



RESEARCH AND EVALUATION REPORT

Using a Quality Improvement Approach to Strengthen Clinical Zika Services: Head Circumference Measurement and Provider Perceptions in Peru

MAY 2020

This research report was prepared by University Research Co., LLC (URC) for review by the United States Agency for International Development (USAID) and authored by Emily Evens, Andres Martinez, Kate Murray, John Bratt, and Eunice Okumu of FHI 360 and Jorge Hermida, Luz Maria Moyano Vidal, Christian Requena, and Astou Coly of URC under the USAID Applying Science to Strengthen and Improve Systems (ASSIST) Project. The work of the USAID ASSIST Project to improve Zika-related health services was made possible by the generous support of the American people through USAID.

RESEARCH AND EVALUATION REPORT

Using a Quality Improvement Approach to Strengthen Clinical Zika Services: Head Circumference Measurement and Provider Perceptions in Peru

MAY 2020

Emily Evens, FHI 360

Andres Martinez, FHI 360

Kate Murray, FHI 360

John Bratt, FHI 360

Eunice Okumu, FHI 360

Jorge Hermida, University Research Co., LLC

Luz Maria Moyano Vidal, University Research Co., LLC

Christian Requena, University Research Co., LLC

Astou Coly, University Research Co., LLC

DISCLAIMER

The contents of this report are the sole responsibility of University Research Co., LLC (URC) and do not necessarily reflect the views of the United States Agency for International Development or the United States Government.

Acknowledgements

The authors thank the Ministry of Health of Peru, the Peru quality improvement teams, and the staff at the participating health facilities for their support in completing this research study.

This research report was prepared by FHI 360 and University Research Co., LLC (URC) under the USAID Applying Science to Strengthen and Improve Systems (ASSIST) Project, which is funded by the American people through USAID's Bureau for Global Health, Office of Health Systems. The project is managed by URC under the terms of Cooperative Agreement Number AID-OAA-A-12-00101. URC's global partners for USAID ASSIST Zika activities included: American Academy of Pediatrics; FHI 360; Institute for Healthcare Improvement; and WI-HER, LLC.

For more information on the work of the USAID ASSIST Project, please visit www.usaidassist.org or write assist-info@urc-chs.com.

Recommended citation

Evens E, Martinez A, Murray K, Bratt J, Okumu E, Hermida J, Moyano Vidal LM, Requena C, Coly A. 2020. Using a Quality Improvement Approach to Strengthen Clinical Zika Services: Head Circumference Measurement and Provider Perceptions in Peru. *Research and Evaluation Report*. Published by the USAID ASSIST Project. Chevy Chase, MD: University Research Co., LLC (URC).

TABLE OF CONTENTS

List of Tables and Figures	i
Acronyms	ii
EXECUTIVE SUMMARY	iii
I. INTRODUCTION	1
A. ASSIST Zika Activities	1
B. Challenges to the Provision of Clinical Zika Care	1
C. Quality Improvement Interventions	1
D. ASSIST QI Approach	1
II. OBJECTIVES	2
III. METHODOLOGY	3
A. Overview	3
B. Data Sources	3
C. Study Design	3
D. Study Setting	4
E. Study Population and Eligibility	4
F. Data Collection Methods	5
G. Ethical Considerations	6
H. Analysis Methods	6
IV. RESULTS	6
A. Head Circumference Measurement	6
B. QI Fidelity Assessment	9
C. Qualitative Findings	9
V. LIMITATIONS	15
VI. DISCUSSION	15
VII. CONCLUSIONS AND RECOMMENDATIONS	16
REFERENCES	16

List of Tables and Figures

Table 1: Research objectives, data sources, and study design	3
Table 2: Sample size for clinical records reviews	4
Table 3: Percentage of medical records with head circumference measure documented and interpreted by record type and period	7
Table 4: Percentage of medical records with head circumference measure documented by facility, record type, and period	8
Table 5: Demographic characteristics of in-depth interview participants	9

Figure 1: Month-to-month change in documentation of head circumference 8

Acronyms

ANC	Antenatal Care
ASSIST	Applying Science to Strengthen and Improve Systems
CSaZ	Congenital Syndrome associated with the Zika Virus
IDI	In-depth Interview
MOH	Ministry of Health
PI	Principal Investigator
QI	Quality improvement
QIC	Quality improvement collaboratives
URC	University Research Co., LLC
USAID	United States Agency for International Development

EXECUTIVE SUMMARY

Introduction

Though rates of Zika infection are now declining, USAID, the international community, and country governments continue to respond to Zika infection in the Latin American and Caribbean Region. The USAID Applying Science to Strengthen and Improve Systems (ASSIST) Project has worked to strengthen the capacity of Ministries of Health to provide quality Zika care to reproductive age and pregnant women and newborns. ASSIST's work to enhance Zika care included: improving delivery of Zika prevention messages, providing condoms to pregnant women to prevent Zika infection, developing and supporting standardized processes for Zika screening, referring suspected cases for further investigations, diagnosing and improving clinical care and follow-up for infants affected by Congenital Syndrome associated with the Zika virus, and providing psycho-social support to mothers, partners, and families. As focus on increasing the knowledge of providers through training alone does not produce the expected changes in provider behavior, ASSIST sought to improve Zika care through the addition of quality improvement (QI) interventions to training.

QI is a data-driven approach to identify and address gaps in health care service quality, however there is limited data on its effectiveness and cost-effectiveness. ASSIST worked with the regional health authorities of Peru to develop and strengthen QI efforts in the Tumbes and Piura regions between July 2018 and July 2019. In addition to training antenatal and newborn care providers on Zika care, ASSIST implemented QI activities using multi-facility improvement collaboratives including national-level planning visits, formation of the ASSIST Peru team, QI curriculum review, training facilitators and QI teams, and health facility visits. This study sought to assess whether the ASSIST Zika QI approach was associated with improvement in specific Zika-related processes of care such as head circumference measurement and documentation among health workers providing antenatal and newborn care in Peru and to identify providers' perceptions of the benefits of QI for improving Zika clinical care..

Methodology

The objectives of this study were to: 1) determine if training + QI is associated with an increase in the documentation of the percentage of newborns who receive head circumference measurement; 2) determine whether training + QI is associated with an increase in the documentation of the interpretation of head circumference measurements according to international standards compared to pre-intervention.; and 3) identify providers' perceptions of the benefits of a QI approach for improving clinical Zika care and understanding the facilitators and barriers to the successful implementation of QI to support Zika care according to QI leaders and QI team members

The study was conducted in the Tumbes Region of Peru. For research objectives 1 and 2, we used a one-group pre-post design and conducted clinical record abstraction of newborn medical records (birth book and clinical history). For research objective 3, we conducted in-depth interviews with QI leaders and QI team members at intervention facilities. Data was collected from eight sites. The original study design included additional research objectives related to the impact of QI on the delivery and retention of Zika counseling messages and a cost-effectiveness analysis of the intervention. However, those components were excluded from this report due to the lack of appropriate comparison sites.

