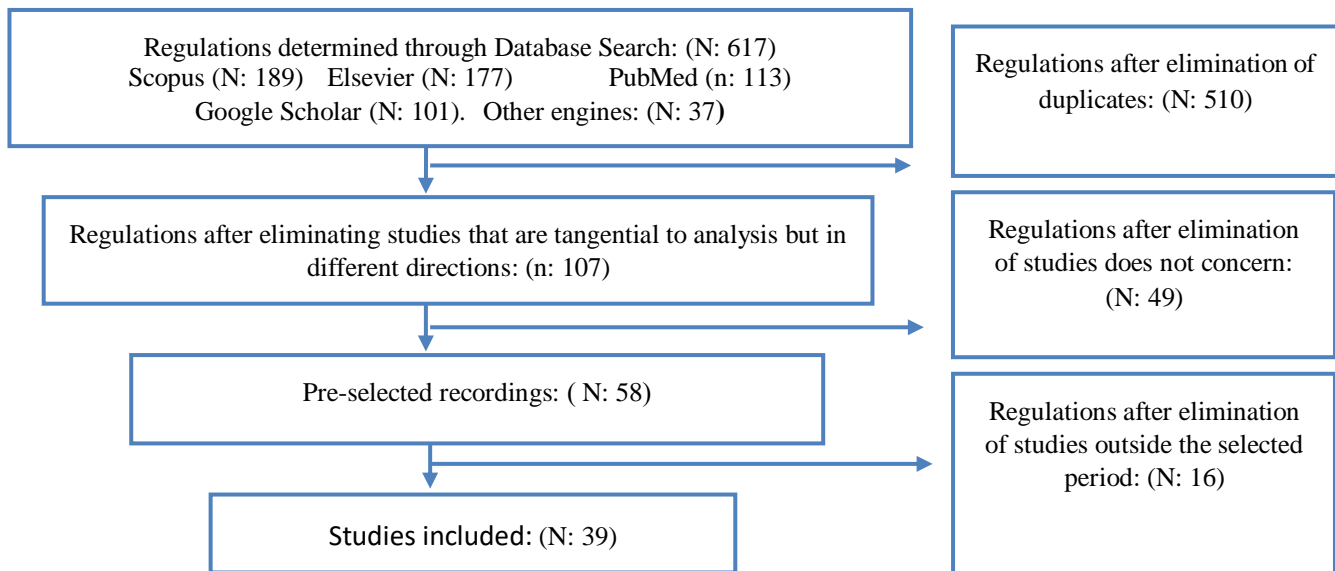
Figure (3): PRISMA Graphique study selection: shows the number of studies included in the search, identified in the literature on international and national data on maternal neonatal and child mortality and policies to reduce its rise in the Middle East and Morocco are multilevel, after data processing, and the criteria for elimination.

III.3 Characteristics of the studies included in the meta-analysis on international and national data on maternal, child, and neonatal mortality and policies to reduce its rise in the Middle East and Morocco are multilevel.

In every article, indicate the year, countries, number of participants, number of samples, place of study, number of references on which each research was based, and comment for each reference.

Most of the research was done in 2022, followed by 2018, 2019, 2021, 2016, 2020, 2017, 2015, 2013 and 2012. Among the studies we analyzed, were 4 studies in Jordan, 4 studies in Morocco, 3 studies included 14 countries and 3 in Iran, 2 studies included 15 Countries, 2 studies in each of Cyprus, Egypt Iraq, Oman, Palestine, Syria, Turkey, and Yemen, one in each of studies included 10 countries, 6 countries, 4 countries and one each in Kuwait, Lebanon, Qatar, and Saudi Arabia. **(Table 1)**

Table (1): Summary of the studies incriminated in meta-analysis:

References	Year	countries	Number of participants	number of samples	Place of Study	Comments	N. Rf.
S. Rahman et al [14]	2012	Qatar	10	20583 live births	National data	The neonatal mortality rates in Qatar right now are comparable to the majority of wealthy West European nations.	28
A. Santosh et al [15]	2013	Oman	6	27.668	Nizwa Referral Hospital in Al- Al-Dakhiliyah	Women who are at risk including gestational diabetes, pregnancy-induced hypertension, or IUGR need to receive extra attention.	18
B. Basiri et al [16]	2015	Iran	4	492	Fatemieh Hospital, Hamadan	approximately one-quarter of premature neonates had early mortality	30
H. Bashour et al [17]	2015	4 Countries	9	9,063 live birth, a total of 77 cases	Major public hospitals	Inconsistency would seem to exist between high reported coverage of the primary clinical interventions in the study facilities.	30
N. Kabbali *et al* [18]	2015	Morocco	11	44 cases	In Moroccan hospitals	For prevention, health infrastructure must be improved and compulsory antenatal care established.	22
R. Chibber et al [19]	2016	Kuwait	5	30 cases	A tertiary hospital	There were no maternal fatalities and a low incidence of eclampsia.	17
M. Bayati et al [20]	2016	Iran	7	-	-	Improving women's level of education and knowledge is the main factor in making policies related to promoting maternal, neonatal, and child health and reducing mortality.	22
W. Boutayeb et al[21]	2016	Morocco	5	8	national data	It is challenging to track the impact of a primary health intervention on the access to health care.	34
S. Benzouina et al.[22]	2016	Morocco	7	588	Souissi maternity hospital of Rabat	Reduced rates of emergency cesarean sections and hence decreased fetal problems may result from early identification and referral of moms who are likely to have a cesarean section.	29
E. Hadjigeorgiou *et al* [23]	2017	Cyprus	10	Deaths per 1000 live births 4.6%	International data	Media professionals have an ethical obligation to evaluate the effects of high national CS rates.	7
K. M. Zahran et al [24]	2017	Egypt	4	21.387	Hospital, Assiut University	Poor healthcare quality was highlighted by quality indicators.	20
A. Shetty and S. Shetty [25]	2017	10 Countries	2	-	-	Countries with increased healthcare spending per capita had significantly lower levels of IMR	23
Ahmed Hamood Al-Shahethi et al [26]	2018	15 Countries	6	14 areas	(UNICEF), (WHO), and (UNESCO).	Although NMR is declining, it is still high in Middle Eastern nations, and it appears that a variety of related factors also have a significant impact on NMR.	7
Y. S. Khader et al [27]	2018	Jordan	4	21.928 wome	-	Preeclampsia had an overall incidence rate of 1.3%.	22
WHO [28]	2018	Lebanon	no	-	-	Increased recently from 9/100,000 lb in 2014 to 23/100,000 lb in 2017.	No
M. M. van den Berg et al.[29]	2018	Palestine	8	64.5	Gaza	Since 2006, there has been no decrease in the projected newborn death rate among Palestinian refugees in Gaza.	23
A. H. Subki et al [30]	2018	Saudi Arabia	5	9493	King Abdulaziz University Hospital	The incidence of HDP was very low. Nevertheless, early pregnancy screening for this disease is advised to prevent negative effects on both the mother and fetus.	31
W. A. Hayajneh et al [31]	2018	Jordan	10	-	Data Ministry of Health, King Abdullah University Hospital	Children's vaccinations are anticipated to be a financially viable intervention; It will significantly reduce the public health and economic burden.	53

Continued Table (1): Summary of the studies incriminated in meta-analysis:

References	Year	countries	Number of participants	number of samples	Place of Study	Comments	N. Rf.
H. H. Khachfe et al [32]	2019	14 Countries	5	13 areas	International data	MMR and LTR of maternal mortality have decreased in Middle Eastern countries, according to a study.	50
B.-M. V *et al* [11]	2019	Morocco	8	6 Arabic countries in North Africa	-	Notwithstanding the uneven death figures. We believe that setting achievable goals to be met by 2030 is better given the stark variations in country baselines.	74
C. Gulumser et al [33]	2019	Turkey	8	779 maternal deaths	Research Hospital, Ankara	Results may motivate international efforts to enhance women's health and offer helpful information for other developing nations striving to lower maternal mortality.	24
B. Mortensen et al [34]	2019	Palestine	6	2200	Nablus governmental hospital.	Receiving the continuity model of treatment directed by a midwife in Palestine was linked to various enhanced maternal and neonatal health outcomes.	30
A. H. Al-Shahethi et al [35]	2019	Yemen	4	952	General	In Sana'a City, perinatal mortality rates were greater than those predicted by the WHO for the country whole. To improve the maternal and neonatal health of the nation, sustainable interventions must be implemented.	46
J. Al Abri [36]	2020	Oman	1	25 maternal deaths 312 MNM	A national survey	The most frequently found issues were outdated policies and procedures or a lack of availability for all MNM events.	No
A. A. Salam and R. M. Al-Khraif [37]	2020	6 Countries (Arabian Gulf):	2	-	-	An impressive budget allocation and investment in building the health system, and improving other contributing sectors	23
E. JENABI and S. KHAZAEI [38]	2020	14 Countries	2	-	-	The Child Mortality Index is an important tool for measuring progress toward the objectives of sustainable development as well as the health of children.	4
Dilek SARPKAYA GÜDER [39]	2021	Cyprus	1	crude birth rate: per 1000 live births 14.6%	WHO	There is not enough information on mother and child health indicators in the nation, No stillbirth has been reported between 2013-2017	20
O. S. Yaya, O. Adekoya, and O. Babatunde [40]	2021	14 Countries	3	14 areas	International data	To determine the best-performing country's IMR over time, percentage decreases are calculated for each country and ranked.	20
Hasan Hüseyin Çam and Fatma Karasu [41]	2021	Turkey	2	18.4 deaths	University, Kilis	Most neonatal deaths may have been avoided by encouraging institutional delivery, early warning signs identification, strengthening referral networks, and routine retraining of medical staff.	31
R. Al-Baba and A. B. Zetoune [42]	2021	Syria	2	173	Hospitals Syria	Steatorrhea incidence, and the presence of class I pathogenic variants were statistically correlated	25
Hiba A. Rasheed et al [43]	2022	Iraq	3	716	Al-Sadar city	Two-thirds of neonatal deaths occurred early.	No
Hewa Sattar Salih et al [44]	2022	Iraq	4	62692	Babylon Health Directorate	This study concluded that using current family planning techniques would help to lower maternal mortality.	23
A. H. Daher et al [45]	2022	Jordan	6	1523	Jordan university Hospital	Most of the children who died away already had comorbid conditions and did not have a DNR order time they died away.	17
B. S. Cetin and A. Orman [46]	2022	Syria	2	49 neonatal cases	Hospital in Turkey	In this study, neonates referred from cross-border locations had a high prevalence of BCC infection and related mortality.	34
A. H. Abdel Mohsen and A. S. Amin [47]	2022	Egypt	2	PPHN 32 infants (5%),	Al-Minya University Hospital	It is advised that Egypt conduct a nationwide PPHN survey to identify any geographical variations in disease incidence.	27
A. A. Al-Shameri *et al* [48]	2022	Yemen	10	290 of the total admissions (305)	Hospital in Thamar	Strongly advise expanding the number of facilities and medical personnel to lower the NMR by offering superior nursing care in the tribal areas.	25
F. Aghajani et al [49]	2022	Iran	6	335.216 all 8 cases	Hospitalises, Tehran	It is crucial to Implement a thorough strategy for high-risk pregnancies.	No
Sathyanarayanan Doraiswamy et al [50]	2022	15 Countries	5	-	-	Governments should recognize that there is an opportunity to learn from each other to approximate maternal mortality rates to zero as possible	30

