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**Comparison of users of an HIV/syphilis screening community-based mobile van and traditional voluntary counselling and testing sites in Guatemala**

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## **ABSTRACT**

**Objectives:** Mobile van (MV) for HIV and other sexually transmitted infections (STIs) screening is effective in reaching at-risk populations. We aimed to compare behaviour characteristics and HIV and syphilis prevalence between subjects tested at a mobile van offering voluntary counselling and testing (VCT) versus those tested at 3 STI clinics in Guatemala.

**Methods:** Over 28 months, female sex workers (FSWs), men who have sex with men/transgenders (MSM/TG), and people not reporting being a member of a risk group (NR) were offered HIV and syphilis rapid tests and interviewed on their sociodemographic and risk behaviour.

**Results:** We tested 2,874 subjects (MV:1,336 (46%) vs. clinics:1,538 (54%)). The MV screened 73% of FSWs and 73% of the MSM/TG, and detected 19% of HIV and 69% of syphilis cases. HIV prevalence was significantly higher ( $p < 0.001$ ) at the STI clinics than at the MV for both NR and MSM/TG (NR:7% vs. 1%, MSM/TG:8% vs. 1%, respectively). A significantly higher proportion of MSM/TG screened at the STI clinic reported having had a prior HIV test (MV: 21% vs. clinics: 41%,  $p$ -value  $< 0.001$ ) while more FSWs tested in the MV reported having multiple partners and using condoms at their last sexual intercourse.

**Conclusions:** The higher prevalence of HIV and syphilis at the STI clinics suggests they successfully identified high-risk subjects. In particular, the NR group showed higher than expected HIV and syphilis prevalence. Innovative approaches such as MV contributed to increasing access to other hard-to-reach groups such as MSM/TG or FSWs.

## INTRODUCTION

Early identification of HIV and sexually transmitted infections (STI) not only results in earlier treatment initiation and reduced morbidity but also decreases further infection transmission. Most voluntary, counselling and testing (VCT) services are usually offered by traditional publicly funded HIV/STI clinics and community-based services. However, outreach programmes such as mobile vans (MV) clinics for HIV/STI screening have proven to be an effective service in reaching at-risk populations, including female sex workers (FSWs), men who have sex with men (MSM) and injection drug users (IDUs) (1-3), offering them VCT in convenient locations. In addition, the uptake of HIV testing increases four-fold when VCT is provided in community-based settings, highlighting the potential to reduce testing barriers such as stigma (4-6). Furthermore, recent evidence has shown that the use of rapid tests might enhance the effectiveness of MV clinics, increasing significantly the proportion of patients receiving their results and post-counselling (7-10).

Several studies have found differences in demographic, behavioural and clinical characteristics between clients seen in traditional HIV/STI clinics and those seen at a MV HIV/STI clinic (1-3). Studies conducted in urban populations of the United States have observed that mobile clinic clients were more likely to be diagnosed with HIV (2) and that "high-risk" clients (including MSM and IDUs) were more likely to seek care in non-traditional outreach settings (1). Reisner et al. observed that MSM accessing MV services in Massachusetts, USA had higher HIV-related risk behaviours (3). However, there is little information on the effectiveness of MV HIV/STI clinics in identifying HIV and STIs among at-risk population in developing countries, in particular in Central America.

Guatemala currently has a concentrated HIV epidemic, with less than 1% in the general population and high HIV prevalence in at-risk groups (11). In the past years, efforts have been made to expand VCT services across the country, with the number of facilities providing HIV counselling and testing increasing from 41 in 2007 to 183 at the end of 2008 (12). Despite this, HIV testing is still conducted largely in client-initiated testing sites and outreach programmes are still scarce (13), resulting in missed HIV/STI prevention opportunities, especially for hard-to-reach

populations such as FSW and MSM that might not seek care at traditional VCT clinics. A study about reproductive healthcare perceptions and needs among FSWs in Guatemala found that most of them were reluctant to attend public health care centres due to the stigmatizing nature of service provision and the discriminatory attitudes of the health personnel (14).

To address the effectiveness of MV services in identifying cases of HIV and STIs and contribute to infection control efforts, we aimed to compare HIV and syphilis prevalence and risk behaviour characteristics between subjects tested at the MV and those tested at the traditional VCT service offered at 3 STI clinics in Escuintla, Guatemala.

