Title

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Journal

Sexual and Reproductive Health Matters, 32(1)

ISSN

0968-8080

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Publication Date

2024-12-31

DOI

10.1080/26410397.2024.2433824

Peer reviewed

RESEARCH ARTICLE

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SRHM SEXUAL AND REPRODUCTIVE HEALTH MATTERS
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Sexual and reproductive health awareness and practices among adolescents and adults in a rural farming community in Baja California, Mexico: a quantitative and qualitative cross-sectional study

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Abstract: *Rural, indigenous populations in Mexico face barriers to accessing sexual and reproductive health (SRH) resources and services. Given the lack of information to inform educational materials tailored to the needs of these indigenous communities, we aimed to: (a) quantitatively characterise the SRH awareness and practices among adolescents and adults in a rural, mostly indigenous community in northern Mexico and (b) qualitatively assess community perspectives on an educational pamphlet with SRH information (e.g. contraceptive options). Quantitative data collection occurred in November 2018 and April 2019 using convenience sampling in a community clinic and random sampling for community households. Qualitative data collection occurred in November 2019 via individual interviews and focus group discussions to assess*

Supplemental data for this article can be accessed online at https://doi.org/10.1080/26410397.2024.2433824.

*community perspectives about an SRH educational pamphlet developed from quantitative data. Participants in the quantitative phase of our study (*n = *217) were a median age of 30 years, 71% were female, and those with children reported having a median of three (range = 1–11). SRH knowledge was low, as were self-reported efforts to obtain contraceptives or testing for HIV/STIs. Most believed that children should learn about SRH by age 10–15 years, and 94% felt that parents should deliver such education. Participants had low knowledge about SRH but high motivation to educate children and adolescents on these topics, indicating potential for SRH campaigns in this community. Health education materials were well-received in the qualitative phase of our study (*n = *17 from individual interviews;* n = *22 from focus group discussions), and raised interest among community members in learning more about these topics.*
DOI: 10.1080/26410397.2024.2433824

Plain Language Summary: *Indigenous people in Mexico often struggle to get sexual and reproductive health (SRH) services, especially in rural areas. We wanted to learn more about SRH awareness and practices in a mostly indigenous, rural community in northern Mexico. We conducted a study using both surveys and in-depth interviews. In late 2018 and early 2019, we surveyed 217 people (mostly women, with a median age of 30 years) to gather data on SRH awareness. Later in 2019, we interviewed 17 individuals and held two focus groups to get feedback on an SRH educational pamphlet. The pamphlet was well-received, and many participants were eager to learn more and teach others about SRH. This suggests there is a strong potential for SRH campaigns in this rural community.*

Keywords: adolescent pregnancy, family planning, HIV, indigenous communities, Triqui, Mixtec

Introduction

Family planning strategies and resources enable individuals to make informed decisions regarding whether to have children and, if so, the number and spacing between them and they are particularly important among marginalised groups like indigenous women who face disparities in sexual and reproductive health (SRH).[1–12] Some key benefits of effective family planning programmes include postponing pregnancy, avoiding unplanned pregnancy (thereby reducing the frequency of unsafe abortions), as well as mitigating maternal and child morbidity and mortality.[13–20] Additionally, effective family planning among adolescents and young adults allows for greater educational attainment, future earning potential, socioeconomic stability, and upward mobility.[21–28] Mexico has enacted national policies that prioritise the importance of family planning services, including amending the Mexican Constitution nearly five decades ago to define family planning as a human right and passing legislation (i.e. NOM 005-SSA2-199329) indicating that family planning should be offered to all individuals of reproductive age (including adolescents, among whom parental consent is not required).[29,30] These services led to decreases in average fertility rates and infant mortality rates, in part due to increased contraception use among reproductive-aged individuals.[19,20,31–34]

Despite the progress in reproductive health across Mexico, adolescent pregnancy remains an important public health concern, particularly in indigenous communities.[35,36] Compared to the teenage pregnancy rates of countries in the Organization for Economic Cooperation and Development (average of 19 births per 1,000 adolescents aged 15–19 years), Mexico had the second highest teenage pregnancy rate with 54 births per 1,000 adolescents aged 15–19 years as of 2022.[36] Among nationally registered births in 2022, 259,702 births (14%) were among adolescents aged 15–19 years and 7,255 births (0.4%) were among girls aged 10–14 years.[35] Efforts to better understand family planning awareness, access, and service uptake in this demographic is imperative given the associated health risks for adolescent mothers and their infants,[31,37] and that earlier age of motherhood is associated with lower educational attainment, lower future earning potential, and the propagation of social and gender disparities.[38–42]

