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The impact of the POCQI model on improving maternal, neonatal, and children healthcare services in Jordan

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ABSTRACT

This retrospective observational study assessed the US Agency for International Development-health quality accelerator activity data from 2022 to mid-2024 to examine the impact of the point of care quality improvement (POCQI) model on maternal, neonatal, and child health in Jordan. Significant improvements were made to 356 different POCQI initiatives enrolled in various healthcare facilities. In maternal health, antenatal care improved from 23.8% to 71.4%; anemia screening and treatment increased from 50.6% to 79.1%; and family planning services increased from 40.6% to 74.4%. Neonatal health outcomes improved, with delayed cord clamping rates increasing from 12.3% to 77.8% and immediate drying rate increasing from 35.3% to 82.9%. Child health outcomes also improved, with growth and development screening rates increasing from 27.4% to 63.3%. All improvements in outcomes results were statistically significant ($p < 0.05$). In conclusion, the POCQI model has significantly improved health outcomes and reduced preventable health challenges with more research needed for sustainability and integration long-term.

Keywords: health quality accelerator activity, POCQI model, neonates, maternal, children

INTRODUCTION

Despite significant global improvements in health care, child, neonatal, and maternal health are still considerable public health challenges in low and middle-income countries [1]. In 2000, there was around the global maternal mortality rate of an estimated 287,000 [2]. In addition, in 2022, there were 4.9 million deaths among children less than five years of age and 2.3 million deaths were due to neonatal reasons [3-5]. This data show the necessary improvements needed in health care systems across the world, especially in parts of the world where access to health care is limited. Effective and quality health care can avoid a significant portion of these deaths [6].

The World Health Organization (WHO), and some other global health organizations, continue to promote the need for better quality health care [7]. They support organized quality improvement strategies, including the point of care quality improvement (POCQI) model [8]. WHO's support of quality improvement models such as POCQI is consistent with the growing recognition of the necessity to improve health systems to prevent avoidable mortality [9].

Despite improvement in health outcomes in Jordan, still numerous disparities are present. The maternal mortality ratio was 33 per 100,000 live births in 2022 [10]. Additionally, in 2023, the under-five and newborn mortality rates were 15 and 9 per 1,000 live births, respectively [11]. These rates reflect just how important targeted interventions are to further decrease the mortality rates of children and mothers in Jordan [11]. Numerous people make use of maternity and child health care services, however, challenges like not always being in line with clinical standards and discontinuities in service provision still hinder progress [12]. The existence of such long-standing challenges highlights the importance of the presence of solid, evidence-based models that have the potential of improving healthcare on the countrywide scale.

The POCQI model, developed by the WHO South-East Asia Regional Office, has proven effective in improving healthcare delivery at the facility level in several countries [13]. The POCQI approach trained healthcare professionals, including nurses, midwives, physicians, obstetricians, gynecologists, and pediatricians, in evidence-based care methods. The POCQI model supported healthcare providers in implementing quality improvement initiatives through facility action plans, supplemented by monthly monitoring and ongoing feedback sessions from health quality accelerator activity (HSQA) team members, to ensure high-quality care for mothers, children, and newborns.

The HSQA activity is a five-year flagship initiative funded by the US Agency for International Development (USAID) and

implemented by University Research Co., LLC (URC) (August 4, 2021-August 3, 2026). The program aims to enhance reproductive, maternal, newborn, and child health (RMNCH) services across Jordan's 12 governorates, focusing on equitable and high-quality care. The HSQA targets systemic healthcare improvements to achieve better health outcomes, particularly for underserved populations.

A cornerstone of the initiative is the integration of the POCQI training for healthcare workers at primary healthcare and hospital levels. This training promotes evidence-based practices and addresses systemic healthcare challenges, ensuring improved outcomes for mothers and children. The initiative is implemented in collaboration with the Ministry of Jordan.

By emphasizing quality at the point of care, the model has shown potential to improve health outcomes through the active participation of healthcare workers in continuous improvement processes [14, 15]. The model, however, has not yet been applied in Jordan. Therefore, this study aims to examine whether the POCQI model improves maternal, newborn, and child health services in Jordan as part of the HSQA program funded by USAID.

METHODS

Study Design, Setting, and Data Source

This study is a retrospective observational study design that aim to analyze secondary data retrieved from USAID-HSQA records in Amman, Jordan, spanning 2022 to mid-2024 [16]. The analysis evaluates quantitative changes in HSQA key indicators measurement pre- and post-implementation of the POCQI model to measure its effectiveness. These indicators include maternal, neonatal, and under-5 child healthcare service quality and outcomes, with a focus on preventable complications.

