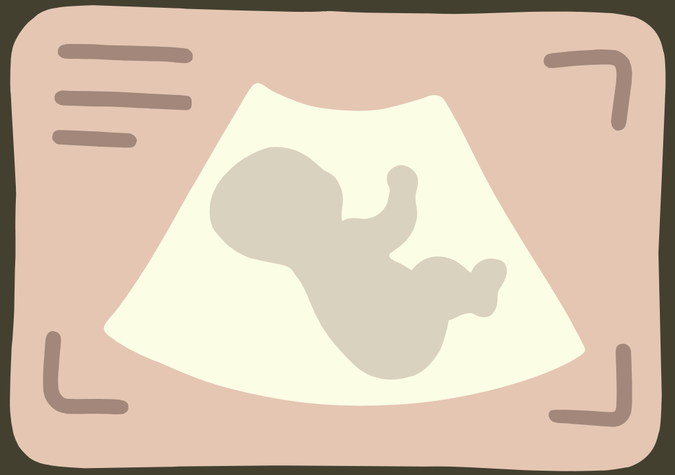
MATERNAL MORTALITY

TRENDS, DISPARITIES, AND DETERMINANTS

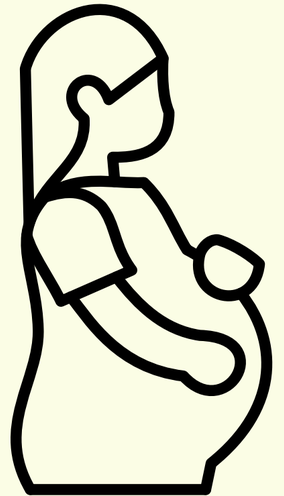


Donny Dutcher, Mariya Ivanova,
N'Senga Kinzoni, Maggie Kuo

DIDA 260 Final Project

WHAT IS MATERNAL MORTALITY?

“A woman’s lifetime risk of maternal death is the probability that a 15-year-old woman will eventually die from a maternal cause.”



WHAT IS MATERNAL MORTALITY?

Maternal mortality is the **death** of a pregnant woman or death within **42 days of giving birth**. These deaths could be caused by complications from the pregnancy or poor care/ management during pregnancy, but aren't the result of accidental or incidental causes.

The maternal mortality rate in the US in 2021 was 32.9 deaths/100,000 live births, compared with a rate of 23.8 in 2020 and 20.1 in 2019, where as in European countries these rates decrease over the years. Interestingly in the US there seems to be trend of increasing rates of maternal mortality as technology and medicine advance, but this isn't the case for other countries, so why is this occurring?

UNDERSTANDING THE IMPACT

A maternal death occurred almost **every 2 minutes** in 2023.

- Care by skilled health professionals before, during, and after childbirth can save the lives of women and newborns.

92% of all maternal deaths occurred in **low- and lower-middle-income countries** (2023) when it could have been preventable.

- *Sub-Saharan Africa* - 70% of maternal deaths (182,000)
- *Southern Asia* - 17% of maternal deaths(43,000)

A high number of maternal deaths reflects inequalities to quality health services and emphasizes the gap between rich and poor.

- In *low-income countries* - **1 in 66 women die** from maternal causes

- In *high income countries* - **1 in 7933 women die** from maternal causes

WHY ARE WOMEN DYING?

Women are dying from **complications** (that are preventable and treatable) during and following pregnancy and childbirth.

- Major complications that account for 75% of all maternal deaths are:
  - **severe bleeding**
  - **infections**
  - **high blood pressure during pregnancy** (pre-eclampsia and eclampsia)
  - **complications from delivery**
  - **unsafe abortion**

Factors **preventing women** from receiving or seeking care during pregnancy and childbirth are:

- Failures in the health system - poor quality of care (disrespect, mistreatment, and abuse)
  - Lack of trained health-care providers
  - Medical supply shortages
  - Poor accountability of health systems

- Social determinants - income, access to education, race and ethnicity (puts some sub-populations at greater risk)

- Harmful gender norms and/or inequalities - low prioritization of women and girl rights (right to safe, quality and affordable sexual and reproductive health services)

- External factors - climate and humanitarian crises

HOW CAN WE SAVE WOMEN?

Prevent unintended pregnancies

- Access to **contraception** and **safe abortion services**

Access to high quality care in pregnancy (during and after childbirth)

- All births need to be attended by skilled health professionals
  - Timely management and treatment affects life and death for women and newborns

Examples:

- *Severe bleeding* - can kill a healthy woman within hours after birth if unattended
  - Injecting oxytocics immediately after childbirth effectively reduces the risk of bleeding

- *Infection* - can be eliminated if good hygiene is practiced and if early signs of infection are recognized and treated in a timely manner

- *Pre-eclampsia* - should be detected and appropriately managed before the onset of convulsions (eclampsia) and other life-threatening complications
  - Administering magnesium sulfate for pre-eclampsia can lower a woman's risk of developing eclampsia