Indigenous women in Mexico face a multitude of disparities related to SRH compared to their non-indigenous counterparts.[9,10,35,43–47] These inequities are often exacerbated in rural settings where indigenous women have lower educational attainment and financial autonomy given geographic isolation and limited resources (e.g. housing availability, educational institutions, transport, employment opportunities outside of the home) compared to non-indigenous women in urban settings.[5,8,42,48,49] Traditional and heteronormative

norms predominate in many rural indigenous communities,[3–5] where marital status or domestic partnerships provide important social stability for indigenous women, but reduce their autonomy regarding making SRH choices rather than following the preferences of their male partners.[48,50] Compared to non-indigenous women, indigenous women reported less contraceptive use (27% compared to 47% among non-indigenous women) and greater unmet need for contraceptives.[5,31,51,52] Rural, indigenous populations in Mexico face significant barriers to accessing SRH services, including the indirect costs of obtaining services (e.g. transportation or childcare), as well as cultural and community norms that result in the rejection of health services that are not culturally tailored.[42] These barriers influence the lower contraceptive use and greater unmet need for contraceptives reported among indigenous women,[5,31,51,52] and play a role in indigenous women having significantly more children than non-indigenous women.[53,54] As in many other resource-limited settings, it is necessary in Mexico to focus efforts among underserved and vulnerable populations (who often face the most challenges to receiving appropriate care) to achieve equity in accessing and using SRH services.[55,56]

San Quintin is a major agricultural region in a rural, isolated area of Baja California where poor, mostly indigenous Mixtec, Zapotec, and Triqui immigrants from Oaxaca, Guerrero, and other regions in southern Mexico moved to find jobs beginning in the 1980s.[57] Formal and informal settlements (*colonias*) created socially disadvantaged and medically underserved communities throughout the region. Given the lack of information available to inform culturally appropriate educational materials that are tailored to the SRH needs of these communities, preliminary research was needed. The objectives of this study were to (a) characterise SRH awareness and practices among adolescents and adults in one *colonia* in San Quintin, and (b) qualitatively assess community perspectives of an empirically-designed SRH educational pamphlet.

Methods

Study population and design

We conducted this study in one *colonia* of San Quintin with approximately 4,000 residents at the time of this study. The study was conducted as part of the *Viaje Interinstitucional de Integración Docente, Asistencial y de Investigación program* (VIIDAI; English translation: Inter-institutional Field Experiences for Integration, Teaching, Medical Service, and Research), which is a binational, interdisciplinary, public health training programme involving four institutions: Universidad Autónoma de Baja California (UABC), San Diego State University (SDSU), the University of California San Diego (UCSD) and Rotary International.[58] VIIDAI has a longstanding collaborative partnership with this community and has visited the *colonia* twice yearly since 2004 for two to four days to provide a free primary care clinic (which includes primary obstetric and gynaecological services) in the local elementary school and conduct research in collaboration with local community leaders to identify and implement relevant public health interventions, applying the philosophy of community-based participatory research.

The current study uses data from two cross-sectional quantitative surveys administered during the VIIDAI community clinics offered in November 2018 and April 2019. The quantitative surveys were iterative because we knew very little about the population; we revised questions and shortened the second quantitative survey based on what we learned in the first data collection period. We collected qualitative data in November 2019 using data from the quantitative surveys to assess perceptions about the culturally-adapted SRH pamphlet designed for this *colonia*. Both the quantitative and qualitative studies were developed in part to inform potential future SRH interventions in this community. We developed informed consent and assent forms in English, which were translated into Spanish by a bilingual, native Spanish-speaking member of the research team and back-translated into English by a second bilingual team member to ensure the intended meaning was retained. We obtained verbal consent from all adult participants or from the parent/guardian of adolescent participants; adolescent participants provided verbal assent. Verbal (versus written) consent and assent were obtained for the convenience of potential participants and to avoid any stigmatisation among potential participants who may have had low to no literacy. To obtain informed consent or assent, study interviewers reviewed the study's IRB-approved and Spanish-translated informed consent document with each potential participant. Study interviewers explained each section of the informed consent form and answered any questions

the potential participants had related to the study procedures. Study participants were then asked whether they consented or assented to participate in the study; the study interviewers recorded when verbal consent was received by checking the appropriate box in the informed consent form. The IRB did not require a witness to be present during the consent or assent process. Given that SRH is a sensitive topic in this community, all study procedures (i.e. obtaining consent and/or assent, completing the quantitative survey) occurred between the participants and the study interviewers at a distance from non-participants to provide privacy. This study (including all consent/assent procedures) was approved by the Bioethics Committee of the Facultad de Medicina y Psicología at UABC and an Institutional Review Board at UCSD (Project Number 181574SW) on 11 October 2018.

