Analysis of the Kisii Konya Oroiboro Project's (KIKOP) Impact on Infant Mortality 2024

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Acknowledgments

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This report was made possible through the collaboration of KIKOP, and community and international partners. We are deeply thankful for the contributions of each partner, whose insights and dedication were key in shaping this report. KIKOP is a community-based organization (CBO) that functions within community and governmental networks to drive, mobilize, and facilitate efforts aimed at improving maternal and child health. The success outlined in this document reflects the collective effort of all parties. The impact described here is a testament to the teamwork and shared commitment of all involved. We look forward to further strengthening these partnerships to continue advancing maternal and child health outcomes in the coming years.

Abbreviations and Acronyms Guide

- CHV: Community Health Volunteer

- KCDOH: Kisii County Department of Health
- KIKOP: Kisii Konya Oroiboro Project
- KPC: Knowledge Practice Coverage
- MMR: Maternal Mortality Rate
- SDG: Sustainable Development Goal
- VHC: Village Health Committee

Contents

Executive Summary

0.1 Introduction

The Kisii Konya Oroiboro Project (KIKOP), launched in 2018, operates in the Matongo, Iranda, and Nyagoto catchments of Kisii County, Kenya. The project aims to improve maternal and child health through education, outreach, and community involvement. Since 2022, it has operated as an independent community organization focusing on maternal and child health education.

0.2 Methods

In early 2025, KIKOP conducted a vital events census in the three catchment areas to track pregnancies, births, and deaths in 2024. Community health volunteers used a comprehensive questionnaire to collect data on vital events and the reach of community services. Verbal autopsies were performed for deaths in women of reproductive age and children under five years of age to determine the causes and contributing factors.

0.3 Findings

The project has contributed to significant improvements in maternal and child health outcomes between 2018 and 2024:

- **Infant Mortality Rate**: Declined from 94.7 to 13.3 per 1,000 live births, lower than the national (30.5) and near the World Health Organization-recommended threshold (12).
- **Maternal Mortality Ratio**: Decreased from 1,247 to 533.3 per 100,000 live births, although still higher than the national average (594) and the World Health Organization target (less than 70).

Despite these improvements, maternal mortality remains a concern, requiring continued efforts.

0.4 Discussion

KIKOP's success in reducing mortality is attributed to Care Groups and Routine Home Visits, which provide education and support to mothers. Key

challenges include limited healthcare infrastructure, transportation barriers, and cultural beliefs that delay seeking care.

0.5 Conclusion

KIKOP has made notable strides in improving infant and maternal health in Kisii County. However, ongoing efforts to improve healthcare infrastructure, improve data collection, and address barriers to care are essential to sustain and build on these gains.

1 Introduction

Pregnant women and young children in Kenya face a range of health challenges, including malaria, diarrheal disease, and various birth-related complications. These challenges are compounded by limited access to essential resources such as clean water, electricity, and well-maintained healthcare facilities. The Kisii Konya Oroiboro Project (KIKOP) provides health programming in the Kitutu Chache South and Kitutu Chache North subcounties of Kisii County. KIKOP is committed to improving maternal and child health outcomes through education and outreach.

Launched in 2018, KIKOP is a collaboration between Impact Global Health Alliance and the Kisii County Department of Health (KCDOH). KIKOP initially began in the Matongo catchment, which included a population of 10,405 people. By fall 2020, KIKOP expanded to two additional regions, reaching a total population of 35,960. In 2024 they reached 10,492 households through the vital events census in all three regions, Iranda, Matongo, and Nyagoto.

KIKOP employs various strategies, including Care Groups, Routine Home Visits, and Community Mobilization, which have been central to its efforts. Care Groups facilitate mother-to-mother education through dedicated volunteers. Routine Home Visits are conducted by Community Health Volunteers (CHVs) to provide customized health education at the household level for expectant mothers and mothers of U2 children. Community mobilization occurs through participation in village health committees (VHCs), which include CHVs, clan elders, and traditional birth attendants.