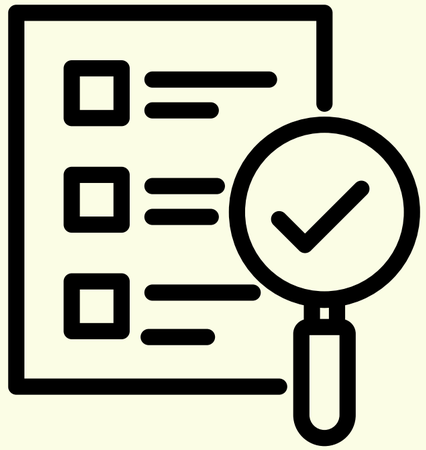
OUR RESEARCH QUESTIONS:

1. How does the **economic status** of a country **influence** how often **skilled healthcare workers** are in **attendance** during child birth?
2. What are the **leading causes of maternal mortality** in low-income vs. high-income countries?
3. How has **maternal mortality rates** changed over the **last two decades**?

DATA DESCRIPTION

- **Gross National Income (GNI) Data Set:**
  - Shows the GNI for all countries across various years
- **Maternal Mortality Data Set:**
  - Maternal mortality ratio and number of deaths by country over the years
- **Health Professional Present at Birth Data:** World Health Organization (WHO)
  - Data was sourced from the World Health Organization
  - The percentage of births attended by skilled health personnel is calculation:
    - Births attended by skilled health personnel = (number of births attended by skilled health personnel/total number of live births) x 100.

DATA AND VARIABLES USED



VARIABLES

- Maternal Mortality Ratio
- Number of Maternal Deaths
- GNI (all countries and highest/lowest 10 countries)
- % of Skilled Healthcare Workers Present During Childbirth
- Causes of Death
- Year (2000-2023)
- Geographic Location

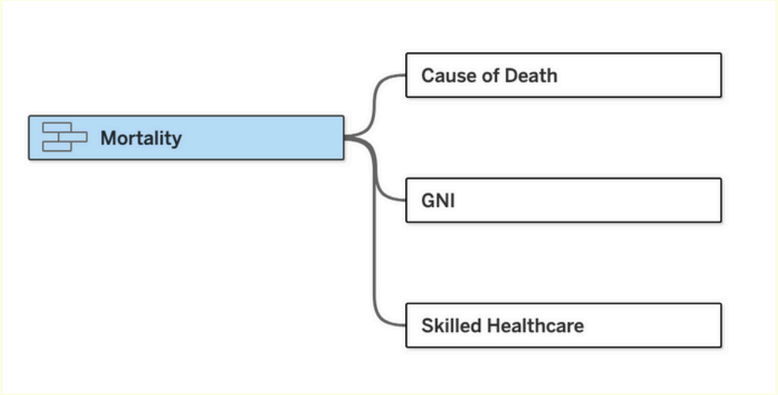
METHODS

DATA CLEANING AND FORMATTING

- Datasets were **cleaned and formatted** in Excel prior to being imported into Tableau.
- Null rows and columns were removed.
  - Mortality dataset was filtered in order for mortality ratio value and number of maternal deaths to appear in separate columns.
- Time variables in non-standard (year) format were removed to allow for seamless merging between different datasets.
- Ensuring geographic location were labeled the same across all data sets.

DASHBOARD DESIGN

- **Dashboard 1** focuses on maternal **mortality ratios**, **number of maternal deaths** across geographic regions and countries, and **skilled healthcare personnel.**
- **Dashboard 2** highlights patterns and differences in **health outcomes** across countries with **high GNI and low GNI.**



MERGING

- Causes of Death, GNI, and Skilled Healthcare Worker datasets were merged in Tableau using the “Relationship” feature, which connects datasets using one or more shared variables.
  - Year and Location

RESULTS AND FIGURES

HTTPS://PUBLIC.TABLEAU.COM/APP/PROFILE/MAGGIE.KUO/VIZ/FINALPROJECTDASH1_17465960340370/DASHBOARD1?PUBLISH=YES

CONCLUSION

- Higher GNI is associated with lower maternal mortality, although there are outliers like the United States.
- A higher presence of skilled health workers during childbirth is associated with reduced maternal mortality.
- Global maternal mortality has decreased over time, reflecting progress in intervention measures, but disparities remain.
- Hemorrhage is the leading cause of maternal death in low GNI countries, while it is the 5th leading cause of dead in high GNI countries, highlighting the gaps in access to skilled obstetric care.

LIMITATIONS

- Privacy protections around health data may result in redacted or limited information; limits findings and ability to run geographic comparisons.
- Not all countries provide/collect data and results in some countries being excluded from the dataset.
- “Births attended by skilled health personnel” is an indicator of health care utilization, but does not necessarily measure quality of care received.

WORK CITED

https://www.msdmanuals.com/professional/gynecology-and-obstetrics/antenatal-complications/maternal-mortality-and-perinatal-mortality

https://www.who.int/news-room/fact-sheets/detail/maternal-mortality

WHO recommendation on routes of oxytocin administration for the prevention of postpartum haemorrhage after vaginal birth [Internet]. Geneva: World Health Organization; 2020. Executive summary. Available from: https://www.ncbi.nlm.nih.gov/books/NBK564758/

https://vizhub.healthdata.org/gbd-compare/#