Abbreviation: United Nations Children's Fund (UNICEF), World Health Organization (WHO), and United Nations Educational, Scientific and Cultural Organization (UNESCO). Conflict-affected situations (FCS), Maternal Near Miss (MNM), Persistent pulmonary hypertension of the newborn (PPHN), Maternal mortality rate (MMR), neonatal mortality rate (NMR), Child mortality rate (CMR), Hypertensive Disorders of Pregnancy (HDP), low birth weight (LBW) Infants Mortality Rate (IMR), Neonatal Intensive Care Unit (NICU), Comprehensive Emergency Obstetric and Neonatal Care (CEMONC), blood culture contamination bacteremia (BCC), pediatric intensive care unit (PICU), United Arab Emirates (UAE) and low birth weight (LBW)
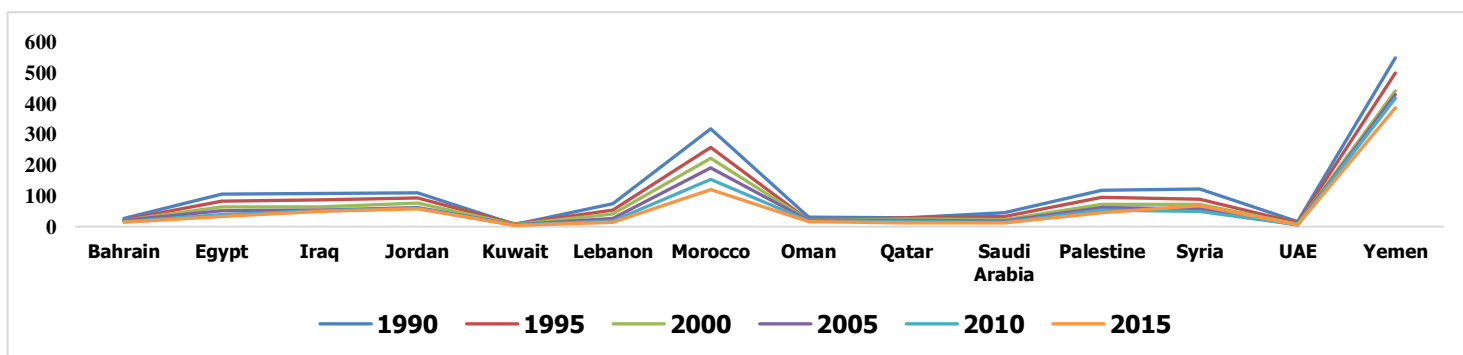
III.1- Evaluation of maternal mortality rate and causes in the Middle East and Morocco

III 1-1 MMR, health in the Middle East and Morocco: A 25-year epidemiological study

The study was published in 2019. Maternal mortality rate data and lifetime risk of mother's fatalities were sourced from official databases maintained by the United Nations Children's Fund (UNICEF). The annual percentage change was calculated using the Joinpoint regression model. Statistical significance between countries was identified using one-way analysis of variance. During the years of study, there was a significant low in maternal mortality rate in all countries in the Middle East from 1990 to 2015 (Table 1). The average maternal mortality rate decreased by about 45% from 1990 to 2015 in the Middle East and Morocco. The countries with the lowest MMR in the Middle East were the UAE and Kuwait (9 and 6 mortality per 100000 live births), although there is a low maternal mortality rate, to reduce the burden of maternal mortality, ongoing research, and efforts must be undertaken to create a better healthcare system a huge number of Arab countries.

Table (2) **Maternal mortality ratio (MMR) per 100000 and annual percentage change (APC) among the Middle Eastern countries and Morocco from 1990 to 2015.**

Reference	Year	Countries	1990	1995	2000	2005	2010	2015	APC	P-value
H. H. Khachfe et al (32)	2019	Bahrain	26	22	21	20	16	15	−2.12†	**0.01**
		Egypt	106	83	63	52	40	33	−4.59†	**<0.001**
		Iraq	107	87	63	54	51	50	−3.13†	**0.005**
		Jordan	110	93	77	62	59	58	−2.7†	**0.02**
		Kuwait	7	9	7	6	5	4	−2.66†	**0.002**
		Lebanon	74	54	42	27	19	15	−6.4†	**<0.001**
		Morocco	317	257	221	190	153	121	−3.7†	**<0.001**
		Oman	30	20	20	20	18	17	−1.79†	**0.039**
		Qatar	29	28	24	21	16	13	−3.3†	**0.001**
		Saudi Arabia	46	33	23	18	14	12	−5.3†	**0.003**
		Palestine	118	96	72	62	54	45	−3.75†	**<0.001**
		Syria	123	89	73	58	49	68	−2.8†	**0.046**
		UAE	17	12	8	6	6	6	−4.2†	**0.09**
		Yemen	547	498	440	428	416	385	−1.3†	**0.01**

Figure (4): MMR per 100000 and annual percentage change among the Middle Eastern countries and Morocco from 1990 to 2015.

III 1-2 Evaluation of maternal mortality rate and causes per 100000 births % in the Middle East and Morocco

In a study published in Lebanon (2018) by WHO Agenda (2018–2023), Key indicators of health outcomes have improved dramatically and continuously over the past decades: between 2000 and 2014, 5.1 years were added to life expectancy at birth, the maternal mortality rate has gradually increased recently from 9(0.009%)/100000 in 2014 to 23 (0.023%)/100000 in 2017.

In Iran (2022), all instances of maternal mortality, totaling 80 cases, occurred within seven years from (20 March 2013, to 19 March 2020), across twenty hospitals affiliated with Tehran University of Medical Sciences. During this period, these hospitals registered 335,216 live births, with an MMR of 0.024% per 100000 live births. The mean age of mother's fatalities was (31.9 ± 6.9) years, direct causes accounted for 48.75% of MM, with hemorrhage being the most common direct cause of fatalities 17.5%. In addition, cancer 17.5%, and cardiovascular diseases 17.5% were the most common indirect causes of MM, which has increased even after considering the COVID-19 pandemic's consequences, therefore, it is crucial to put a comprehensive strategy in place for high-risk pregnancies.

In Iraq (2022), study a descriptive retrospective, the data is gathered through a convenience sample, encompassing all documented cases of maternal mortality reported within Babylon Health Directorate for the duration spanning 2014 to 2018. According to findings, from 2015 to 2018, the rate of maternal mortality in developing countries was almost twice as high compared with developed countries, in the study was maternal mortality ratio per 100000 live births was (0.054). and causes of maternal mortality were obstetric partum hemorrhage at 33% and hypertension at 13.9% primary risk factors contributing to maternal mortality from 2014 to 2018 were largely associated with rural residency, and lack of effective communication between primary health care centers and maternal hospitals. Moreover, inefficiencies within primary health services, limited access to family planning, and inadequate availability of skilled midwifery or emergency care services were also major contributors to maternal mortality during this period, in Palestine (2018), used the same preceding-birth technique as in surveys to estimate IMR and NMR per 100000 live births and maternal mortality. Was maternal mortality ratio (0.160) per 100000 live birth, the causes of maternal mortality were not explained, in Egypt (2017), the research was carried out at Women's Health Hospital, Assiut University, the largest university hospital in Upper Egypt, serving as a primary referral hospital for regions spanning from Beni-suaf to Aswan governorates. This hospital has more than 20,000 deliveries annually. The study encompassed data from January 1st to December 31st, 2012, case fatality and direct obstetric case fatality rate at the Women's Health Hospital, as well as primary deficiencies in medical records and reasons of MMR, was alarmingly high reaching 225/100000, nevertheless, those who delivered in the hospital, the MMR was (0.230%)/100000. leading causes of MM were obstetric hemorrhage 38.3%, complications of cesarean sections 27.7%, and pre-eclampsia/eclampsia 23.4%. Nearly half 42% of mortality occurred during vacations and indicators unveiled poor healthcare quality.

In Oman (2020), conducted to establish criteria for the identification of Maternal Near Miss (MNM), a national survey with an in-depth review of MNM cases was implemented. MNM cases were identified from twenty-three hospitals across all eleven governorates, capturing more than 90% of total deliveries in the country, between (October 2016 and September 2017) all cases fulfilling the MNM criteria were reviewed at regional levels and hospitals by trained reviewers, and additional 50% of cases

underwent review, conducted jointly by National MM Review Committee and an international panel of experts, Cohen's kappa coefficient was used to calculate the determined of agreement between different levels of reviewers. Over one year of data collection, a total of 25 maternal fatalities and 312 MNM cases were reported, given an MNM incidence of 4.0 per 100000 women giving birth (deliveries), and a ratio of MNM: maternal mortality (0.400%) per 100000. The leading causes of maternal mortality: are partum hemorrhage 23% and hypertension 44%. Previous cesarean sections 20.0%, medical disorders 20.0%, grand-multiparty 20.0% were the main contributory conditions to MNM. Overall, there was good care given to 43.6%. In up to 36.5% of cases, improved care could have made a difference in results. The most frequently identified contributing factors were associated with the healthcare team responsible for the care, accounting for 50.0% of cases. Specifically, inappropriate management was cited in 28.2% of instances, and failure to initially recognize the severity of the condition was reported in 25.6% of cases, regarding factors linked to women themselves, approximately one-third of MNM events were connected to non-compliance with prescribed treatment and delays in seeking care. In approximately 25% of all MNM events, factors related organization of care were noted, the most frequently identified factor being the absence or outdated nature of policies and guidelines.

In Syria (2015), we selected data from Syria, a cross-sectional study of maternal near-death cases, starting in 2011-2013, to collect data on severe maternal morbidity in 4 hospitals study, using a WHO form (individual HRP form A65661) in the hospital. A total of 9063 live birth deliveries were reported during the data collection period, with a total of 77 cases in Dar Al Tawleed hospital in Syria (14.3%) maternal mortality ratio per 100000 live births was (0.700%), the leading cause of maternal mortality cardiovascular

diseases (33%). In the study hospital, coverage of crucial evidence-based interventions among women who encountered a near-miss was nearly universal or exceedingly widespread.

In Turkey (2019), women who died because of hemorrhage during pregnancy or after delivery within the first 42 days, from 2012 to 2015, across the country (N¼812/146). During the research period, 779 maternal fatalities were recorded, estimated MMR in the three years was (0.770%) per 100000 live births. Among 779 fatalities, the report listed 411 as direct and 285 as indirect deaths. Direct obstetric complications were the leading causes of maternal fatalities, the most common of which was maternal cardiovascular diseases 21% and partum hemorrhage 20.6%. Enhancing data surveillance and putting into practice national standards of prevention, and care for serious problems during pregnancy, delivery, and puerperium is necessary to reduce MMR

In Morocco (2015) in the Moroccan hospitals of both Fez and Rabat 44 cases. The MMR was 1.140%, were leading causes of MM most common of which was maternal was renal failure in the postpartum period at 70.6%, pre-eclampsia at 63.6%, hemorrhagic shock at 13.6%, and sepsis at 11.4%. It requires improving the health infrastructure and obligating prenatal care.

In Saudi Arabia (2018), a retrospectively examined OF 9493 women's medical records from births at the tertiary care King Abdulaziz University Hospital between (January 2015 and June 2017). All case of hypertensive disorders of pregnancy (HDP) were included. An identified 224 pregnant women with HDP in the patient cohort, giving a prevalence of 2.4%. Their mean age was 31.3±6.7 years, with a mean gravidity of 4.0 and mean parity of 3.0. The overall prevalence of maternal complications was 9.4% and MMR (2.200%) per 100000 live births. The leading causes of maternal mortality were preeclampsia (54.9%) and hypertension (29.5%) and the prevalence

of MM was 1.3%. Multigravid women and women with chronic hypertension exhibited a slightly elevated risk of prematurity compared to their counterparts, although this difference did not reach statistical significance. It is worth noting that the prevalence of HDP in the cohort was relatively low. Nevertheless, it is advisable to initiate early screening for this condition during pregnancy to mitigate potential adverse effects on both the mother and the fetus.