KIKOP tracks its impact on maternal and child mortality through an annual vital events census, which records pregnancies, births, and deaths. These data are used to generate key metrics that guide KIKOP in the refining and improvement of its programs.

2 Methods

2.1 Study Design

KIKOP presently operates in three distinct catchments in Kisii, Kenya: Matongo, Iranda, and Nyagoto. A baseline vital events census was conducted in July 2018, capturing vital events that occurred from July 1, 2017 to June 30,

2018. From that point forward, all data was collected in the subsequent year in a retrospective manner until 2023, when the evaluation of vital events was switched to follow the calendar year, with all three catchments collected at the same time.

2.2 Census Administration and Data Collection

Data was collected by enumerators with the assistance of Community Health Volunteers, who acted as guides within their respective villages. Data was collected on tablets using the Meaningful App, a data management tool.

The survey administered to the participants in the KIKOP project collected comprehensive data on various aspects of household demographics and health outcomes. Key information gathered includes the household's migration status, the type of migration (if applicable), and the community's KIKOP catchment area. Respondents were asked about their residency status, the length of time they have lived in the community, and whether an adult respondent reviewed and signed the consent form. Additionally, the primary respondent's role within the household was noted.

The survey also inquired about the number of pregnant women in the household. Questions were then focused on live births in 2024, capturing information on the number of live births, the name and birthdate of each child, the location of birth, and the mother's involvement with Community Health Volunteers (CHVs) and Neighbor Group meetings. Further questions explored additional living children between 12 and 23 months, their mothers' engagement with CHVs, and participation in group meetings.

The survey also recorded any stillbirths, miscarriages, and deaths that occurred in the household during 2024, with detailed information on each death, including the date, name, gender, relationship to the household head, age, and the deceased's pregnancy or postpartum status. Finally, respondents were asked about their preferred method of coordinating a follow-up visit for further details on any losses experienced, and any other important information for the KIKOP team to be aware of was also requested.

Verbal autopsies were then conducted for children under age 5 and women of reproductive age (15-49) to determine the primary cause of death and any delays that contributed to the death.

2.3 Data Cleaning and Preparation

Following completion of data collection, the data cleaning process followed a rigorous structured approach to ensure accuracy and consistency in the dataset. The following steps were performed in R Studio:

- **Loading Libraries and Importing Data:** Essential R libraries such as `readxl`, `dplyr`, `lubridate`, `tibble`, and `openxlsx` were loaded. The dataset was imported from an Excel file for subsequent cleaning and validation.
- **Removing Invalid Records:** Entries where the `Interviewer Name` column contained a "-" were removed to eliminate incomplete or invalid records.
- **Adding Error Tracking:** A new column, `Errors_Notes`, was created to track any inconsistencies or potential data quality issues identified during the cleaning process.
- **Household ID Validation:** Household numbers were validated by removing extra spaces, converting to numeric format, and checking for values outside the valid range (1 to 300). Invalid entries were flagged in the `Errors_Notes` column. Duplicate household IDs were identified by concatenating location details and household numbers, allowing for efficient duplication checks.
- **Pregnancy Data Validation:** The reported number of pregnant women in a household was compared with the corresponding names. Discrepancies, such as missing names for reported pregnancies, were flagged as errors.
- **Date Validation:** Birth, stillbirth, and death records were checked for correct dates. For example, live births were expected to have occurred in 2024, additional children under two years old were expected to have been born in 2023, and stillbirths and deaths were expected to be recorded in 2024. Records outside of the expected years were flagged.
- **Final Data Validation:** After the initial R-based cleaning, the dataset was exported for a final round of manual validation. In the Meaningful system, duplicate records flagged during the cleaning process were

deleted, and misaligned date entries were corrected. Any remaining inconsistencies not automatically caught by the script were reviewed and corrected, ensuring that the dataset was fully accurate and ready for analysis.

