



RESEARCH AND EVALUATION REPORT

Assessing changes in knowledge and factors influencing behavior related to Zika prevention among women receiving antenatal care in Latin America

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DISCLAIMER

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

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Acronyms

ANC	Antenatal care
ASSIST	USAID Applying Science to Strengthen and Improve Systems Project
CAP	Permanent Care Centers (<i>Centros de Atención Permanente</i>)
DAS	Health Area Offices (<i>Dirección de Área de Salud</i>)
EW	Epidemiologic Week
FP	Family planning
LAC	Latin America and Caribbean
M&E	Monitoring and evaluation
MSPAS	Ministry of Public Health and Social Assistance (<i>Ministerio de Salud Pública y Asistencia Social</i>)
PAHO	Pan American Health Organization
PLISA	PAHO/WHO Health Information Platform for the Americas
QI	Quality improvement
SIGSA	Health Management and Information System (<i>Sistema de Información Gerencial de Salud</i>)
URC	University Research Co., LLC
USAID	United States Agency for International Development
WHO	World Health Organization

EXECUTIVE SUMMARY

Introduction: Zika was declared an international emergency in Latin America and the Caribbean from February to November 2016 and has since remained an endemic health issue. Given the need for protective behavior change, ranging from environmental to interpersonal, successful confrontation of the Zika virus requires an understanding of health providers' and public perceptions of risk, knowledge of Zika and how to prevent it, and promising strategies for communicating knowledge and reinforcing behavior change. The USAID Applying Science to Strengthen and Improve Systems (ASSIST) Project supported the United States Government response to the Zika virus epidemic in the Latin America and Caribbean (LAC) region from FY16 through March 2020. ASSIST worked with national authorities in 13 LAC countries to train clinical care providers on Zika counseling and implement a quality improvement (QI) program for Zika-related clinical processes, along with other system strengthening activities.

The objectives of this study were to determine whether the ASSIST Zika QI intervention was associated with a change in women's knowledge of Zika prevention behaviors in four countries, to understand antenatal care (ANC) clients' perspectives on which aspects of the intervention most influenced women's desire/non-desire and ability/inability to practice Zika prevention behaviors, and to understand the perspectives of facility-based staff on which aspects of the intervention facilitated the providers' ability to effectively counsel women on Zika prevention during ANC visits.

Methodology: Two complementary analyses were conducted: a quantitative analysis of existing data from four ASSIST-supported countries (Dominican Republic, Guatemala, Nicaragua, and Paraguay), and a qualitative case study specifically assessing ASSIST-supported Zika activities in Guatemala. The quantitative analysis utilized a mixed effects regression to explore the association between intervention duration (in months) and Zika counseling comprehensiveness on knowledge of Zika prevention among pregnant women exiting ANC services in supported facilities in the four countries. The model also controlled for the facilities' country and region. To understand the implementation of the ASSIST intervention and how it influenced the provision of Zika counseling as part of ANC and the perceptions of the clients of ANC related to Zika prevention knowledge and behaviors, the methods for the qualitative case study included in-depth interviews in ten health centers (*centros de atención permanente* or permanent health centers) with women who attended antenatal care visits and with health providers in both ASSIST-supported and non-ASSIST-supported facilities. A total of 80 interviews were conducted: 46 pregnant women, 18 health providers in ASSIST-supported facilities, 12 health providers in non-ASSIST-supported facilities, and four ASSIST technical staff.

Findings: The findings from both analyses converged to suggest that provider capacity development and effective counseling were associated with improved knowledge and potential for enacting prevention practices. For the quantitative analysis, the mixed effects regression model revealed that time and comprehensiveness of Zika counseling in ANC were significantly associated with women's knowledge of Zika prevention behaviors (p value < 0.01). The model predicted that, on average, holding all else constant, one additional month of the ASSIST intervention was associated with a marginal increase in knowledge of one percentage point, and an increase of one additional percentage point on

a facility's Zika counseling comprehensiveness score was associated with nearly a 0.6 percentage point increase in knowledge.

In the Guatemalan context, the intervention reinforced the importance of standardized preparation processes and training of a range of health and support staff. Implementation barriers included a lack of human resources in the health facilities, high staff turnover, and the limited participation of doctors at the beginning of the program resulting from slower physician buy-in, unlike the nursing staff, whose support was stronger from the start. Given challenges related to time, infrastructure, supplies, and client volume, health facility staff adopted different processes to maximize quality of care and ensure they took advantage of opportunities to provide Zika counseling during ANC visits. Interviews with women attending ANC suggest that these women benefited from the Zika counseling and had at least some knowledge and understanding about Zika and the prevention measures. On average, the women and the ASSIST-supported providers and staff rated the majority of the priority prevention practices as “easy” to enact, which was contrary to what the non-supported providers perceived. Participants reported that reasons that impeded the realization of the recommended behavior varied across the priority practices.

Conclusions and Way Forward: Findings suggest the importance of continuing to increase knowledge, but also of promoting sufficient understanding of risks and prevention measures to enable behavior change. For example, exit interview data to monitor Zika knowledge among ANC clients did not capture whether women understood the severity of the potential risk to the baby, but rather only whether they understood Zika can be transmitted sexually and that condoms are a primary method for prevention of sexual transmission. However, the qualitative data indicated that the threat of microcephaly to the baby sometimes served as a “tipping point” in convincing partners to use a condom during pregnancy. Routine monitoring and evaluation going forward should include whether this key risk to the baby is understood. Messaging must be strategic, take into account other similar diseases, and be nuanced enough to assist in the proper execution of the priority practices. The study participants' recommendation to engage the community is a good one, as provider reinforcement of practices during intermittent ANC visits at the facility level is likely insufficient. Finally, while the acute threat of Zika has passed and priorities have shifted to other competing and pressing health issues, the hope is that the processes, training materials, lessons learned, and expertise will remain sufficiently embedded in the health system to support action during the next phase of the Zika epidemic in the future.

I. INTRODUCTION

Zika was declared an international emergency in the Latin America and Caribbean (LAC) region from February to November 2016 and has since remained an endemic health issue. Zika is transmitted through bites from the *Aedes Aegypti* mosquito and through sexual and mother-to-child transmission. There are three main types of measures that can prevent transmission of the virus: avoidance of mosquito bites, elimination of mosquitos at all stages of their lifecycle, and prevention of sexual transmission (Leontsini et al. 2017). Given the need for protective behavior change, ranging from environmental to interpersonal, successful confrontation of the Zika virus requires an understanding among both health providers and the public of risk perceptions and knowledge related to Zika and how to prevent it, as well as promising strategies for communicating Zika information and reinforcing behavior change. To address these needs, some evidence has been generated in the LAC region and in Guatemala, in particular. The following paragraphs provide a brief summary of key findings from four relevant studies: three qualitative studies and a household survey conducted in Guatemala between 2016 and 2018.

1. In 2016, Research Triangle Institute conducted a qualitative study in Zacapa and Suchitepéquez, Guatemala, among men and women to explore public understanding of Zika (Southwell et al. 2018). Their findings underscore the importance of understanding the emergence of Zika in the context of other similar emerging infections. Guatemala is home to regular Dengue infection, and the recent Zika outbreak emerged on the heels of a Chikungunya epidemic. They found that the public relied on their understanding of Dengue and Chikungunya to interpret the emergence of Zika. This presents a risk that in grouping Zika with the other two mosquito-borne infections, important considerations specific to Zika may be overlooked, including that it is frequently asymptomatic and can also be transmitted sexually.
2. From July to August 2017, the Health Communication Capacity Collaborative commissioned a qualitative study among pregnant women and their partners and women likely to get pregnant in the near future who were recruited by community outreach workers in Barbarena, Santa Rosa (a lowlands town) and Mazatenango, Suchitepéquez (a highlands town), Guatemala (Leontsini et al. 2017). The study objective was to understand participants' perceptions of Zika risk, how it has changed, how to prevent Zika, and attitudes around recommendations related to prevention. The results of a free listing and rank-rating exercise indicated that those behaviors required to prevent sexual transmission of Zika (e.g., condom use, delay of pregnancy) were largely perceived as lower in effectiveness and less feasible to undertake. Lack of condom use was rooted in Zika being seen as a "silent" virus, resulting in the perception there is no need for birth control if a woman is already pregnant. Participants also confused Zika with other mosquito-borne diseases.
3. In November 2018, the USAID Applying Science to Strengthen and Improve Systems (ASSIST) Project conducted a gender assessment of factors influencing the Zika response in Guatemala (Faramand et al. 2018). Methods used included a desk review; 15 focus group discussions with pregnant women, women of reproductive age, men, and midwives; and key informant interviews with health providers from five urban, peri-urban, and rural sites in Guatemala City, Santa Rosa, and Zacapa. The aim was to assess the role of sociocultural factors that hinder Zika prevention and care and

treatment for Zika-related sequelae (e.g., microcephaly, Guillain-Barré syndrome). Findings indicated limited decision-making power of women/girls related to sexual and reproductive health, resistance to condom use among long-term couples and during pregnancy, and low participation of men in antenatal care visits. The study highlighted the sociocultural barriers to condom use such as: condoms being viewed as a symbol of infidelity or associated with being gay or having HIV and it being generally better when condoms are suggested and supplied by a man than a woman. While there were some potentially promising results when health providers delivered messages around Zika to men directly, there is limited interaction between men and the health system. Furthermore, given high rates of gender-based/intimate partner violence, women often fear violent reactions when suggesting condom use. In addition to these sociocultural barriers, the study found that cost and availability of condoms contributed to poor access.

4. At the end of 2018, Breakthrough RESEARCH conducted a household knowledge, attitudes, and practices (KAP) survey in four countries, including Guatemala, where 668 individuals (roughly three quarters women) from 24 communities located in Quetzaltenango, Santa Rosa, Suchitupéquez, and Chiquimula, Guatemala, were questioned about perceptions of trusted information sources for health and Zika, knowledge of transmission, perception of risk, preventive behaviors, and observations of water storage in communities. In Guatemala, men knew less than women about Zika, and men from across the other three countries were less likely to know Zika is transmitted sexually. The perceived risks in relation to Zika, Dengue, and Chikungunya were largely the same with roughly a third perceiving the risk as moderate and 45 percent perceiving the risk as high. The most popular sources of trusted information related to Zika were through health services, TV, and the internet; all other sources were reported by 10 percent or less. In terms of behavior, condom use was mentioned as a preventive measure for Zika among less than five percent of respondents, and only 10 percent reported always using a condom in the last 30 days.

In addition to studies examining Zika-related knowledge, attitudes, and practices more generally, the literature also includes studies examining the effectiveness of Zika counseling in producing positive changes in knowledge and practice of prevention behaviors. The evidence for counseling resulting in increased uptake of Zika prevention behaviors specifically is currently both limited and mixed, with some studies suggesting an impact of counseling on knowledge but not on actual behavior (Delet et al. 2018; Earle-Richardson et al. 2018).

The results of these studies indicate there are still challenges differentiating Zika from other mosquito-borne diseases, maintaining perceptions of severity in the context of other diseases, and sustaining delivery of trusted and sufficiently nuanced messaging that can inform preventive behaviors. Behavior change, especially as it relates to use of condoms, is a significant barrier. The most promising recommendations for achieving behavior change center on health provider counseling, which underscores the importance of understanding how Zika messaging is conveyed and sustained, and how perceptions of Zika have evolved among health providers and service users (especially those attending antenatal care visits) during the two and a half years since Zika was declared an international emergency in the LAC region.

A. USAID ASSIST Project

The USAID ASSIST Project supported the United States Government response to the Zika virus epidemic in the LAC region from 2016 through March 2020. ASSIST worked with national authorities to train clinical care providers on Zika counseling and implement a quality improvement (QI) program for Zika-related clinical processes, along with other system strengthening activities.

One of the objectives of this work was to improve Zika-related knowledge—such as knowledge of Zika transmission routes, risks, personal and home measures to prevent vectoral transmission, and the use of a condom as a preventative measure for sexual transmission—among pregnant women using antenatal care services and among women of reproductive age in family planning clinics.

ASSIST monitored 11 prioritized indicators as defined by the USAID Zika Monitoring and Evaluation (M&E) Framework in eight Latin American countries. These indicators were collected and reported monthly by facility-level QI teams and used by facility and MOH district and regional management to monitor the quality of Zika-related care. The indicators included whether women attending family planning and antenatal care visits can identify sexual transmission as an infection route and can identify condom use as the primary method to prevent sexual transmission of Zika.

B. Purpose

This research explored the role and impact of the USAID ASSIST Project's Zika-relevant ANC interventions in influencing provider counseling and women's knowledge and practice of Zika prevention behaviors. This study builds on the existing literature to help advance facility-based Zika interventions by examining how to improve counseling and messaging as part of the Zika response. This was accomplished through a quantitative analysis of exit interview data among antenatal care (ANC) clients in four countries and a qualitative case study from Guatemala. Unlike other studies recently carried out in Guatemala, this study focused on a specific program approach to identify what is most successful in transmitting knowledge and facilitating behavior change and why. The case study examines the value of the counseling intervention in supporting Zika prevention behavior change from the perspective of ANC clients and the value of the ASSIST training and QI interventions from the perspective of providers in strengthening their capacity to deliver effective Zika counseling.