Quantitative methods

The quantitative component of the study aimed to characterise SRH awareness and practices among adolescents and adults living in the *colonia*.

Participant eligibility and recruitment

Individuals were eligible to participate if they were ≥13 years old, as we were interested in collecting data regarding potentially different perspectives related to SRH between younger and older members of the community. Additionally, individuals could participate in our study if they lived in the *colonia* for ≥6 months and spoke Spanish. Recruitment occurred in two settings: the VIIDAI community clinic and households located within the same *colonia*. Participants from the clinic were recruited via convenience sampling while they waited for clinic services or health promotion activities. The lead author (CEDS, a female, Hispanic doctoral student and epidemiologist credentialled with a M.P.H. degree) trained students from UABC, UCSD, and SDSU who volunteered to be quantitative survey interviewers for this study; she reviewed the study procedures (including informed consent and assent processes), discussed methods to collect data pertaining to sensitive topics like SRH, standardised question prompts, and employed peer modelling and role play to help prepare the interviewers for collecting data in the community. Interviewers approached individuals outside of the clinic, invited them to participate in the survey, and administered a brief eligibility screening questionnaire. To ensure that the survey did not only represent residents in need of clinical care, we also recruited participants through systematic sampling of households with random starting points throughout the *colonia*. A geographic information system (GIS) map of the *colonia* was used to randomly select blocks of houses. Interview teams started at a randomly selected house and then moved clockwise around each block approaching every other household for the survey. If a selected household had no eligible participants, no one home, or the occupants refused to participate, the interviewers approached the next adjacent house. Each household could provide up to four individuals for the survey: one adolescent female, one adolescent male, one adult female, and one adult male. If multiple individuals from a particular category were present, a coin flip determined who would be enrolled in the study.

During the data collection in November 2018, participants were recruited from the VIIDAI community clinic and from households located within the same *colonia*. Given that recruitment rates in November 2018 were much higher among households in the *colonia*, recruitment in April 2019 was focused on households.

Data collection

The survey was pilot-tested among 63 community members recruited through convenience sampling at the VIIDAI community clinic during a prior VIIDAI visit to the *colonia* in April 2018. The questionnaire used in the current study reflects their valued input, including dichotomising response options (e.g. agree versus disagree compared to 5-point Likert-type response options including strongly agree, somewhat agree, neither agree nor disagree, somewhat disagree, strongly disagree) for certain questions and shortening the survey overall to reduce respondent burden. Bilingual Spanish/English or native Spanish-speaking interviewers (all graduate students) administered the surveys using KoBo Toolbox61 on a password-protected smartphone or tablet. Given that our study included sensitive topics related to SRH, we used sex-matched interviewer pairs so that participants could feel more comfortable disclosing sensitive information in the presence of an interviewer of the same sex.

Survey instrument

The questionnaire (Supplementary Material 1) assessed sociodemographic variables including age, sex, place of birth, language(s) spoken

other than Spanish, years of education completed, weekly income in Mexican pesos, marital status, number of children, and years lived in the *colonia*. Since years lived in the *colonia* is dependent on age, we created a variable to describe the percentage of lifetime years lived in the *colonia* by dividing years in the *colonia* by age. Some of these sociodemographic questions were adapted from the Demographic and Health Surveys (DHS) Model Questionnaire – Phase 762 and others were developed by our research team. The questionnaire also assessed factors related to SRH (e.g. practices, attitudes, social and cultural norms, reproductive health knowledge, sexually transmitted infections (STI)- and HIV-related knowledge), with questions adapted from the DHS Model Questionnaire – Phase 7 (from the sections pertaining to reproduction, contraception, pregnancy and postnatal care, marriage and sexual activity, fertility preferences, and HIV/AIDS)[60] and the Reproductive Autonomy Scale.[61] Questions about knowledge of SRH, access to services, and HIV were collected only during the first data collection period (November 2018).