In Kuwait (2015), an analysis of all eclampsia cases records' case files from January 2005 to December 2014, there were thirty cases of eclampsia. The most significant risk factors for developing preeclampsia are unbooked cases (97%), and the maternal mortality ratio per 100000 live births was (3.300%). All antepartum cases were delivered by cesarean section and intrapartum. 13 (43%) of women delivered vaginally, only 6(20%) patients were of low socioeconomic status and were primary school educated, severe maternal complications occurred in 8(27%), with abruption placentae being the most common 3(38%), the prevalence of eclampsia was low; a significant risk factor is the lack of prenatal care.

In Yemen (2019), a community-based prospective cohort study was conducted between 2015 and 2016, participants were chosen from community households located in Sana'a's five districts using a multistage cluster sampling technique. A Total of 952 pregnant women were tracked up to seven days after giving birth, was MMR (8.900%) per 100000 live births. In multivariable analysis older age (+35 years) of maternal at birth (R. risk = 2.83), teenage mothers age at first pregnancy (<18 years), primipara mothers, multi-nuclear family, mud house, mothers who underwent female genital mutilation and mothers who chewed khat, from were factors connected to a higher risk of perinatal mortality, the tetanus vaccination status of the mother, however, was a major protective factor against perinatal mortality.

Table (3): Evaluation of maternal mortality rate and causes per 100000 births% in the Middle East Countries and Morocco

Reference	Countries	N	Years	Mortality rate%	Leading causes	%
WHO (28)	Lebanon	undefined	2018	0.023	Undefined	undefined
F. Aghajani et al (49)	Iran	335,216 live births, all 80 cases	2022	0.024	direct	48.75
					hemorrhage	17.5
					cancer	17.5
					cardiovascular diseases	17.5
Hewa Sattar Salih et al (44)	Iraq	62692	2022	0.054	hypertension	13.9
					partum hemorrhage	33
M. M. van den Berg *et al.* (29)	Palestine	3136	2018	0.160	undefined	undefined
K. M. Zahran et al (24)	Egypt	21,387	2017	0.230	hemorrhage	38.3
					complications of cesarean sections	27.7
					preeclampsia/eclampsia	23.4
J. Al Abri (36)	Oman	25	2020	0.400	partum hemorrhage	23
					hypertension	44
H. Bashour et al (17)	Syria	77 cases	2015	0.700	cardiovascular diseases	76.1
C. Gulumser et al (33)	Turkey	779	2019	0.770	partum hemorrhage	20.6
					cardiovascular diseases	21
N. Kabbali et al (18)	Morocco	44 cases	2015	1.140	pre-eclampsia	63.6
					hemorrhagic shock	13.6
A. H. Subki et al (30)	Saudi Arabia	9493	2018	2.200	preeclampsia	54.9
					hypertension	29.5
R. Chibber et al (19)	Kuwait	30 cases	2015	3.300	preeclampsia	97
A. H. Al-Shahethi et al (35)	Yemen	952	2019	8.900	Age over 35 years, environment, and societal causes	undefined

III 2 Evaluation of neonatal mortality rate in the Middle Eastern countries and Morocco

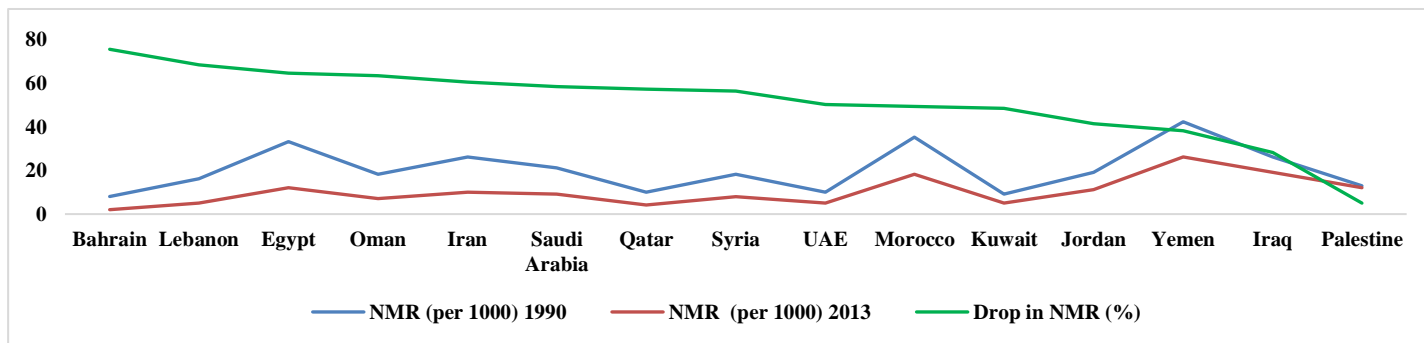**III 2-1 NMR in the Middle East Countries and Morocco from 1990 – 2013**

In a study published in 2018, the data on NMR from 1990 to 2013 was gathered from official websites, including (UNICEF, WHO, and UNESCO), NMR in the Middle East and Morocco in 2013, there were 2 to 46 fatalities per 1000 live births (See table 4). The Middle East was classified into three categories as follows: the first category included the countries with the lowest rates of neonatal mortality ($\leq$ 10 fatalities per 1000 live births); these included Bahrain (2/1000), Qatar (4/1000), Kuwait (5/1000), UAE (5/1000), Lebanon (5/1000), Oman (7/1000), Syria (8/1000), Saudi Arabia (9/1000), and Iran (10/1000), Countries with moderate rates (> 10 to 25/1000 live births) were included in the second category; this category included Jordan (11/1000), Egypt (12/1000) and Morocco (18/1000), the State of Palestine (12/1000), and Iraq (19/1000). The third category included countries with the highest rates (> 25 fatalities per 1000 live births); this category included Yemen (26/1000). Therefore, a decline in neonatal mortality rate was found in all Middle East and Morocco from 1990 to 2013, while the lowest decrease was found in Palestine, which showed a 5% decrease in rate, data analysis revealed a significant decline in NMR, with reductions ranging from 5% in Palestine to a remarkable 75% in Bahrain. Visible evidence of a discernible decline in rate was seen in Lebanon, Egypt, and Morocco.

Table (4): Neonatal Mortality Rates (NMR) in the Middle East Countries and Morocco

Reference	Year	Countries	NMR (per 1000) 1990	NMR (per 1000) 2013	Drop in NMR (%)1990 to 2013
Ahmed Hamood Al-Shahethi et al (26)	2018	Bahrain	8	2	**75**
		Lebanon	16	5	**68**
		Egypt	33	12	**64**
		Oman	18	7	**63**
		Iran	26	10	**60**
		Saudi Arabia	21	9	**58**
		Qatar	10	4	**57**
		Syria	18	8	**56**
		UAE	10	5	**50**
		Morocco	35	18	**49**
		Kuwait	9	5	**48**
		Jordan	19	11	**41**
		Yemen	42	26	**38**
		Iraq	26	19	**28**
		Palestine	13	12	**5**

Sources: UNICEF, September 2014.

Figure (5): Neonatal Mortality Rates (NMR) in the Middle East Countries and Morocco from 1990 to 2013

III 2-2 Evaluation of neonatal mortality rate and causes per 1000 births% in the Middle Eastern countries and Morocco

In a study published in Cyprus (2021), data for this study was collected from publications utilizing established data collection techniques, WHO and Turkey have established a number of health indicators to measure maternal and neonatal health. Accordingly, the study's data were given, It has been stated that in Northern Cyprus, the NMR is 0.08% per 1000 live births; the nation lacks adequate data on maternal and child health indices.

In Oman (2013), a four-year retrospective cohort analysis, from January 2006 to December 2009. All inborn neonatal admissions and fatalities were collected from the neonatal intensive care unit at Sultan Qaboos University Hospital on predesigned forms, all outborn admissions and fatalities were excluded. Causes of neonatal fatalities were classified using Wigglesworth's classification, during the study period, there were 10064 inborn live births, and admissions overall 1475 inborn neonatal, the study indicated neonatal mortality rates was (0.73%) per 1000 live births and were common causes of neonatal mortality: respiratory disease (7%), congenital malformations (29), an increasing trend in neonatal admissions and fatalities among inborn babies, prematurity, with sepsis as its major complication and congenital malformations were the leading cause NM, patterns and causes in Oman.

In Turkey (2021), a descriptive, retrospective study utilized registers and documentation from the death register and post-mortem reports. Annual infant deaths occurred in Kilis from January 2012 to December 2018, Medical cases that were initially reported to Kilis State Hospital and subsequently to Kilis Provincial Directorate of Health were subject to review, study indicated NMR was (1.84%) per 1000 live births and were common causes of neonatal mortality Sepsis (13%), and congenital malformations (19.4%). For seven years, Kilis had a higher neonatal mortality rate than both the national and regional estimates. According to a study, male, preterm, and low birth weight infants account for the majority of infant mortality, The majority of baby fatalities may have been avoided by encouraging institutional deliveries, early warning indications detection, and strengthened referrals.

In Palestine (2018), NMR per 1000 live births was calculated using the same preceding birth method as in surveys. All multiparous mothers who came to 22 UNRWA health centers to register their last-born child for immunization were asked if their preceding child was alive or dead. Based target sample size of the previous IMR of 22.4 and interviewed 3126 mothers from (September to November 2015), NMR was (2.23%) per 10000 live births and were common causes of NM: congenital malformations 19.29%, infections 12.19%. The survey assessed mortality rates for the year 2013. The IMR stood at 22.7 per 1000 live births with a 95% confidence interval of 17.2 to 28.1. This IMR had not shown a decline compared to the estimated rates of 20.2 (with a confidence interval of 15.3 to 25.1) per 1000 live births in 2006 and 22.4 (with a confidence interval of 16.4 to 28.3) per 1000 live births in 2011. NMR in 2013 was 16.1 per 1000 live births, with a confidence interval of 11.6 to 20.7. This rate was not statistically significantly different from the NMR in 2006, which was 12.1 (with a confidence interval of 8.7 to 16.4), and it was lower than the NMR in 2011, which was 20.3 (with a confidence interval of 15.3 to 26.2), Since 2006, there has been no decrease in the projected newborn death rate among Palestine refugees in Gaza, infant mortality rate's stagnation suggests that more work is needed to identify its reasons and determine how to deal with any potentially preventable causes.

In Qatar (2012), from every public and private maternity institution throughout the country, data on live births and NM were gathered from 1st January to

December 31st, 2011, and compared with historical NM data from 1975 to 2010 ascertained from the database of maternity and neonatal units of Women's Hospital and annual reports of Hamad Medical Corporation. For comparison, inter countries, country data of 2009 was extracted from World Health Statistics 2011 (WHO) and the European Perinatal Health Report in 2008. A total of 20583 live births were registered during the study period. The national mortality rate for Qatar was 4.95% in 2011. Between 1975 and 2011, Qatar's population more than doubled by 10-fold, and there were 7.2 more deliveries, the R. risk NMR fell by 87%.