C. Objectives

The objectives of this study were to understand whether the ASSIST Zika QI intervention was associated with a change in women's knowledge of Zika prevention behaviors in four countries, to understand ANC clients' perspectives on which aspects of the intervention most influenced women's desire/non-desire and ability/inability to practice Zika prevention behaviors, and to understand the perspectives of facility-based personnel on which aspects of the intervention most influenced providers' ability to effectively counsel women on Zika prevention in ANC. Specifically, we addressed the following questions:

1. In the four countries with at least one year of data available (Dominican Republic, Guatemala, Nicaragua, and Paraguay):

- a. How did knowledge of the risk of sexual transmission of Zika and knowledge of condoms as the principle method for preventing sexual transmission of Zika change among women attending ANC at ASSIST-supported facilities over the period of the ASSIST Zika intervention?
 - b. Was there an association between the mean 'quality' or comprehensiveness of Zika counseling delivered at a facility (with quality defined by the proportion of 18 counseling elements covered in the counseling sessions observed at a particular facility¹) and the change in the mean exit interview score of women's Zika knowledge over the intervention period?
2. In the Guatemala case study:
- a. Was the Zika counseling component of the ASSIST intervention implemented as expected and what are the lessons learned?
 - b. Do women who received Zika counseling as a part of ANC visits know key Zika prevention behaviors²? Where did they receive information? How useful was Zika counseling?
 - c. Do women who received Zika counseling as a part of ANC visits report prior practice and/or future intention to practice each of the Zika prevention behaviors recommended in the counseling (Breakthrough ACTION/Breakthrough RESEARCH 2018)?
 - i. What are women's attitudes towards practicing each of these behaviors?
 - ii. What factors influenced willingness or motivation to practice each of these prevention behaviors?
 - d. Are women who received Zika counseling as a part of ANC visits able to practice these Zika prevention behaviors? What are barriers, facilitators, and recommendations?

II. CONTEXT

The four countries included in this study range in population from about seven to 17 million and share similar basic socioeconomic and health characteristics in terms of life expectancy and fertility rate, with Guatemala standing out as having a slightly higher fertility rate, higher poverty rate, and a higher proportion of indigenous people among the population (**Table 1**). All are classified as upper-middle income countries according to

¹ This facility-reported indicator of quality or 'comprehensiveness' of Zika counseling is one of the 11 prioritized indicators within the USAID Zika M&E Framework.

² The Matrix was an effort supported by USAID, UNICEF, and USAID implementing partners to develop an evidence-based reference for partners working in Zika prevention on the most effective prevention measures and the contextual factors to consider in supporting uptake of those measures.

World Bank income classifications, except Nicaragua, which is classified as lower-middle income.

Table 1. Basic population statistics for the Dominican Republic, Guatemala, Nicaragua, and Paraguay

	Population (millions) ^a	Life expectancy (years) ^b	Fertility rate ^b	Rural population (% of total) ^a	Indigenous population (% of total) ^c	Population in moderate/extreme poverty (% of total) ^f
Dominican Republic	10.6	73.7	2.4	19%	-	6%/1.6% ^d
Guatemala	17.2	73.8	2.9	49%	41%	24%/8.7% ^e
Nicaragua	6.5	74.1	2.4	41%	6%	13%/3.2% ^e
Paraguay	7.0	74.0	2.5	38%	1.7%	6%1.2% ^b

All data are from the most recent year for which data were available via the World Bank Data Bank (World Bank 2019), except for the data on indigenous population, which is from a World Bank report on Indigenous Latin America (World Bank 2015).

^aData from 2018.

^bData from 2017.

^cEstimate for 2010 based on most recent census data up to 2010.

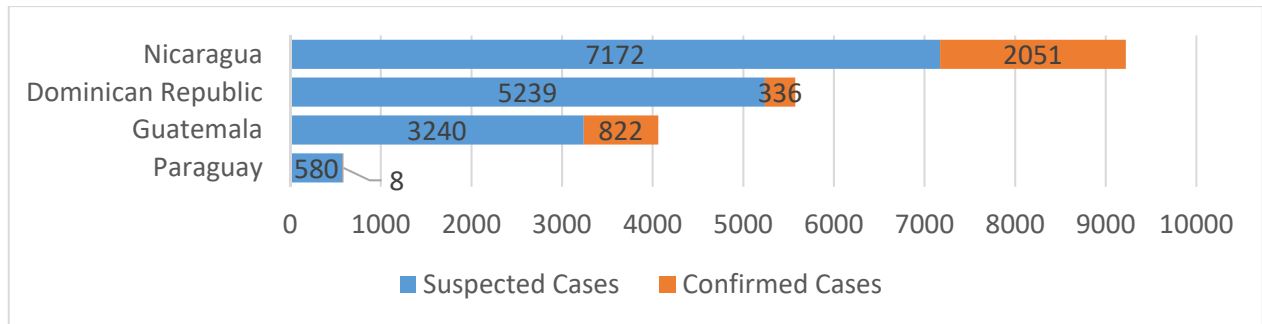
^dData from 2016.

^eData from 2014

^fModerate poverty defined as living on \$3.20 per day or less (2011 PPP); extreme poverty as living on less than \$1.90 per day (2011 PPP)

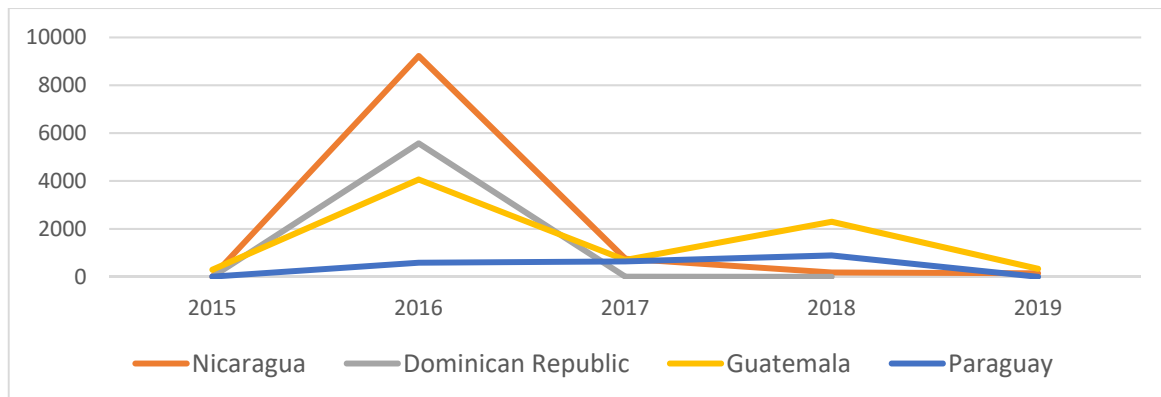
Each of the four countries initially experienced the Zika epidemic beginning in 2015-2016. As was the case throughout the region, 2016 was the height of the epidemic in terms of number of cases reported per year, with total cases (including suspected and confirmed) ranging from 588 (Paraguay) to 9,223 (Nicaragua), and laboratory confirmed cases ranging from 8 (Paraguay) to 2,051 (Nicaragua) (see **Figure 1**).

Figure 1. Suspected and confirmed Zika cases by country, 2016³



Following 2016, the number of Zika cases decreased in each country (see **Figure 2**), except in Guatemala, where the number of suspected cases increased slightly in 2018. The number of confirmed cases in Nicaragua did peak in 2016 (608 in 2016 versus 6 in 2017).

Figure 2. Total Zika cases (suspected and confirmed) by country and year⁴



Other key characteristics of each country's epidemic include:

- Dominican Republic:** The first case of Zika was registered in January 2016. At the height of the epidemic (week 15 of 2016), 354 cases were reported in one week. As of week 12 of 2017, the highest incidence rates were observed in San Jose de Ocoa (2010 cases per 100,000 residents), Independencia (139 cases per 100,000 residents), and Distrito Nacional (100 cases per 100,000 residents). Of 966 suspected cases among pregnant women through week 30 of 2017, 271 were laboratory confirmed. As of week 17 of 2017, 85 cases of microcephaly in newborns with laboratory-confirmed infection were reported (PAHO/WHO 2017).

³ Data for this figure are from: for the Dominican Republic and Guatemala - PAHO/WHO Health Information Platform for the Americas (PLISA) (PAHO/WHO 2019); for Nicaragua - PAHO/WHO Zika Epidemiologic Reports from 2016 (confirmed cases, through EW 50) (PAHO/WHO 2016) and 2017 (suspected cases through EW 33); Paraguay - ASSIST Paraguay final report.

⁴ Data for this figure are from: for the Dominican Republic and Guatemala - PAHO/WHO Health Information Platform for the Americas (PLISA) (PAHO/WHO 2019); for Nicaragua - data is from PAHO/WHO Zika Epidemiologic Reports from 2016 (confirmed cases, through EW 50); 2017 (suspected cases through EW 33) (PAHO/WHO 2017); and 2015 and 2017-2019 data from PLISA (PAHO/WHO 2019); Paraguay - 2016-2018 data is from ASSIST Paraguay; 2015 and 2019 data from PLISA (PAHO/WHO 2019).

- Guatemala:** The first cases of Zika were registered in Guatemala at the end of 2015, with a total of 1,161 confirmed cases between 2015 and 2019, of which 822 occurred in 2016 alone (PAHO/WHO 2019). In 2016, the highest incidence was reported in the department of Santa Rosa (106 per 100,000 residents) and in Zacapa (106 per 100,000 residents). As of week 28 of 2017, there were cases of Zika reported in 20 of the country's 29 health areas, with the highest incidence in Guatemala Central (14 cases per 100,000 residents); Chiquimula (6 cases per 100,000 residents); and Santa Rosa (5 cases per 100,000 residents). The age group most widely affected was women 25 to 39 years of age, followed by women 20 to 24 years of age, and then by infants less than 1 year of age. As of week 31 of 2017, Guatemala had reported 1,414 suspected cases of Zika among pregnant women, of which 341 were confirmed. As of week 21 of 2017, 140 confirmed cases of congenital syndrome associated with Zika had been reported (PAHO/WHO 2017).
- Nicaragua** experienced its first confirmed case in January 2016 and the height of its epidemic between June and September 2016. In week 33 of 2016, over 800 Zika cases were reported in one week. By week 35 of 2016, Nicaragua had reported 7,172 suspected and 1,696 confirmed Zika cases. By the same point in 2017, cases were down by about 90 percent (633 suspected and 5 confirmed cases) (PAHO/WHO 2017). Of 2051 confirmed cases by EW 50 of 2016, 1,114 were among pregnant women (PAHO/WHO 2016).
- Paraguay** announced its first confirmed case in November 2015. In 2016, Paraguay experienced 580 suspected and 8 confirmed cases, with 2 cases of microcephaly associated with Zika reported. The number of cases increased slightly in 2017 (637 suspected, 6 confirmed, 57 cases microcephaly associated with Zika suspected) and again in 2018 (886 suspected, 4 confirmed; 79 cases suspected microcephaly, 1 confirmed).

The timing and basic composition of the ASSIST Zika QI intervention in each country are described below:

- Dominican Republic:** The intervention was implemented from 2016 through May 2019, initially in 17 referral hospitals at the national, regional, and provincial levels in five health regions. In a second phase that began in 2018, six additional hospitals in three health regions were added.
- Guatemala:** The ASSIST Zika QI intervention was implemented in Guatemala between 2016 and 2019, with the aim of strengthening the capacity of health services related to the Zika virus, specifically the Maternal-Child Program carried out through the Health Area Offices (*Dirección de Área de Salud* or DAS), to offer assistance to women of child-bearing age (pregnant and not pregnant) and newborns.
- Nicaragua:** The intervention focused on both MOH facilities and university training centers. Support to MOH facilities took place from May 2017 through April 2018 at 65 facilities in five departments of the country (Managua, Carazo, Masaya, Granada, and Nueva Segovia) targeting three health system levels (central,

regional, and primary and secondary facilities). Support to training institutions took place from April 2017 through June 2019 targeting medical and nursing faculty and students at the seven largest public and private universities in the country, located in six departments.

- **Paraguay:** The intervention was carried out from August 2017 through June 2019 in 14 hospitals in three regions: Asunción (capital), Central, and Alto Paraná.

III. STUDY METHODOLOGY

A. Quantitative Data

1. Country Selection

The countries selected for inclusion in the analysis were all supported by the USAID ASSIST Project's Zika interventions in the LAC region and had facility-level data available on women's knowledge of Zika transmission and prevention and on Zika counseling comprehensiveness during ANC visits. Four countries met these criteria: Dominican Republic, Guatemala, Nicaragua, and Paraguay.

2. Data

The data used in the study were recorded by ASSIST-supported facilities on a monthly basis during the period of the ASSIST intervention in each country and shared with ASSIST personnel at the national and headquarters levels. Facilities included primary, secondary, and tertiary care facilities.