Statistical analysis

We combined data from the quantitative surveys completed in November 2018 and April 2019 for this analysis and excluded participants from the latter data collection period who indicated that they had already taken ($n = 19$) or were unsure if they had taken the survey in November 2018 ($n = 6$). To assess birth cohort differences, we categorised age into six groups (i.e. 13–17 years, 18–24 years, 25–34 years, 35–44 years, 45–64 years, ≥65 years).

We measured reproductive health knowledge using five items. A combined knowledge score was calculated for each participant, with higher scores indicating greater knowledge (range: 0–5). We measured HIV-related knowledge using eight questions, and summed scores were generated with a higher score indicating greater HIV knowledge (range: 0–8).

We calculated descriptive statistics to compare differences in sexual health knowledge and perceptions by age categories using the Kruskal–Wallis test and the Fisher's Exact test with Monte Carlo estimation[62] for continuous and categorical variables, respectively.

Qualitative methods

TBD (a female, non-Hispanic medical student credentialled with a M.S. degree) led the development of a culturally adapted SRH educational pamphlet (Supplementary Materials 2 and 3) designed for community members of childbearing age and informed by the findings from the quantitative surveys, with a focus on a lower reading level and high processing fluency (e.g. contrast between text and background, use of plain language, use of round numbers, limited number of key points), given that our participants were from a low health literacy community.[63–67] Given that 92% of the population in the San Quintin Valley are literate (per the 2020 Mexican Census[68] and likely measuring literacy at the primary education level) and the SRH educational pamphlet was designed to have a 6th-grade reading level, literacy was not considered a barrier to participate in the study. To assess *colonia* residents' comprehension and acceptability of the pilot pamphlet, TBD conducted in-depth interviews with community members and two focus groups (one with the school principal and six male and female teachers and one with 15 female volunteer community health workers (*promotoras*)).

Participant eligibility and recruitment

Eligible participants were ≥18 years old, lived in the *colonia* for ≥6 months, and spoke Spanish. While the reading level of the SRH educational pamphlet was suitable for minors as well as adults, only adults were included in the qualitative assessment because we wanted to first determine whether parents would accept the use of the pamphlet with their children before exposing children to it. For the in-depth interviews, we recruited a convenience sample of 17 patients waiting to be seen in the VIIDAI community clinic. Given the smaller sample needed for the qualitative interviews, we were able to quickly recruit participants among the patients attending the VIIDAI clinic and did not have any reason to believe that opinions about the pamphlet would differ between community members attending the VIIDAI clinic and other community members. All approached individuals agreed to participate and none dropped out during the study. Immediately after completing the informed consent process in the VIIDAI clinic in which the interviewer (TBD) explained the reasons for doing the

research, she handed participants the SRH educational pamphlet, allowed them time to read through the pamphlet, and then asked them for their opinions of the pamphlet. The focus groups were coordinated by TBD and facilitated by one male and one female bilingual, Hispanic, Preventive Medicine Residents. The first focus group was conducted in the school where the VIIDAI clinic took place and included the principal and teachers from the school. The second focus group was held at a local community centre with *promotoras*. The *promotoras* were recruited by the community centre director.

Data collection

The qualitative interviews lasted 10 minutes. Participants were given time to review the educational pamphlet before being interviewed. Interviewers followed a structured interview guide asking open-ended questions about perceptions and reactions to the pamphlet. Interviewers also asked participants in the individual interviews to rate the usefulness and ease of understanding the pamphlet on a scale from 1 to 10 with higher scores indicating more usefulness and greater ease of understanding. Focus groups lasted for one hour. Focus group participants were also given time to review the educational pamphlet and subsequently participated in a guided discussion. Participants were asked to provide their opinions about whether community members perceived a need for this type of reproductive health educational resource, their understanding of the pamphlet content as well as their opinions about the pamphlet layout, and any recommendations to improve the effectiveness or feasibility of use of the pamphlet to raise community awareness and educate community members.

Qualitative analysis

This analysis includes qualitative data from individual interviews among community members and focus groups among the school principal, teachers, and *promotoras*. Audio recordings from the focus groups were used to create transcripts, which were then translated into English; these transcripts were kept by the study staff. To minimise participant discomfort, individual interviews were not recorded and interviewer notes were used for this analysis. Thematic analysis was used to identify common themes that emerged from the individual interviews and focus groups. Guided by senior author RSG (male, non-Hispanic, professor and epidemiologist), TBD read and re-read the transcripts, noting initial ideas. The data were systematically coded by TBD and RSG using deductive and inductive approaches. Codes were entered into an Excel spreadsheet and reviewed by both authors to identify themes. Themes were compared to codes, ensuring they accurately reflected the data. Given the small sample size, all themes that emerged are presented (rather than categorising them as major and minor). Since data analysis occurred after departing from San Quintin, it was not possible to obtain participant feedback on the findings. The number of focus groups ($n = 2$) was too small to assess data saturation.