In Egypt (2022), a Prospective study was performed enrolling all full-term and post-term newborns admitted to the neonatal intensive care unit (NICU) of Al-Minya University Hospital from January 2009 to April 2012, all neonates underwent a thorough history and physical checks, arterial blood gases, laboratory data including a complete blood count, serum electrolytes, blood glucose, and blood culture to exclude sepsis. Cases with Persistent pulmonary hypertension of the newborn (PPHN) had a continuous pulse oximeter, blood pressure, and electrocardiography monitoring. Chest X-rays and echo cardiographs were carried out to verify shunt and exclude structural congenital heart disease out of the studied 640 infants, developed PPHN, 32 infants (5%) died, 3(9.3%) developed chronic lung diseases, 2(6.2%) developed hearing defects and another 3(9.3%). The study indicated neonatal mortality rates were (5.00%) per 1000 live births and were common causes of neonatal mortality respiratory disease (6.2%).

In Jordan (2018), a study is a component thorough national investigation into perinatal mortality carried out in Jordan; this study included all women who gave birth in the hospitals during the study period. NMR (8.10% per 1000 live births).

In Morocco (2016), a cross-sectional prospective study of all cases undergoing emergency cesarean section and elective for any indication at Souissi maternity hospital of Rabat (from January to February 2014), the analysis of the data focused on the fetal outcome and indications for cesarean procedures. Mothers with clear prenatal problems that would have a negative impact on the fetal outcome were not included in the study. For a total of 588 neonatal, the perinatal mortality rate was 10.20% per 1000 births, The most common cause of mortality was asphyxia at birth, as the rate of asphyxia in the emergency cesarean section was 4.04%, compared with an elective cesarean section at 2.11%, was respiratory diseases the most common, with a rate of 8.16%, and the majority of them occurred in emergency cesarean deliveries, with a rate of 89.58%.

In Iran (2018), a study cross-sectional and descriptive (retrospective), study population included every neonate who had been admitted to the neonatal intensive care unit (NICU) of the Besat Hospital in Hamadan City for a year between October 2015 and September 2016, was 600 infants made up the study population, and 13% (78) of them died, the study indicated neonatal mortality rates were (13.00%) per1000 live births and were common causes of early neonatal mortality Sepsis (3.5%), asphyxia (4%) and congenital malformations (0.7%).

In Syria (2022), a total of 49 neonatal cases with blood culture-proven BCC bacteremia (blood culture contamination) within the first 72 hours of admission to the neonatal intensive care unit between June 2017 and December 2018. A retrospectively analyzed, all but one of the cases were born in Jarabulus, Al-Bab, or Aleppo in Syria and were referred to Turkey for urgent medical treatment needs. The rate of BCC bacteremia among the neonates transferred from across the border was 16.1% (48/297). The study indicated neonatal mortality rate was (16.10%) per 1000 live births and the most common coexisting

problems in the cases included multiple congenital malformations at 12.2%, gastrointestinal system atresia at 8.2%, congenital heart diseases at 4.1%, median age at the time of their admission in Turkey 3 days. In this study, neonates referred from cross-border locations had a significant prevalence of BCC infection and associated mortality.

In Yemen (2022), a retrospective study carried out at the Thamar University Al-Wahdah Teaching Hospital in Mabar City, Dhamar Governorate's nursery care unit, was conducted through the period from 1 September 2019 to 29, February 2020. Data gathered comprised: gestational age, age at admission, sex, place of delivery, weight at admission, final diagnosis, outcome, and length of hospital stay, The number of neonates with complete data was 290 of the total admissions 305 to the unit during the research phase, 196 (67.6%) were males while 94 (32.4%) were females, total 202 patients 69.7% were born in hospital while 88 (30.3%) were home-born babies, study indicated neonatal mortality rates was (21.00%) per

1000 live births and common causes of neonatal mortality Sepsis 19.7%, asphyxia 24.1%, Strongly advise expanding the number of facilities and medical personnel to lower the NMR by offering superior nursing care in the tribal areas.

In Iraq (2022), requested data were reviewed from medical records (cause of mortality, sex). Chi-square was used to show the impact of dependent variables (mortality causes) on the independent variables (type of neonatal mortality and sex). The number of NM per 1000 live births ranged from 19.30 to 19.08 per 1000 live births (2015 to 2019) respectively, Showing neonatal mortality rates of 32.1% per 1000 live births (2015 to 2019). Males had the highest NM through studied years (54.8%, 54.5%, 56.4%, 57.2%, and 59 respectively), prematurity (487, 32.10%), and respiratory distress syndrome (387, 25.5%), were common causes of early NM: Sepsis (30.1%), asphyxia (20.8%) and congenital malformations (13.8), the study period had a high NMR, happened early in two-thirds of cases.

Table (5): Evaluation of neonatal mortality rate and causes per 1000 births % in the Middle East Countries and Morocco.

Reference	Countries	N	Years	Mortality rate%	Leading causes	%
Dilek SARPKAYA GÜDER	Cyprus	14.6 births	2021	0.08	undefined	undefined
A. Santosh et al	Oman	58	2013	0.73	Respiratory disease	7
					congenital malformations	29
Hasan Hüseyin Çam and Fatma Karasu	Turkey	18.4 deaths 14.6 births	2021	1.84	Asphyxia	13
					congenital malformations	19.4
M. M. van den Berg *et al.*	Palestine	3126	2018	2.23	congenital malformations	19.29
					infections	12.19
S. Rahman et al	Qatar	20583 live births	2012	4.95	undefined	undefined
A. H. Abdel Mohsen and A. S. Amin	Egypt	5%	2022	5.00	Respiratory disease	6.2
Y. S. Khader et al	Jordan	Out of 21928 live births	2018	8.10	undefined	undefined
S. Benzouina *et al.*	Morocco	588	2016	10.20	respiratory diseases	8.16
					Asphyxia	6.15
Ahmed Hamood Al-Shahethi et al	Iran	600	2018	13.00	Sepsis	3.5
					Asphyxia	4
					congenital malformations	0.7
B. S. Cetin and A. Orman	Syria	49	2022	16.10	congenital malformations	12.2
A. A. Al-Shameri *et al*	Yemen	290	2022	21.00	Asphyxia	24.1
					Sepsis	19.7
Hiba A. Rasheed at al	Iraq	716	2022	32.10	Asphyxia	20.8
					Sepsis	30.1
					congenital malformations	13.8.8

III 3 Evaluation of child mortality rate in the Middle East

III 3-1 child mortality rates in the in the Middle East From the nineties to 2018

In a study published in 2021, child mortality rate data sets for 14 Middle East contras were analyzed, was used to retrieve data sets for the website https://fred.stlouisfed.org, which houses the economic research division database of Federal Reserve Bank of St. Louis, the countries considered: Bahrain, Iran, Iraq, Jordan, Kuwait, Lebanon, Oman, Palestinian, Qatar, Saudi Arabia, Syria, Turkey, UAE, and Yemen (Table 6). Presents sample periods of each country's child mortality rates, with the starting and ending child mortality rate for each country's case as well as the

percentage reduction in CMR over a historical period, starting points for countries vary, with the longest series having samples start in 1960 and shortest series having samples start in 1985. By looking at the starting child mortality rates, Yemen presents a children mortality rate of 0.2794 in 1962, the lowest rank in that year; this country can lower its children mortality rate to 0.0429 in 2018, ranking 42nd in that year. Percentage reductions are computed for each country and ranked to determine the best-performing country's children mortality rate over the years; these outcomes are presented in the last column of (**Table 6**). Saudi Arabia has reduced their children's mortality rate to about 90% and above.

Table (6): Countries examined; sample periods and growth rate in child mortality rate %

Reference	Year	Countries	Period	Starting CMR	Ending CMR	Reduction%
O. S. Yaya, O. Adekoya, and O. Babatunde (40)	2021	Palestinian	1975-2018	0.0767 (14)	0.0173 (27)	**77.4 (11)**
		Iraq	1960-2018	0.1294 (29)	0.0225 (30)	**82.6 (17)**
		Yemen	1962-2018	0.2794 (45)	0.0429 (42)	**84.6 (19)**
		Jordan	1960-2018	0.1070 (22)	0.0139 (22)	**87.0 (24)**
		Syria	1960-2018	0.1169 (24)	0.0140 (23)	**88.0 (28)**
		Lebanon	1960-2018	0.0566 (8)	0.0064 (7)	**88.7 (30)**
		Qatar	1969-2018	0.0532 (6)	0.0058 (4)	**89.1 (31)**
		Iran	1971-2018	0.1255 (28)	0.0124 (20)	**90.1 (33)**
		Kuwait	1960-2018	0.0977 (19)	0.0067 (10)	**93.1 (37)**
		Saudi Arabia	1972-2018	0.1094 (23)	0.0060 (5)	**94.5 (40)**
		Turkey	1960-2018	0.1723 (36)	0.0091 (16)	**94.7 (41)**
		UAE	1960-2018	0.1341 (31)	0.0065 (9)	**95.2 (42)**
		Bahrain	1960-2018	0.1337 (30)	0.0061 (6)	**95.4 (43)**
		Oman	1963-2018	0.2163 (43)	0.0098 (18)	95.5 (44)

Registration was limited to the occupied regions in the case of Palestine because of the continuing war.

III 3-2 Evaluation of child mortality rate per 1000 births% in the Middle East Countries and Morocco

In a study published in Jordan (2022), A single academic institution conducted a retrospective cohort study at Jordan University Hospital, encompassing a comprehensive chart review of all cases of mortality that occurred within the Pediatric Intensive Care Unit (PICU) between September 2015 and June 2020. During the period of the study, there were 1523 admissions. of those, 102 patients died with an overall children mortality rate was 6.7%. Patients who died tended to be younger, and the majority (85%) had a preexisting comorbidity, with neuromuscular disease being the most common. The majority of the patients who died (69%) required invasive ventilation, the most common immediate cause of mortality was respiratory disease, and the highest case fatality was among those with cardiac disease. Of those patients who died, 90% had failed cardiopulmonary resuscitation and 10% had a do not resuscitate orders, no patient received any care interruptions.

In Morocco (2016), during the previous two decades, the Moroccan authorities have launched a number of measures and strategies to enhance access to health services and improve health outcomes. For all populations in general, the child in particular, and worked to achieve the millennium development goals that led the Moroccan government to develop a national strategy to reduce child mortality. The Ministry of Health launched action plans from 2008 to 2012, and 2012 to 2016, establishing a monitoring system, as well as covering compulsory health insurance for the public, private sectors, and medical insurance for self-employed persons. The results indicate that great achievements have been obtained through this study, where the child mortality rate was 21.7% per 1000 births compared to 27% per 1000 births in 2004, it was most common cause of child mortality was diarrhea and pneumonia.

In Syria (2021), a retrospective that included 173 children diagnosed according to diagnostic criteria with cystic fibrosis. This study was conducted to determine the diagnostic, clinical, and genetic characteristics of patients with cystic fibrosis in Syria and to assess the relationship between the genotype and the phenotype of the disease in these patients. As an outcome of early classical manifestations, cystic fibrosis diagnosis was established in the present study by the age of 1 year at 78.6%, mortality rate was 23.1%, and it was more common diseases: respiratory disease 8.8%, gastrointestinal inflammation 78.6%, Steatorrhea incidence and presence of class I pathogenic variants were statistically correlated.