Outcome Variable

The continuous outcome variable examined was based on data from exit interviews of pregnant women who received ANC services at each facility. The variable is expressed as the proportion of women who correctly responded to two questions. Correct responses required: 1) identifying sexual transmission as a possible transmission route for the Zika virus, and 2) identifying condoms as the primary means for preventing sexual transmission of the Zika virus during pregnancy. Women who correctly identified one element but not the other were not included in the proportion. Facilities reported exit interview results from up to ten women per facility per month. Interviews were conducted by facility QI team members and/or project staff.

Key Independent Variables

Two key independent variables were included in the model: month and Zika counseling comprehensiveness. The month in which facilities began 'exposure' to the ASSIST intervention was the first month for which data was available for the indicators included in the analysis. The counseling score was the proportion of 18 Zika counseling criteria addressed during observed ANC visits, with up to ten visits observed and scored per facility per month (see **Annex D**).

Fixed effects variables: The region within country and the country in which the facility is located were also included in the model as fixed effects to control for unobserved, time-constant heterogeneity by region and country.

3. Data Analysis

The analysis was conducted using Stata 11 with a pooled four-country sample. Model estimates were considered to be statistically significant at the five percent level. Descriptive statistics were developed to provide basic information on the Zika knowledge scores by intervention month in each country and in the pooled sample. A model was estimated using multivariate mixed effects linear regression to estimate the effect of time (intervention month) and Zika counseling comprehensiveness in ANC on change in the estimated knowledge scores among pregnant women. The knowledge and counseling comprehensiveness variables were expressed as decimals (e.g., 0.10 for 10 percent). The analysis utilized a quasi-experimental model with country and region fixed effects to control for unobserved time-constant heterogeneity at the country and region levels. Because the data included in the model were only collected following the start of the intervention, and these data were only available for facilities participating in the intervention, neither a pre-post nor control group comparison were possible.

B. Qualitative Data: Guatemala Case Study

1. Overview and Design

The assessment was performed in 10 health centers located in nine municipalities of four out of the 22 departments of the country: Quetzaltenango, Santa Rosa, Zacapa, and Chiquimula. The department of Quetzaltenango is located in the western part of the country, with a population of 799,101 people; Santa Rosa is located to the southeast of Guatemala City, with a population of 396,607 people; the departments of Zacapa and Chiquimula are located in the eastern part of the country, with estimated populations of 245,374, and 415,063, respectively.

The qualitative case study assessment in Guatemala explored how counseling services supported by ASSIST influenced behavior to prevent Zika virus transmission from the perspective of antenatal care clients along with the perceived value of training and quality improvement interventions toward strengthening capacity to render effective Zika counseling, from the perspective of the health providers. The sample for the assessment included the following stakeholders: USAID ASSIST Project technical staff, health providers that received ASSIST support, health providers that did not receive ASSIST support, and women attending ANC.

In-depth interviews were performed in 10 health facilities comprised of seven health centers (*centros de salud*) and three permanent care centers or CAPs (*centros de atención permanente*), with participation of six health facilities that received technical assistance from ASSIST and four health facilities that did not receive technical support from ASSIST. The participation of both ASSIST-supported and non-ASSIST-supported facilities allowed for comparing and understanding the differences in the counseling service and in the behavior that the pregnant women demonstrated to prevent Zika, as a result of the technical assistance of the project.

All health providers working in ANC at study facilities were selected for an interview. In all facilities, there was an attempt to interview the coordinator or the director. In addition to the interviews with local stakeholders, the study included interviews with ASSIST technical advisors and senior consultants. A convenience sample of up to eight pregnant women

from 18 to 45 years of age who attended ANC the day of data collection were interviewed. Each woman was personally approached upon leaving the consultation, and their voluntary participation was requested, which was recorded in the informed consent. All women who consented were interviewed upon leaving the consultation until the number of interviews established per interview was reached.

Semi-structured guides were used to conduct the in-depth interviews (**Annexes A-C**) and addressed the following domains: knowledge regarding the Zika virus and prevention measures, perceptions regarding the counseling service rendered/offered and the training received, practices to prevent Zika, and recommendations. In the case of ASSIST staff, matters related to project implementation were also discussed. An information sheet with quantitative information was filled out for each participant, which included socio-demographic data of the participant and the score obtained from the questions regarding perception of the difficulty of applying the practices to prevent Zika, rated on a Likert Scale.

2. Data Collection

Data were collected by five female Guatemalan interviewers with experience in qualitative research methods. A five-day training was held in May 2019. Data collection tools were piloted in a health facility not included in the sample. Training included field guidelines, communications plan, interview record plan, review final interview guidelines, and ethical procedures. Data collection took place from June 3-17, 2019. A total of 80 interviews were held: 46 with pregnant women, 18 with service providers in ASSIST-supported facilities, 12 with service providers in facilities not supported by ASSIST, and four with ASSIST technical staff. **Table 2** shows the distribution of the interviews held in the 10 health facilities.

Table 2. Number of interviews held by stakeholder, service, and location

	Facility Departments and Municipalities	Pregnant Women	Service Providers	ASSIST Technical Support Staff
ASSIST Facilities	Department of Zacapa			1
	- CAP	6	4	
	- Centro de Salud	8	3	
	Department of Quetzaltenango			1
	- CAP	8	3	
	- Centro de Salud	8	3	
	Department of Santa Rosa			1
	- CAP	8	3	
	- Centro de Salud	8	2	
NON-ASSIST Facilities	Department of Chiquimula			
	- Centro de Salud A	0	3	
	- Centro de Salud B	0	3	
	- Centro de Salud C	0	3	
	- Centro de Salud D	0	3	
	Senior Staff			1
	Total	46	30	4

3. Data Analysis

The socio-demographic data and scores from the Likert Scales were analyzed in the SPSS statistical analysis program to determine basic frequencies. Prior to the interview data analysis, a code book was developed, largely consisting of a priori codes or themes in alignment with the assessment objectives and questions asked to participants. The coding of key themes was conducted in NVivo 12 by three members of the data collection team who met regularly to discuss and compare coding to ensure inter-coder reliability. The discussion of results and interpretation was facilitated by the co-principal investigators (Samantha Ski and Emily Peca). The analysis and articulation of findings was originally done in Spanish and then translated into English.

4. Ethical considerations

All data collection was conducted in Spanish, and participants provided consent prior to commencing the interview. The study team briefed every participant on the voluntary nature of the interview activity, reminded them that their personal information would be kept confidential, and asked for explicit permission to audio record the interview. Upon consenting to participate, all participants were given a form with contact information if the need for follow-up presented. The interviews were recorded with prior authorization and subsequently transcribed. No identifying information (such as names) were collected, and all transcripts and data collection files were password protected and only accessible to the data collection team.

Authorization to conduct interviews with health staff and ANC clients was granted by the relevant Directors of the Health Areas—all of whom were already collaborating with ASSIST to implement Zika-related activities described above. Ethical and technical approval was granted by URC's Institutional Review Board prior to commencing data collection activities.

IV. FINDINGS FROM THE QUANTITATIVE ANALYSIS

A. Descriptive Statistics

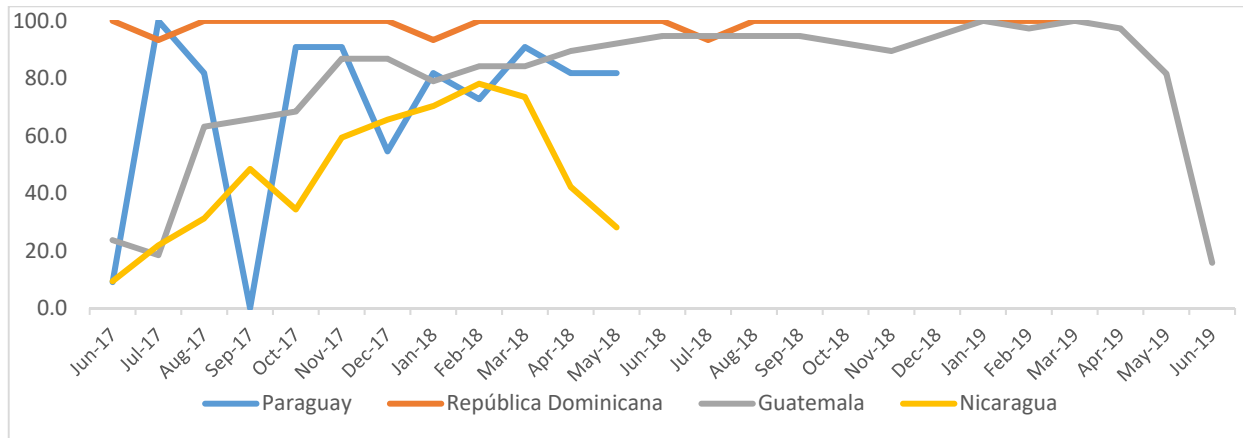
Among the four countries included in the analysis, the time period and the number of months for which data were collected varied. **Table 3** shows the number of facilities for which data were collected in each country, as well as the number of months for which data were reported per country during the period of July 2017 to April 2019. For facilities in Guatemala and the Dominican Republic, monthly data were available for approximately two years, while for facilities in Nicaragua and Paraguay, data were only available for one year or less. The number of facilities participating in the intervention also varied by country, ranging from 11 in Paraguay to 64 in Nicaragua.

Table 3. Number of facilities participating and number of months for which facilities reported data between July 2017 to April 2019, by country

Country	Number of months with data reported	Number of facilities that reported during the period of time
Dominican Republic	22	15
Guatemala	25	38
Nicaragua	12	64
Paraguay	12	11

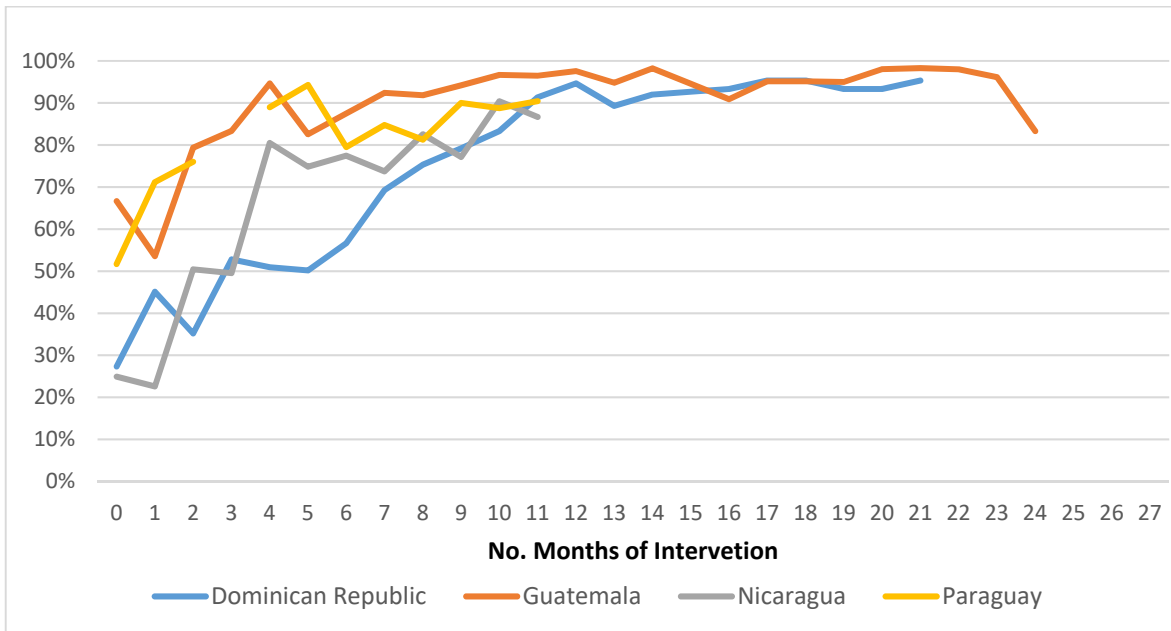
As demonstrated in **Figure 3**, the percentage of facilities for which data were available varied from month to month, in particular for Nicaragua and Paraguay. For the Dominican Republic, data were typically available for all facilities (n=15). In Guatemala, of the 38 facilities participating, the majority were not reporting at the start; by November 2016 (about six months after the start of the measurements), the percentage of facilities reporting became consistently high, and this continued through June 2019, when the percentage of facilities reporting dropped to 15.8%. This is most likely due to the closure of the project.

Figure 3. Trends in the percentage of facilities that reported information during the period of intervention for each country



Trends in the mean proportion of ANC clients that could identify the risk of sexual transmission of Zika and the use of a condom for prevention over time (intervention month) are displayed in **Figure 4** and **Table 4**. In each of the countries, the knowledge ‘score’ among ANC clients increased during the first 12 months of the period assessed. In Guatemala and the Dominican Republic, which have slightly more than and slightly less than two years of data available, respectively, facilities maintained the high percentage (90-100%) throughout the second year of the intervention.