Results

Quantitative results

Sample characteristics

A total of 217 unique individuals completed the survey, of whom 147 (68%) were assessed in the first data collection period. Participants had a median age of 30 years (range = 13–90) and 71% were female (Table 1). Most participants were born either in Oaxaca (45%) or Baja California (36%), with a majority of the younger participants aged 13–24 years ($n = 10$, 83%) being born in Baja California compared to those aged 45–64 years ($n = 27$, 77%) and those aged >65 years ($n = 4$, 67%) who mostly reported being born in Oaxaca ($p < 0.001$). Participants had lived in the *colonia* a median of 20 years, with younger adults having lived a greater proportion of their lives in the *colonia* compared to middle-aged and older adults ($p < 0.001$). In addition to Spanish, 64% of participants spoke Mixtec and 24% spoke Triqui alone or in combination with Spanish. Participants completed a median of six years of education, with younger participants reporting more years of education compared to middle-aged and older adults ($p < 0.001$). Sixty-nine per cent of participants reported being married. Overall, 79% ($n = 171$) reported having children, among whom the median number of children was three (range: 1–11).

Sexual and reproductive health attitudes and practices

Of the 217 survey participants, 66% reported being sexually active and 71% were currently in a relationship (Table 2). The median age at sexual

Table 1. Characteristics of adolescents and adults in a rural farming community by age group, San Quintin, Baja California, Mexico – 2018–2019

Characteristics, *n* (%)	Total (*N* = 217)	Age (years)						
		13–17 (*n* = 12)	18–24 (*n* = 59)	25–34 (*n* = 65)	35–44 (*n* = 40)	45–64 (*n* = 35)	≥65 (*n* = 6)	*p*
Female	154 (71)	8 (67)	42 (71)	52 (80)	27 (68)	20 (57)	5 (83)	0.247
Place of birth								<0.001
Oaxaca	98 (45)	1 (8)	12 (20)	28 (43)	26 (65)	27 (77)	4 (67)	
Baja California	78 (36)	10 (83)	43 (73)	21 (32)	3 (8)	1 (3)	0 (0)	
Other Mexican states[a]	41 (19)	1 (8)	4 (7)	16 (25)	11 (28)	7 (20)	2 (33)	
Non-Spanish languages spoken (*n* = 72)								0.621
Mixtec	46 (64)	1 (100)	6 (46)	13 (54)	13 (72)	11 (79)	2 (100)	
Triqui	17 (24)	0 (0)	6 (46)	6 (25)	3 (17)	2 (14)	0 (0)	
Other languages[b]	9 (13)	0 (0)	1 (8)	5 (21)	2 (11)	1 (7)	0 (0)	
Years of education, med (IQR)	6 (3–9)	9 (7–11)	9 (7–12)	6 (4–9)	5 (0–9)	4 (0–6)	0 (0–1)	<0.001
Weekly income in Mexican pesos								0.009
≤1250 pesos	94 (43)	3 (25)	20 (34)	35 (54)	17 (43)	16 (46)	3 (50)	
>1250 pesos	74 (34)	1 (8)	20 (34)	22 (34)	16 (40)	14 (40)	1 (17)	
Don't know/refuse to answer	49 (23)	8 (67)	19 (32)	8 (12)	7 (18)	5 (14)	2 (33)	

Years lived in *colonia*, med (IQR)	20 (11–24)	15 (13–16)	19 (8–22)	19 (7–25)	20 (10–25)	24 (20–30)	22 (20–40)	<0.001
% lifetime lived in *colonia*, med (IQR)[c]	59 (33–100)	100 (97–100)	100 (44–100)	59 (27–97)	52 (27–69)	45 (40–57)	33 (26–44)	<0.001
Marital status								<0.001
Married	150 (69)	0 (0)	33 (56)	56 (86)	33 (83)	26 (74)	2 (33)	
Divorced or separated	18 (8)	0 (0)	2 (3)	6 (9)	7 (18)	3 (9)	0 (0)	
Single/never married	41 (19)	12 (100)	24 (41)	3 (5)	0 (0)	2 (6)	0 (0)	
Widow/widower	8 (4)	0 (0)	0 (0)	0 (0)	0 (0)	4 (11)	4 (67)	
Any children	171 (79)	0 (0)	32 (54)	60 (92)	39 (98)	34 (97)	6 (100)	<0.001
Number of children, med (IQR)	3 (2–4)	–	1 (1–2)	3 (2–3)	3 (2–4)	5 (3–6)	7 (7–9)	<0.001