This systematic data cleaning process ensured the dataset was accurate, consistent, and free from errors, providing a reliable foundation for further analysis.

2.4 Data Analysis

The goal of the analysis was to determine the rates of perinatal, child and maternal mortality. Mortality rates were calculated by dividing the number of deaths in 2024 by the total number of live births in the same year and multiplying by 1,000 for perinatal and child mortality, and 100,000 for maternal mortality.

Data analysis was carried out using R Studio and Excel, with trends observed over time in relation to mortality rates.

2.5 Ethical Considerations

Informed consent was obtained from all participants prior to their involvement in the study. Confidentiality of data was ensured through secure storage, transportation, and analysis procedures. Only the program management and data analysis team had access to the collected data.

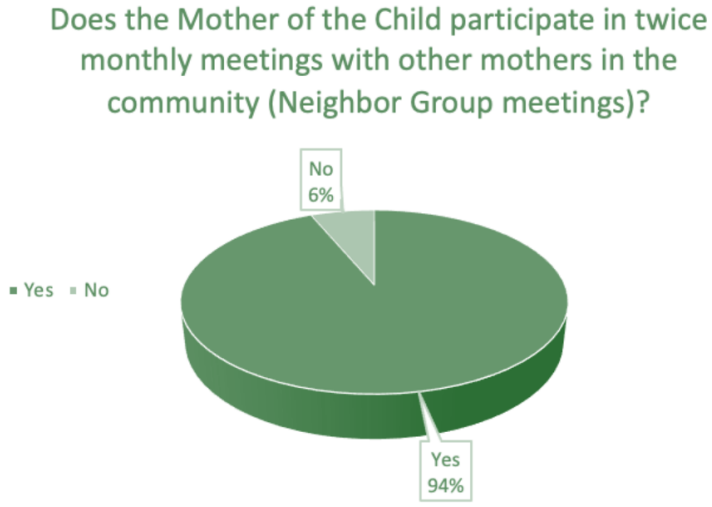
3 Results (2024)

This section presents key findings on birth outcomes, infant and child mortality, maternal mortality, and miscarriage rates for the year 2024, with data collected in January and February 2025.

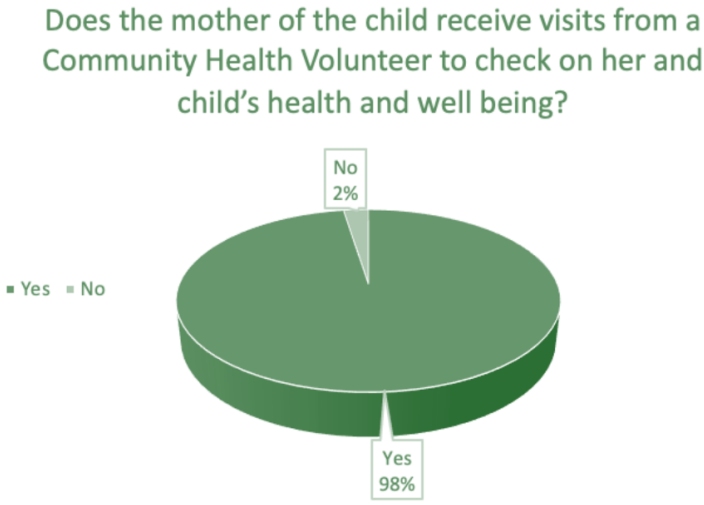
3.1 Community Health Volunteer Visits and Mother Support Groups

Among the 362 birthing parents that reported live births in 2024:

- **23 out of 362** (6%) did not participate in twice-monthly Neighbor Group meetings with other mothers in their community.



- **9 out of 362** (2%) did not receive visits from a Community Health Volunteer to check on the mother and child's health and well-being.



These findings highlight successes and small gaps in maternal support and community engagement, which may impact maternal and child health

outcomes.