Figure 4. Percentage of ANC users who could identify the risk of sexual transmission of Zika and the use of a condom for prevention by month of the intervention



Multivariate analyses

The mixed effects regression analysis (**Table 5**) revealed that time and comprehensiveness of Zika counseling in ANC were significantly associated with women’s knowledge of Zika prevention behaviors ($p < 0.01$). The model predicted that on average, holding all else constant, one additional month of the ASSIST intervention was associated with a marginal increase in knowledge of approximately one percentage point (0.008 or 0.8%), and an increase of one additional percentage point on a facility’s Zika counseling comprehensiveness score was associated with nearly a one percentage point increase (0.6%) in knowledge. Each additional year of the intervention is therefore associated with a 9.6 percentage point increase in knowledge. Improving counseling comprehensiveness by ten percentage points would produce a marginal six percentage point increase in women’s Zika knowledge on average, holding all else constant.

Table 4. Mean Zika prevention knowledge among ANC clients by month of ASSIST intervention (standard deviation from the mean reported below the estimate, along with n facilities for which there observations in each month)

Country	M1	M2	M3	M4	M5	M6	M7	M8	M9	M10	M11	M12	M13	M14	M15	M16	M17	M18	M19	M20	M21	M22	M23	M24
Dominican Republic	0.27 (n=15)	0.45 (n=15)	0.35 (n=15)	0.53 (n=15)	0.51 (n=15)	0.51 (n=15)	0.57 (n=15)	0.73 (n=14)	0.74 (n=15)	0.79 (n=15)	0.86 (n=15)	0.91 (n=15)	0.93 (n=15)	0.91 (n=14)	0.92 (n=15)	0.93 (n=15)	0.93 (n=15)	0.96 (n=15)	0.95 (n=15)	0.93 (n=15)	0.93 (n=15)	0.96 (n=14)	0.96	0.06
Guatemala	0.79 (n=36)	0.69 (n=27)	0.89 (n=30)	0.94 (n=30)	0.88 (n=33)	0.89 (n=29)	0.93 (n=29)	0.96 (n=34)	0.94 (n=32)	0.94 (n=32)	0.96 (n=34)	0.98 (n=35)	0.95 (n=37)	0.96 (n=36)	0.96 (n=34)	0.94 (n=34)	0.92 (n=36)	0.98 (n=34)	0.95 (n=35)	0.98 (n=34)	1.00 (n=28)	0.91 (n=23)	0.98 (n=14)	1.00 (n=10)
Nicaragua	0.28 (n=55)	0.60 (n=20)	0.71 (n=30)	0.73 (n=38)	0.76 (n=42)	0.73 (n=44)	0.83 (n=47)	0.79 (n=33)	0.82 (n=28)	0.89 (n=20)	0.93 (n=12)	0.97 (n=6)	0.38 (n=55)	0.42 (n=20)	0.31 (n=30)	0.30 (n=38)	0.29 (n=42)	0.28 (n=44)	0.27 (n=47)	0.31 (n=33)	0.32 (n=28)	0.26 (n=20)	0.23 (n=12)	0.08 (n=6)
Paraguay	0.52 (n=10)	0.74 (n=12)	0.73 (n=8)	1.00 (n=1)	0.89 (n=10)	0.94 (n=9)	0.80 (n=6)	0.85 (n=9)	0.83 (n=9)	0.90 (n=10)	0.89 (n=9)	0.89 (n=8)	0.34 (n=10)	0.31 (n=12)	0.26 (n=8)	1.00 (n=1)	0.15 (n=10)	0.10 (n=9)	0.18 (n=6)	0.19 (n=9)	0.14 (n=9)	0.22 (n=10)	0.15 (n=9)	0.15 (n=8)
Pooled Sample	0.46 (n=116)	0.62 (n=74)	0.71 (n=83)	0.78 (n=84)	0.78 (n=100)	0.76 (n=97)	0.82 (n=97)	0.85 (n=90)	0.85 (n=84)	0.89 (n=77)	0.92 (n=70)	0.95 (n=64)	0.94 (n=52)	0.95 (n=50)	0.95 (n=49)	0.94 (n=49)	0.92 (n=51)	0.97 (n=49)	0.95 (n=50)	0.96 (n=49)	0.97 (n=43)	0.93 (n=37)	0.98 (n=14)	1.00 (n=10)

Table 5. Results of mixed effects regression analysis, pooled four-country sample^a (n=121 facilities)

Time	0.008***
Counseling	0.606***
Country	-0.163
Region	0.002
Model fit (Wald chi2)	936.47***

^a Percentage variables (knowledge and counseling comprehensiveness scores) are expressed as decimals (0.10 for 10%).

*** Represents statistical significance at the 0.01% level

FINDINGS FROM THE QUALITATIVE CASE STUDY IN GUATEMALA

A. Characteristics of Participants

1. Pregnant Women

Table 6 shows the characteristics of the study participants. The sample of ANC clients in ASSIST-supported facilities interviewed included 46 pregnant women between the ages of 18 and 33, with an average age of 23.8 years, who were between one and eight months pregnant at the time of the interview. Almost a third of the women (30.4%) were attending their first prenatal care consultation. Twenty of the 46 women (43.5%) were expecting their first child. All but two of the women reported Spanish as their native language, and the remaining two reported being bilingual (Spanish and an indigenous Mayan language). Of the 46 women interviewed, 32 (69.5%) resided in the rural areas of the municipalities visited. The majority of women interviewed (42 of 46) were in a relationship (27) or married (15), and four were single and expecting their first baby.

Table 6. Demographic data of the pregnant women participating in the study (n=46)

	Range	Median	Mean
Age (years, n=46)	18 - 33	23	23.8
Education (years, n=45)	0 – 14	7	7.8
Duration of pregnancy (months, n=46)	1 – 8	5	5.3
Pregnancies (number, n=46)	1 – 6	2	2.0
Living children (number, n=46)	0 – 4	1	0.9
ANC visits (number, n=46)	1 – 7	3	3.0

2. Health Providers

The health provider interviews (n=30, 18 from ASSIST-supported sites and 12 from non-ASSIST-supported facilities) included the coordinator or director of the health facility and staff in charge of providing counseling services regarding Zika for ANC or family planning services. Of the 18 ASSIST-supported site health providers interviewed, 16 were women and two were men; in the non-ASSIST-supported sites, seven were men and five were

women. Among the entire group of health providers interviewed the following training was reported: high school graduate (1), nursing assistants (6), nurses (9), and doctors (14). These individuals had a wide range of time spent working at the present health facility (between two months and 27 years). Two of the 18 providers from the ASSIST-supported sites had not received any training on Zika; among the non-ASSIST-supported site providers, three of the 12 had not received any training on Zika (**Table 7**).

Table 7. Demographic data of the service providers participating in the study (n=30)

	ASSIST-supported Providers (n=18)			Non-ASSIST-supported Providers (n=12)		
	Range	Median	Mean	Range	Median	Mean
Age	20 – 66	35	40.7	28 – 65	38	44
Time of service (years)	0.1 – 22	2.5	5.3	0.5- 27	6.5	9.4
Number of Zika trainings*	1 – 15	6	6.2	1 – 8	3	3.2

*Among the 25 out of 30 providers who received at least one training.

The non-ASSIST-supported site providers received less Zika-related training, began training earlier, and the majority had their last training session in 2017 or prior. On the other hand, the providers from ASSIST-supported sites, compared to the others, received more Zika trainings over a shorter timeframe and more recently. For example, of the 25 providers who received Zika training, ASSIST-supported providers received almost twice as much training as the non-ASSIST-supported providers (6 and 3.2 training sessions on average, respectively). Five of the eight non-ASSIST-supported providers received their first Zika training in 2014 and 2015. One of them received their most recent training in 2014, two in 2017, and three in 2019. The majority of ASSIST-supported providers (12 of 14) received the first training related to Zika between 2017 and 2019; 14 of the 16 received their most recent training in 2019.

B. Priority Zika Prevention Practices: Knowledge and Perceived Feasibility of Adoption

The conversations with all respondents—women and health providers—began by exploring knowledge and perceptions of Zika symptoms and transmission.

“It is important for them to know that there are consequences, if one of them has contracted Zika because the virus lives in the body for two years. During these two years, we have told them that they should not get pregnant during this time, but it is equally difficult to control this part.” (Health provider, ASSIST-supported site)

According to the health providers interviewed, Zika does not have serious effects in adults, but the symptoms can be intense in children and the elderly. All respondents agreed pregnant women are at risk, particularly because it affects the development of the baby. The most serious consequence for pregnant woman who contract this virus mentioned by health providers is the risk of the baby being born with microcephaly, meaning, children

born with a “small head” or “smallness of the brain.” The health providers also identified a series of congenital deformities that included being blind, deaf, or effects to the psychomotor skills of the baby.

“We diagnose this type of disease from complications among pregnant women; especially for the baby, not necessarily the mother.” (Non-ASSIST-support provider)

All pregnant women interviewed had some knowledge of Zika. It was described by them as an illness transmitted by a mosquito, and some women likened symptoms of Zika to those of Dengue and Chikungunya. Women also mentioned the importance of preventing harm to the baby as a result. Despite general awareness of Zika transmission, few could well-articulate the consequences to the baby.

“The deformities that affect the baby; we were told that they are born, like a frog, straight here, without a brain, and some are so affected that the baby is born and immediately dies. This is the most significant effect. And then, if the Zika hasn’t had too much effect, the baby is born, and it is difficult, it is difficult for the mother to raise the child, because it is hard to walk, even hard to hear, because they say that the ear is affected. It isn’t complete.” (Pregnant woman, Quetzaltenango)

The majority heard about Zika during their ANC visits—some during their current pregnancy and others during a previous pregnancy. While some women interviewed were aware of Zika from the radio and television, in general, they received more detailed information when attending ANC.

“I had only heard people mention things, until I came here [health facility] and they explained to me that the children get infected by mosquito bites. That’s why they told me to use condoms.” (Pregnant woman, Zacapa)

Among the 46 women asked about the three forms of Zika transmission, mosquito bite was by far the most widely mentioned (85%), followed by sexual transmission (78%), with vertical transmission (i.e., mother-to-child), only mentioned twice. One woman said Zika could be transmitted through the use of contaminated needles.

Women said they valued the Zika counseling as part of ANC visits, primarily because they learned about the disease and how to avoid infection, most notably, transmission through sexual relations and the need to protect themselves during pregnancy. One pregnant woman said, *“I didn’t know, I was unaware that it could be transmitted through sexual relations with a partner. I didn’t know this, and I came here and learned this.”*

Women were asked to identify and share thoughts on the Zika priority prevention practices. Specifically, this refers to the practices identified as priorities and promoted by the Ministry of Public Health and Social Assistance and the USAID ASSIST Project (**Box 1**). In addition, all respondents (women and providers) were asked to rate their perception of how easy or difficult (on a Likert scale) it is for pregnant women to adopt each of the Zika prevention measures. In general terms, all prioritized practices were considered “easy” to “very easy” to perform. However, there was variation in responses among stakeholder groups. The following sections highlight their perspectives on each of the practices.

Box 1. Summary of priority Zika prevention practices

Preventative Practices

1. Application of mosquito repellent (DEET, Picaridin, IR3535, or oil of lemon eucalyptus, only), using each product as directed, for duration of pregnancy, to reduce risk of Zika transmission through mosquito bites
2. Use of condoms to prevent sexual transmission of Zika in pregnancy.

Vector Control

3. Regularly removing unintentional standing water both inside and outside of the house, and in communal areas.
4. Covering water storage containers at all times with a cover that is tight fitting and does not warp or touch the water.
5. Scrubbing walls of water storage containers weekly to remove mosquito eggs.

Enabling Behaviors

6. Seeking prenatal care to monitor pregnancy and discuss Zika risk and prevention.
7. Seeking counseling from a trained provider on modern family planning methods if not planning on getting pregnant.

An additional practice that was promoted by the Ministry of Health and Social Assistance, but not currently considered a priority by USAID: use of mosquito nets or screens/mesh on doors and windows in the home especially during pregnancy.

1. Priority Practices: Preventative Actions

When asked to identify Zika prevention measures, the women interviewed spontaneously mentioned more than 20 prevention practices. These included the prioritized measures, and others, such as cleanliness of home, use of long-sleeve shirts or light-colored clothing, and use of fans and electric rackets. Of the prioritized practices, five appear among the most widely referenced spontaneously by the 46 women, although none of them were offered by more than half of the participants: the use of **a condom** and the use of **mosquito nets** (which is not currently considered a priority practice by USAID) were most popular. Those were followed by: **washing walls and water storage containers**, **removing unintentional standing water** and **using repellent**. Additional practices were mentioned by very few women, but not spontaneously: covering water storage containers, seeking ANC care, and using a mosquito net. The use of modern methods of family planning *to avoid pregnancy* was not mentioned as a measure to prevent Zika.

a) *Application of mosquito repellent*

The use of **mosquito repellent** was mentioned by about a third of the women interviewed, most of whom mentioned it spontaneously. Respondents generally indicated they do not use repellent all year, but rather during the times of the year when “mosquitos are more abundant” or during times of the day when they are relaxing or not moving. Reasons given for not using repellent include the cost (especially if the entire family uses it), the belief it is

a type of “poison” and people prefer not to use it, and that it has an unpleasant smell and sensation when applied to the skin.