Note: Abbreviation: IQR = interquartile range, med = median, p = p-value. Column percentages are provided, percentages may not sum to 100 due to rounding.

a Some participants reported being born from the following Mexican states: Guerrero (3.7%), Veracruz (3.7%), Baja California Sur (2.8%), Sinaloa (1.8%), Chiapas (1.4%), Ciudad de México (1.4%), Puebla (1.4%), Sonora (1.4%), Guanajuato (0.5%), Durango (0.5%), Michoacán (0.5%).

b Some participants reported speaking the following languages: Zapotec (4.2%), English (4.2%), Amuzgo (2.8%), and Nahuatl (1.4%).

c Calculated as the years lived in the *colonia* divided by the participant's age, multiplied by 100%.

Table 2. Sexual and reproductive health practices and attitudes by age group among adolescents and adults in a rural farming community, San Quintin, Baja California, Mexico – 2018–2019

Characteristics in full sample, *n* (%)	Total (*N* = 217)	Age (years)						
		13–17 (*n* = 12)	18–24 (*n* = 59)	25–34 (*n* = 65)	35–44 (*n* = 40)	45–64 (*n* = 35)	≥65 (*n* = 6)	*p*
Currently in a relationship	154 (71)	4 (33)	38 (64)	53 (82)	34 (85)	24 (69)	1 (17)	<0.001
Sexually active	144 (66)	0 (0)	41 (69)	48 (74)	33 (83)	22 (63)	0 (0)	<0.001
Age at sexual debut (*n* = 194), med (IQR)	17 (15–18)	15 (*n* = 1)	17 (16–18)	17 (15–19)	17 (15–18)	17 (15–19)	15 (14–15)	0.098
Characteristics in reduced sample[a]	Total (*n* = 147)	Age (years)						
		13–17 (*n* = 7)	18–24 (*n* = 36)	25–34 (*n* = 51)	35–44 (*n* = 31)	45–64 (*n* = 18)	≥65 (*n* = 4)	*p*
At what age do you think a woman should start having children, med (IQR)[b]	20 (20–23)	20 (18–22)	20 (20–25)	20 (20–23)	20 (19–20)	20 (20–25)	14 (13–17)	0.006
At what age do people in your community think that women should start having children, med (IQR)	20 (17–20)	20 (15–25)	20 (17–25)	20 (18–23)	19 (15–20)	18 (14–20)	17 (14–24)	0.125
What information or services have you sought from a health professional in the past 12 months?[c] (*n* = 124)								
Contraceptives/pregnancy prevention[d]	29 (23)	0 (0)	11 (37)	13 (25)	5 (16)	0 (0)	0 (0)	0.155
Testing for HIV and other STI[d]	12 (10)	0 (0)	2 (7)	6 (12)	4 (13)	0 (0)	0 (0)	0.799
Abortion services[d]	75 (60)	1 (100)	12 (40)	28 (55)	23 (74)	10 (100)	1 (100)	0.001

Note: Abbreviations: IQR = interquartile range, med = median, *p* = *p*-value, STI = sexually transmitted infection. Column percentages are provided, percentages may not sum to 100 due to rounding.

a Assessed in the first data collection period only.

b Restricted to first data collection period.

c This question captured whether a participant sought certain information or services from a health professional, but did not measure whether the information or services were actually provided to the participant.

d Restricted to individuals who reported ever having sex (specifically female participants of reproductive-age and all male participants, *n* = 124).