Table (7): Evaluation of child mortality rate and causes per 1000 births% in the Middle East Countries Countries and Morocco

Reference	Countries	N .or births	Years	Mortality rate%	leading causes	%
A. H. Daher et al (45)	Jordan	1523	2022	6.7	Direct: artificial respiration and heart disease. Indirect: history of diseases,	85
W. Boutayeb et al (21)	Morocco	national data	2016	21.7%	Diarrhea and Pneumonia	undefined
R. Al-Baba and A. B. Zetoune (42)	Syria	173	2021	23.1	Respiratory disease	8.8
					Gastrointestinal inflammation	78.6

III 4 Evaluation of policies to reduce the high maternal, neonatal, and child mortality rate in Middle Eastern countries.

A study published in the Middle East countries (2014), used data obtained from WHO and World Bank databases to assess the impact of government health spending on infant mortality. Illustrates total and private health spending in the Middle East, the Gulf countries support health to a large extent, and this is reflected in the low levels of spending for those countries. Yemen had the highest spending on health, followed by Lebanon and Iran. Iraq, Kuwait, and Oman spent the least spending on health out of the total expenditure, in Iran (2016), In the development of an analytical model, required data were collected from the WHO online database, explaining that improving income, economic development, increasing materials allocated to the health sector, improving delivery services, especially the increased use of trained staff, improving quality primary services, care centers, improving the level women's education and knowledge are the main factors in making policies related to the promotion of maternal health.

In 2017 (Egypt), This study showed us that Egypt witnessed many improvements in the past twenty years, in the rapid progress in new technologies and procedures followed, so it worked to increase the provision of services such as intensive neonatal care and interest in the health sector to provide high-quality services and enhance maternal care, worked on the periodic review of medical records, and it will save numerous lives and prioritize the quality of care during holiday periods.

In Cyprus (2018), the policies were explained to us, as Cyprus worked to follow up with mothers before their children were born in public hospitals and health centers, and pay attention to the national vaccination programs provided by the Ministry of Health, provide maternity services and health care, bring about the necessary changes in the future, and keep the rate of cesarean deliveries consistently low, and the medical reason is the main justification for births Caesarea. The media is considered to have a pivotal role in informing and educating the population.

In Lebanon (2018), WHO, showed that the main indicators of health outcomes have improved dramatically and continuously over the past decades between 2000 and 2015. The main indicators of health outcomes improved significantly in previous years, which led decrease in maternal, infant, and child mortality rates, The impact Syrian crisis led to an increase in the MMR, due to the spread of diseases that could have been prevented by vaccines b. The national health strategies from 2017 to 2020 were based on four main pillars: modernizing and strengthening the government of the health sector, improving collective health, and moving towards universal health coverage, development, and readiness in health security, but only in some areas. It still suffers from a lack of services, there is an overflow of doctors and a shortage of nurses and midwives, the influx of one and a half million Syrian immigrants has led to a heightened demand for healthcare services, which has led to stress on the health system, countries, and humanitarian partners are making great efforts to ensure health care. In 2017, 89% of Syrians received health care, health care and 80% received hospital care.

Jordan (2018) adapted a population-based age-structured model of the dynamics of hepatitis A transmission to highlight the epidemiological and economic impact of vaccinating 1-year-old children. The model was calibrated using local data, these data encompassed seroprevalence and incidence statistics sourced from the Jordanian Ministry of Health, along with hospitalization data obtained from King Abdullah University Hospital in Jordan, explained to us that the immunization and vaccination program that covers children will significantly reduce public health and economic burden.

Turkey (2019), showed us that Turkey is working to improve data monitoring and implement national guidelines to prevent most complications of pregnancy, childbirth, and the puerperium to reduce the maternal mortality rate, as the healthcare authority in Turkey continues to reduce the MMR to 70 cases per 100000 live births by the year 2030 by increasing women's awareness and implementing the guidelines.

In Palestine (2019), care by midwives in Palestine had a role in reducing cesarean section operations and medical interventions during childbirth, and the experience of midwives could be a model of continuity in health care in Palestine, as the number of health centers decreased, and policies worked to save hospital costs and improve the quality of care during labor and premature birth.

In Morocco (2019), an agenda adopted by 193 member states of the United Nations encourages these countries to develop strategies, reach health goals, and achieve universal health coverage, among which are Egypt and Morocco.

Morocco is one of the countries that has experienced a sharp decline in maternal mortality. Although still far from the country's global target, it appears to be comfortably on track to reach an MMR of less than 70 by 2030 per 100000 live births, MMR in 2015 was (121) deaths per 100000 live births to reach 70 deaths in 2030 per 100000, the child mortality rate was 28 deaths per 1000 births in 2015, and it is working until it decreases to 25 in 2030. Also, the neonatal mortality rate, as the premature death rate was in 2015 17.6 and seeks to reach 12 deaths per 1000 in the year 2030. This success is the result of several factors introduced into the Moroccan health system during the recent period, examples of which include reducing barriers to accessing neonatal, and obstetric care, improving the quality of antenatal care, and improving the governance of safe care maternity.

In Gulf countries (2020), using the latest update of the United Nations Inter-Agency Group for children mortality estimates for the year 2017, to try to review and evaluate achievements in reducing child mortality taking into account children under the age of 5 infant and NM, IMR is the most important indicator of national progress and is not only a reflection of the performance of health system, but also of budget and wealth. There was a rapid decline in the infant mortality rate in the Arabian Gulf, which is in line with achieving the goals of sustainable development. Allocating a large budget, investing in a health system, and improving other contributing sectors such as water, sanitation, hygiene, and improvement are among the policies followed in the Arabian Gulf and are always sought after. Developing infant mortality standards has been a tedious task simplified by the objectives set the Arabian Gulf region has achieved remarkable progress by mobilizing resources, building infrastructure, structures, systems, health institutions, employment, and equipping the workforce, which made a significant decrease in the IMR.

Compared in the Middle East countries (2020), based on the World Health Organization report in 2017 in mortality rate and health level. The world has made great progress in reducing child rates in recent decades, as both acute respiratory infections and malaria are responsible for millions of fatalities of children under the age of 5, more than half of all deaths are related to malnutrition, while some environmental factors such as unsafe water, hygiene, and sanitation have an impact Significant on the under-five mortality index. The infant mortality index major indicator not only for child health but also for monitoring higher progress towards the goals of sustainable development. The under-five mortality rate halved between 1990 and 2016. Among these countries are the Emirates, Kuwait, Bahrain, and Qatar, and the worst situation was for Yemen, while Turkey, Iran, and Egypt have the highest annual decline rate, the lowest decline was in Iraq (where Iraq and Yemen participated in several conflicts).

In Iraq (2022), a descriptive retrospective record-based study covering five years, from 2016 to 2020, was conducted in the Basrah governorate's public health department between the first of January and the last day of October 2021. There was a sufficient number of comprehensive emergency obstetric and neonatal care (CEMONC) facilities and a high rate of deliveries within health facilities and by skilled staff reflecting good utilization of the EMONC facility.

In Yemen (2022), a retrospective study carried out at the Thamar University Al-Wahdah Teaching Hospital in Mabar City, Dhamar Governorate's nursery care unit, was conducted through the period from 1 September 2019 to 29 February 2020, this study showed us the policies that Yemen implemented, as it focused on training the medical staff on newborn resuscitation skills, which led to a decrease in the mortality rate of children born with asphyxia in the perinatal period to up to 40%, and it worked to improve quality prenatal care, awareness of maternal nutrition and health within families and worked to strengthen the role of institutions in care during and after childbirth and as a first step in improving and reducing the death rate.

In the Middle East countries and Morocco (2022), to analyze trends in MMR for countries in the region to achieve this understand the variances in reduction between countries. Data were extracted from several international databases and interregional in the region on measures to empower women, the availability of vehicles, and human resources to health (instead of the 3-delays model). Although significant reductions in maternal mortality have been achieved in the Middle East, the authorities must recognize that there is an opportunity to learn from each other and share experiences to get the maternal mortality rate as close to zero as possible. Immediate steps in the right direction include investing in human health resources (Specifically, midwives and nurses), measures to improve the sexual and reproductive health of adolescents increasing the level of education for females.

Table (8) Evaluation of policies to reduce the high maternal, neonatal, and child mortality rate in the Middle Eastern countries and Morocco

Reference	Countries	Years	Important policies to reduce the high maternal, neonatal, and child mortality rate in the Middle East and Morocco.
A. Shetty and S. Shetty	Iran, Iraq, Jordan, Kuwait, Lebanon, Qatar, Saudi Arabia, Syria, UAE and Yemen	2014	-Increased total health spending -support for the health sector by governments -Health awareness through the media about vaccination programs and immunizations -Sanitary and epidemiological data were monitored
M. Bayati *et al*	Iran	2016	-Economic income improvement -General health care improvement -Spreading health awareness for mothers
K. M. Zahran et al	Egypt	2017	-Increasing the provision of services and intensive care -Attention to the quality of health care -Review medical data and records
E. Hadjigeorgiou et al	Cyprus	2018	-Attention to health care before and after childbirth -Maintaining the cesarean section rate -Paying attention to educating the population through the media -Focusing on national vaccination programs
WHO	Lebanon	2018	-Developed health services and universal coverage -Qualified the health human cadres -Sanitary and epidemiological data were monitored centrally and peripherally -Interest in health and environment -Fighting infectious diseases that can be prevented by vaccines and promoting healthy lifestyles
W. A. Hayajneh *et al*	Jordan	2018	Making vaccination programs for children and immunizing them
C. Gulumser et al	Turkey	2019	-Implemented guidelines and data control -Develop strategies to reduce the maternal mortality rate to 0.07%.
B.-M. V et al	Morocco	2019	-Enhancing the quality of maternal healthcare within maternity services program in general, and prenatal follow-up. -Neonatal and Child care. -Implementing a system for monitoring maternal, Neonatal, and Child mortality rate
B. Mortensen et al	Palestine	2019	-Support and rehabilitation of midwives - Improving the quality of health care and reducing hospital costs
A. A. Salam and R. M. Al-Khraif	Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, and, UAE.	2020	-Investing in the health system -Paying attention to the water, sanitation and hygiene sectors -Building the infrastructure, structures, and health institutions -Equipping the workforce -Sanitary and epidemiological data were monitored
E. JENABI and S. KHAZAEI	Egypt, Bahrain, Iran, Iraq, Jordan, Kuwait, Lebanon, Oman, Qatar Saudi Arabia, Syria, Turkey, UAE, and Yemen,	2020	-Interested in combating infectious diseases -Interested in healthy nutrition -cared about environmental factors, water and sanitation -Health awareness through the media about vaccination programs and immunizations -Sanitary and epidemiological data were monitored
Hewa Sattar Salih at al	Iraq	2022	-A sufficient number of comprehensive emergency obstetric and neonatal care (CEmONC) facilities existed -High percentage of births within health facilities and by trained professionals.
A. A. Al-Shameri et al	Yemen	2022	-The medical staff qualified -Enhancing the role of institutions and health care and awareness centers, especially vaccinations (tetanus). -Monitored the sanitary and epidemiological evidence
Sathyanarayanan Doraiswamy et al	Yemen, Morocco, Jordan , Syria , Iraq , Palestine, Egypt , Iran, Oman, Lebanon, Bahrain, Qatar, Saudi Arabia , UAE and Kuwait	2022	-Investing in sound human resources -Adolescent sexual and reproductive health measures -Raising the level of education and awareness among females

IV. Discussion:

The significance of our study is to assess maternal, neonatal, and child mortality rates, health care, and policies to reduce high mortality rates in the Middle East and Morocoo historically, over the past ten years (2012-2022), in meta-analysis we have selected 39 articles and 264 participants carried out in the last 10 years included (16)15 in the Middle East countries and Morocoo to analyze and compare the data of these studies to conclude to an analytical and statistical knowledge and its change with years, we ranked the research for each branch, starting with the historical branch, then by mortality ratio, mortality rate, not years, the studies were arranged by mortality rate.