Results

Pre-post comparisons revealed that documentation of head circumference measurement and documentation of the interpretation of the measurement increased following the implementation of QI. ASSIST facilities showed a statistically significant improvement in documentation of the first head circumference measurement by nurses in the birth book and in the documentation of a second head circumference measurement by physicians in the clinical history. The documentation of a first head circumference measurement in the birth book and in the clinical history was high both before and after QI,

though not at the targeted 100% (from 89.2% to 94.8% and from 90.5% to 92.2%, respectively). The documentation of a second head circumference measurement in the clinical history increased significantly following QI, rising 25.0% (from 7.4% to 32.5%). Although the documentation of the interpretation of the measurement increased following the intervention, it remained low (from 3.6% before QI to 10.4% following QI) and the increase was not statistically significant. It is important to note that some providers may not have recorded interpretation of measurements that were in the normal range.

In-depth interviews conducted with 19 health care providers from ASSIST sites provided insight about how the ASSIST-supported QI activities helped to improve care. Both the QI training and the online Zika training were felt to be useful. Participants found the structured counseling and ASSIST Zika materials were critical to improving Zika care. Furthermore, participants felt that the ASSIST-supported Zika QI intervention improved not only the frequency of head circumference measurement and documentation, but also the accuracy of measurements and ability to interpret them. Participants reported several factors as being critical to the success of the ASSIST-supported QI intervention: engaging all levels of staff in the health facility, identifying QI “champions” within the facility to implement activities and motivate others, continuing external supervision and feedback, and implementing refresher trainings.

Conclusions and Recommendations

Intervention facilities showed a statistically significant improvement in documentation of the first head circumference measurement in the birth book and in clinicians’ execution of a second head circumference measurement in the clinical history. According to data from qualitative interviews, providers reported that the clinical tools and visual educational and counseling materials and training offered through the QI intervention were very useful to providers and helpful for clients. This study provides important insight into the utility of a short-duration QI intervention in Zika care. Specific recommendations include 1) identifying champions for the QI teams in each facility will improve QI success as reported in qualitative interviews, and 2) conduct future research with a more rigorous design including pre- and post-QI data and a control group comparable to the intervention group. Such a design could contribute to the evidence-base of the effectiveness and cost-effectiveness of QI interventions.

I. INTRODUCTION

A. ASSIST Zika Activities

Though rates of Zika infection are now declining, USAID, the international community, and country governments continue to respond to Zika infection in Latin America and the Caribbean Region. The USAID Applying Science to Strengthen and Improve Systems (ASSIST) Project, as part of this response, implemented activities in El Salvador, Honduras, Guatemala, Nicaragua, Paraguay, Ecuador, Peru, Jamaica, the Dominican Republic, and four Eastern and Southern Caribbean countries to strengthen the capacity of Ministries of Health (MOHs) to deliver consistent, evidence-based, respectful, person-centered, quality care with a focus on reproductive age and pregnant women and newborns. As part of these activities, ASSIST integrated evidence-based Zika care elements into existing family planning, antenatal, post-partum, and newborn care activities at the facility level through a combination of improving MOH guidelines, provider training, and QI coaching and follow-up.

ASSIST's work to enhance Zika care addressed: delivery of Zika prevention messages during antenatal counseling care, providing condoms to pregnant women to prevent Zika infection in pregnancy, developing and supporting standardized processes for Zika screening, referring suspected cases for further investigations, diagnosing and improving clinical care and follow-up for infants affected by Congenital Syndrome associated with the Zika virus (CSaZ), and providing psycho-social support and follow-up to mothers, partners, and families.

B. Challenges to the Provision of Clinical Zika Care

In addition to antenatal counseling, screening newborns to identify microcephaly and other manifestations of CSaZ is a key component of clinical Zika care. Screening includes measuring infants' head circumference and interpreting the measurements in relation to standards for gestational age, identifying suspected or confirmed microcephaly and other CSaZ signs, and providing early intervention and support for babies and families affected by Zika. While head circumference should be measured for every baby and interpreted in accordance with gestational age and international standards, this does not happen consistently.

C. Quality Improvement Interventions

As focus on increasing the knowledge of providers through training alone does not seem to produce the expected changes in provider behavior and improve quality of care in meaningful way,^{1,2} ASSIST sought to improve Zika care through the addition of a quality improvement (QI) intervention to the training. QI is a data-driven approach to identify and address gaps in health care service quality. The QI process provides a structure for addressing common obstacles to quality health care by creating a framework in which health care providers can learn from their own experience and others' successes and challenges and implement the appropriate changes.³ QI collaboratives involve teams in multiple health facilities testing changes to improve care and sharing information. There is, however, little consensus about the demonstrated effectiveness of quality improvement collaboratives (QICs) due to the lack of quantitative data and differing definitions of success across studies.⁴⁻⁶ Reviews agree that QICs need to be able to quantify the results caused by the changes implemented during the intervention to determine the overall success and sustainability of the QI intervention.^{4, 6 - 8} However, QICs, and QI more generally, are often specific to the context and location in which they occur, which makes comparison between facilities difficult and the transfer of results to other facilities challenging.⁴

D. ASSIST QI Approach

ASSIST worked with regional health authorities in Peru to develop and link existing QI structures, facilitators, materials, and leadership in 32 health facilities in 9 provinces in the Tumbes and Piura regions of Peru between July 2018 and July 2019. ASSIST implemented three formal collaboratives in Peru: one

aimed at improving antenatal care, one for newborn care, and one for Zika-affected infants and their mothers. The project also transferred knowledge gained from other countries where ASSIST worked to Peru through the facilitation of information sharing among country teams engaged in the Zika work.

ASSIST supported countries facing Zika outbreaks in multiple ways. These included strengthening treatment norms and protocols; procuring condoms, kits for early infant stimulation, and office equipment; and providing clinical staff with training and job aids. In addition to training antenatal and newborn care providers on Zika care, ASSIST implemented the following QI activities:

1. *Formation of the ASSIST Peru team:* In July 2018, the ASSIST technical team was established, based in Piura. In addition, ASSIST hired six “facilitators” (referred to as “QI coaches” in other ASSIST countries) who were fully dedicated to the QI component, provided guidance and support to QI teams, and functioned as the primary interface between the ASSIST core team and the regional health authorities and the clinical staff in health facilities.
2. *QI curriculum review:* An ASSIST regional staff member based in Quito traveled to Peru for one week to support the review of the QI curriculum and preparations for QI training workshops
3. *Training of Facilitators:* Two ASSIST senior regional staff conducted a two-day QI training workshop for six ASSIST facilitators at a venue in Tumbes, Peru.
4. *Training local QI teams (MOH clinicians):* ASSIST regional staff joined members of the ASSIST core team in Peru to carry out two workshops, one in Tumbes and one in Piura. A total of 139 clinicians received QI training during these two-day workshops.
5. *Visits to health facilities:* QI facilitators visited each health facility several times over the nine-month period after the QI workshops. The main objective of these visits was to support the work of QI teams to improve Zika care; specifically, facilitators worked with QI teams to provide continued training and guidance, distribute job aids, measure changes in performance, and transfer evaluation capacity to the QI team so they could perform their duties independently.