## **METHODS**

### **Study setting and population**

In 2005 the Fundació Sida i Societat, a non-profit organization that specializes in providing STI and HIV prevention and care services in resource-constrained settings, in collaboration with the Ministry of Health of Guatemala implemented the UALE Project (UALE means 'be in health' in Latin), a multilevel intervention whose overall aim is to prevent and control HIV/STI particularly among vulnerable groups in Guatemala (15). The UALE project includes 3 STI clinics located within the community health care centers of 3 municipalities of the Escuintla province (Escuintla provincial capital, Santa Lucia Cotzumalguapa, and Puerto de San José), which has one of the highest HIV prevalence of Guatemalan provinces (16). This might be related to elevated population mobility through the Pacific Road, the traffic of irregular migrants and illegal drugs, as well as the widespread sex work. All 3 clinics offer HIV and syphilis counselling and testing on a voluntary and anonymous basis from 8:30 to 16:00, uninterrupted.

In 2006, a community-based MV offering a VCT service with HIV and syphilis rapid tests was implemented to target hard-to-reach population in the municipalities where the STI clinics were located and in 10 other municipalities characterized by a high number of commercial sex venues. To establish the operational frame of the MV, we used the community mapping of commercial sex venues and sites frequented by MSM and transgenders (TG) already completed by the UALE project in each municipality. Experienced health educators visited bars, brothels, MSM hair

salons, and streets where sex workers met clients to obtain the permission of their owners/managers. None of them refused the MV service provision. The MV offered the VCT service once every two weeks in a different site of each municipality.

Subjects were recruited from February 2006 to May 2009. We defined FSW as women who reported having sex in exchange for money during the last 12 months. The MSM/TG group was defined as men who self-identified as homosexuals or who reported having sex with penetration with a same sex partner during the last 12 months, including male sex workers (MSW). Those who did not meet any of the previous criteria were considered people who do not report being a member of a risk group, from now on referred to as the "not-reporting" (NR) group.

### **Counselling and testing**

The procedures were similar in both settings. After obtaining written informed consent from participants, trained health educators conducted pre-test HIV counselling and collected data on sociodemographic characteristics, personal risk behaviours, HIV testing history and reasons for testing by means of a structure questionnaire. Educational material on HIV/STI and condoms were available in both settings.

Samples were collected by a practitioner nurse, who also performed both the HIV and syphilis testing by fingerprick. HIV testing was done using the Determine HIV-1/2 rapid test (Abbott Laboratories, Tokyo, Japan) and participants received their results within 15 minutes. Venipuncture blood was drawn from participants with a reactive HIV rapid test result, who were post-test counselled as preliminary positive, and were asked to return to the STI clinic or to the MV testing place after 7 days to receive their confirmatory test result and counselling by the same health educator. All reactive samples were confirmed by enzyme-linked immuno-sorbent assay (ELISA) using Bioelisa HIV-1+2 (Biokit, Lliçà d'Amunt, Spain). Those participants with a positive Determine HIV-1/2 rapid test that did not return for their results were actively traced. Subjects with a positive confirmatory test were referred and accompanied by a community health worker to the HIV referral hospital for enrolment into the care and treatment programme.

Syphilis testing was performed using the Determine Syphilis rapid test (Abbott Laboratories,

Tokyo, Japan). Participants with a reactive syphilis rapid test were referred to the STI clinic for confirmatory testing using *Treponema pallidum* hemagglutination test (Immutrep TPHA; Omega Diagnostics Ltd, Ontario, Canada) and the Venereal Infections Research Laboratory test (VDRL; Murex Biotech Limited, Dartford, United Kingdom). Due to the high probability of syphilis re-infection, treatment was administered when the rapid treponema test was reactive to minimize loss of follow-up as well as to stop the transmission chain.

### **Data analysis**

The analysis was restricted to participants who were at least 15 years old and to the baseline visit, regardless of the testing site. Data was analyzed using STATA version 10.0 (StataCorp, College Station, TX) and described using frequencies, medians and interquartile ranges (IQR). Sociodemographic and behavioural characteristics and HIV/syphilis prevalence of each sub-population between the STI clinics and the MV were compared using the Chi-square test or Fisher's exact test for categorical variables and the Wilcoxon rank-sum test for continuous variables. Within each sub-group, the prevalence of HIV over time was determined using the Mantel-Haenszel test for trend.

This analysis was included in the general IRB of the UALE project, that was approved by the Hospital Germans Trias i Pujol Ethics Review Committee, and had the support of the Guatemalan Ministry of Health and the Escuintla Department of Health.