The records were retrieved from medical facilities run by the Ministry of Health (MOH), Royal Medical Services (RMS), and non-governmental organizations like the National Women's Health Care Center (NWHCC) and the Institute for Family Health (IFH) in all 12 governorates of Jordan. The study included all facilities that adopted the POCQI model. Participating facilities were chosen according to patient volume, equitable access to care, and the presence of maternity, neonatal, and pediatric services.

Data Collection

Under the oversight of HSQA monitoring officials, trained facility staff executed the data-collection procedure to ensure consistent and accurate reporting. Data for 14 indicators were collected, including 4 indicators for neonatal health, 4 for child health, and 6 for maternal health. Data about these indicators were collected from 356 initiatives. For each indicator, the mean percent from the different initiatives was calculated before and after the POCQI implementation.

The indicators are as follows:

A. Neonatal health indicators:
   1. compliance with delayed cord clamping protocol,
   2. neonates compliant with critical congenital heart defects (CCHD) screening protocol,
   3. neonates dried immediately after delivery, and
   4. neonates exclusively breastfed from 0 to 6 months.

B. Child health indicators:
   1. pediatric patients receiving antibiotics according to protocol,
   2. registered and screened children for growth and development,
   3. anemic children treated, and
   4. children aged 6-59 months screened for anemia.

C. Maternal health indicators:
   1. pregnant women accessing antenatal care services,
   2. pregnant women diagnosed with anemia and treated,
   3. pregnant women receiving health awareness on skin-to-skin contact and breastfeeding,
   4. C-section procedures documented in electronic medical records (EMR),
   5. postnatal women returning to reproductive health services, and
   6. women using family planning methods.

Original Data Reliability

HSQA initiatives built their records using standardized forms designed by experts in healthcare quality improvement to collect data consistently with minimum variability in recording and reporting from healthcare facilities during different periods. Also, the HSQA initiatives provide standardized training for healthcare providers from all health facilities and conduct regular follow-ups to ensure consistency in applying data collection techniques. Furthermore, HSQA teams examine all collected data and evaluate discrepancies to ensure reliability.

Original Data Validity

Content validity

The data collected through HSQA initiatives aligned with the global goals of enhancing RMNCH outcomes and implementing the POCQI model, emphasizing evidence-based practice and continuous improvement in healthcare services. The data collection tools were created in collaboration with specialists in healthcare quality improvement, ensuring that the measured indicators are relevant to the project goals.

Construct validity

Indicators measured by the POCQI model align with international standards and are specified for use in the Jordan setting. This ensures that the data obtained accurately represents targeted constructs, such as maternal, children, and neonatal health outcomes, and supports valid comparisons over time.

Access to Data

Permission to access USAID-HSQA records was obtained from the USAID-HSQA office in Amman, Jordan, with acknowledgment from MOH and RMS. The dataset provided contains healthcare facilities and de-identified patients to ensure ethical standards and protect patient privacy.

Ethical Considerations

The research procedures were conducted in accordance with the principles outlined in the Declaration of Helsinki.

Table 1. POCQI model initiatives distribution in Jordan (n = 356)

Variable	n (%)
POCQI model initiatives distribution	
North of Jordan	131 (36.8)
Center of Jordan	139 (39.0)
South of Jordan	86 (24.2)
Year of the initiatives	
2022	143 (40.2)
2023	144 (40.4)
2024	69 (19.4)
Managing authority of the initiatives	
MOH	317 (89.0)
RMS	22 (6.2)
IFH	15 (4.2)
NWHCC	2 (0.6)
Health domain of the initiatives	
Child health	110 (30.9)
Neonatal health	20 (5.6)
Maternal and reproductive health	216 (60.5)

Ethical clearance was received from the Jordan University of Science and Technology Institutional Review Board (REF: 17/167/2024) for the study. This study was secondary data analysis and involved no direct contact with patients, the data was de-identified, and informed consent was waived.

Statistical Analysis

Data were analyzed using the IBM SPSS statistics for Windows, version 26.0 (IBM Corp., Armonk, NY, USA). Descriptive statistics were expressed for categorical variables as frequencies and percentages and continuous variables as median and interquartile range. The normality of continuous variables was assessed using the Shapiro-Wilk test, indicating that the data were not normally distributed. Paired t-test or (Wilcoxon sign rank test) was used to analyze the healthcare data before and after the implementation of the POCQI model, to determine if changes were statistically significant. The threshold of statistical significance was $p \leq 0.05$.

RESULTS

POCQI Model Initiatives Distribution in Jordan

This study included data from 356 POCQI model initiatives, as displayed in **Table 1**. The bulk of the initiatives were located in the southern region (n = 139, 39.0%) and were developed by the MOH (n = 317, 89.0%). The majority of the initiatives were focused on maternal and reproductive health (n = 216, 60.5%), with child health being the next most popular options (n = 110, 30.9%). The year 2023 had the highest number of initiatives (n = 144, 40.4%), followed by the next largest count of initiatives being from 2024 (n = 69, 19.4%).