II. OBJECTIVES

The research objectives were to:

1. Determine if ASSIST’s training and QI approach was associated with an increase in the documentation of the percentage of newborns who receive head circumference measurement (first and second measurements).
2. Determine whether ASSIST’s training and QI approach was associated with an increase in the documentation of the interpretation of head circumference measurements according to international standards compared to pre-intervention.
3. Identify providers’ perceptions of the benefits of a QI approach for improving clinical Zika care and understand the facilitators and barriers to the successful implementation of QI to support Zika care according to QI leaders and QI team members.

The original study design included the additional research objectives listed below. However, that component was excluded from this report because the comparison sites (non-ASSIST sites) were not similar to intervention sites (ASSIST sites):

1. Determine whether ASSIST’s training and QI approach was associated with an increase in the percentage of Zika counseling elements delivered during ANC consultations compared to training alone.
2. Identify how client retention of key Zika prevention messages differed between facilities implementing ASSIST’s training and QI approach and those utilizing training alone.

- Determine the incremental cost and cost-effectiveness of ASSIST’s training and QI approach for increase the percentage of Zika counseling elements delivered during ANC consultations compared to training alone.

III. METHODOLOGY

A. Overview

The study design was developed by FHI 360 researchers in collaboration with the ASSIST regional, national, and headquarters teams. The selection of facilities and the timeline for the initiation of Zika training, QI, and research activities were implemented to be responsive to programmatic and logistical issues. To rapidly improve clinical care, Zika training and QI activities were initiated simultaneously,

B. Data Sources

The study used a variety of data collection methods to achieve the research objectives:

- Clinical records review** of newborn care to determine the proportion of newborns whose head circumference was measured at two timepoints (at birth and before discharge or 24 hours after birth) and the proportion for whom the interpretation of head circumference measurement was documented in clinical records using a standardized tool. Two data sources were reviewed: clinical history and birth books. A survey of 29 items was used to collect data from these reviews.
- QI fidelity assessment** to determine which components of QI each facility received. This included: the number of providers trained, the number of coaching visits conducted, the number of learning sessions conducted, the identification of a quality gap, measurement of QI indicators, and whether a change to health care delivery was tested or implemented.
- Qualitative interviews** with 1) QI team leaders and 2) health care providers who are members of QI teams at intervention facilities, to identify challenges related to the provision of Zika counseling, screening, and identification of Zika-affected infants, describe the implementation of QI processes, explain its perceived effect on Zika care, and describe participants’ perceptions of the ASSIST training on Zika and QI.

C. Study Design

Table 1 lists the data collection method and study design used for each research objective.

Table 1: Research objectives, data sources, and study design

Research objective	Data collection method	Study design
1. Head circumference measurement documentation	Clinical records review	One group pre-post
2. Head circumference interpretation documentation	Clinical records review	One group pre-post
3. Qualitative assessment	Qualitative interviews	Descriptive qualitative

The QI training took place September 20 -21, 2018, and the online Zika training took place during October 2018 for ASSIST-supported sites.

Clinical records were reviewed for two time periods 1) up to a year prior to the implementation of QI and 2) up to six months after.

The qualitative assessment sought to describe how the ASSIST QI approach affected Zika care. In-depth interviews with QI team leaders and QI team members were conducted to supplement the quantitative results of the study.

D. Study Setting

While ASSIST and the Peruvian MOH selected 32 facilities in two regions for the implementation of ASSIST Zika activities, this research was conducted in the Tumbes region only. Facilities were selected for the ASSIST intervention to maximize programmatic impact, as they were the biggest facilities with the highest number of deliveries and ANC consultations. To address the research objectives described in this report, data was collected from eight out of nine ASSIST facilities in Tumbes. One facility did not have any births in 2017.

E. Study Population and Eligibility

1. Inclusion criteria

The following individuals were eligible to be interviewed: QI team leaders. QI team members who had received Zika training and provided antenatal or delivery care at an intervention facility. These individuals were selected because of their involvement of Zika-related care and QI processes in ASSIST facilities All participants in qualitative interviews were all 18 years of age or older and agreed to have their interviews audio recorded Sampling

Review of clinical records

For the analysis of the head circumference measurements, we compared pre-QI to post-QI birth records across the eight intervention facilities that had births recorded in 2017--one facility did not have any births in 2017. The pre-QI records represent pre-intervention values and the post-QI records represent the post-intervention values. Data from other ASSIST countries show that changes in clinical services post-QI occur in the first three months post-intervention. Therefore, we compared medical records of births from up to one year prior to the start of the ASSIST activities to medical records of births up to six months post-intervention. At each facility we reviewed the number of births per month. To meet the target sample, for months with more than seven births, we selected seven medical records at random for review, and for months with seven or fewer births, we included all medical records for the month. Overall, we reviewed a total of 719 records, 490 pre-QI and 229 post-QI (see **Table 2**).

Table 2: Sample size for clinical records reviews

Intervention (post-intervention)	229 post-intervention records across 8 facilities
Comparison (pre-intervention)	490 pre-intervention records across 8 facilities
Total	719 records across 8 facilities

Qualitative in-depth interviews

We conducted 19 qualitative, in-depth interviews (IDIs) with two groups of participants:

- Nine health care providers who are ASSIST QI team leaders at intervention facilities
- 10 health care providers who are members of QI teams at ASSIST-supported intervention facilities

The sample sizes for the qualitative data collection activity were based on purposive, non-probabilistic sampling where the size of the sample relies on the concept of saturation, or the point at which no new

information or themes are observed in the data. We purposively sampled participants based on their experiences participating in ASSIST QI activities or ASSIST Zika training.