Maternal mortality rate, a 25-year epidemiological study published in 2019, data on MMR and lifetime risk of maternal fatalities were taken from the United Nations Children's Fund's official databases. The annual percentage change was calculated using the Join point regression model. Statistical significance between countries was determined using one-way analysis of variance, there was a substantial drop in MMR in all countries in the Middle East and Morocco from 1990 to 2015. in the Middle East, the average maternal mortality rate decreased by about 45% from (1990- 2015), the countries with the lowest maternal mortality rates were Kuwait and the United Arab Emirates (6 and 9 mortality per 100000 live births), although there is a low maternal mortality rate, continuous research, and efforts must be made to develop a better health care system in some Arab countries to reduce the burden of maternal mortality. In comparison, the highest MMR in Africa was found in Mauritania and Somalia. regional estimates also found that teenage pregnancy and birth rates are highest in sub-Saharan Africa.[51], [52]. The higher incidence of pregnancy complications such as pre-eclampsia, eclampsia, postpartum hemorrhage, and puerperal endometritis in younger mothers could potentially elucidate the elevated risk of maternal mortality observed among women in Sub-Saharan Africa [53].

Study in Lebanon (2018), by WHO, key indicators of health outcomes have improved dramatically and continuously over the past decades: between 2000 and 2014, the maternal mortality rate gradually increased from (0.009%)/100000 live births in 2014 to (0.023%)/100000 live births in 2017, in Iran (2022), these hospitals recorded 335,216 live births, with an MMR of 0.024% per 100000 live births, among maternal mortality cases, direct causes constituted 48.75%, with hemorrhage emerging as the most prevalent direct cause, accounting for 17.5% of cases. Additionally, cancer and cardiovascular diseases, each at 17.5%, represented the most frequent indirect causes of maternal mortality. We have noticed an increase in MMR. As a result, implementing a comprehensive approach for high-risk pregnancies is critical, in Iraq (2022), was maternal mortality ratio (0.054%) per 100000 live birth, and the causes of maternal mortality were obstetric partum hemorrhage (33%) and hypertension (13.9%) and accounted for the majority of maternal mortality risk factors, in Palestine (2018), Was maternal mortality ratio (0.160%) per 100000 live birth, the causes of maternal mortality were not explained, in Egypt (2017), the Maternal mortality ratio was (0.230%)/100000, leading causes of maternal mortality were obstetric hemorrhage (38.3%), complications cesarean sections (27.7%) and pre-eclampsia/eclampsia (23.4%). Nearly half (42%) of the mortality occurred during vacations. Quality indicators revealed the poor quality of health care, in Oman (2020), was MMR (0.400%) per 100000, were leading causes of MM: partum hemorrhage (23%) and hypertension (44%), in Syria (2015), was maternal mortality ratio per 100000 live birth (0.700%), was leading cause of maternal mortality cardiovascular diseases (33%), in Turkey (2019), maternal mortality

rate (0.770%) per 100000 live births. Obstetric complications directly were the leading cause of maternal fatalities, maternal cardiovascular disorders were the most prevalent (21%) and partum hemorrhage (20.6%), in Morocco (2015) the MMR was 1.140%, was the leading cause of maternal fatalities most common of which was maternal and was due to renal failure in the postpartum period 70.6%, was due to pre-eclampsia63.6%, was due to hemorrhagic shock13.6%, and sepsis11.4%, in Saudi Arabia (2018), was maternal mortality rate (2.200%) per 100000 live birth, the leading causes of maternal mortality were preeclampsia (54.9%) and hypertension (29.5%), in Kuwait (2015), the maternal mortality rate per 100000 live birth was (3.300%), all antepartum cases were delivered by cesarean section and intrapartum. 13(43%) of women delivered vaginally. Only 6 (20%) patients were of low socioeconomic status and were primary school educated. Severe maternal complications occurred in 8(27%), with abruption placentae being the most common 3(38%). Incidence of eclampsia was low, lack of antenatal care is a major risk factor and in Yemen (2019), was maternal mortality rate (8.900%) per 100000 live births. In multivariable analysis older age (35+ years) mothers at birth (Relative Risk = 2.83), teenage mothers aged at first pregnancy (<18 years), primipara mothers, multi-nuclear family, mud house, mothers who underwent female genital mutilation and mothers who chewed khat were factors linked to an increased risk of perinatal death, whereas a mother's positive tetanus vaccination status was an important preventative factor. in sub-Saharan Africa, with an estimated 542 deaths per 100000 live births in 2017 but an unexplained cause of death [54], still had MMR 432/100000 live births, the most frequent occurrence was hemorrhage (40.8%), followed by infection (21.5%), hypertensive disorders (18.0%), anemia (11.8%) and dystocia (7.9%) in Sudan [55], MMR was estimated at 620 deaths per 100000 live

births, of which 46% of maternal mortality were related to a parturient delayed decision in seeking healthcare in time. Maternal mortality was significantly associated with complications such as uterine ruptures, hemorrhagic, infections, and dystocia in the Eastern Democratic Republic of the Congo in 2022 [56], determinants of the time of maternal fulfillment in Morocco after childbirth The maternal mortality rate in the first day was 48.9%, from the second to the seventh day it was 24.5%, and from the eighth to 42 days it was 24.9% [57].

Neonatal mortality rate, epidemiological study published (2018), the data for 1990 to 2013 on neonatal mortality rates, from official websites, including the United Nations Children's Fund (UNICEF, WHO, and UNESCO). The neonatal mortality rate in the Middle East and Morocco in 2013 ranged from 2 to 46 deaths per 1000 live births (Table 4). The Middle East was classified into three categories as follows: the first category included the countries with the lowest rates of NM (≤ 10 deaths per 1000 live births), the second category included countries with moderate rates (> 10 to 25/1000 live births, and the third category included countries with highest rates (> 25 deaths per 1000 live births. As it is reported that neonatal mortality alone accounts for more than half a significant reduction in neonatal mortality must be achieved, this means that the current global live birth level of 20/1,000 live births should be reduced to less than 10. If there is no serious action to address neonatal mortality, Millennium Development Goal 4 (MDG4) is likely to be achieved only by 2035 [58]. The SDG framework has been extended to the Northern Mediterranean with all countries aiming to reduce neonatal mortality to at least 12 per 1000 live births [59].

Study in Cyprus (2021), NMR is 0.08 % per 1000 live births, indicators of maternal and child health in nation are not sufficiently well-documented, in Oman

(2013), the study indicated neonatal mortality rates was (0.73%) per 1000 live births and were common causes of neonatal mortality: respiratory disease (7%), congenital malformations (29), in Turkey (2021), the study indicated neonatal mortality rates was (1.84%) per 1000 live births and were common causes of neonatal mortality: sepsis (13%), and congenital malformations (19.4%), in Palestine (2018), NMR was (2.23%) per 10000 live births and were common causes of neonatal mortality: congenital malformations (19.29%), infections (12.19%), in Qatar (2012), neonatal mortality rate 4.95%, in Egypt (2022), the study indicated neonatal mortality rates was (5.00%) per 1000 live births and were common causes of neonatal mortality respiratory disease (6.2%), in Jordan (2018), was NMR was (8.10% per 1000 live births), in Morocco (2016), NMR was 10.20% per 1000 births, was most common cause of mortality was asphyxia at birth, respiratory diseases, in Iran (2018), the study indicated neonatal mortality rates was (13.00%) per 1000 live births and were common causes of early neonatal mortality sepsis (3.5%), asphyxia (4%) and congenital malformations (0.7%), in Syria (2022), the study indicated neonatal mortality rates was (16.10%) per 1000 live births and Multiple congenital malformations 12.2%, gastrointestinal system atresia 8.2%, congenital cardiac disorders 4.1%, and other congenital conditions were the most prevalent comorbid issues in cases in Yemen (2022), the study indicated neonatal mortality rates was (21.00%) per 1000 live births and common causes of neonatal mortality sepsis 19.7%), asphyxia (24.1%) and in Iraq (2022), showed neonatal mortality rates 32.1% per 1000 live births were common causes of early neonatal deaths: sepsis (30.1%), asphyxia (20.8%) and congenital malformations (13.8), neonatal mortality decreased by 14.57 deaths / 1000 live births in 2008, 9.14 / 1000 live births in 2018 due to preventable causes, deaths decreased by 2.88% annually. However, the causes

that can be reduced by immunization procedures, for women during pregnancy, fetal development, and non-partum, have stable rates. Deaths from preventable causes decreased in the late neonatal period (-11.69%), there are serious defects and gaps in the line of mother and child care, possibly related to prenatal care, birth, and childbirth, particularly in the first 6 days of life in Rondônia [60]

Child mortality rate, Samples starting from the year 1960, and the shortest series having Samples starting from the year 1985 year is epidemiological, study published in 2021, children mortality rate data sets for 14 the Middle East countries are analyzed, and these data sets are retrieved from the Federal Reserve Bank. Presents the sample periods of each country's child mortality rate, with starting and ending child mortality rate for each country's case as well as the percentage reduction in child mortality rate over the historical period, the different starting times to countries by looking at the starting child mortality rate, Yemen presents a child mortality rate of 0.2794 in 1962, the lowest rank in that year; this country can lower its child mortality rate to 0.0429 in 2018, ranking 42 in that year, were Saudi Arabia, have reduced their child mortality rate to about 90% and above. When compared to other Asian nations, Brunei, which had the lowest beginning in 1983, shows the lowest percentage drop (15.5%), while Maldives shows the biggest percentage reduction (96.5%) from 1964 to 2018. The 5 countries displaying the slowest growth of IMRs are as follows: Brunei 15.5%, Korea 50.5%, Turkmenistan 62.4%, Philippines 66.2%, and Pakistan 69.2%. according to the percentage reduction, while other highly developed Asian countries like Japan, Singapore, and China have reduced their IMRs to 90% and higher [61].

Study in Jordan (2022), the child mortality rate stood at 6.7%. Notably, those who passed away tended to be younger, and the majority (85%) had a

preexisting comorbidity, with neuromuscular disease being the most prevalent among them, the majority of patients who passed away (69%), in Morocco (2016), was child mortality rate was 21.7% per 1,000 births compared to 27%, it was most common cause infant mortality diarrhea and pneumonia and in Syria (2021), was child mortality rate was (23.1%), it was more common diseases: respiratory disease (8.8%), gastrointestinal inflammation (78.6%). Compared to a study published in 2021 of 192 countries around the world, the under-five mortality rate ranged from 1.3 per 60 deaths (1000) per live birth, the causes of child deaths were due to the lack of a specialized medical staff, the total national income per capita, capita expenditure on health, presence of a sufficient number of specialized medical staff worldwide may save 50000 child annually from death, as strengthening human resources is an integral part of supporting the goals of security. Sustainable development for the United Nations and achieving the desired goals for neonatal and child mortality around the world [62].

The policies in the Middle East countries and Morocco have developed in the past ten years. In 2014, they depended on the support of the health sector by governments. The development of policies increased, as they began to monitor health and epidemiological data in (2017), and they began to pay attention to the quality of health care. After that, the interest in cadres and human resources in Lebanon became (2018).

Through the policies set in Morocco (2019), to reduce the maternal, neonatal, and child mortality rate average, we have attended the decrease in the mothers' death rate at 50 % from 2000 to 2015 and seek to reduce them to almost 70 fatalities per 100000 live births in 2030 and also worked to release the rate of neonatal to 63 % until 2015 and seeks to reduce it to 43 % in 2030 and took care of (child under the age of five) and worked on the rate of deaths from 2000 to 2015 at a rate of 56 % and seeks to protect them to 50 % in 2030.