3.2 Birth Outcomes and Infant Mortality

A total of **376 births** were recorded, of which **375 were live births** and **1 was a stillbirth**. The **perinatal mortality rate** was calculated as follows:

$$\text{Perinatal Mortality Rate} = \left(\frac{\text{Stillbirths} + \text{Early Neonatal Deaths}}{\text{Total Births}}\right) \times 1000 \tag{1}$$

$$\text{Perinatal Mortality Rate} = \left(\frac{1+1}{376}\right) \times 1000 = 5.3 \text{ per 1,000 births} \tag{2}$$

Among the live births, the **neonatal mortality rate** was calculated as follows:

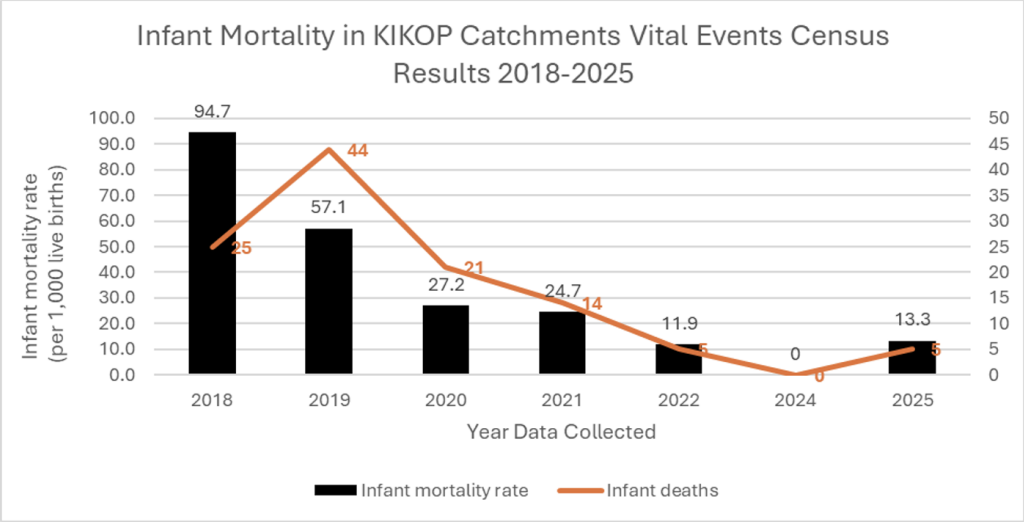
$$\text{Neonatal Mortality Rate} = \left(\frac{\text{Neonatal Deaths}(< 29 \text{ days})}{\text{Live Births}}\right) \times 1000 \tag{3}$$

$$\text{Neonatal Mortality Rate} = \left(\frac{1}{375}\right) \times 1000 = 2.7 \text{ per 1,000 live births} \tag{4}$$

Additionally, there were **4 post-neonatal deaths (1–11 months)**, leading to the calculation of the **infant mortality rate**:

$$\text{Infant Mortality Rate} = \left(\frac{\text{Neonatal Deaths} + \text{Post-Neonatal Deaths}}{\text{Live Births}}\right) \times 1000 \tag{5}$$

$$\text{Infant Mortality Rate} = \left(\frac{1+4}{375}\right) \times 1000 = 13.3 \text{ per 1,000 live births} \tag{6}$$



3.3 Under-5 Mortality Rate

The under-5 mortality rate represents the probability of a child dying before reaching the age of five, per 1,000 live births. It is calculated as:

$$\text{Under-5 Mortality Rate} = \left(\frac{\text{Infant Deaths} + \text{Child Deaths (1–4 years)}}{\text{Live Births}}\right) \times 1000 \tag{7}$$

$$\text{Under-5 Mortality Rate} = \left(\frac{5+1}{375}\right) \times 1000 = 16.0 \text{ per 1,000 live births} \tag{8}$$