F. Data Collection Methods

1. Clinical record reviews

Data collectors reviewed medical records of births to determine the proportion of newborns who received proper microcephaly screening, including the following: measurement of head circumference at two timepoints (at birth and before discharge or 24 hours after birth), documentation of microcephaly screening, interpretation of the measurements using a standardized tool, and notation in the medical records indicating whether follow-up services were needed. At each data collection point, trained data collectors reviewed records for infants born in the facility during the specified time periods:

1. Pre-intervention: Births that occurred up to one year prior to the start of the ASSIST-supported QI intervention
2. Post-intervention: Births that occurred during the time period immediately following the start of intervention up to six months post-intervention

Records were identified for inclusion by trained data collectors using a data extraction guide. No identifying information was gathered by data collectors.

2. QI fidelity assessment

To determine which components of QI each facility received, a QI fidelity assessment was conducted at each intervention facility. The assessment included questions on the number of providers trained on Zika, the timing and activities of the QI team(s) at the facility, how many coaching visits were conducted, how many changes had been tested, and whether a change to health care delivery was implemented. The assessment was conducted by a member of the research team at the conclusion of the data collection period.

3. Qualitative in-depth interviews

Qualitative interviews were conducted with QI team leaders and health care providers to describe how the ASSIST QI approach was implemented, explain its effect on Zika care, and describe participants' perceptions of the ASSIST Zika training and QI approach. Challenges that providers and QI team leaders faced in providing and improving Zika care in their facilities were also explored.

To identify participants, ASSIST generated a list of QI team leaders at the specified facilities for recruitment into the study. Each facility was assigned a level of engagement with QI activities by the research team based on its performance using ASSIST's monitoring and evaluation data. We selected QI team leaders for interviews who came from both highly engaged facilities and low engagement facilities. ASSIST also generated lists of eligible providers who were QI team leaders and team members at the intervention facilities; providers were randomly selected from these lists. Once identified, data collectors contacted the eligible providers to ask if they would be interested in participating in IDIs; if they were, informed consent was obtained, and the interview conducted. All interviews were conducted by trained interviewers at the facilities or another private location of the participants' choice. The IDIs lasted approximately one hour and were conducted in Spanish. With participant consent, the IDIs were audio-recorded so they could be transcribed in Spanish and translated into English. The transcripts were typed into a word processing document on a password-protected computer. All potentially identifying proper names of people were redacted from the electronic transcripts.

G. Ethical Considerations

FHI 360's Protection of Human Subjects Committee reviewed and approved the research study to ensure it was conducted in line with local and international ethical standards. Additionally, the ethical review board of the Universidad Peruana Cayetano Heredia (UPCH CIE) Peru reviewed and approved the study, and both the Peruvian MOH and the leadership of each health facility approved data collection at each study site. All study staff who came into contact with participants or data were required to have current training on research ethics, either on FHI 360's ethics curriculum or other approved training.

Participation in the assessment was voluntary and confidential. Every effort was made to protect the confidentiality of the providers. At the beginning of the study, the research team met with all providers in a facility who participated in antenatal care to describe the research objectives and data collection activities to them. Permission from the staff in-charge of antenatal care was sought prior to all data collection activities. Providers were not financially reimbursed or otherwise provided incentives for participation.

All participating providers were assigned a coded study identification number; there was no link between providers' names and their study ID codes. No sensitive data were collected about participants, and risks to research participants in this study were minimal. Neither individual nor facility names nor any other identifying information appear on any documents or survey instruments. Study data, notes, and other assessment materials were stored in password-protected electronic files or in a locked cabinet available only to study staff. All assessment materials were secured, with access only by project staff for data management and analysis.

H. Analysis Methods

1. Objectives 1 and 2: Head circumference measurement and interpretation

For the medical records, we calculated the percentage of records with the head circumference measure documented and interpreted by record type for each round (pre- and post-intervention). We also calculated the difference between the pre- and post-intervention records and applied a regular t-test to that difference for statistical significance. We also calculated descriptive statistics by facility and by month, broken down by pre- and post-intervention.

2. Objective 3: Providers' perceptions of QI

Audio recordings of IDIs with QI leaders and QI team members were transcribed and translated into English. A detailed coding matrix was developed to identify themes and relevant quotes. Some codes were predetermined based on previous literature, and others were created inductively, and therefore, generated from reading the transcripts. Any discrepancies were discussed with the study team to ensure a common understanding of the codes and interpretation of the text going forward. Once all the transcripts were analyzed, summary reports were developed identifying the overall themes related to the study objectives.

3. QI fidelity assessment

Simple summaries of QI elements were calculated using an Excel-based checklist.

IV. RESULTS

A. Head Circumference Measurement

Table 3 shows the results for head circumference measurement and interpretation for the records in the year prior to the implementation of the intervention (pre-QI) and in the six months after QI implementation (post-QI). Two head circumference measurements are supposed to be obtained, the first at birth and the

second when the infant is discharged from the health facility or is 24 hours old, whichever happens first. The first measurement should be documented in the birth book, a book completed by the nurse in charge of the newborn, and in the clinical history, completed by the physician, while the second measure is supposed to be documented in the clinical history only. Measurements documented in the clinical history are supposed to be interpreted as to whether they indicate microcephaly. The birth book is a facility-level book that by mandate is to be kept in the delivery room; the purpose of this book is to serve as an easily accessible catalogue of the births attended in the facility. The clinical history is a woman- or family-level folder with the mother's recent clinical history and the newborn's initial medical history.

Both documentation and interpretation of head circumference measurement were deemed critical to quality in Zika care by ASSIST. Documentation and interpretation of head circumference increased as expected following the implementation of QI for all measures. Documentation of head circumference in the birth book was fairly high during the pre-intervention (89.2%) and increased during the post-intervention (94.8%). (see **Table 3**). The documentation of the first measurement and the documentation of its interpretation in the clinical history also increased, though not significantly (documentation of measurement 90.5% pre-intervention and 92.2% post-intervention; documentation of interpretation 7.9% pre-QI to 8.0% post-QI). The documentation of the second measurement in the clinical history was relatively low in both groups, though it increased 25 percentage points from 7.4% pre-intervention to 32.5% post-intervention. Documentation of the interpretation of these measurements to determine if a child was possibly affected by Zika was quite low at both time periods but again increased from 3.6% to 10.4% post-QI.

Table 3: Percentage of medical records with head circumference measure documented and interpreted by record type and period

	Pre-intervention records n=490	Post-intervention records n=229	Difference
Birth book measurement			
Documented	89.2	94.8	5.6**
First measurement in clinic history			
Documented	90.5	92.2	1.7
Interpreted	7.9	8.0	0.1
Second measurement in clinic history			
Documented	7.4	32.5	25.0***
Interpreted	3.6	10.4	6.8

*** Denotes the difference is statistically significant at the 0.01 level; ** at the 0.05 level; and * at the 0.10 level.