## **RESULTS**

### **Subjects' Characteristics**

From February 2006 to May 2009, 2,874 subjects ( $\geq 15$  years old) were tested for HIV and syphilis (MV: 1,336 (46%) vs. STI clinics: 1,538 (54%)). Only 125 (4%) had more than one visit and subsequent visits were excluded from the analysis. A mean of 80 subjects received VCT per month (43 people at the clinics and 37 at the mobile van).

The socio-demographic characteristics of subjects included in the analysis are described in

Table 1. The median age of the NR tested at the MV was slightly older than those tested in the traditional clinics (29.6 vs. 28.3 years, p-value=0.007), and the proportion of females tested in the MV was also significantly higher (MV:62% vs. STI clinics:55%, p-value=0.005). The MSM/TG group included 28 (5%) transgenders and 123 (23%) male sex workers (which included 9 transgenders). Among NR, subjects tested in the MV were significantly more likely to report that they took the test to know their health status (MV:98% vs. STI clinics:94%, p-value<0.001), although less likely to report that the partner asked them to take the test (MV:1% vs. STI clinics:3%, p-value=0.001). Overall, 1,136 (40%) had ever been tested for HIV. MSM/TG (including male sex workers) seen at the MV clinic were significantly less likely to have had a prior HIV test in the past than MSM/TG seen at the STI clinics (21% vs. 41%, p-value<0.001). Almost 24% of FSW were from a country other than Guatemala (mainly from El Salvador and Honduras), and this proportion was similar in both settings.

### **HIV and syphilis prevalence**

The MV screened 29% (513/1,746) of the NR, 73% (385/529) of the MSM/TG and 73% (438/599) of the FSW, and detected 19% (27/140) of HIV and 69% (25/36) of syphilis cases (Table 2). HIV prevalence was significantly higher at the STI clinics for NR (MV:1% vs. STI clinics:7%, p-value<0.001) and MSM/TG (MV:1% vs. STI clinics:8%, p-value<0.001). Among MSM/TG, the HIV prevalence was similar in the three subgroups (MSM:3% , TG:4%, MSW:3%) (data not shown). Syphilis prevalence was similar between the MV and the clinics for NR and MSM/TG. The 2 cases of syphilis in the MSM/TG were MSM who were not TG nor MSW. Although not significant, syphilis rates among FSW tested in MV tended to be slightly higher (MV: 5% vs. STI clinics:2%, p-value=0.128). Five participants were co-infected with HIV and syphilis. The proportion of patients with a reactive HIV rapid test who returned for their confirmatory results was lower in the MV than in the STI clinics (MV:42% vs. STI clinics:65%, p-value<0.001). Nevertheless, all of them were post-counselled as preliminary positive the day they undertook the rapid HIV test and those who did not come back for their confirmatory result were actively traced.



From 2006 to 2008, HIV prevalence at the clinics reduced significantly for NR and MSM/TG (NR: 18% vs. 6%, p-value<0.001, test for linear trend); MSM/TG: 25% vs. 5%, p-value=0.06, test for linear trend), while no statistically significant difference was observed across time in the MV (data not shown).

### **Risk behaviours**

HIV-related risk behaviours are displayed in Table 2. NR tested at the MV were less likely to report having had sex with a FSW (MV:11% vs. STI:17%, p-value=0.009) or with multiple partners (MV:5% vs. STI:12%, p-value<0.001). MSM/TG tested at the MV were more likely to report having sex with a bisexual partner (MV:53% vs. STI:34%, p-value<0.001), although the proportion reporting other risk behaviours were similar in both groups. A substantial proportion of MSM/TG reported having had sex in exchange of money or drugs in the past 12 months (MV:25% vs. STI:19%, p-value=0.134), although the HIV and syphilis prevalence of this subgroup were similar to the overall MSM/TG group (data not shown). Finally, FSWs tested in the MV were more likely to report having had sex with multiple partners (MV:47% vs. STI:33%, p-value=0.003), as well as more likely to have used a condom at their last sexual intercourse (MV:78% vs. STI:68%, p-value=0.021).