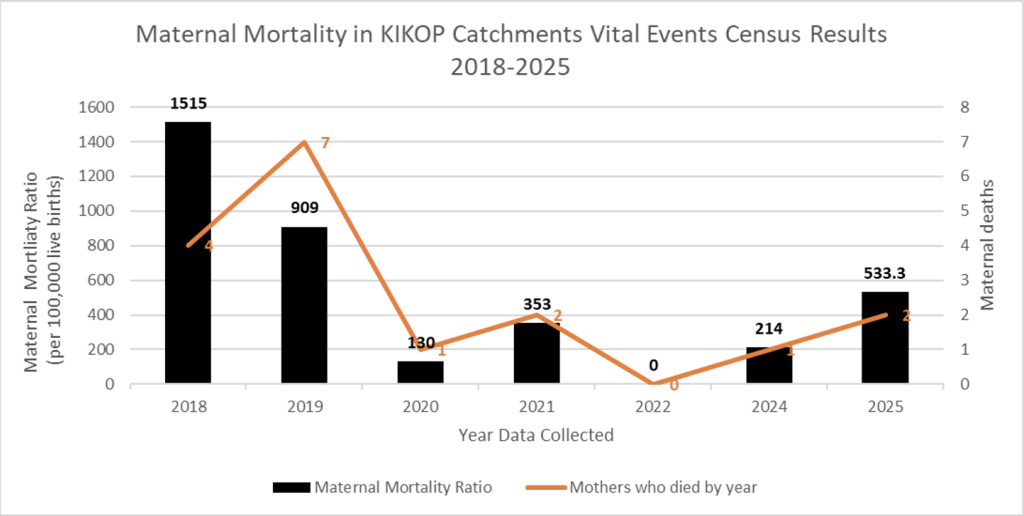
3.4 Maternal Mortality

Two maternal deaths were recorded for the period, giving a **maternal mortality ratio (MMR)** calculated as:

$$\text{MMR} = \left(\frac{\text{Maternal Deaths}}{\text{Live Births}}\right) \times 100,000 \tag{9}$$

$$\text{MMR} = \left(\frac{2}{375}\right) \times 100000 = 533.3 \text{ per 100,000 live births} \tag{10}$$

This figure aligns closely with the national maternal mortality rate and highlights the ongoing need to strengthen referral systems and high-risk patient care.



3.5 Miscarriages

A total of **4 miscarriages** were reported, corresponding to:

$$\text{Miscarriage Rate} = \left(\frac{\text{Miscarriages}}{\text{Total Births} + \text{Miscarriages}} \right) \times 1000 \tag{11}$$

$$\text{Miscarriage Rate} = \left(\frac{4}{376 + 4} \right) \times 1000 = 10.52 \text{ per 1,000 pregnancies} \tag{12}$$

3.6 Comparison with World Health Organization Recommendations

- **Infant Mortality Rate**: The observed value of **13.3 per 1,000 live births** is now below the World Health Organization target of **less than 12 per 1,000 live births**, indicating an improvement in infant survival.

- **Maternal Mortality Ratio**: The reported **533.3 per 100,000 live births** remains significantly higher than the World Health Organization Sustainable Development Goal (SDG) target of **less than 70 per 100,000 live births**.
- **Neonatal Mortality Rate**: The recorded **2.7 per 1,000 live births** is now below the World Health Organization target of **less than 10 per 1,000**, reflecting positive progress in neonatal survival.

These findings highlight significant improvements in neonatal and infant mortality but underscore the persistent challenge of maternal mortality. Future efforts should focus on further reducing maternal deaths through improved prenatal care, access to skilled birth attendants, and enhanced emergency obstetric care.

3.7 Comparison with the rest of Kenya

The **maternal mortality ratio (533.3 per 100,000 live births)** in Kisii County is lower than Kenya's national figure of **594 per 100,000**, indicating some progress in maternal health outcomes.

The **under-five mortality rate (16.0 per 1,000 live births)** in these locations is significantly lower than Kenya's national figure of **35 per 1,000 live births** in 2024, demonstrating a notable improvement in child survival.