More than half of the women who use repellent believe that it is an easy or very easy means of prevention because repellent is simple to apply and is available locally. With respect to its effectiveness, they posited that protection is for a limited amount of time and requires continuous application. For this reason, some women prefer to use mosquito nets or long-sleeved clothing. On the other hand, some women did not know about repellent, never used it, and were unsure if it is an effective method to protect against mosquito bites. Some women indicated that health providers failed to mention the use of repellent as one of the Zika prevention measures.

b) Use of condoms during pregnancy

More than half of the pregnant women interviewed said they used a **condom** as a Zika prevention measure. The majority began using them as a result of prenatal counseling. Women reported receiving information regarding sexual transmission of Zika from a man to a woman and how it put the development of the baby at risk. In addition to condom promotion, condoms were also distributed.

“... the [the doctor] told me, when I was being given everything that I had to use, the folic acid and iron supplements, I was told that I would be given condoms because they were essential, and I asked why condoms, because I was pregnant, and that is when I was told about Zika.” (Pregnant woman, Quetzaltenango)

In reference to the past, only a few women suggested they used condoms as a Zika prevention practice or contraceptive method. According to them, the guidance to use a condom during pregnancy was a change and not part of the regular recommendations given by health providers to pregnant women.

“Previously I don’t think it was recommended [the use of a condom], beforehand I don’t think they were given out, but now they are, and ever since I got pregnant, they started giving them to me, and telling me about this, more frequently than before.” (Pregnant woman, Zacapa)

The use of a condom during pregnancy was considered a difficult practice by a third of pregnant women, while the rest rated it easy or very easy. Condom use requires negotiating with the partner, which can be difficult because men refuse for the following reasons: it is not customary, they experience a loss of sensitivity, they want to avoid accusations of infidelity; and they lack knowledge regarding Zika and the modes of transmission: *“She is pregnant, why would we use one, what are we going to prevent, he says.”*

Some husbands agreed to use condoms after they understood why they are necessary for the wellbeing of the baby. Not all women achieved acceptance by their partner, and some who were at risk preferred not having sexual relations without protection.

“I told him, I gave him a pamphlet, and as I was unsure, I told him that I was going to use a condom, that from here on out I would use a condom. So, he started laughing, and I asked him why he was laughing, and told him I wasn’t joking. I told him that he needs to take it seriously, because it isn’t a joke, or does he want to have a child, a baby that is born with a

deformity, born a vegetable, or that cannot move because he doesn't want to do what I say or what is said in the talk. So, he said, it's best not to have relations, that we wouldn't have relations, and I said for me there's no problem. That's how we left it, but now, I went in for my consultation, and I listened to the talk, because yesterday I didn't hear the talk when I came, and now I have condoms, so now there is the option to have relations." (Pregnant woman, Quetzaltenango)

c) Perceived ease of adoption

The health providers' perceptions on condom use varied by group. More than half of the non-ASSIST-supported providers (n=12) thought it to be difficult, while nearly two thirds of the ASSIST-supported providers (n=18) considered it easy. Women were more optimistic in their responses as sixty percent of the pregnant women (n=44) determined it easy/very easy and that appreciating the risks for the baby can be sufficient motivation for the women to confront the "machismo" of their partner, which is considered the primary challenge.

2. Priority Practices: Vector Control at Home and in the Community

A lack of running water was reported to be common in the majority of the municipalities where interviews were conducted, and therefore, storing water is a frequent practice among families. Water is considered very valuable and should not be wasted. Treatment of stored water depends on the use. Among most women interviewed, they indicated it is important to keep water stored for drinking or cooking covered, but not necessarily the water used for washing containers or clothes. Emptying water storage containers within and outside of the community was reported by about three quarters of women. Further, cleaning the walls of the *pila* or receptible for water were mentioned by the majority and covering the water storage containers were reported by nearly all women. These practices were rated easy by the majority of the women.

a) Covering water storage containers

Covering water storage containers is a practice pregnant woman learned at home, and was reinforced during talks or training on hygiene, health, prevention of illnesses, and as part of the recommendations received during ANC counseling. *"We always cover them, but now even more carefully."* *"We always [did it], but they explained it to us more and more."*

"But, like I said, it is done because that is how we do it, but sometimes we forget, but now, with so much talk, with so much illness, we are so worried about going around covering everything." (Pregnant woman, Santa Rosa)

Women indicated the type of items used to cover containers with water includes towels, plastic with a cord to tighten around it, pieces of wood. Using containers with their own top that fits perfectly is an effective measure for protecting water.

"Buy containers with a top, because with a top you don't have to look for nylon to top them, or a cord, and the nylon wears out after a while with the sun and water. On the other hand, the top only needs to be washed and put on the container." (Pregnant woman, Santa Rosa)

b) Scrubbing walls of water storage containers

Women reported that the water storage basin or *pila* is washed as part of the cleaning routine at home. It is a task that the women have done “forever,” and learned at home. They consider this an easy job. The majority of the women wash the basins two or three times per week, as recommended by the health services; although some do it once per week. The women suggested the main reason for washing the storage receptacle is remove the “filth” from the walls, because the water is also used to wash, among other things, utensils to prepare and eat food.

“[I use bleach] to disinfect it, so you don’t notice the bad smell of the basin.” (Pregnant woman, Quetzaltenango)

“I use detergent to get rid of the filth, scrubbing with a brush, and then rinsing it so it is clean. (...) The bleach also helps it to be cleaner.”

Most women reported using bleach and detergent, either combined or successively and depending on the size of the water receptacle, a brush or a broom is used to remove the “filth.” Some also mentioned they add drops of bleach to the full tank of the basin, with the aim of maintaining the water clean and keeping mosquitos out.

“We didn’t use detergent, but only the brush until we were told here, and I told my mom how to use it, and now, even when we fill up the basin, we put in a little bleach. I have seen how this helps out (...) because it doesn’t get dirty now, and there are no mosquitos. Bleach helps a lot.” (Pregnant woman, Quetzaltenango)

c) Removing unintentional standing water weekly

The pregnant women interviewed reported that emptying the containers with standing water inside and outside of the home, as well as eliminating tires and garbage that accumulate water is useful to avoid the propagation of mosquitos. Some began to do this more carefully, applying the recommendations received in the health services and the orientations of the group of vector control specialists that visit the communities; others learned from their mothers as part of the cleaning habits of the house; and some remember they were told about mosquitos and eliminating standing water at school.

Pregnant women expressed that getting rid of standing water is an important measure, as this keeps mosquitos from laying their eggs in standing water: *“They are flipped over, they won’t have anywhere for the larva to reproduce.”* They believe that this is easy to do, because the only thing they need to do is collect the trash, “gather it in a pile,” burn it or bury it, and this would be even easier if the entire family helped out. Other women believe that it is a complicated, difficult task, as there are families who are not aware of the risks that they run due to inadequate cleaning of their houses and the community. Some say that, while they have the intention of doing so, they do not have help from anyone else, and all of the work at home doesn’t allow time to do everything, for example, a woman mentioned: *“It’s hard, because sometimes we want to do our work later, or get it over with quickly.”*

d) Perceived ease of adoption

When respondents were asked to comment on the ease of adopting vector control prevention practices in the home and communities e.g., empty water containers within and

outside of the community, clean and cover the water storage containers, between 70% and 90% of the pregnant women consider these easy or very easy to perform. On the other hand, the ASSIST-supported and non-ASSIST-supported providers consider these practices more difficult, for example, more than 40% of the non-ASSIST-supported providers consider the elimination of tires and trash that accumulate water outside of the home as difficult to perform, and they have had to put in extra effort to achieve awareness of the importance of cleanliness among the people, because according to them, it is rare for people to report removing tires and flipping over containers. With respect to the cleanliness of the basins, while the practice is considered easy by the women, the providers state that they do not do it properly.

3. Priority Practices: Enabling Behaviors

a) Seeking of ANC Care to monitor pregnancy

The pregnant women interviewed consider it useful to seek ANC to prevent Zika because how to prevent the disease is known. Attending ANC appointments and receiving counseling about Zika was rated relatively easy by the vast majority of pregnant women and is a practice that is more common now than in previous generations. The women considered it important to attend ANC to prevent any problems during pregnancy or birth and to receive the necessary care for the baby to develop properly. Increased ANC attendance in more recent times was attributed to having more accessible services equipped with trained staff and supplies. On the other hand, obstacles to ANC attendance included long wait time, competing responsibilities at home such as childcare, and the costs associated with services.

b) Seeking family planning counseling if not intending to get pregnant

Seeking family planning methods and counseling to avoid a pregnancy as a measure to prevent Zika infection was deemed easy or very easy by three quarters of the women interviewed. Access to public health services that offer information about modern methods has allowed women to make informed decisions about their method of preference.

“It is easy because here, at the health center, you come and say you want to plan and there are a lot of methods to do so. All you need to know is the date and day for your turn, depending on the method you are going to use. It’s all free.” (Pregnant woman, Quetzaltenango)

“It doesn’t cost us anything to come here to search, to be seen, to hear about all of the methods, and see which one is right for you.” (Pregnant woman, Zacapa).

The counseling service offered to pregnant women included, in some cases, the recommendation to prevent future pregnancies.

“We need to make sure that we don’t get pregnant during, let’s say, if you’ve had symptoms of dengue or any illness similar to Zika, to have lab tests first, to see if you’re healthy and how to plan, the methods of planning, normal actions, everything they teach us at the health facilities.” (Pregnant woman, Santa Rosa)

Nevertheless, some women interviewed said their Zika prevention counseling as part of ANC received on the day of the interview did not include the use of family planning

methods. This topic, according to them, is primarily discussed when the women are not pregnant, to avoid pregnancies in quick succession, and not necessarily for Zika prevention.

The desire to protect their family from Zika infection was a sufficiently compelling factor for some to use a family planning method. However, even if some were convinced of the importance of this measure, it is necessary to have approval from their partner. In many cases, this was the biggest hurdle. *“The husband makes the decisions,” “If my partner wants to have a baby, I don’t know what to do,”* are some of the barriers stated by the women interviewed. Faced with this situation, some women prefer not to use family planning methods, and others do it without the knowledge of their partner.

“This can be a little bit difficult, in the sense that the husbands, not all of them are in agreement that the women do this part of family planning. We even have users who leave their ID card here, and we keep it, because they don’t want to take it home and have their husband see that they are coming here for consultations regarding methods.” (Health provider, Chiquimula)

c) Perceived ease of adoption

The non-ASSIST-supported providers think it is less feasible for woman and families to enact the abovementioned enabling preventative practices (seeking ANC and FP for Zika prevention). Some providers believe that the lack of knowledge and unwillingness among clients are behaviors that are not easy to modify. Conversely, pregnant women, ASSIST-supported providers, and ASSIST staff are more convinced that counseling effectively facilitates change, despite challenges.

Understanding the consequences of not following the recommendations has been sufficient motivation to adopt certain practices. Nevertheless, not all of the women have put the new lessons into practice. There are some women who *“don’t do it; it goes in one ear and out the other.”* Following the recommendations depends on the willingness and desire of each person.

“If they are explaining something to me, it is for good reason, not just to explain something, right. So, I think that it is great, because as they are guiding us, if we don’t take precautions, it’s because we were negligent, because since the very beginning, at least with me, they have been explaining everything. Put it on they say, and I don’t use a condom, or don’t use repellent, they say you don’t need to cover yourself with warm clothes or anything. So, if I don’t understand, it is my fault, and I can’t come later and try and blame the doctor or the person who saw me, because I need to take care of myself.” (Pregnant woman, Quetzaltenango)

C. Implementation of the Intervention: Success and Challenges

While the previous sections addressed knowledge and perceptions around Zika and the ease of prevention practice adoption, this section explores whether the ASSIST intervention was implemented as intended, including aspects such as health provider education and training, ongoing technical mentorship to providers, and delivery of ANC care. Experiences of non-ASSIST-supported providers are also included to contrast those of ASSIST-supported providers to elucidate any major differences or similarities. This section also addresses the intervention’s facilitating factors and challenges.

1. Intervention Implementation: Health Provider Training

During its development, the USAID ASSIST Project continuously trained health providers regarding matters related to Zika. The information presented corresponds to 18 health providers interviewed from the ASSIST-supported facilities and 12 providers from non-ASSIST-supported health facilities. Sixteen of the 18 ASSIST-supported providers interviewed received training regarding Zika. The amount of training received ranged between one and 15 sessions, the majority was facilitated by the USAID ASSIST Project and others by the DAS, largely prior to the project, in the municipalities most affected by the epidemic. The Health Area Offices also had trained health personnel. Among the non-ASSIST-supported providers, nine out of 12 interviewed received between one and eight sessions of Zika-related training. These training sessions were provided by personnel of the DAS and other institutions, such as the Red Cross and Doctors of the World.

To participate in trainings in ASSIST-supported sites, the coordinator selected staff including doctors, nursing staff (assistants and professionals), and in some cases, educators and social workers. The quality improvement team of each facility participated in all training sessions, while the remaining staff participated in some, attending sessions in small groups to avoid interrupting care for clients. The selection criteria for participants in each training session depended on the topic and the relevance it had to particular staff and their functions. Afterward, the content from the training was shared in some cases with all support staff, including those who do not have direct contact with clients, such as administrative or cleaning personnel. In some cases, health promoters and midwives also participated. The knowledge was passed on to other groups, such as teachers and women of child-bearing age, to *“teach them about the Zika disease, how it’s transmitted, and for future mothers who are preparing for a pregnancy to understand the means of prevention, symptoms and complications caused by Zika.”* (Health provider, non-ASSIST-supported site)

Those trained became point people to refer matters related to Zika. The teamwork and cross-cadre learning allowed for preparing staff to address Zika in an integrated manner.