Turkey has developed strategies to reduce the maternal mortality rate to 71 per 100000 births in 2030, (2020), the Arab Gulf countries have paid attention to the water, sanitation, and hygiene sectors. The interest of the Middle East countries has increased in health awareness through the media, vaccination and immunization programs, and interest in healthy nutrition (2020). Some countries have benefited from the Middle East and Morocco based on health evidence and the results of epidemiological data in improving its policies, as in Yemen (2022), the policies of all Middle Eastern countries and Morocco converged in (2022) with interest in sexual and reproductive health measures for adolescents. These findings highlight the essential need for ongoing investments in health-related human resources [63]. There is still a need to scale up skilled pregnancy and childbirth care to reach the millennium development goals in middle, low-income countries. However, with increasing numbers of women and children accessing facilities and hospitals even in conflict zones, the challenges of quality of care in these facilities must be addressed urgently compared to major countries such as America and Europe. A change in emphasis on care quality has the potential to deliver significant gains for every mother and every newborn after 2022 to end preventable maternal and newborn deaths and stillbirths in 2030. These findings highlight the essential need for continued investments in health-related human resources [64]. By dividing the results by the income groups of the World Bank, Low-income nations had the highest surgical under-five mortality rates, with an average of 29.23 fatalities per 1000 live births, compared to middle-income countries' average of 13.62 and high-income countries' average of 3.64 [62].

The outcomes of our meta-analysis on maternal, neonatal, and child mortality, health care, and policies to reduce the high mortality rates in the Middle East and Morocoo in the past ten years showed the importance of studying International and national data on maternal, neonatal and child mortality rate, health care and policies to reduce the rise in differences due to a number of reasons. Additional research in this area would help describe the relationship between changing mortality rates by years and the work of future strategies and more care and development of mechanisms and better training of medical staff and increase maternal and child care centers.

V.   Conclusions:

It is very important to know the maternal, neonatal, and child mortality rates and the policies that limit their rise. The lower the rates, the better indicator of the health policies followed in the countries, hence the importance of conducting more studies and in-depth research and applying future policies and strategies to reduce the death rate and training the medical staff, especially during pregnancy and follow-up. Continuing efforts by mothers, raising awareness and protecting the quality of health care, which opens a wide scope in this matter for disseminating these policies among neighboring countries and achieving the goals of sustainable development desired by the United Nations and especially attention to maternal, neonatal, child health in fragile and conflict-affected situations.

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References:

[1]   P. Truche *et al.*, "Defining Surgical Workforce Density Targets to Meet Child and Neonatal Mortality Rate Targets in the Age of the Sustainable Development Goals: A Global Cross-Sectional Study," *World J. Surg.*, vol. 46, no. 9, pp. 2262–2269, Sep. 2022, doi: 10.1007/s00268-022-06626-6.

[2]   N. J. Kassebaum *et al.*, "Global, regional, and national levels of maternal mortality, 1990–2015: a systematic analysis for the Global Burden of Disease Study 2015," *The Lancet*, vol. 388, no. 10053, pp. 1775–1812, Oct. 2016, doi: 10.1016/S0140-6736(16)31470-2.

[3]   World Health Organization, "Trends in maternal mortality 2000 to 2017: estimates by WHO, UNICEF, UNFPA, World Bank Group and the United Nations Population Division: executive summary," World Health Organization, WHO/RHR/19.23, 2019. Accessed: Dec. 28, 2022. [Online]. Available: https://apps.who.int/iris/handle/10665/327596

[4]   L. Say *et al.*, "Global causes of maternal death: a WHO systematic analysis," *Lancet Glob. Health*, vol. 2, no. 6, pp. e323-333, Jun. 2014, doi: 10.1016/S2214-109X(14)70227-X.

[5]   "Newborn Mortality." Accessed: Dec. 28, 2022. [Online]. Available: https://www.who.int/news-room/fact-sheets/detail/levels-and-trends-in-child-mortality-report-2021

[6]   "Child Mortality," UNICEF DATA. Accessed: Dec. 28, 2022. [Online]. Available: https://data.unicef.org/topic/child-survival/under-five-mortality/

[7]   Commission on Social Determinants of Health, "Closing the gap in a generation : health equity through action on the social determinants of health : final report : executive summary,"

World Health Organization, WHO/IER/CSDH/08.1, 2008. Accessed: Dec. 28, 2022. [Online]. Available: https://apps.who.int/iris/handle/10665/69832

[8] J. Gruber, "Technical assistance for health in non-conflict fragile states: challenges and opportunities," *Int. J. Health Plann. Manage.*, vol. 24 Suppl 1, pp. S4–S20, Oct. 2009, doi: 10.1002/hpm.1019.

[9] S. Witter, "Health financing in fragile and post-conflict states: what do we know and what are the gaps?," *Soc. Sci. Med. 1982*, vol. 75, no. 12, pp. 2370–2377, Dec. 2012, doi: 10.1016/j.socscimed.2012.09.012.

[10] S. Abouchadi, A. B. Alaoui, F. Z. Meski, R. Bezad, and V. De Brouwere, "Preventable maternal mortality in Morocco: the role of hospitals," *Trop. Med. Int. Health TM IH*, vol. 18, no. 4, pp. 444–450, Apr. 2013, doi: 10.1111/tmi.12065.

[11] B.-M. V *et al.*, "A gap analysis of SDG 3 and MDG 4/5mortality health targets in the six Arabic countries of North Africa: Egypt, Libya, Tunisia, Algeria, Morocco, and Mauritania," *Libyan J. Med.*, vol. 14, no. 1, Dec. 2019, doi: 10.1080/19932820.2019.1607698.

[12] A. G. M. Al-Selwi and A. Barkat, "Composition and Development of the Intestinal Microbiome in Children and Its Changes with Certain Pathologies (Cystic Fibrosis, Multisystem Inflammatory Syndrome, Type 1 Diabetes, and Autism): Meta-Analysis," *Egypt. J. Hosp. Med.*, vol. 90, no. 1, pp. 636–654, Jan. 2023, doi: 10.21608/ejhm.2023.279819.

[13] A. G. M. Al-Selwi and A. Barkat, "Antibiotic Resistance of Streptococcus Pneumoniae, Neisseria Meningitidis, Haemophilus Influenzae and Staphylococcus Aureus in Morocco, National Data: Meta-Analysis.," *Biomed.*

Pharmacol. J., vol. 16, no. 1, pp. 251–263, Mar. 2023.

[14] S. Rahman *et al.*, "A PEARL Study Analysis of National Neonatal, Early Neonatal, Late Neonatal, and Corrected Neonatal Mortality Rates in the State of Qatar during 2011: A Comparison with World Health Statistics 2011 and Qatar's Historic Data over a Period of 36 Years (1975-2011)," *J. Clin. Neonatol.*, vol. 1, no. 4, pp. 195–201, 2012, doi: 10.4103/2249-4847.105990.

[15] A. Santosh, G. Zunjarwad, I. Hamdi, J. A. Al-Nabhani, B. E. Sherkawy, and I. H. Al-Busaidi, "Perinatal Mortality Rate as a Quality Indicator of Healthcare in Al-Dakhiliyah Region, Oman," *Sultan Qaboos Univ. Med. J.*, vol. 13, no. 4, Art. no. 4, Nov. 2013.

[16] B. Basiri, F. E. Ashari, M. Shokouhi, and M. K. Sabzehei, "Neonatal Mortality and its Main Determinants in Premature Infants Hospitalized in Neonatal Intensive Care Unit in Fatemieh Hospital, Hamadan, Iran," *J. Compr. Pediatr.*, vol. 6, no. 3, Art. no. 3, 2015, doi: 10.17795/compreped-26965.

[17] H. Bashour *et al.*, "A cross sectional study of maternal 'near-miss' cases in major public hospitals in Egypt, Lebanon, Palestine and Syria," *BMC Pregnancy Childbirth*, vol. 15, p. 296, Nov. 2015, doi: 10.1186/s12884-015-0733-7.

[18] N. Kabbali *et al.*, "Outcome assessment of pregnancy-related acute kidney injury in Morocco: A national prospective study," *Saudi J. Kidney Dis. Transplant. Off. Publ. Saudi Cent. Organ Transplant. Saudi Arab.*, vol. 26, no. 3, pp. 619–624, 2015, doi: 10.4103/1319-2442.157426.

[19] R. Chibber *et al.*, "Maternal and perinatal outcome of eclampsia over a decade at a tertiary hospital in Kuwait," *J. Matern. Fetal Neonatal*

Med., vol. 29, no. 19, pp. 3132–3137, Oct. 2016, doi: 10.3109/14767058.2015.1114095.

[20] M. Bayati *et al.*, "Determinants of maternal mortality in Eastern Mediterranean region: A panel data analysis," *Med. J. Islam. Repub. Iran*, vol. 30, p. 360, Apr. 2016.

[21] W. Boutayeb, M. Lamlili, A. Maamri, S. Ben El Mostafa, and A. Boutayeb, "Actions on social determinants and interventions in primary health to improve mother and child health and health equity in Morocco," *Int. J. Equity Health*, vol. 15, no. 1, p. 19, Feb. 2016, doi: 10.1186/s12939-016-0309-9.

[22] S. Benzouina *et al.*, "Fetal outcome in emergency versus elective cesarean sections at Souissi Maternity Hospital, Rabat, Morocco," *Pan Afr. Med. J.*, vol. 23, p. 197, Apr. 2016, doi: 10.11604/pamj.2016.23.197.7401.

[23] E. Hadjigeorgiou *et al.*, "Variation in caesarean section rates in Cyprus, Italy, and Iceland: an analysis of the role of the media," *Minerva Ginecol.*, vol. 70, no. 6, pp. 676–686, Dec. 2018, doi: 10.23736/S0026-4784.18.04295-8.

[24] K. M. Zahran, K. A.-M. Fadel, S. M. Ahmed, and A. F. El-Gazzar, "Maternal mortality in an academic institution in Upper Egypt," *J. Obstet. Gynaecol. J. Inst. Obstet. Gynaecol.*, vol. 37, no. 3, pp. 315–319, Apr. 2017, doi: 10.1080/01443615.2016.1242559.

[25] A. Shetty and S. Shetty, "The correlation of health spending and infant mortality rate in Asian countries," *Int. J. Contemp. Pediatr.*, vol. 1, no. 2, pp. 100–105, Feb. 2017.

[26] Ahmed Hamood Al-Shahethi, Awang Bulgiba, Rafdzah Ahmad Zaki, Sami Abdo Radman Al-Dubai, Khaled Mohammed Al-Surimi, and Abdulwahed Abduljabar Al-Serouri4, "Neonatal Mortality in the Eastern Mediterranean Region: Socio-Demographic, Economic and Perinatal Factors, 1990 - 2013," *Iran J Pediatr*, vol. 28,

no. 1, p. e10485, 2018, doi: doi: 10.5812/ijp.10485.

[27] Y. S. Khader, A. Batieha, R. A. Al-Njadat, and S. S. Hijazi, "Preeclampsia in Jordan: incidence, risk factors, and its associated maternal and neonatal outcomes," *J. Matern.-Fetal Neonatal Med. Off. J. Eur. Assoc. Perinat. Med. Fed. Asia Ocean. Perinat. Soc. Int. Soc. Perinat. Obstet.*, vol. 31, no. 6, pp. 770–776, Mar. 2018, doi: 10.1080/14767058.2017.1297411.