Table 3. Individual and community norms about sexual and reproductive health education by age group among adolescents and adults in a rural farming community, San Quintin, Baja California, Mexico – 2018–2019

Characteristics in full sample, *n* (%)	Total (*N* = 217)	Age (years)						
		13–17 (*n* = 12)	18–24 (*n* = 59)	25–34 (*n* = 65)	35–44 (*n* = 40)	45–64 (*n* = 35)	≥65 (*n* = 6)	*p*
If you have children, do you talk to them about sex?	122 (74)	–	22 (79)	38 (67)	28 (72)	30 (88)	4 (67)	0.176
Giving teens information about contraceptive methods will promote earlier sexual debut								0.042
True	85 (39)	5 (42)	15 (25)	29 (45)	18 (45)	12 (34)	6 (100)	
False	115 (53)	6 (50)	38 (64)	33 (51)	20 (50)	18 (51)	0 (0)	
Don't know	17 (8)	1 (8)	6 (10)	3 (5)	2 (5)	5 (14)	0 (0)	
Characteristics in reduced sample[a]	Total (*n* = 147)	Age (years)						
		13–17 (*n* = 7)	18–24 (*n* = 36)	25–34 (*n* = 51)	35–44 (*n* = 31)	45–64 (*n* = 18)	≥65 (*n* = 4)	*p*
Age children should learn about reproductive and sexual health								0.279
<10 years	21 (14)	1 (14)	1 (3)	11 (22)	5 (16)	1 (6)	2 (50)	
10–12 years	84 (57)	3 (43)	22 (61)	26 (51)	19 (61)	12 (67)	2 (50)	
13–15 years	30 (20)	3 (43)	11 (31)	9 (18)	3 (10)	4 (22)	0 (0)	
16–18 years	9 (6)	0 (0)	2 (6)	3 (6)	3 (10)	1 (6)	0 (0)	
19–20 years	3 (2)	0 (0)	0 (0)	2 (4)	1 (3)	0 (0)	0 (0)	

Who should educate children about sex[b]								
Parents (mother or father)	138 (94)	5 (71)	34 (94)	49 (96)	29 (94)	18 (100)	3 (75)	0.079
Teachers	76 (52)	4 (57)	16 (44)	27 (53)	17 (55)	11 (61)	1 (25)	0.748
Health professionals	80 (54)	3 (43)	18 (50)	30 (59)	16 (52)	12 (67)	1 (25)	0.630
Community health workers	53 (36)	2 (29)	9 (25)	21 (41)	9 (29)	11 (61)	1 (25)	0.137
VIIDAI clinic personnel	59 (40)	2 (29)	14 (39)	21 (41)	12 (39)	9 (50)	1 (25)	0.925
Other relatives	52 (35)	2 (29)	11 (31)	24 (47)	7 (23)	8 (44)	0 (0)	0.138
Friends	25 (17)	0 (0)	4 (11)	8 (16)	6 (19)	7 (39)	0 (0)	0.165

Note: Abbreviations: p = p-value. Column percentages are provided, percentages may not sum to 100 due to rounding.
a Assessed in the first data collection period only.
b Participants asked to check all answer options that apply.

Table 4. Sexual and reproductive health knowledge by age group among adolescents and adults in a rural farming community, San Quintin Baja California, Mexico – 2018–2019

Characteristics in reduced sample[a]	Total (*n* = 147)	Age (years)						
		13–17 (*n* = 7)	18–24 (*n* = 36)	25–34 (*n* = 51)	35–44 (*n* = 31)	45–64 (*n* = 18)	≥65 (*n* = 4)	*p*
Reproductive Health Knowledge								
From one menstrual period to the next, there are certain days when a woman is more likely to get pregnant	108 (74)	5 (71)	23 (64)	37 (73)	28 (90)	12 (67)	3 (75)	0.287
After the birth of a child, a woman can get pregnant before her menstrual period has returned	82 (56)	0 (0)	20 (56)	28 (55)	21 (68)	11 (61)	2 (50)	0.103
A woman can get pregnant while breastfeeding	99 (67)	2 (29)	24 (67)	37 (73)	23 (74)	10 (56)	3 (75)	0.144
A woman can get pregnant the first time she has sex	122 (83)	6 (86)	29 (81)	39 (76)	28 (90)	16 (89)	4 (100)	0.738
Urinating or bathing after sex protects against pregnancy[b]	58 (40)	2 (29)	16 (44)	17 (33)	12 (39)	11 (61)	0 (0)	0.537
Summed Score, median (IQR)	4 (3–4)	3 (2–3)	3 (2–4)	4 (3–4)	4 (3–5)	3 (2–4)	4 (4–5)	0.032
HIV-Related Knowledge								
A person can get HIV from vaginal sex	127 (86)	6 (86)	32 (89)	48 (94)	27 (87)	13 (72)	1 (25)	0.007
A person can get HIV from oral sex	81 (55)	2 (29)	20 (56)	29 (57)	17 (55)	12 (67)	1 (25)	0.504
A person can get HIV from anal sex	87 (59)	3 (43)	23 (64)	30 (59)	20 (65)	11 (61)	0 (0)	0.216