“What we learn, at least in my case, I share with my social promoters, including my janitor, my drivers, [...] It would be catastrophic if a tire was found with larva in the health center. That would be a sin. I need everyone to be on the same page, and to know what we are looking for, and what we are fighting against.” (Health provider, ASSIST-supported site)

“Sometimes the nursing personnel, thank God, my professional nurses, they have received continuous training, and this has made me, in some cases, look weak when providing assistance, going with them so they can help me, and see what type of treatment they are providing or how they are treating the clients.” (Health provider, ASSIST-supported site)

“Yes, because sometimes the health offices refer the pregnant women to me, for me to see them, and when I take a look at them, and when I ask them about their knowledge, yes, it is like they had received it from us, because we are all providing the same thing.” (Health provider, ASSIST-supported site)

The providers indicated the training was positive (using descriptors such as “excellent,” “nice,” “good,” “perfect”) because they received new lessons, updates, and reinforcement

of knowledge regarding Zika, and the importance of raising prevention awareness among clients. They rated the training methods employed as adequate, because in addition to sharing knowledge, trainings were dynamic. They also appreciated the content and the selection of the experts.

“... good, because we sometimes are like robots during the consultations, and when there is training, this is fresh in our minds and we have other ideas and manners of caring for the users. For me, it is excellent that they are training us so that we don't forget. While we had received training three years ago, and we know what Zika is, there are always changes, something new, both epidemiologically and how to treat the user.” (Health provider, ASSIST-supported site)

“... [the training sessions] are good, well structured, from the places they are held, to the content and trainers. You can tell that each specialist presents [is selected] depending on the topic. It isn't the same person that gives all of the topics, but rather, for example, an expert on gender, an expert on prenatal care, there was an ophthalmologist-pediatrician for complications; a specialist for each topic.” (Health provider, ASSIST-supported site)

“This is a way for the health provider to remain up to date, informed, and to have the resources necessary to be able to properly evaluate the pregnant woman and the newborn.” (Health provider, ASSIST-supported site)

The educational program included providing tools to the providers and the facilities to be used during the ANC consultation and to assist with exams. The tools included educational materials (signs, posters, tri-folds), checklists, graphics, measuring tape, early stimulation materials, and others. Some innovative topics included were the systematic measurement and evaluation of head circumference, psychosocial support for families with children with Congenital Syndrome associated with Zika, and stimulation for the development of these children. This last activity was not planned in the original design but incorporated due to the health provider need to improve their capacity to meet the needs of children and families. The systematic head circumference measurement has allowed the doctors and nurses to provide special attention and monitoring to this indicator of Congenital Syndrome associated with Zika from birth.

The reactions of the providers to the training were positive. The knowledge and support to putting it into practice contributed to their empowerment in the prevention and treatment of Zika.

“The purpose of the program is, as you would say, to respect the norms, but to make it operational, feasible, and to show us, and for us to show ourselves, that it can be done.” (Health provider, ASSIST-supported site)

All of the participants had a positive opinion regarding ASSIST, as the knowledge acquired could be used in other programs, for example, to improve prenatal care in general, and to improve care processes, which could apply to other diseases. The learning from the collaborative efforts or teamwork can also be applied to solutions for improvements in other areas, whether administrative or clinical.

2. Intervention Implementation: Ongoing Technical Mentorship to Providers

The ASSIST technical assistance to health providers took place with three stakeholders: USAID ASSIST Project staff, supervision of the DAS, and the quality improvement teams. The constant and friendly support of the technical advisors allowed for concerns to be resolved, knowledge to be fostered, and the processes to be carried out properly.

“We feel accompanied during the whole process, meaning, they never leave us by ourselves; they are always concerned about how we are doing, if there are new cases; they handle the matters as if they were part of our staff, [...] they know the children by name, they are very committed.” (Health provider, ASSIST-supported site)

The providers believed the instruments to be helpful for generating indicators for monitoring, evaluation, and supervision of the implementation of Zika-related preventive action. ASSIST promoted the creation of quality improvement teams. The teams fostered change, for example, by amending care processes and adopting ANC forms. The changes were well received because they arose from the staff themselves. The staff also learned to work as a team, manage issues, and understand that sometimes money is not required to implement changes that can have an impact.

“This is one of the things that we leave; they can make changes without being dependent upon the Ministry or other organizations, or they can do it with other organizations, but managing said changes themselves.” (ASSIST staff)

3. Intervention Implementation: Zika Counseling during ANC

The USAID ASSIST Project focused on providing Zika counseling prior to conception, during pregnancy, and postpartum. Pre-conception and postpartum family planning services were not investigated as part of this effort—ANC was the focus. ANC visits are divided into three phases: pre-consultation, consultation, and post-consultation. The division of the visits into three phases offers a greater opportunity for clients to consume the information repeatedly and by more than one individual throughout the process. Zika counseling is offered individually or in a small group with other pregnant women or sometimes in a larger group of all clients waiting for exams if it is the topic of the health talk that day.

“Yes, it is useful, because during this phase, during ANC, this is when the people have this space for learning, which is a two-way street, as they express their concerns and we provide clarification. These spaces are useful and have provided good results.” (Health provider, ASSIST-supported site)

The providers in charge of providing counseling are primarily nursing assistants, nurses, and doctors. Nevertheless, in some facilities, it was evident that the malaria group also contributed to Zika education both as part of ANC and independently.

Individually, pregnant women receive information regarding Zika during the pre-consultation, while taking vital signs, weight, and other information. During this time, some information about Zika is offered, which is then reinforced by the health provider. The counseling lasts an average of half an hour, including the portion regarding Zika. During the post-consultation, the ANC process ends with the provision of condoms as part of the

Zika prevention recommendations and verification the woman understands condom use as part of Zika prevention. Providers indicated that pregnant women who attended their first consultation had longer consultations. For all others, the duration and the content depended on determining how much they knew and how they were applying the prevention practices.

All of the women interviewed affirmed that they had received Zika counseling the day of the interview. However, some stated that they did not always talk about Zika during their visits. When it was discussed, supporting materials provided by the USAID ASSIST Project were used to foster the organization and structure of the talk and reinforce understanding of concepts and risks. While some believed the talks were boring, others think that it is a way of learning and reinforcing information so it is remembered. The women considered privacy to be essential, and many do not ask questions because they are embarrassed and do not want to discuss topics, such as the use of condoms. Arriving with another child or using cellphones are factors that distract the women when receiving the talk. Two priority topics within Zika counseling were: use of condoms and Zika complications among babies. Further, health providers have enacted different strategies to get couples involved in ANC, such as inviting them to participate in the medical consultation or in meetings of the Pregnancy Club.

The promotion of male involvement is another dimension of ANC reinforced by ASSIST. Typically, women attend their ANC visits by themselves; however, the USAID ASSIST Project implemented various strategies to encourage the participation of men so that they can make informed and educated decisions.

“If a woman comes by herself to the first visit, a recommendation is made for her partner to come to the second visit.” (Health provider, ASSIST-supported site)

Women felt it was important to engage their partners, as they do not always feel capable of relaying the information precisely, and they are “embarrassed” to talk about using condoms. They indicated they feel like the men will listen more to the suggestions of the provider, especially if it is a man.

“On occasions, the husbands have come by themselves, and they say, look, my wife said that you called me. So, we ask them if the wife is pregnant, and that is when we get their attention and we talk with them. On occasions, the women are embarrassed to take the condoms and say no, I don’t want to take them, just give me one. No, we tell them, and try to convince them to take them. Nevertheless, the next time they say, my husband doesn’t want to use them, so we call the husband to come. Sometimes they come. Some of the villages are very reluctant.” (Health provider, ASSIST-supported site)

The health providers indicated it was difficult to get men to use condoms at the beginning. One of the strategies was to invite them to voluntarily attend the ANC consultation. Men were surprised to learn the importance of using a condom to prevent Zika and negative consequences for the baby, but over time, they became more accepting, despite their initial unwillingness.

“And we begin to talk to them, so, OK, if you don’t want to live a life, have a life, it is not a burden, but it is a lot of work to have a child with special needs, because the child will not develop, will not evolve psychologically. You will end up living the entire time with a small

child at home. You won't expect them to walk, you will not expect them to develop on their own, you won't have hope then, and this is what we want to avoid. With our economic conditions, we are not prepared for that. So yes, you are right, and we began to use a condom more." (Health provider, ASSIST-supported site)

d) Factors that facilitate effective counseling services

To provide effective counseling, health providers suggest the following: **staff are prepared** and possess adequate information. Training for staff is essential for the provider to be successful as an educator. It is helpful to have **supportive material** such as the **checklist and registration tools** in the file and Health Management and Information System (Sistema de Información Gerencial de Salud) or SIGSA form, to monitor and enhance the implementation of care processes. For example, using the **checklist** was coined "the eighth wonder of the world" because it ensured that all topics were covered, in addition to efficiently managing the time so that women would not get anxious.

Establishing an **environment of trust** that fosters communication, interaction, and learning was considered a key to success. Some strategies mentioned were women-to-women or men-to-men learning. The women mentioned that they were more comfortable when a woman provided counseling services; if a man gives them, they do not ask questions, even when they have concerns. One of them said, *"I won't talk about condoms, I don't like talking to men, I don't trust them; it is better talking to a woman,"* ensuring private spaces where the confidentiality of the information exchanged is guaranteed.

"We have figured out how to change this train of thought, and what we have been asked, because those of us that are part of the Pregnancy Club, we are women that show how to put on a condom. The guys don't like this part; that women, the nurses, show how to do this, and they would rather a man show them, so we have two social promoters who do this. They go and they show them how to put it on, because there is more trust, man-to-man." (Health provider, ASSIST-supported site)

The providers consider having a **positive attitude** as essential to incorporating changes in processes, accepting new approaches, and above all, being aware that changes in knowledge, attitudes, and behaviors among clients can be a slow process that requires repeated messages and different forms and styles of communication of the health topics.

e) Factors that hinder effective counseling services

Effective communication is essential to fostering learning among clients. What can hinder the communication and learning process are failing to consider the audience's level of schooling, ability to understand Spanish, and the difficulty and sensitivity of some of the topics, which require additional time and explanation. Some providers acknowledge these limitations and attempt to find solutions such as: the use of simpler language, communication with those who accompany the women, and reinforcing the benefits of familial support to understand and apply knowledge. Unfortunately, some women are burdened with a multitude of responsibilities are less open or able to absorb counseling information.

"The fact of the matter is that people are more worried about returning home, hurrying to make a meal, rather than being worried about the creature in the womb." (Health provider, non-ASSIST-supported site)

Further, the quality of consultations is sometimes compromised by: high unscheduled client volume and insufficient numbers of providers resulting in limited time for client interactions along with some providers who lack the abilities or attitudes necessary to provide effective Zika counseling.

4. Challenges, Success and Recommendations to Improve Implementation

One of the major challenges for providers is to get clients to understand that Zika is transmitted sexually and the use of a condom during pregnancy is essential as a method of prevention. The former can be attributed to a low level of education among clients, association of condoms exclusively with family planning, and the association of the use of condoms with infidelity and machismo. To address these obstacles, ASSIST promoted greater frequency and consistency of messaging, especially with respect to the risk of contracting the virus and the need to apply prevention measures as an individual, family, and community. Additionally, efforts were made for the providers to include tools to help women negotiate the use of condoms with their partner. One strategy used by various providers was to reinforce the importance of a healthy baby, and in some cases instilling the fear of having a baby born with Congenital Syndrome associated with Zika. Some services have attempted to get the significant others more involved, inviting them to ANC or Pregnancy Club activities, with the aim of informing them about the virus. Some health facilities received the support of community leaders to promote men accompanying their partners during ANC.

Another challenge health centers and CAPs confront is losing non-permanent staff, who are then replaced by providers who are not trained in Zika counseling. Faced with this reality, staff have proposed to establish training cycles for Zika counseling to ensure new and existing staff remain up to date.

The laboratory capacity at the CAPs and health centers hinders demand for Zika-related services. Only the National Health Laboratory has the capability to process tests for Zika. According to the Care Standard, the health services must take a blood sample of all pregnant women suspected of having contracted Zika, send it to the DAS in order to be sent to the LNS, but the results take more than one month. The individuals interviewed believed this takes too long. In some cases, the women who have financial means get tested at private laboratories to receive timely diagnoses. The non-ASSIST-supported service providers said it was important to have more ultrasound devices to foster timely diagnosis and to alleviate the workload in the hospitals.