### **DISCUSSION**

Our findings confirm significant differences in HIV and syphilis prevalence and risk behaviour characteristics between mobile clinic users and traditional STI clinic users in Escuintla, Guatemala. Contrary to our initial hypothesis, HIV prevalence was statistically significantly higher in the STI clinics for both the NR and MSM/TG, suggesting that the traditional VCT did effectively identified high-risk subjects. Nonetheless, the MV was successful in diagnosing new cases of HIV and syphilis and increasing access to at-risk populations such as MSM/TG and FSW. Our results are contrary to those found by Ellen et al. (17) in Baltimore, USA, although the context of our

study was considerably different and they did not stratify by population group. In fact, their MV group had a higher percentage of at-risk subjects (FSWs and IDUs), which could explain the higher prevalence of HIV in this group.

The higher HIV rates observed in the STI clinics among people who do not report being a member of a risk group could be explained in part by high-risk subjects seeking HIV screening earlier than others, as suggests the higher proportion of men attending the clinics who have sex with sex workers and who had multiple sexual partners during the last 12 months. Because seeking HIV testing is a voluntary decision, data from the VCT service located in the STI clinic is particularly prone to participation bias, and therefore HIV prevalence in the STI clinic will result in an overestimation of the prevalence in this group. Although Escuintla province has one of the highest HIV prevalence in Guatemala, (16), the overall HIV prevalence in people who do not report any risk behaviours is much higher than expected (5% compared to the national estimate of 0.8% (18)).

With regards to MSM/TG, our findings are consistent with those observed by Bailey et al. (19), where HIV prevalence was higher at the STI clinics. Despite the low level of risk behaviours reported by MSM tested in the STI clinics, they showed higher HIV rates, reported lower condom use and were twice as likely to have had a prior HIV test than those tested in the MV, which suggests they might perceive themselves at risk of infection. Moreover, a salient proportion of MSM/TG in our study performed sex work, but their HIV and syphilis prevalence were similar to those who did not. The overall HIV prevalence for MSM was 5.5%, much lower than the 12% that Soto et al. found in Guatemala City (20). The MV provided HIV testing and counselling services to a group of MSM/TG who continue to face obstacles in accessing essential VIH prevention, treatment, and care services, since 80% of those seen at the MV were being tested for HIV for the first time. In fact, most of the MSM/TG were tested at the MV, indicating that MV does indeed increase access and choice for this population seeking tested for HIV and syphilis as previously described (19).

No significant differences in HIV prevalence were observed among FSWs and the overall 4% prevalence was similar to what has been described elsewhere (18, 20). FSWs tested in the MV

reported higher HIV-related risk behaviour but significantly higher proportion of condom use during the last sexual intercourse. Overall, condom use for FSWs was considerably high (68%). Whether the high condom use among FSW in this study is related to the UALE project needs further evaluation but the project has shown a significant reduction of the STI and HIV incidence among FSWs attending the STI clinic as well as an increase in condom use with clients (15).

In Latin American and Caribbean countries, the proportion of FSWs and MSM who know their HIV status from a recent test is 66% and 34% respectively (12), which is similar to the percentage observed in our study. In the three populations, the main reason for testing was to know their health status while the proportion that tested because they perceived themselves to be at risk for HIV/STI was considerably low. Taking into account the low proportion of subjects that used a condom at their last sexual intercourse (especially NR and MSM/TG), the low risk-perception reported in this study provides evidence of one of the main barriers to behavioural change that would lead to safer conducts and lower HIV/STI prevalence.

A unique aspect of the mobile van is that it allows HIV/STI control programmes to be spatially and temporally targeted. The MV service identified more than two-thirds of the new syphilis cases (mostly in FSWs), suggesting the potential of this innovative service. The high prevalence of syphilis in the FSW group tested in the MV could be due to a higher proportion of street-based FSW in the MV compared to the traditional clinic. Contrary to off-street FSWs, street-based FSWs are not required to visit the health clinic periodically to obtain a health stamp in their health card (which includes a medical examination and HIV/STI testing) (15), and are more reluctant to attend the health centre for examination of STIs (14).

One of the limitations was possible misclassification of high-risk subjects, which could have led to include MSM who do not self-identify as homosexuals or did not disclose their sexual orientation in the NR group. To minimize this bias, the health workers had extensive experience working with vulnerable groups and ensured high levels of confidentiality. A second limitation was the need to confirm the reactive rapid tests, which might have led to loss of follow-up. In fact, one of the limitations of outreach programmes is the difficulty of ensuring that HIV-positive patients actually access the health system. In our study, all patients with a reactive HIV rapid test were

post-counselled as preliminary positive and an active case finding programme was implemented for those confirmed HIV-positive patients that did not return for their results. Finally, the cost of the MV was reasonable and affordable for resource-constraint budgets but studies about its cost-effectiveness are still scarce (21).