These findings suggest significant progress in reducing infant and neonatal deaths. However, the persistently high maternal mortality rate in the region highlights the need for continued focus on improving maternal healthcare, such as enhancing access to emergency obstetric care and ensuring skilled birth attendance. Strengthening community health programs and improving healthcare infrastructure will be essential to closing these gaps and aligning outcomes with national and global health targets.

3.8 Causes of Death

In 2024, a total of six under-5 deaths were recorded in the study areas. The causes of these deaths included respiratory illnesses, infections, epilepsy, feeding-related incidents, and prematurity complications. The following sections provide a detailed summary of the causes of death and the associated delays in seeking and accessing medical care.

3.8.1 Pneumonia (2 deaths, 33.3%)

Two infants, including a triplet, died from pneumonia. Both cases were associated with prematurity and delayed medical attention. Traditional medicine was used in both cases before hospital care was sought.

3.8.2 Feeding Accident – Choking (1 death, 16.7%)

One infant died from choking on breast milk during nighttime feeding. The baby was not burped after feeding, which led to aspiration.

3.8.3 Malaria (1 death, 16.7%)

One infant had malaria-like symptoms but was attributed to "witchcraft" by family members. The baby showed signs of fever, night sweats, and weakness before passing away.

3.8.4 Epilepsy and Seizures (1 death, 16.7%)

A 3-year-old child with epilepsy experienced prolonged convulsions and breathlessness. The family relied on traditional medicine instead of seeking immediate medical intervention.

3.8.5 Prematurity (1 death, 16.7%)

One newborn died from complications related to extreme prematurity (28 weeks gestation). The mother delivered the first stillborn twin en route to the health facility and the second baby died shortly after birth in the hospital due to low birth weight and prematurity-related complications.

3.9 Delays Contributing to Deaths

Delays in seeking, accessing, and receiving quality medical care were key contributors to the recorded deaths. These delays can be classified into four types, summarized below:

3.9.1 Type 1 Delays: Failure to Recognize Danger Signs

Five out of six cases (83.3%) involved caregivers failing to recognize critical symptoms. In both pneumonia cases, parents did not act promptly despite

signs of respiratory distress. The family of the child with epilepsy delayed medical attention, assuming seizures could be managed traditionally. The infant who died from choking was not properly burped, and caregivers did not recognize the risk. In the prematurity case, danger signs of complications from premature delivery were not fully understood.

3.9.2 Type 2 Delays: Delay in Seeking Services

Four deaths (66.7%) involved delays due to cultural beliefs, myths, or ignorance. The malaria case was attributed to "witchcraft," delaying proper medical care. The pneumonia cases involved traditional medicine use before seeking formal healthcare. Cultural barriers and lack of knowledge contributed to delays in the epilepsy and prematurity cases.

3.9.3 Type 3 Delays: Delay in Accessing Skilled Attendance

Three cases (50%) were affected by transport or logistical issues. In one pneumonia case, lack of transport to a hospital contributed to delays. The epilepsy case faced financial constraints that prevented timely care. In the prematurity case, the mother could not access the intended health facility and delivered the first baby en route.

3.9.4 Type 4 Delays: Delay in Receiving Quality Care

Four cases (66.7%) were linked to health system deficiencies. Lack of resuscitation equipment, emergency drugs, and staff shortages affected the quality of care. The epilepsy and prematurity cases involved multiple facility visits with inadequate long-term management or emergency care.

4 Discussion

4.1 Intervention Strategies and Positive Data Trends

The Kisii Konya Oriobora Project (KIKOP) has shown notable success in improving maternal and child health outcomes, particularly in reducing infant mortality rates. Through community-based interventions such as Care Groups, Routine Home Visits, and community mobilization efforts, KIKOP has empowered mothers and families with essential knowledge and resources.

These strategies have helped increase awareness about the importance of regular health checks, safe childbirth practices, and the need for timely medical attention when complications arise.