The findings at the facility level show similar improvement with increases in the percentage of records with head circumference documented in the birth book and both the first and second measurements in the clinical history increasing for most facilities (**Table 4**). The percentage of births with a head circumference measurement documented in the birth book before implementation of QI was above 90% in all but two of the facilities. Post-QI, all but one of the facilities were above 95%, with the remaining facility having made a significant increase from 55.8% to 77.5%. For clinical histories, all but one of the facilities increased the percentage of births with documentation of the first head circumference measurement from pre-QI to post-QI. While none of the changes were statistically significant, four facilities were at or near universal documentation of the first measurement. Documentation of the second measurement was low, with five facilities showing no documentation pre-QI. Following QI, all facilities (aside for one with a single record available post-QI) increased, with five facilities having significantly higher second measurements post-QI.

We also explored the month-to-month change in the documentation of the head circumference measures in the birth book and in the clinical histories. As shown in **Figure 1** below, the documentation of the first

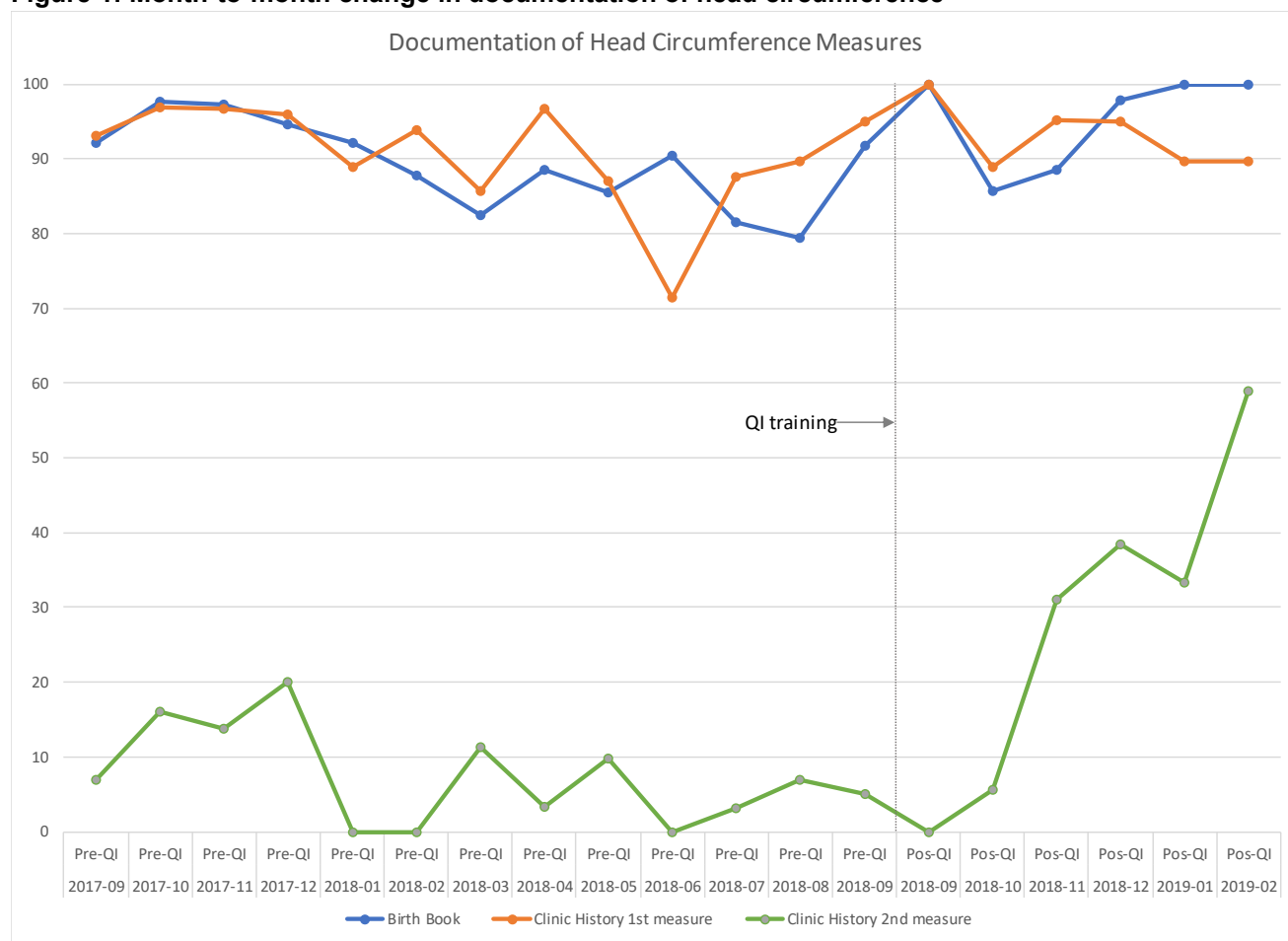
measurement, whether in the birth book or in the clinical history, was fairly high (i.e., almost at or above 90%) in the last 4 months of 2017, decreased in 2018 up until September of that year, and increased afterwards with documentation in the birth book at 100%. In contrast, the documentation of the second measurement was very low until October of 2018. It then started to increase rapidly, reaching its highest point in February 2019, the last month for which we reviewed medical records.

Table 4: Percentage of medical records with head circumference measure documented by facility, record type, and period

Facility	Number of Medical Records Reviewed		Birth Book		Clinic History			
	Pre-QI n	Pos-QI n	Pre-QI %	Pos-QI %	1st measurement		2 nd measurement	
					Pre-QI %	Pos-QI %	Pre-QI %	Pos-QI %
A	40	11	90	100	67.7	90	0	10
B	75	42	93.3	100	90.1	94.9	1.4	28.2***
C	70	38	94.3	97.4	86.9	72.2	0	38.9***
D	71	16	98.6	100	93	100	0	54.5***
E	74	40	100	95	93.1	93.8	6.9	50***
F	7	1	71.4	100	71.4	100	0	0
G	77	40	55.8	77.5*	93.8	97.1	39.1	40
H	76	41	96.1	100	100	100	0	10**

*** Post-QI percentage statistically different from the pre-QI percentage at the 0.01 level; ** at the 0.05 level; * at the 0.10 level.

Figure 1: Month-to-month change in documentation of head circumference



B. QI Fidelity Assessment

The QI fidelity assessment was used to assess the degree to which QI was implemented at each facility. Data were provided for each facility on: the number of coaching visits (these are meetings where QI experts external to the facility come to provide guidance on use of QI), the number of learning sessions in which the QI team participated (these are meetings where members of QI teams share and learn with each other), whether or not a QI team identified a quality gap, and, if so, whether a change to health care delivery was tested or implemented and QI indicators were measured using run charts or measurement of QI indicators on a monthly basis. All nine ASSIST-supported facilities reported identifying a quality gap and reporting measurement of indicators on a monthly basis. Each facility participated in two learning sessions for providers focusing on newborn care and in two learning sessions for prenatal care. The number of coaching visits ranged from 27 – 61, with an average of 41. The number of visits depended on the number of providers per facility and the degree to which the facility engaged with the QI effort.