[28] WHO, "Country cooperation strategic agenda," *East. Mediterr.*, 2018, [Online]. Available: http://www.emro.who.int/lbn/programmes/maternal-and-child-health.html Global Health Observatory May 2017 http://apps.who.int/gho/data/node.cco

[29] M. M. van den Berg *et al.*, "Stalled decline in infant mortality among Palestine refugees in the Gaza Strip since 2006," *PLoS ONE*, vol. 13, no. 6, p. e0197314, Jun. 2018, doi: 10.1371/journal.pone.0197314.

[30] A. H. Subki *et al.*, "Prevalence, Risk Factors, and Fetal and Maternal Outcomes of Hypertensive Disorders of Pregnancy: A Retrospective Study in Western Saudi Arabia," *Oman Med. J.*, vol. 33, no. 5, pp. 409–415, Sep. 2018, doi: 10.5001/omj.2018.75.

[31] W. A. Hayajneh *et al.*, "Public health impact and cost effectiveness of routine childhood vaccination for hepatitis a in Jordan: a dynamic model approach," *BMC Infect. Dis.*, vol. 18, p. 119, Mar. 2018, doi: 10.1186/s12879-018-3034-8.

[32] H. H. Khachfe, J. Sammouri, H. A. Salhab, M. Y. Fares, and R. El-Najjar, "Maternal mortality and health in the Arab World: A 25-year epidemiological study," *J. Obstet. Gynaecol. Res.*, vol. 45, no. 12, pp. 2369–2376, Dec. 2019, doi: 10.1111/jog.14119.

[33] C. Gulumser *et al.*, "Maternal mortality due to hemorrhage: population-based study in Turkey," *J. Matern-Fetal Neonatal Med. Off. J. Eur. Assoc. Perinat. Med. Fed. Asia Ocean. Perinat. Soc. Int. Soc. Perinat. Obstet.*, vol. 32, no. 23, pp. 3998–4004, Dec. 2019, doi: 10.1080/14767058.2018.1481029.

[34] B. Mortensen, M. Lieng, L. M. Diep, M. Lukasse, K. Atieh, and E. Fosse, "Improving Maternal and Neonatal Health by a Midwife-led Continuity Model of Care – An Observational Study in One Governmental Hospital in Palestine," *eClinical Medicine*, vol. 10, pp. 84–91, Apr. 2019, doi: 10.1016/j.eclinm.2019.04.003.

[35] A. H. Al-Shahethi, R. A. Zaki, A. W. A. Al-Serouri, and A. Bulgiba, "Maternal, prenatal and traditional practice factors associated with perinatal mortality in Yemen," *Women Birth J. Aust. Coll. Midwives*, vol. 32, no. 2, pp. e204–e215, Apr. 2019, doi: 10.1016/j.wombi.2018.06.016.

[36] J. Al Abri, "National Survey and Review of Maternal Near Miss in Oman," phd, University of Liverpool, 2020. Accessed: Nov. 30, 2022. [Online]. Available: https://livrepository.liverpool.ac.uk/3089785

[37] A. A. Salam and R. M. Al-Khraif, "Child Mortality Transition in the Arabian Gulf: Wealth, Health System Reforms, and Development Goals," *Front. Public Health*, vol. 7, p. 402, Jan. 2020, doi: 10.3389/fpubh.2019.00402.

[38] E. JENABI and S. KHAZAEI, "Child Mortality Rate in Iran Compared with Other Eastern Mediterranean Countries Based on WHO Report in 2017," *Iran. J. Public Health*, vol. 49, no. 1, pp. 206–208, Jan. 2020.

[39] Dilek SARPKAYA GÜDER, "Maternal and Child Health in Northern Cyprus," *J. Health Syst. Policies*, vol. Vol. 3, no. 2, pp. 75–84, 2021, doi: 10.52675/jhesp.884484.

[40] O. S. Yaya, O. Adekoya, and O. Babatunde, "Testing Fractional Persistence and Nonlinearity in Infant Mortality Rates of Asia Countries." Rochester, NY, Aug. 23, 2021. doi: 10.2139/ssrn.3909628.

[41] Hasan Hüseyin Çam and Fatma Karasu, "Infant mortality rates and causes of infant deaths in Kilis province between 2012 and 2018," *Turk J Public Health*, vol. 19, no. 1, pp. 20–30, 2021, doi: doi: 10.20518/tjph.799206.

[42] R. Al-Baba and A. B. Zetoune, "A retrospective study of cases diagnosed with cystic fibrosis at a single care center in Syria," *Egypt. J. Med. Hum. Genet.*, vol. 22, no. 1, p. 59, Jun. 2021, doi: 10.1186/s43042-021-00178-5.

[43] Hiba A. Rasheed, Huda S. Saeed Al Jadiri, and Eman A. Al-Kaseer, "Neonatal mortality rates at Al-Sadar city 2015 – 2019 | Technium BioChemMed." Accessed: Nov. 29, 2022. [Online]. Available: https://techniumscience.com/index.php/biochemmed/article/view/6430

[44] Hewa Sattar Salih, Naji Yasser Saadoon, Zhian Salah Ramzi, and Anees Flayyih Abdulhassan, "Prevalence of Maternal Mortality in Babylon Governorate for the Period of 2014-2018," *Bahrain Med. Bull.*, vol. 44, no. 1, Mar. 2022.

[45] A. H. Daher, I. Al-Ammouri, N. Ghanem, M. Abu Zahra, E. Al-Zayadneh, and M. Al-Iede, "All-cause mortality in a pediatric intensive care unit at a teaching hospital in Amman, Jordan," *Pediatr. Int. Off. J. Jpn. Pediatr. Soc.*, vol. 64, no. 1, p. e14940, Jul. 2021, doi: 10.1111/ped.14940.

[46] B. S. Cetin and A. Orman, "Burkholderia cepacia Complex Infections in Urgently Referred Neonates from Syrian Border Regions to a Hospital in Turkey: A Cross-Border

Cluster," *Child. Basel Switz.*, vol. 9, no. 10, p. 1566, Oct. 2022, doi: 10.3390/children9101566.

[47] A. H. Abdel Mohsen and A. S. Amin, "Risk Factors and Outcomes of Persistent Pulmonary Hypertension of the Newborn in Neonatal Intensive Care Unit of Al-Minya University Hospital in Egypt," *J. Clin. Neonatol.*, vol. 2, no. 2, pp. 78–82, 2013, doi: 10.4103/2249-4847.116406.

[48] A. A. Al-Shameri *et al.*, "Pattern and outcomes of neonates in a nursery care unit of Alwahda Teaching Hospital, Thamar University, Yemen.," *Curr. Pediatr. Res.*, vol. 26, no. 7, Jul. 2022, doi: 10.35841/0971-9032.26.7.1501-1507.

[49] F. Aghajani, K. Maajani, A. Nakhostin-Ansari, A. Maleki-Hajiagha, R. Aghajani, and A. Tehranian, "Maternal mortality and it's determining factors among hospitalised mothers in Tehran, Iran, 2013–2020," *J. Obstet. Gynaecol.*, vol. 42, no. 6, pp. 1905–1910, Aug. 2022, doi: 10.1080/01443615.2022.2054678.

[50] Sathyanarayanan Doraiswamy, Sohaila Cheema, Patrick Maisonneuve, Anupama Jithesh, and Ravinder Mamtani, "Maternal mortality in the Middle East and North Africa region – how could countries move towards obstetric transition stage 5? | BMC Pregnancy and Childbirth | Full Text." Accessed: Dec. 21, 2022. [Online]. Available: https://bmcpregnancychildbirth.biomedcentral.com/articles/10.1186/s12884-022-04886-7

[51] Council NR., *The Changing Transitions to Adulthood in Developing Countries: Selected Studies*. Washington, D.C.: National Academies Press, 2006. doi: 10.17226/11524.

[52] G. Sedgh, L. B. Finer, A. Bankole, M. A. Eilers, and S. Singh, "Adolescent pregnancy, birth, and abortion rates across countries: levels and recent trends," *J. Adolesc. Health Off. Publ. Soc.*

Adolesc. Med., vol. 56, no. 2, pp. 223–230, Feb. 2015, doi: 10.1016/j.jadohealth.2014.09.007.

[53] A. Conde-Agudelo, J. M. Belizán, and C. Lammers, "Maternal-perinatal morbidity and mortality associated with adolescent pregnancy in Latin America: Cross-sectional study," *Am. J. Obstet. Gynecol.*, vol. 192, no. 2, pp. 342–349, Feb. 2005, doi: 10.1016/j.ajog.2004.10.593.

[54] "Maternal mortality." Accessed: Dec. 29, 2022. [Online]. Available: https://www.who.int/news-room/fact-sheets/detail/maternal-mortality

[55] A. A. A. Ali, A. Khojali, A. Okud, G. K. Adam, and I. Adam, "Maternal near-miss in a rural hospital in Sudan," *BMC Pregnancy Childbirth*, vol. 11, p. 48, Jun. 2011, doi: 10.1186/1471-2393-11-48.

[56] I. B.-E. Ramazani, S.-D. M. Ntela, M. Ahouah, D. K. Ishoso, and R.-T. Monique, "Maternal mortality study in the Eastern Democratic Republic of the Congo," *BMC Pregnancy Childbirth*, vol. 22, no. 1, p. 452, May 2022, doi: 10.1186/s12884-022-04783-z.

[57] J. Dol *et al.*, "Timing of maternal and neonatal mortality and morbidity in healthy women and newborns during the postnatal period: a systematic review protocol," *JBI Evid. Synth.*, vol. 19, no. 3, pp. 629–643, Mar. 2021, doi: 10.11124/JBIES-20-00036.

[58] "Committing to Child Survival: A Promise Renewed." Accessed: Dec. 29, 2022. [Online]. Available: https://www.unicef.org/reports/committing-child-survival-promise-renewed

[59] "GHO." Accessed: Dec. 28, 2022. [Online]. Available: https://www.who.int/data/gho

[60] J. L. G. Freitas, J. C. Alves, P. P. da S. Pereira, K. F. A. Moreira, E. dos S. Farias, and D. F. B. Cavalcante, "Child mortality for avoidable causes in Rondônia: temporal series study, 2008-

2018," *Rev. Gaúcha Enferm.*, vol. 42, Jul. 2021, doi: 10.1590/1983-1447.2021.20200297.

[61] "Federal Reserve Economic Data | FRED | St. Louis Fed." Accessed: Dec. 29, 2022. [Online]. Available: https://fred.stlouisfed.org/

[62] P. Truche *et al.*, "Potentially Avertable Child Mortality Associated with Surgical Workforce Scale-up in Low- and Middle-Income Countries: A Global Study," *World J. Surg.*, vol. 45, no. 9, pp. 2643–2652, Sep. 2021, doi: 10.1007/s00268-021-06181-6.

[63] S. Doraiswamy, S. Cheema, P. Maisonneuve, A. Jithesh, and R. Mamtani, "Maternal mortality in the Middle East and North Africa region – how could countries move towards obstetric transition stage 5?," *BMC Pregnancy Childbirth*, vol. 22, no. 1, p. 552, Jul. 2022, doi: 10.1186/s12884-022-04886-7.

[64] A. M. Gülmezoglu *et al.*, *Interventions to Reduce Maternal and Newborn Morbidity and Mortality*. The International Bank for Reconstruction and Development / The World Bank, 2016. doi: 10.1596/978-1-4648-0348-2_ch7.