The results highlight significant improvements in neonatal and infant survival rates. The **infant mortality rate** of **13.3 per 1,000 live births** is a considerable improvement, now below the World Health Organization target of **less than 12 per 1,000**. These outcomes indicate that the project's efforts in promoting early healthcare access and mother support groups are yielding positive results, contributing to healthier pregnancies and improved child survival.

Moreover, KIKOP's community-driven model has played a critical role in reducing child mortality, despite the persistence of maternal health challenges, particularly the high **maternal mortality ratio (MMR)** of **533.3 per 100,000 live births**, which remains above the World Health Organization SDG target of **less than 70 per 100,000**. This suggests that while community-based interventions are improving certain aspects of maternal and child health, additional strategies are needed to address the more complex issues affecting maternal health, such as access to skilled birth attendants and emergency obstetric care.

4.2 Causes of Death and Delays

While KIKOP's interventions have contributed to the decline in mortality rates, a closer look at the causes of death reveals persistent issues that require attention. The six recorded under-5 deaths were primarily due to pneumonia, feeding accidents, malaria, epilepsy, and prematurity. Pneumonia alone accounted for 33.3% of the deaths, often associated with **prematurity** and **delayed medical attention**, underscoring the critical role that timely healthcare can play in preventing deaths from treatable conditions.

The addition of a death due to **prematurity-related complications** highlights the ongoing challenge of managing high-risk births, particularly when access to specialized neonatal care is limited. Furthermore, cases of **choking** and **malaria**, where traditional medicine was used before hospital care, emphasize the need for greater community education on recognizing danger signs and seeking immediate medical help.

Delays in seeking and receiving appropriate care remain a significant barrier. Many of the cases involved delays in recognizing symptoms, seeking medical services, or accessing skilled attendance due to **cultural beliefs**,

transportation issues, and **financial constraints**. For example, **type 1 delays** (failure to recognize danger signs) were present in 83.3% of the deaths, suggesting that more emphasis on health education is needed to ensure caregivers can identify critical health symptoms early. Additionally, **type 2 and type 4 delays** were identified in 66.7% of the cases, indicating that both community-level factors and health system challenges continue to contribute significantly to child mortality.

4.3 Challenges in Maternal Health

Although the data indicate positive trends in neonatal and infant mortality, the **maternal mortality ratio (MMR)** remains a significant concern. The MMR of **533.3 per 100,000 live births** is still far above the global target of **less than 70 per 100,000** and suggests that improvements in maternal healthcare need to be prioritized. The delay in access to skilled birth attendants, particularly in rural areas, continues to be a critical challenge. Additionally, financial and transportation barriers have been cited as factors contributing to delays in seeking timely maternal care.

In addition, the small percentage of birthing parents who did not receive visits from a **Community Health Volunteer** (2%) and those who did not participate in **Neighbor Group meetings** (6%) suggests that, while engagement is high, some gaps still exist in ensuring that every mother receives the full spectrum of support. These gaps may impact maternal health outcomes and need to be addressed by increasing outreach and access to community health services.

5 Conclusion

5.1 KIKOP's Success

KIKOP's success is evident in the reduction of **infant mortality rates** and the **neonatal mortality rate**, demonstrating the power of community-driven interventions in improving child health outcomes. The positive trends in maternal and child health outcomes reflect the project's focus on education, regular health visits, and the empowerment of local communities. However, the findings also highlight the persistent challenges in **maternal health**, particularly the **high maternal mortality ratio**. This suggests the

need for continued efforts to improve maternal healthcare access, including **skilled birth attendants** and **emergency obstetric care**.

Moving forward, KIKOP should continue to focus on strengthening its interventions for maternal health, particularly through expanding access to healthcare services and addressing delays in seeking and receiving care. By continuing to build on the success of community-based programs while addressing these critical gaps, KIKOP can contribute to even greater improvements in maternal and child health outcomes.

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