C. Qualitative Findings

1. Demographics

In-depth interviews were conducted with 19 health care providers from ASSIST-supported sites (**Table 5**). The majority of participants in in-depth interviews were certified midwives. Approximately half were QI team leaders and half were QI team members; they were also distributed evenly between the ANC and newborn QI teams.

Table 5: Demographic characteristics of in-depth interview participants

Provider type	
Doctor	4
Nurse	7
Certified midwife	8
QI team role	
Leader	9
Member	10
Attended ASSIST Zika QI training	12/19
Attended ASSIST Zika online course	14/19
Length of time working at facility	
<1 year	0
1 to 2 years	2
>2 years	17

2. Feedback on ASSIST Zika QI training

Twelve out of 19 providers (63%) reported that they had attended the ASSIST Zika QI training. An additional three participants reported that they had attended replica sessions at their facility (i.e., staff members who attend ASSIST QI trainings led a training session for their peers). None of the comparison site providers had attended ASSIST Zika QI training but all nine providers attended the ASSIST Zika

online course. The majority of participants who attended ASSIST Zika QI training felt that the course was useful and provided practical information and tools that they could use in their facilities. Only one participant reported that they felt the course was not useful because health facility staff were already familiar with QI.

"Very practical. I think that training courses where you apply things right then and there are better because you don't learn anything from the ones with a PowerPoint presentation where they just go over lots of slides. You learn more by practicing. When you execute, you learn more effectively. So, what did we do in the training course? We raised questions and their possible answers. It means that we return to our health center focused on the limitations, the problems and, in addition, we've already come up with potential responses. For me it was very practical. If it can be given more often, that would be great."

- QI Team Member, High Engagement Facility

"The [QI] project has helped us more [than the online Zika training alone]. Like when we trained on how we were going to carry out the project and what aspects we could analyze, we were also asked to think that it was not only about carrying out a project but looking at what aspects we ourselves could improve and act upon. That is when we started thinking and generating ideas for improvement, and that's led to some things. I think that if we didn't learn about these topics, we would have remained focused merely on counselling. We could've stayed there like other situations we face. But as a result of training, we were taught to try to figure out what we could improve. It has definitely helped a lot."

- ANC Leader, High Engagement Facility

"It was practical and dynamic, and it has been useful not only for the Zika project, but also for applying any strategy or identifying any health-related problems and looking for a way in which we can improve the care provided."

- ANC Leader, Low Engagement Facility

Participants from both the ANC and newborn QI teams were asked how the ASSIST Zika QI training affected their ability to provide care. Participants reported that the ASSIST QI training helped them to provide care through improving both knowledge and skills.

3. Improved ANC counseling skills

Participants from ANC teams reported that the QI intervention improved their Zika counseling skills. Through the QI intervention they learned to provide structured counseling which helped them to communicate more effectively with their patients and to use their time efficiently during counseling. Because having limited time with patients was frequently reported to be a challenge in ANC care, having the tools to provide efficient and clear Zika counseling was very helpful.

"We were given a model for counseling, which significantly helps to identify signs and symptoms – something we weren't doing very well before... we did it sometimes, and sometimes we didn't. Sometimes we didn't do it due to all of the multitasking we do. Since our training, and the evaluations I've been having, we have been motivated to keep getting better. We have been providing the counseling, and the model they've given us has really helped to get through to the expecting mothers."

- ANC Leader, High Engagement Facility

Intervention facilities also received audio-visual materials and visual aids to assist with providing Zika counseling; participants reported that these resources enabled them to better communicate information in language that was accessible to the patients, especially those with low literacy or limited education. Intervention facilities developed stamps to place in the medical records to document whether Zika counseling and condoms were provided to patients at each visit. Participants reported that the stamps helped improve care by reminding the provider to give Zika counseling and to talk about each element, to distribute condoms, and to record that the counseling was done.

"Now it's normal that besides giving prenatal check-ups, to also give counseling through some posters we also received... Now we give better structured and more straight-forward counseling by using images. This way people understand what we want to say better, and we confirm it with a stamp in the clinical record. This is done both in regard to how counselling is given and how it's registered in the clinical record.

- ANC Leader, Low Engagement Facility

4. Improved head circumference measurement

Providers of newborn care at intervention facilities also received materials and tools through ASSIST which they found to be very useful, such as standardized head circumference measuring tapes, interpretation charts, and stamps to use in medical records to record newborn head circumference measurements and interpretation. Prior to the QI training, the providers used generic (often tailor) measuring tapes made of paper, which could stretch out of shape, to measure head circumference. The introduction of standardized measuring tapes was perceived as a valuable benefit. Furthermore, the ASSIST-provided measuring tapes enabled more precise measurement.

"In the health center... the head circumference measurement with decimals didn't use to be recorded and nor was it recorded after 24 hours at discharge. Also, we didn't have a proper children's record sheet at discharge... So, to record the head circumference measurement with decimals is what has been implemented most... Not only by the health professional who is responsible for the newborn care at delivery and discharge, but also through the medical staff who monitors the newborns' progress and discharge."

- ANC/Newborn Leader, High Engagement Facility

A few participants reported that the training had improved their measurement accuracy through teaching them how to take the measurement correctly.

"At the beginning it's a little hard to understand the measurement and where to put the measuring tape. From the closer zone of the occipital bone to the glabella. At first, we had to do the workshops, and the replicated training sessions and practice helped too. It has made it easier for when we need to actually take the measurement on the newborns.

- Newborn Leader, High Engagement Facility

Finally, the head circumference measurement charts, which were placed strategically in the facilities, improved interpretation of the measurements.

"Before, we only measured head circumference as another standard activity, but now we know how to analyze the data and detect anything on time."

- QI Team Member, High Engagement Facility

Similar to ANC care, the introduction of stamps for newborn care records improved documentation of measurements and helped staff to remember to measure head circumference both at birth and 24 hours after birth. Prior to the ASSIST intervention, medical records did not include a place to record the second

head circumference measurement or interpretation. The stamps were designed to provide a place to document both first and second measurement as well as interpretation. Participants felt that this helped to increase measurement, especially the second measurement. Strikingly, one facility changed the discharge time for patients from 12 hours after birth to 24 hours after birth, in order to do the second head circumference measurement.

5. Improved provider clinical knowledge

As illustrated by the quote below, providers reported that training by ASSIST (both QI and online Zika training) improved their knowledge to be able to identify possible Zika and microcephaly cases and increased staff awareness of the importance of Zika care. Participants reported that this resulted in improved referrals of possible Zika cases.