The following are respondents' suggestions for how to improve implementation in the future:

- The service providers supported by the USAID ASSIST Project suggested that training take place in areas closer to the work sites, as the workers have to cover the transportation costs; that the groups be smaller, and the sessions be more frequent to aid feedback. They also suggested that participation of the doctors be promoted as part of the training.
- The providers suggested the donation of repellent for pregnant women and that genetic testing take place with kids with congenital syndrome to verify if this is

associated to Zika. They also requested the project be extended for at least one more year in order to reinforce and continue to strengthen the providers' capacity, especially with regards to monitoring and evaluation of the indicators.

- The beneficiaries, e.g., pregnant women, stated that not all women come to the health centers, and therefore it is important for the health services to visit communities and homes to motivate more women to attend the talks of the services and for more men, community leaders, and teachers to get involved and prepare the communities for an integral response to Zika.
- The health providers highly rated the ASSIST-supported training on Zika prevention behaviors and how to counsel women during routine ANC visits. Therefore, the providers suggested the training processes be incorporated into the DAS plans to ensure that all new staff entering health facilities in priority Zika areas have the knowledge and skills necessary to provide effective counseling services during prenatal care. In addition, it would be useful for those trained to receive a periodic refresher training or updates to ensure the provision of high-quality care.

V. DISCUSSION

This report includes two complementary analyses, both of which investigated the role of ANC counseling as it relates to enabling behavior change to prevent Zika transmission—with an emphasis on preventing mother-to-child transmission. The qualitative Guatemala case study documented client and provider knowledge and perceptions of the priority Zika prevention practices along with insights into the implementation of the ASSIST efforts to strengthen ANC-related counseling, while the quantitative analysis looked at the association between counseling and reported Zika knowledge in the Dominican Republic, Guatemala, Nicaragua, and Paraguay. The findings from both analyses converge to indicate provider capacity development and effective counseling led to improved knowledge and potential for enacting prevention practices. While the analyses do not capture actual behaviors, the data provide important insights into what continues to facilitate and challenge efforts to adopt the Zika prevention practices.

Quantitative Analysis. The quantitative analysis of women's Zika knowledge in four countries shows that the number of months of the Zika intervention that health facilities had been exposed to and the comprehensiveness of counseling observed at facilities were significantly associated with increased Zika knowledge among women receiving ANC. This association does not get at causality because neither pre-intervention data nor a control group could be included in the analysis. Other factors besides the ASSIST Zika QI intervention could be responsible for the increase in Zika knowledge among pregnant women observed in the facilities studied. However, the model was able to control for variation in counseling quality observed at the facilities, and counseling quality did have a strong direct relationship with women's knowledge. Moreover, improving the quality of Zika counseling was an area of focus within the ASSIST Zika QI intervention, which does suggest the possibility that some of the observed increase may be attributable to the intervention. In addition, the inclusion of country and region fixed effects controlled for unmeasured factors in specific countries or regions, including severity of the epidemic. It could be that where the epidemic was more severe, knowledge spread more quickly of the risks of sexual transmission because of heightened risk perceptions among health care

workers and the population at large. Even controlling for these unmeasured region- and country-specific characteristics, time and counseling quality were significantly associated with increased knowledge among pregnant women.

Guatemala Case Study. The first half of the findings from the Guatemala case study elucidate knowledge and perceived ability for women and families to adopt the seven priority prevention practices. According to the women attending ANC, among the most important practices is the use of a condom and the use of mosquito nets, which is not one of the seven priority practices. According to them, these play an important role in preventing disease transmission. They viewed an acceptance of these practices as a shift in the norm and gave credit to the health providers for informing them. There was less evidence around the use of repellent. Knowledge of repellent was limited, and some stated that they have never used it and were unaware if it was an effective method to avoid mosquito bites. Some women mentioned that they add chorine to water in the pila, confusing measures to prevent Zika with water purification for consumption. Counseling and information sharing around preventative practices should consider what is already being done in the household, why, and how effective messaging should be tailored accordingly.

When it came to assessing ease of priority practice adoption, in general, the non-ASSIST-supported providers were much less convinced most practices were “easy” to adopt compared to the more optimistic respondents from the ASSIST-supported sites (women, providers, and ASSIST staff). Repellent was viewed as fairly easy to employ, though maybe not always reinforced during ANC, and misperceptions of repellent and its cost remained barriers to use. Emptying water containers and cleaning them was viewed as fairly easy, but there was concern by non-ASSIST-supported providers that women do not do it correctly. When it came to more socially complex behavior change e.g., enabling behaviors such as seeking ANC and family planning (FP) services and adopting condom use, the ASSIST-supported site beneficiaries and staff were much more convinced it was “easy” compared to the non-ASSIST-supported providers. The majority of women interviewed reported enacting prevention practices prior and/or the future intention of practicing one or various Zika prevention behaviors recommended during the ANC visit. However, even with the effective transmission of information, other factors affect realization of the prevention behaviors. These factors include household and community support and the role of women who are often assigned the tasks related to vector eradication, among other competing priorities.

The second half of the case study findings address whether the ASSIST Zika intervention was implemented as intended. According to the informants, it appeared that despite some obstacles, the intervention was carried out as planned in the prioritized health facilities located in the zones most affected by Zika. The intervention reinforced the importance of standardized preparation processes and training. Implementation barriers that were managed included a lack of human resources, high staff turnover, and the slow buy-in and limited participation of doctors at the beginning, unlike the nursing staff, whose support was strong from the start. Given challenges related to time, infrastructure, supplies, and client volume, health facility staff adopted different processes to maximize quality of care and ensure they took advantage of opportunities to provide Zika counseling during ANC visits. Health staff had to be flexible and adapt the provision of Zika counseling the best

way possible in any given context, which meant a mix of individual and group interactions and reinforcing messaging in phases throughout the visit. One of the principal achievements was the formation of the quality improvement teams. The QI team members had varying levels of participation but were always represented in all the trainings. One key activity was the systematic measurement and evaluation of newborn head circumference, which is one of the best reported and adopted practices by staff in the health facilities. However, implementation success varied by facility. Additionally, there was an emphasis on psychosocial support and stimulation for families with children with Congenital Syndrome associated with Zika—a component that was added to the intervention during implementation because of a need to equip providers with additional tools to assist children and their families managing the consequences of Zika.

VI. LIMITATIONS

Limitations of the quantitative analysis included incomplete data from some facilities (e.g., missing data for certain months) and differential periods observed (nearly two years for two countries but only one year for the other two). In addition, the timing of the intervention elements that may have been most effective in improving the quality of counseling could not be controlled for, so providers at some facilities may have received the critical training on Zika prevention counseling sooner or later than others and at higher or lower frequency than others. A prospective controlled study design would have provided stronger evidence for the added value of the ASSIST intervention.

Challenges related to the Guatemala case study implementation included the activity being perceived as an evaluation, which resulted in staff subsequently “preparing” by ensuring Zika counseling during ANC was carried out and Zika was the topic of health talks when data collectors arrived. Women attending ANC further confirmed this bias when they indicated this was the first time a provider spoke to them about Zika. There are various reasons that could explain why these women had not received Zika counseling prior. For example, less of an emphasis on Zika may be a result of health providers needing to manage competing priorities during visits or lacking sufficient time due to high client volume. In addition, the Zika epidemic has largely subsided in recent months, which may mean the topic has slipped from the top of the list of priorities to promote during the provision of care. While this bias is appreciated, the frequency or regularity of Zika prevention counseling as part of ANC, was not the focus of the assessment. The data still provides multiple perspectives around the knowledge, attitudes, and practices related to Zika prevention from the point of view of clients and providers—and does not affect the consideration of potential differences between providers from ASSIST-supported and non-ASSIST-supported health facilities. There were also challenges ensuring women understood how to rate practices from difficult to easy –the combination of the cultural interpretation of what is easy (e.g., easy to understand versus easy to do) and social desirability bias likely led to higher instances of “easy” ratings.

VII. CONCLUSION AND WAY FORWARD

This effort reinforces the importance of building capacity to prepare health providers to detect and counsel women and families on the prevention and consequences of the Zika virus. The USAID ASSIST Project worked effectively with the Ministry of Health, DAS, and facility administration to develop facility staff’s ability to execute quality improvement

practices to address Zika monitoring and counseling. Supportive elements of the intervention included engaging Pregnancy Clubs, involving men, and expanding the intervention to include new components like early child development/stimulation when needed. Providers ultimately participated in improvement activities with enthusiasm and believed the training offered an opportunity to update and further their knowledge. The methodology for the QI teams resulted in improved management with little or no economic investment. While Zika is no longer an epidemic, these training materials and tools (checklists, graphics, and guidelines) are now available and ready to use in the future, and the established QI teams have the potential to extend the QI process to enhance other health services within the facility.

This study also highlights the value of comprehensive Zika counseling—in this case as part of ANC. Given the high uptake of ANC, this is a promising opportunity to enhance knowledge and understanding of health issues, particularly around complex behavior change such as the need to use a condom during pregnancy to prevent vertical transmission of Zika. The former, in particular, is a highly nuanced prevention practice that is compounded because on top of the existing difficulty of promoting condom adoption in general, couples must understand why adoption is necessary when a woman is already pregnant. The women and staff associated with ASSIST-supported sites were more likely to think this and other practices were easy compared to non-ASSIST-supported staff. This suggests interventions such as that by the USAID ASSIST Project were critical in building capacity to confront emerging threats, but the opinions outside of the intervention area serve as a warning and reminder of the reality that exists beyond the extra support and begs the question of what will be sustained going forward—especially in the waning months of a dying epidemic.

Moving forward, the present findings and conclusions suggest the importance of continuing to increase knowledge but also sufficient understanding to enable behavior change. For example, exit interview data to monitor Zika knowledge among ANC clients did not capture whether women understood the severe potential risk to the baby, only whether they understood Zika can be transmitted sexually and that condoms are a primary method for prevention of sexual transmission. However, the qualitative data indicated that the threat to the baby of microcephaly sometimes served as a “tipping point” in convincing partners to use a condom during pregnancy. Routine monitoring and evaluation going forward should include whether this key risk to the baby is understood, and messaging must be strategic, take into account other similar diseases, and be nuanced enough to assist in the proper execution of the priority practices. Partial enactment of practices will likely be insufficient—using repellent only sometimes, improperly cleaning the water basin, or removing standing water in some areas but not others is marginally less risky than not acting at all. The respondents’ recommendation to engage the community is a relevant one as provider reinforcement of practices during intermittent ANC visits at the facility level is likely insufficient. People often learn by example, and the evidence reinforces the need to get the entire family and community on board to be most successful. Finally, while the acute threat of Zika has passed and priorities have shifted to other competing and pressing health issues, the hope is that the processes, training materials, lessons learned, and expertise will remain sufficiently embedded in the health system to support action during any recurrence of the Zika epidemic in the future.

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ANNEXES

A. Interview Guide: ASSIST Staff

Site ID: _____ Interviewer ID: _____ Date: _____ Informed Consent Completed Y/N

Introduction

Thank you for taking the time to answer some questions related to your job. We appreciate your participation. We will start by asking a few questions about you.

Demographic Questions

Age of respondent	
Education	
Type of training (nurse, doctor)	
Length of time working for ASSIST	
Did you receive Zika training? If so when? By whom?	

A. Knowledge of Zika Prevention Behaviors

Now I would like to ask you what you know about the Zika virus.

1. Please tell me what someone can do to prevent themselves from getting Zika while pregnant?
2. Please share what you know about the consequences of getting Zika?
 - a. Why is it important to prevent Zika?
 - b. What can happen to women who contract Zika while pregnant?
3. Explain what women should be told about Zika during:
 - a. In ANC visits
 - b. In FP visits

B. ASSIST Intervention/Technical Assistance

4. Please explain the technical assistance ASSIST provides related to the prevention and treatment of Zika.
 - a. Who do you support?
 - b. In what ways?
5. Did the technical assistance related to Zika go as planned?
 - a. Did you have to make changes?
 - b. Why?
6. Do you think the technical assistance was/is successful?

- a. Please explain what went well?
- b. How do you know it was successful?
- 7. How could the technical assistance could be improved?
 - a. Why?

C. Factors Influencing Counseling Around Zika Prevention Behavior

Now I would like to talk about service provision and counseling related to the Zika Virus in your ASSIST facilities.

- 8. Describe how well you think your facility services have counseled and educated women during ANC services on Zika risk and prevention.
 - a. What have been challenges?
 - b. What have been successes?
 - c. Have there been changes over time?
- 9. Describe how well you think your facility services have counseled and educated women during FP services on Zika risk and prevention.
 - a. What have been challenges?
 - b. What have been successes?
 - c. Have there been changes over time?
- 10. When are providers most successful in counseling women/families on the Zika virus? Why?
- 11. What prevents providers from properly counseling women/families on the Zika virus?

D. Perceptions of Ability to Practice Prevention Measures

I'd like to move on to discussing your perceptions around Zika prevention practices.

12. How easy is it for women and families to do the following (1= VERY DIFFICULT and 5= VERY EASY)?

- a. Use of mosquito repellent (DEET, Picaridin, IR3535 or oil of lemon eucalyptus ONLY)

1 2 3 4 5

Please explain:

- b. Use of condoms?

1 2 3 4 5

Please explain:

- c. Removal of standing water inside and outside the home and in communal areas?