The Impact of POCQI Implementation on Maternal Health

The impact of POCQI implementation on several maternal health indicators was assessed in the study (**Table 2**). The mean percentage of pregnant women accessing antenatal care services prior to POCQI implementation was 23.8% (standard deviation [SD] = 20.5) and increased significantly to 71.4% (SD = 26.9) following POCQI implementation ($p < 0.001$). The mean percentage of pregnant women diagnosed with and treated for anemia, also increased substantially from 50.6% (SD = 26.2) prior to POCQI implementation to 79.1% (SD = 22.1) following implementation ($p = 0.002$).

The mean percentage of pregnant women receiving health awareness (about skin-to-skin contact and breastfeeding) also increased significantly from 13.7% (SD = 21.9) to 67.4% (SD = 32.2) in ($p < 0.001$). The mean percentage of C-section procedures recorded in the EMR system increased from 29.3% (SD = 17.2) to 60.0% (SD = 21.6), with p of 0.020.

With respect to postnatal care, the mean percentage of postnatal women returning to reproductive health services rose from 27.6% (SD = 23.4) following POCQI implementation to 65.5% (SD = 28.4) ($p < 0.001$). Finally, the mean percentage of women utilizing a family planning method improved from 40.6% (SD = 25.0) to 74.4% (SD = 26.7) ($p < 0.001$).

The Impact of POCQI Implementation on Neonatal Health Improvements

With regard to POCQI implementation effect on neonatal health indicators (**Table 3**). Results showed that prior to POCQI implementation, the mean percentage of compliance with the delayed cord clamping protocol was 12.3% (SD = 24.5) but this increased to 77.8% (SD = 26.1) following implementation ($p = 0.011$). The mean percentage of neonates compliant with the CCHD screening protocol increased from 32.5% (SD = 46.0) to 57.5% (SD = 45.9) but did not reach statistical significance ($p > 0.05$).

The mean percentage of neonates dried immediately after delivery increased from 35.3% (SD = 35.3) to 82.9% (SD = 82.9) and demonstrated statistically significant change with ($p = 0.005$). Finally, the mean percentage of neonates exclusively breastfed from 0 to 6 months increased from 35.5% (SD = 6.4) to 75.0% (SD = 35.4) but was also not statistically significant ($p > 0.05$).

The Impact of POCQI Implementation on Child Health Improvements

In relation to outcomes of child health, **Table 4** details the consequences of POCQI implementation on a responsive grade of indicators. The average proportion of pediatric patients in receipt of antibiotics per protocol, prior to POCQI implementation, was 13.0% (SD = 14.7), rising to a statistically significant 56.7% (SD = 20.2) post-POCQI implementation ($p = 0.009$). The average proportion of registered and screened

Table 2. The impact of POCQI implementation on maternal health within the 216 initiatives

Indicator	Before POCQI implementation: Mean (SD)	After POCQI implementation: Mean (SD)	p
Pregnant women accessing antenatal care services	23.8 (20.5)	71.4 (26.9)	< 0.001
Pregnant women diagnosed with anemia and treated	50.6 (26.2)	79.1 (22.1)	0.002
Pregnant women receiving health awareness on skin-to-skin contact and breastfeeding	13.7 (21.9)	67.4 (32.2)	< 0.001
C-section procedures documented in electronic medical records	29.3 (17.2)	60.0 (21.6)	0.020
Postnatal women returning to reproductive health services	27.6 (23.4)	65.5 (28.4)	< 0.001
Women using family planning methods	40.6 (25.0)	74.4 (26.7)	< 0.001

Table 3. The impact of POCQI implementation on neonatal health within the 20 initiatives

Indicator	Before POCQI implementation: Mean (SD)	After POCQI implementation: Mean (SD)	p
Compliance with delayed cord clamping protocol	12.3 (24.5)	77.8 (26.1)	0.011
Neonates compliant with critical congenital heart defects screening protocol	32.5 (46.0)	57.5 (45.9)	> 0.050
Neonates dried immediately after delivery	35.3 (35.3)	82.9 (82.9)	0.005
Neonates exclusively breastfed from 0 to 6 months	35.5 (6.4)	75.0 (35.4)	> 0.050

Table 4. The impact of POCQI implementation child health within the 110 initiatives

Indicator	Before POCQI implementation: Mean (SD)	After POCQI implementation: Mean (SD)	p
Pediatric patients receiving antibiotics according to protocol	13.0 (14.7)	56.7 (20.2)	0.009
Registered and screened children for growth and development	27.4 (22.3)	63.3 (27.4)	< 0.001
Anemic children treated	36.4 (28.0)	68.0 (22.0)	0.004
Children aged 6-59 months screened for anemia	25.4 (22.4)	72.4 (25.1)	< 0.001

children for growth and development increased from 27.4% (SD = 22.3) to a statistically significant level of 63.3% (SD = 27.4) ($p < 0.001$).