“The most important thing they’ve given us is the theoretical knowledge of the disease, how it’s transmitted, its consequences, how to differentiate it from other similar diseases that we might also have [inaudible 21:40]. That is very important because we can determine, through symptoms, if a patient is infected by Zika or not. I didn’t know much about it myself. I had only read some things about it. The training course helped us know more about it.”

- ANC Member, High Engagement Facility

6. Introduced QI process to facilities

The ASSIST Zika QI training helped participants to identify limitations and problems at the health center as well as potential solutions. Two participants mentioned that the introduction of care flow charts (learned about in the QI training) improved the facilities’ organization. Several participants reported that they felt that the ASSIST Zika QI intervention helped improve Zika care through the focus on working as teams and through the project follow-up and visits by monitoring personnel.

“What the [ASSIST] project came to do is to teach us how to put our house in order. It’s as if I came into your house and started telling you, ‘The bathroom goes here, the sofas, here, etc.’”

- ANC Leader, Low Engagement Facility

7. Challenges

Several challenges to implementing the QI intervention in the facilities were mentioned by site participants, including high rates of staff rotation as well as staff turnover, persistent documentation challenges, limited time, and difficulties counseling pregnant women to use condoms with their partners. The most commonly cited challenge was change in personnel, which impaired facilities’ ability to improve because trained providers left the facility and new providers started working who had not been trained. One low engagement facility reported multiple personnel changes, including management changes, since the QI training in September 2018 which meant that QI teams were formed and then reformed with each change in management, making it difficult to implement any improvements. To resolve these staff challenges, several of the QI teams conducted multiple replica trainings with new staff. Almost half of participants also stated that it was difficult to train their facility’s staff (even if stable staffing existed), due to difficulties scheduling and logistical coordination (as they needed to ensure that the health facility had sufficient providers to care for patients during each training). A few participants reported that lack of staff interest was a challenge.

“At the beginning it was a bit hard... The first barrier then was to make everyone aware of this topic and to form that team. That is why that team was changed on multiple occasions because we didn’t have the staff supporting us. The staff was uninterested in working, so the team was changed twice. The one we have right now has been stable so far, so that was an issue we faced only at the beginning... I know USAID is a project that ends in June, and after that we are on our own, so as any

other project we have to maintain the knowledge received from now on. However, we currently still have USAID's support in terms of training, staff awareness, and training on other Zika-related topics. I think it [staff stability] would help us sustain our work as MISA [Ministry of Health] after the project ends."

- ANC Leader, Low Engagement Facility

In spite of training and introduction of medical record stamps, many participants stated that completing documentation in the medical records was a persistent challenge. This was due to many factors including lack of time, staff not having received training, and issues specific to the stamps. Participants at several facilities reported that there had been problems with the stamps. In one site, the first stamp was too large, and it had to be redesigned which delayed its implementation. In another, the stamp design was so large that it was placed on the back of the medical record; therefore, it was easy for staff to forget to complete it because they do not normally write on the back of the medical record. One site designed a new medical record form to use but was still waiting for MOH approval of the form at the time of the interview and therefore it was not being used.

There are also a few challenges that were specific to ANC Zika counseling. Providers reported that ANC appointments are short (approximately 15 minutes), and the limited time is a challenge because Zika counseling is time-consuming and they have many other clinical responsibilities during those appointments. In addition, cultural issues and machismo were cited as a barrier to condom use during pregnancy, making counseling pregnant women to use condoms with their husbands a challenge. Some sites implemented strategies to engage male partners during ANC visits more: however, participants felt that it is a persistent challenge.

8. Examples of use of QI in Zika care

Providers were asked question to capture their perception of the iterative nature of the QI process. In general, participants did not describe the QI process at their facilities in detail, despite interviewer probing. Participants more frequently discussed concrete tools received from ASSIST (such as the measuring tapes and counseling tools) as the most useful. However, a few QI leaders did describe how the QI process was applied to make improvements at their facility. These participants reported that they had conducted replica trainings with facility staff, formed teams, reviewed medical records, engaged with the ASSIST Zika Facilitator in Tumbes, and implemented key changes, as described in the example below:

"We then started providing counselling, but it wasn't very frequent at the beginning because some people did it and some didn't. To be honest, there was kind of a lack of commitment from the staff. We had to hold coordination meetings. A prenatal improvement team has also been formed. So, with that team we have replicated training sessions to analyze the issue. By identifying an issue, we can start carrying out a job. We have been holding meetings with our colleagues to identify the issues we face in order to find a solution for them. We have gradually advanced by doing that."

- ANC Leader, High Engagement Facility

"We arranged to implement a record for the use of condoms, which wasn't happening in prenatal. We gave counselling, including prevention through condom use. We showed patients how to use condoms, and we gave them a prescription so that they could go to the pharmacy and pick some up. However, when we had shifts at the pharmacy we surprisingly found out that many of them didn't come at all. So, after raising visibility of the issue, of them not picking up the condoms, we arranged to give them out at the outpatient office. We held meetings with the manager of the health center and the pharmacy manager to get them to provide us with condoms so that we could give them out at the outpatient office. We agreed that we would give condoms to every

expecting mother who was given counseling to make sure she understood, basically to provide her with easier access to them.”

- ANC Leader, High Engagement Facility

9. Support from facility administration

Nearly all participants reported that their management/administration was supportive of the ASSIST Zika QI intervention and trainings. Most participants stated that their management supported the intervention and enabled them to participate through providing staff with time and funds to attend trainings and replicas and ensuring staff coverage while they were at the training. Furthermore, their administrators supported their efforts to implement improvements. One leader at a low engagement site reported difficulty forming the QI team due to multiple changes in management and staff rotation, although by the time of the interview, they had formed a QI team and begun activities. Overall facility administration was reported to be supportive of the ASSIST QI intervention, and their support was important to its success.

10. Factors contributing to QI success

Participants provided many responses to what factors contribute to the success of QI efforts. Many participants stated that it is important to involve and train staff at all levels, from the highest to lowest cadres, and that this would contribute both training and also staff commitment to ensure the success of the project.

"Ideally the entire center would have the same idea and make the same effort. It's not only the obstetrician's and the nurse's job- it is also the responsibility of the technician, the doctor, and the entire staff. Unifying criteria among everyone can improve work."

- ANC QI Team Member, High Engagement Facility

Participants reported that having a champion for the project--at least one person who has both the desire to improve and also the ability to motivate others--was critical to success. Supervision, especially external supervision from an ASSIST facilitator, was felt to have contributed to success by providing feedback on performance. Participants also felt that they would need to continue to provide refresher trainings/replica trainings, to sustain the success of the QI intervention. Staff stability (so that trained staff continue to work in the facility) was also seen to be an important factor in success.