The high HIV prevalence observed in the three groups combined with reported low condom use and low perception risk highlight the need to expand current HIV prevention and treatment programmes in the country. Our findings provide evidence of the success of STI clinics in identifying new cases of HIV among at risk population as well as emphasizing the benefits of using innovative approaches such as MV that contribute to increasing access to hard-to-reach groups.

## **KEY MESSAGES**

- HIV prevalence was statistically significantly higher in the STI clinics for both NR and MSM/TG, suggesting that the traditional VCT did effectively identified high-risk subjects.
- The mobile van was successful in diagnosing new cases of HIV and syphilis and increasing access to at-risk populations such as MSM/TG and FSW.
- People who do not report being member of a risk group had higher than expected HIV prevalence

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### **COMPETING INTERESTS**

None declared.

### **CONTRIBUTIONS OF EACH AUTHOR TO THE PROJECT**

All authors reviewed and approved the final contents of the manuscripts. In addition, M.L analyzed data and was the main writer of the manuscript; M.S. designed and supervised the overall study and assisted in writing the manuscript; F.G. supervised the analysis and interpretation of the data; G.H supervised sample collection and was responsible for laboratory test for HIV and syphilis; R.O supervised data collection and active case finding.; J.F.P., V.H.F. and J.C provided institutional support for subject recruitment and data collection.

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**Table 1.** Comparison of sociodemographic characteristics and reason for testing between 1,336 mobile van users and 1,538 traditional clinic users by type of population (people who do not report being a member of a risk group, men that have sex with men and female sex workers) in the province of Escuintla, Guatemala.

	People who do not report being a member of a risk group (NR) N=1,746			Men who have sex with men and transgenders (MSM/TG) N=529			Female sex workers (FSW) N=599		
	Mobile van clinic N=513 (29%)	Traditional clinic N=1,233 (71%)	p-value	Mobile van clinic N=385 (73%)	Traditional clinic N=144 (27%)	p-value	Mobile van clinic N=438 (73%)	Traditional Clinic N=161 (27%)	p-value
<b>Age (median [IQR])</b>	29.6 [23.4-38.4]	28.3 [22.2-36.5]	<b>0.007<sup>a*</sup></b>	23.8 [20.0-29.7]	22.4 [19.7-30.0]	0.236 <sup>a</sup>	28.5 [22.4-34.3]	28.8 [23.6-35.3]	0.366 <sup>a</sup>
<b>Sex</b>									
Male	194 (37.8)	556 (45.1)	<b>0.005*</b>	362 (94.0)	139 (96.5)	0.253	-	-	0.294 <sup>b</sup>
Female	319 (62.2)	677 (54.9)		-	-		438 (100)	161 (100)	
Transexual	0 (0)	0 (0)		23 (6.0)	5 (3.5)		-	-	
<b>Country of origin other than Guatemala<sup>c</sup></b>	5 (1.0)	25 (2.0)	0.123	8 (2.1)	7 (4.9)	0.086	103 (23.5)	38 (23.6)	0.950
<b>Ethnic group indigenous</b>	27 (5.3)	48 (3.9)	0.198	11 (2.9)	6 (4.2)	0.447	18 (4.1)	9 (5.6)	0.429
<b>Reasons for testing</b>									
Perceive themselves at risk for HIV	5 (1.0)	23 (1.9)	0.213 <sup>b</sup>	16 (4.2)	6 (4.2)	0.996	3 (0.7)	1 (0.6)	1.000 <sup>b</sup>
To know their health status	504 (98.3)	1,153 (93.5)	<b>&lt;0.001*</b>	373 (96.9)	139 (96.5)	0.837	388 (88.7)	138 (85.7)	0.326
Partner asked them to take the test	3 (0.6)	37 (3.0)	<b>0.001<sup>b*</sup></b>	6 (1.6)	3 (2.1)	0.710 <sup>b</sup>	0 (0)	0 (0)	-
Report symptoms	0 (0)	26 (2.1)	-	0 (0)	1 (0.7)	0.272 <sup>b</sup>	0 (0)	0 (0)	-
<b>Reported prior HIV test in the past</b>	166 (32.4)	389 (31.6)	0.741	81 (21.0)	61 (42.4)	<b>&lt;0.001*</b>	322 (73.5)	117 (72.7)	0.889

Values are n(%) and p-value is from Chi-square test unless otherwise indicated.

a: p-value from the Wilcoxon test

b: p-value from the Fisher's exact test

c: El Salvador, Honduras and other Central American countries

\* p-value <0.05



**Table 2.** Comparison of HIV/syphilis prevalence and risk behaviors between 1,336 mobile van users and 1,538 traditional clinic users by type of population (people who do not report being a member of a risk group, men that have sex with men and female sex workers) in the province of Escuintla, Guatemala.