1 2 3 4 5

Please explain:

- d. Covering water storage containers at all times with a cover that is tight fitting and does not warp or touch.

1 2 3 4 5

Please explain:

- e. Seek prenatal care to monitor pregnancy and discuss risks and how to prevent Zika.

1 2 3 4 5

Please explain:

- f. Seek counseling from a trained provider on modern family planning methods if not planning to get pregnant.

1 2 3 4 5

Please explain:

- g. [Ask if there is another practice and discuss]

1 2 3 4 5

Please explain:

E. Recommendations

13. For those that you rated difficult to do (e.g. rating of 1-3), what would help facilitate those practices?

- a. Probe on partner support/male engagement
- b. Family support
- c. Community support
- d. Access and affordability of condoms
- e. Access and affordability of appropriate repellent

14. What would be the most effective way to improve uptake of Zika prevention behaviors?

15. Do you have any other thoughts related to Zika or your ANC visit you would like to share?

“7 Plus 1” Priority Preventive Practices (REFERENCE)

Personal Protection

- 1. Application of mosquito repellent (DEET, Picaridin, IR3535, or oil of lemon eucalyptus, only), using each product as directed, for duration of pregnancy, to reduce risk of Zika transmission through mosquito bites
- 2. Use of condoms to prevent sexual transmission of Zika in pregnancy.

Household and Community Vector Control

3. Regularly removing unintentional standing water both inside and outside of the house, and in communal areas.
4. Covering water storage containers at all times with a cover that is tight fitting and does not warp or touch the water.
5. Scrubbing walls of water storage containers weekly to remove mosquito eggs.

Enabling Behaviors - behaviors that do not directly prevent Zika transmission and/or CZS, but facilitate an intervention that effectively contributes to their prevention

6. Seeking prenatal care to monitor pregnancy and discuss Zika risk and prevention.
7. Seeking counseling from a trained provider on modern family planning methods if not planning on getting pregnant.

Other practice once promoted, but now not prioritized

8. Use of screens/mesh on doors and windows in the home especially during pregnancy.

B. Interview Guide: Health Providers of Antenatal Care Services

Site ID: _____ Interviewer ID: _____ Date: _____ Informed Consent Completed Y/N

Introduction

Thank you for taking the time to answer some questions related to your job. We appreciate your participation. We will start by asking a few questions about you.

Demographic Questions

Age of respondent	
Type of training (nurse, doctor)	
Length of time working in current facility	
Did you receive Zika training? If so when? By whom?	

A. Knowledge of Zika Prevention Behaviors

Now I would like to ask you what you know about the Zika virus.

1. Please describe all the ways the Zika Virus can be transmitted.
2. Please tell me what someone can do to prevent themselves from getting Zika while pregnant?
3. Please share what you know about the consequences of getting Zika?
 - a. Why is it important to prevent Zika?
 - b. What can happen to women who contract Zika while pregnant?
4. Is it important to counsel women on Zika during ANC visits?
5. Explain how women should be counseled:
 - a. In ANC visits
 - b. In FP visits
6. Were providers in your facility trained on Zika risk and prevention?
 - a. Who conducted the training?
 - b. When?
 - c. Has there been refresher training? When?
 - d. Was the training effective?
 - i. if you **attended** the training(s) was the training helpful in giving you the information and skills you need to counsel women on Zika risk and prevention?
 - ii. if you **did not attend** the training(s) did you receive the information via your fellow providers?

7. Do you feel there is a broad awareness of Zika risk and prevention among providers at your facility or there is a need for more training? Please explain.
 - a. Is the frequency of training appropriate?
 - b. Is the method of training sufficient (one provider per facility trained, must train colleagues)?
 - c. Is the content of training adequate?

B. Factors Influencing Counseling Around Zika Prevention Behavior

Now I would like to talk about service provision and counseling related to the Zika Virus in your facility.

8. Describe how well you think your facility services have counseled and educated women during ANC visits on Zika risk and prevention.
 - a. Do you think providers at your facility are able to counsel women on Zika during every ANC visit?
 - b. Do you think providers at your facility are able to cover each of the key prevention behaviors when they counsel women on Zika?
 - c. If not, which messages are prioritized?
 - d. What have been challenges?
 - e. What have been successes?
 - f. Have there been changes over time?
9. When are you most successful in counseling women/families on the Zika virus? Why?
10. What prevents providers from properly counseling women/families on the Zika virus?
11. What is your opinion of the following preventive practices? (For example, is it a useful practice, why?)
 - a. Use of mosquito repellent (DEET, Picaridin, IR3535 or oil of lemon eucalyptus ONLY)
 - b. Use of condoms?
 - c. Removal of standing water inside and outside the home and in communal areas?
 - d. Covering water storage containers at all times with a cover that is tight fitting and does not warp or touch.
 - e. Scrubbing walls of water storage containers weekly to remove mosquito eggs.
 - f. Seeking prenatal care to monitor pregnancy and discuss risks and how to prevent Zika.
 - g. Seeking counseling from a trained provider on modern family planning methods if not planning to get pregnant.
 - h. [Ask if there is another practice and discuss]

C. Perceptions of Ability to Practice Prevention Measures

I'd like to move on to discussing your perceptions around Zika prevention practices.

12. Are there prevention behaviors you think women are more likely to practice than others?

13. Are there prevention behaviors women are less likely to practice than others?

14. How *easy is it* for women and families to do the following (1= VERY DIFFICULT and 5= VERY EASY)?

a. Use of mosquito repellent (DEET, Picaridin, IR3535 or oil of lemon eucalyptus ONLY)

1 2 3 4 5

Please explain:

b. Use of condoms?

1 2 3 4 5

Please explain:

c. Removal of standing water inside and outside the home and in communal areas?

1 2 3 4 5

Please explain:

d. Covering water storage containers at all times with a cover that is tight fitting and does not warp or touch.

1 2 3 4 5

Please explain:

e. Scrubbing walls of water storage containers weekly to remove mosquito eggs.

1 2 3 4 5

Please explain:

f. Seek prenatal care to monitor pregnancy and discuss risks and how to prevent Zika.

1 2 3 4 5

Please explain:

g. Seek counseling from a trained provider on modern family planning methods if not planning to get pregnant.

1 2 3 4 5

Please explain:

h. [Ask if there is another practice and discuss]

1 2 3 4 5

Please explain:

D. Recommendations

15. For those that you rated difficult to do (e.g. rating of 1-3), what would help women and families to be able to follow those practices?

Probes:

- a. Partner support/male engagement
- b. Family support
- c. Community support
- d. Access and affordability of condoms
- e. Access and affordability of appropriate repellent

16. What would be the most effective way to improve uptake of Zika prevention behaviors?

17. Do you have any other thoughts related to Zika or your ANC visit you would like to share?

“7 Plus 1” Priority Preventive Practices (REFERENCE)

Personal Protection

1. Application of mosquito repellent (DEET, Picaridin, IR3535, or oil of lemon eucalyptus, only), using each product as directed, for duration of pregnancy, to reduce risk of Zika transmission through mosquito bites
2. Use of condoms to prevent sexual transmission of Zika in pregnancy.

Household and Community Vector Control

3. Regularly removing unintentional standing water both inside and outside of the house, and in communal areas.
4. Covering water storage containers at all times with a cover that is tight fitting and does not warp or touch the water.
5. Scrubbing walls of water storage containers weekly to remove mosquito eggs.

Enabling Behaviors - behaviors that do not directly prevent Zika transmission and/or CZS, but facilitate an intervention that effectively contributes to their prevention

6. Seeking prenatal care to monitor pregnancy and discuss Zika risk and prevention.
7. Seeking counseling from a trained provider on modern family planning methods if not planning on getting pregnant.

Other practice once promoted, but now not prioritized

8. Use of screens/mesh on doors and windows in the home especially during pregnancy.

C. Interview Guide: Women Post-ANC Visit

Site ID: _____ Interviewer ID: _____ Date: _____ Informed Consent Completed Y/N

Introduction

Thank you for taking the time to answer some questions related to your health. We appreciate your participation. We will start by asking a few questions about you.

Demographic Questions

Age of respondent	
Number of ANC visits for current pregnancy at time of interview	
Number of live births	
Education level	
Primary Language Spoken	
Residence (community)	

A. Knowledge of Zika Prevention Behaviors

Now I would like to ask you what you know about the Zika virus.

1. How did you first learn about the Zika Virus?
2. Please tell me what someone can do to prevent themselves from getting Zika while pregnant?
3. [For every behavior mentioned] How did you learn about each of these methods of prevention?
 - a. Probe whether they learned from FP services, ANC services, media, news, family, friends.
 - i. Ask when they learned (approximately)
 - ii. IF FP or ANC services are referenced, be sure to capture the location of the site so we can see if it is an ASSIST site.
4. Please share [more] about what you learned during your ANC visit today as it relates to Zika.
 - a. Did the healthcare provider talk to you about Zika?
 - b. What did he/she say about Zika?
 - c. How useful was the information about Zika?
 - d. Did you feel you understood the information about Zika or did you leave with questions?
 - e. [If the ANC visit did not include any content related to Zika, ask if she was counseled on Zika during another ANC visit. If yes, confirm when that was].

5. Please share what you know about the consequences of getting Zika?
 - a. Why is it important to prevent Zika?
 - b. What can happen if Zika is transmitted to a woman during pregnancy?

B. Factors Influencing Practice of Zika Prevention Behavior

Now I would like to discuss behaviors related to the Zika Virus.

6. What do *you* do to prevent yourself from getting Zika?
 For each behavior mentioned, probe to get specific details on how it is done, what is used (what repellent, how do they remove standing water etc. to determine if it is the recommended method).
 - a. When did you start doing (each mentioned) preventive behavior?
 - b. Do you do (each mentioned behavior) all of the time or sometimes?
 - c. Have you done (mentioned behaviors) for previous pregnancies or just this one?
 - d. Is it easy or difficult to do (mentioned behaviors) consistently? Why?
7. What motivates you to do these preventive practices?
8. What is your opinion of the following Zika preventive practices? (For example, is it an effective practice, why?)
 - a. Use of mosquito repellent during pregnancy (give the examples: DEET, Picaridin, IR3535 or oil of lemon eucalyptus only)
 - b. Use of condoms during pregnancy?
 - c. Removal of standing water inside and outside the home and in communal areas?
 - d. Covering water storage containers at all times with a cover that is tight fitting and does not warp or touch.
 - e. Seeking prenatal care to monitor pregnancy and discuss risks and how to prevent Zika.
 - f. Seeking counseling from a trained provider on modern family planning methods if not planning to get pregnant.
 - g. Scrubbing walls of water storage containers weekly to remove mosquito eggs.
 - h. [Ask if there is another practice and discuss]

C. Ability to Practice Prevention Measures

Let's move on to talking about your thoughts on Zika prevention.

9. How easy is it for you to do the following (1= VERY DIFFICULT and 5= VERY EASY)?

- a. Use of mosquito repellent (have them confirm which type e.g. DEET, Picaridin, IR3535 or oil of lemon eucalyptus etc.)

1 2 3 4 5

Please explain:

- b. Use of condoms during pregnancy?

1 2 3 4 5

Please explain:

- c. Removal of standing water inside and outside the home and in communal areas?

1 2 3 4 5

Please explain:

- d. Covering water storage containers at all times with a cover that is tight fitting and does not warp or touch.

1 2 3 4 5

Please explain:

- e. Seek prenatal care to monitor pregnancy and discuss risks and how to prevent Zika.

1 2 3 4 5

Please explain:

- f. Seek counseling from a trained provider on modern family planning methods if not planning to get pregnant.

1 2 3 4 5

Please explain:

- g. Scrubbing walls of water storage containers weekly to remove mosquito eggs.

1 2 3 4 5

Please explain:

- h. [Ask if there is another practice and discuss]

1 2 3 4 5

Please explain:

10. For those that you rated difficult to do (e.g. rating of 1-3), what would help you to do those practices?

Probes:

- a. Partner support
- b. Family support

- c. Community support
- d. Access and affordability of condoms
- e. Access and affordability of appropriate repellent

11. What could be done to help women and families prevent the transmission of Zika? What do you recommend?
12. Do you have any other thoughts related to Zika or your ANC visit you would like to share?

D. Components of Zika Counseling

- A. Personal explica los signos y síntomas del Zika
 - 1. Erupción en la piel
 - 2. Conjuntivitis
 - 3. Fiebre
- B. Le habla de vías de transmisión
 - 4. Picadura de mosquito
 - 5. Transmisión sexual
 - 6. Madre a hijo
- C. Le da a conocer a la usuaria las medidas de prevención de la infección por Zika
 - 7. Uso de condón
 - 8. Uso de mosquitero de día (siesta) y de noche
 - 9. Uso de repelente
 - 10. Instalar telas metálicas o cedazo en puertas y ventanas
 - 11. Eliminación de basura o chatarras
 - 12. Eliminación de criaderos
- D. Personal explica las complicaciones de la infección por Zika
 - 13. Abortos
 - 14. Muertes fetales
 - 15. Microcefalia
 - 16. Malformaciones
 - 17. Síndrome congénito de Zika
 - 18. Síndrome de Guillain Barré

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