Finally, participants felt that support from management would also help facilities to continue the activities after ASSIST support ends.

11. Suggestions for improvement of ASSIST Zika training

The most common suggestion for improvement was that the ASSIST QI training and the online Zika training should be given to more staff, not just select staff at each facility and not just high patient volume facilities. One participant (at a low engagement facility) reported that only nurses from their facility participated and this resulted in the doctors "rejecting" the project. Furthermore, the replicas at each facility were not always sufficient as they tended to be shorter and interrupted. Participants felt that the sharing of experiences with staff from other facilities was useful and that should be incorporated more. One participant felt that it would be helpful to change the assessment tools to "evaluate the process" and to teach them to make their own indicators.

Of the participants who did not attend a QI training themselves, most felt that the course had helped improve Zika care at their facility (examples given were improved counseling and materials). Two participants stated that they did not know anything about the QI course.

V. LIMITATIONS

As this study was implemented within an intervention designed to address a health emergency, strengthening health services was the central factor in determining when and where training and QI activities took place. Consequently, this resulted in some challenges for study design and attribution. ASSIST-supported facilities were purposively selected for the QI intervention based on maximizing the impact; intervention and non-intervention facilities differed in size, client load, location (, number of health care providers, and number of births (comparison facilities did not routinely provide delivery services), thereby limiting the ability to find comparison groups that were similar to intervention group and the generalizability of the findings. The absence of appropriate comparison groups also limits the ability of this research to make conclusions on the impact of the QI intervention on Zika care processes and results from these research questions are omitted from this report.

VI. DISCUSSION

Documentation of a single head circumference measurement in the birth book and the clinical history was high both before and after QI though not at the targeted 100%. Documentation of head circumference increased significantly following QI with documentation in the birth book increasing 5.6% and documentation of the second measurement in the clinical history rising a full 25.0% though to reach only a frequency of 32.5%. These increases are a strong indicator that the QI method was helpful in improving head circumference measurement. Documentation of the interpretation of the measurement also increased by 6.8% but this was not statistically significant, and interpretation was low before QI (3.6%) and following (10.4%), although some providers may not have recorded the interpretation of interpreted measurements that were in the normal range

The qualitative data support the importance of QI in changing head circumference measurement, noting that prior to QI, documentation of only one head circumference measurement was done routinely. However, the measuring tapes used were not accurate, the measurement frequently did not record the decimal point, and providers did not interpret the measurements. With the involvement of the ASSIST QI intervention, sites received correct measuring tapes, charts to guide interpretation, and stamps to provide a place to record the second head circumference measurement and interpretation. Qualitative interviews also indicated that at some sites, the introduction of the stamp at the facility was delayed and therefore it is possible that this indicator continued to improve after data collection ended.

From the QI fidelity assessment, it appears that QI was implemented similarly across all intervention facilities. However, the variation in the number of coaching visits could have resulted in some facilities receiving more support in implementing QI which could result in variation in the delivery of counseling messages between facilities.

In-depth interviews with participants provided insight about how the ASSIST QI intervention helped to improve care. Both the QI training and the online Zika training were felt to be useful, though the online format of the Zika training did result in some challenges. Participants found the structured counseling and ASSIST Zika materials such as flip charts, stamps, measuring tape, and charts were critical to improving Zika care. Furthermore, participants felt that the ASSIST Zika intervention improved not only the frequency of head circumference measurement and documentation, but also the accuracy of measurements and ability to interpret them, which is critical to Zika care. Changes in staffing and completing documentation were persistent challenges during the ASSIST intervention. In qualitative data, participants identified factors which contributed to the success of QI efforts. Many participants stated that it is important to involve and train staff at all levels, from the highest to lowest cadres, and that this would contribute to both staff knowledge and commitment to ensure the success of the project. Participants also reported that having a champion for the project--at least one person who has both the desire to improve and also the ability to motivate others--was critical to success as was the provision of feedback and supervision by an external ASSIST facilitator.

VII. CONCLUSIONS AND RECOMMENDATIONS

This study provides important insight into the utility of a short-duration QI intervention in Zika care. Intervention facilities showed an improvement in documentation of the head circumference measurement in the birth book and in clinicians' execution of a second head circumference measurement. Based on qualitative data, provision of clinical tools and visual educational and counseling materials and training offered through the QI intervention was appreciated by providers and helpful for clients. Specific recommendations include identifying champions for the QI teams in each facility to improve QI success and conducting future research with a more rigorous design including pre- and post-QI data and a control group comparable to the intervention group. This type of rigorous design would contribute to the evidence-base of the effectiveness and cost-effectiveness of QI interventions.

REFERENCES

1. Silagy C, Lancaster T, Gray S, Fowler G. Effectiveness of training health professionals to provide smoking cessation interventions: systematic review of randomized controlled trials. *Qual Health Care*. 1994;3(4):193–198. doi:10.1136/qshc.3.4.193.
- 2.. Leslie HH, Gage A, Nsona H, Hirschhorn LR, Kruk ME. Training and Supervision Did Not Meaningfully Improve Quality of Care for Pregnant Women or Sick Children in Sub-Saharan Africa. *Health Affairs* 2016 35:9, 1716-1724.
- 3.. Nadeem E, Olin SS, Hill LC, Hoagwood KE, Horwitz SM. Understanding the components of quality improvement collaboratives: a systematic literature review. *The Milbank Quarterly*. 2013; 91:354-94.
4. Walshe K, Freeman T. Effectiveness of quality improvement: learning from evaluations. *BMJ Quality & Safety*. 2002; 11:85-7.
5. Wells S, Tamir O, Gray J, Naidoo D, Bekhit M, Goldmann D. Are quality improvement collaboratives effective? A systematic review. *BMJ Quality & Safety*. 2017:1-15.
6. Strating MM, Nieboer AP, Zuiderent-Jerak T, Bal RA. Creating effective quality-improvement collaboratives: a multiple case study. *BMJ Quality & Safety*. 2011: bmjqs. 2010.047159.
7. Hulscher ME, Schouten LM, Grol RP, Buchan H. Determinants of success of quality improvement collaboratives: what does the literature show? *BMJ Quality & Safety*. 2012:bmjqs-2011-000651.
8. Schouten LM, Hulscher ME, van Everdingen JJ, Huijsman R, Grol RP. Evidence for the impact of quality improvement collaboratives: systematic review. *BMJ*. 2008; 336:1491-4.

**USAID APPLYING SCIENCE TO STRENGTHEN
AND IMPROVE SYSTEMS PROJECT**

University Research Co., LLC
5404 Wisconsin Avenue, Suite 800
Chevy Chase, MD 20815

Tel: (301) 654-8338

Fax: (301) 941-8427

www.usaidassist.org