	People who do not report being a member of a risk group (NR) N=1,746			Men who have sex with men and transgenders (MSM/TG) N=529			Female sex workers (FSW) N=599		
	Mobile van clinic N=513 (29%)	Traditional clinic N=1,233 (71%)	p-value	Mobile van clinic N=385 (73%)	Traditional clinic N=144 (27%)	p-value	Mobile van clinic N=438 (73%)	Traditional Clinic N=161 (27%)	p-value
<b>Test results</b>									
HIV prevalence	6 (1.2)	91 (7.4)	<b>&lt;0.001*</b>	3 (0.8)	12 (8.4)	<b>&lt;0.001*</b>	17 (3.9)	10 (6.3)	0.265
Syphilis prevalence	4 (0.8)	7 (0.6)	0.743 <sup>a</sup>	0 (0)	2 (1.4)	-	20 (4.6)	2 (1.3)	0.128 <sup>a</sup>
<b>Sexual risk behaviors, last 12 months</b>									
Sex with a sex worker <sup>b</sup>	50 (11.2)	146 (16.6)	<b>0.009*</b>	31 (12.7)	24 (19.4)	0.091	NA	NA	
Sex with multiple partners	24 (5.4)	107 (12.3)	<b>&lt;0.001*</b>	108 (38.9)	49 (39.5)	0.899	184 (47.1)	49 (32.7)	<b>0.003*</b>
Sex in exchange of money or drugs	4 (0.8)	12 (1.0)	1.000 <sup>a</sup>	96 (25.0)	27 (18.8)	0.134	438 (100)	161 (100)	-
Sex with bisexual partner <sup>c</sup>	2 (0.5)	5 (0.6)	1.000 <sup>a</sup>	163 (52.6)	42 (33.9)	<b>&lt;0.001*</b>	30 (8.5)	5 (3.4)	0.053 <sup>a</sup>
Sex with injection drug user	1 (0.2)	1 (0.1)	1.000 <sup>a</sup>	9 (3.9)	3 (2.4)	0.553 <sup>a</sup>	16 (4.6)	4 (2.7)	0.338 <sup>a</sup>
Condom use at last sexual intercourse	84 (18.9)	151 (17.4)	0.496	122 (47.3)	45 (38.1)	0.097	314 (77.7)	96 (67.6)	<b>0.021*</b>

Values are n(%). P-value is from Chi-square test unless otherwise indicated.

a: P-value from the Fisher's exact test.

b: Operational definition of client of a sex worker.

c: Bisexual partner defined as those who engage in sexual relationships with both men and women.

\* p-value <0.05

## **APPENDIX**

The UALE Project includes the following: director: Jordi Casabona; executive director: Jaume Font; Ministry of Health in Guatemala: Bianca Rosa Guevara, María Isabel Pedroza, Laura Figueroa; local coordinators: Victor Hugo Fernández, José Ernesto Monzón; medical doctors: Rudy Ortiz, Otoniel Barrios; nurses: Elva Orellana, Irma Mazariegos, Isabel Barrientos, and Leticia Roldan; health educators: Estuardo Cabrera, Kristian Villavicencio, Miguel Meléndez; psychologist: Karla Guzman; microbiologists: Gabriela Hernández, Olga Gálvez, Cristina Cu, Samuel Churuc, Amelia Gerónimo, Xavier Vallès, Victoria González, Christian Alvarez; Statisticians: Federica Giardina; I.T: Mikhail Nikiforov; epidemiologists: Meritxell Sabidó; National AIDS Programme: Mariel Castro; primary health care centre: Maribel Godoy (Santa Lucía Cotzumalguapa), Lucía Gallardo (Puerto de San José), Karina Sazo (Escuintla); data entry: Hugo Felipe; technical support: Fabiola Llanos, Chus Sanz, Mirian Guadalupe Brañas.