The average proportion of anemic children treated improved from 36.4% (SD = 28.0) to 68.0% (SD = 22.0) ($p = 0.004$) as well. The average proportion of screened children aged 6-59 months diagnosed with anemia improved from 25.4% (SD = 22.4) to 72.4% (SD = 25.1) ($p < 0.001$).

DISCUSSION

This research shows considerable improvements in maternal, newborn, and child health outcomes after adopting the POCQI model in Jordan. There were notable increases in utilizing prenatal care, screening and treating anemia, family planning, and newborn practices, including delayed cord clamping and early drying. These results indicate that more formal quality improvement models can advance healthcare in resource-limited settings, where access to high-quality care is often lacking [8, 17].

The improvement between the pre- and post-intervention period of anemia screening and management, from a mean percentage of 50.5% pre-intervention to 79.1% post ($p = 0.002$) signals a critical need for robust maternal health programs with systematic maternal health practices and early screening and intervention for anemia. The prevalence of anemia in pregnant women has been estimated to be 34.7, with rates even higher during the third trimester [18]. Furthermore, another study conducted in South Jordan estimated that 56.5% of pregnant women were anemic, highlighting the need for consideration of this public health context.

Furthermore, the study revealed a noteworthy increase in the adoption of family planning services, from a mean percent of 40.6% to 74.4% ($p < 0.001$). Family planning is critical in minimizing the risks associated with maternal and infant healthcare, enabling women to have an opportunity to plan. The increase in family planning methods accessibility in Jordan is consistent with the national reproductive health/family planning strategy (2013-2017), which aimed to improve family planning services and improve access to modern contraceptive methods [19].

The implementation of delayed cord clamping, which saw significant improvement, is particularly noteworthy. Delayed cord clamping has been shown to improve hemoglobin levels in infants, reducing the risk of anemia. Previous research in Jordan has indicated that delayed cord clamping has positive effects on neonatal health, with improved outcomes without adverse effects on maternal and neonatal variables [20]. Additionally, early drying of neonates, which helps prevent hypothermia, also saw significant improvement under POCQI implementation. Proper drying, skin-to-skin contact, and immediate breastfeeding initiation are crucial for preventing neonatal morbidity and mortality, particularly in low-resource settings [21].

The increase in growth and development screening for children under five years old in Jordan further emphasizes the success of the POCQI model in improving child health outcomes. Early detection of developmental delays is critical for timely interventions that can optimize long-term developmental outcomes. This result aligns with previous research in Jordan, which demonstrated the validity and reliability of screening tools like the PEDS:DM scale for detecting developmental delays in young children [22]. Furthermore, the efforts of the Health Care Accreditation Council (HCAC) in Jordan have focused on improving child health services, and quality improvement programs like POCQI have contributed to enhancing both accessibility and the quality of these services [23].

A main strength of this research is that it utilized secondary data from multiple healthcare facilities across Jordan, providing a diverse and real-world sample which contributes to the generalizability of the results.

The study has several limitations. First, the lack of a control group precluded the researchers from making causal claims about the POCQI model. Second, the use of USAID-HSQA recorded data meant the researchers did not have control over the data collected, and the facilities may have been implementing different reporting practices or processes that could have entered bias, especially if quality checks were conducted inconsistently or not documented. Moreover, the study did not assess heterogeneity in the POCQI model implementation across facilities or how implementation may have contributed to the outcome. Lastly, the short follow-up period may not have been long enough for measuring health outcomes associated with the POCQI model; thus, longer-term outcomes remain unknown. Future research should address the limitations in this research and assess the effectiveness and generalizability of the model.

CONCLUSION

In conclusion, the POCQI paradigm has significantly enhanced maternal, neonatal, and child health outcomes in Jordan. The model's focus on care quality at the site of delivery has resulted in heightened utilization of antenatal care services, improved management of maternal anemia, enhanced neonatal care practices, and better pediatric health outcomes. The findings endorse the efficacy of systematically structured quality improvement models in resource-limited environments and demonstrate the potential for the adaptation of such approaches to mitigate preventable consequences and enhance health outcomes worldwide.

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AI statement: The authors stated that AI-based tools were used to correct grammar and spelling.

Declaration of interest: No conflict of interest is declared by the authors.

Data sharing statement: Data supporting the findings and conclusions are available upon request from the corresponding author.

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