A person can get HIV from breast milk	50 (34)	4 (57)	10 (28)	18 (35)	11 (35)	7 (39)	0 (0)	0.516
A person can get HIV from saliva, sweat, tears[c]	46 (31)	2 (29)	10 (28)	9 (18)	13 (42)	11 (61)	1 (25)	0.013
A person can get HIV from hugging, kissing, or holding hands[c]	17 (12)	2 (29)	7 (19)	5 (10)	2 (6)	1 (6)	0 (0)	0.298
A person can get HIV from sharing IV or tattoo needles	119 (81)	6 (86)	29 (81)	47 (92)	22 (71)	14 (78)	1 (25)	0.016
A person can get HIV from sharing toothbrushes or personal items[c]	57 (39)	2 (29)	13 (36)	19 (37)	14 (45)	8 (44)	1 (25)	0.924
Summed Score, median (IQR)	5 (4–6)	6 (4–6)	6 (4–7)	6 (5–7)	5 (4–6)	5 (4–6)	3 (3–4)	0.023

Note: Abbreviations: IQR = interquartile range, med = median, p = p-value. Column percentages are provided, percentages may not sum to 100 due to rounding.

a Assessed in the first data collection period only.

b Item was reverse-coded so that participants who correctly responded "no" received a higher score for reproductive health knowledge.

c Item was reverse-coded so that participants who correctly responded "no" received a higher score for HIV-related knowledge.

debut was 17 years, which was similar across age groups. Participants aged 13–64 years reported that childbearing should start at an older age (median 20 years, interquartile range (IQR): 20–24) compared to participants aged ≥65 years (median 14 years, IQR: 13–17). Similarly, participants perceived that community members believe the appropriate age for women to start childbearing was 20 years old (IQR: 17–20), which trended downward with increasing participant age. When asked about seeking (although not necessarily receiving) certain SRH information and services, few participants reported seeking contraceptives or HIV/STI testing (23% and 10%, respectively). Overall, 60% reported seeking (although not necessarily receiving) abortion services in the past 12 months, which was reported more often by participants ≥35 years old (Table 2).

Reproductive and sexual health education norms

Of the total sample ($n = 217$), 47% believed that or were unsure about whether giving teenagers information about contraceptive methods would encourage them to have sex, although when those with children were asked if they spoke to their children about sex, 74% ($n = 122$) responded "yes" (Table 3). Most participants (77%) believed that children should learn about SRH between ages 10–15 years, with no statistically significant differences across age groups ($p = 0.279$). When asked who should teach children about sex, 94% answered "parents", 54% answered "health professionals", and 52% answered "teachers" (responses not mutually exclusive).

The median score on reproductive health knowledge was 4 (IQR: 3–4) and was inversely associated with age ($p = 0.032$; Table 4). Most participants were aware that women can become pregnant during their first sexual encounter (83%) and that fertility fluctuates within a menstrual cycle (74%); however, fewer participants knew that urinating/bathing after sex did not prevent pregnancy (60%), or that pregnancy can occur before a woman's first postpartum period (56%) or while breastfeeding (67%).

In terms of HIV-related knowledge, the median score was 5 (IQR: 4–6) and was inversely associated with age ($p = 0.023$; Table 4). Most participants knew that HIV transmission could occur through vaginal sex (86%) or by sharing intravenous and/or tattoo needles (81%) and that HIV cannot be spread through hugging, kissing, or holding hands (88%). However, fewer reported knowing that HIV transmission can occur via oral sex (55%), anal sex (59%), or breastfeeding (34%) and that HIV is not transmitted through saliva, sweat, or tears (69%) or by sharing toothbrushes or other personal items (61%).

Qualitative results

Individual interviews with community members

Several themes emerged from our qualitative analysis, including (a) the helpfulness of the survey, (b) motivation to learn more about SRH topics, (c) the acceptability of the SRH educational pamphlet, (d) the benefits of the SRH educational pamphlet as a tool to counteract the stigmatised nature of SRH topics in this community, and (e) recommendations to improve the SRH educational pamphlet.

Participants ($n = 17$) indicated that the content of the pamphlet was helpful, with an average score of 9.4 out of 10 for the pamphlet's usefulness to the community. Many were surprised by the variety of contraceptive methods available and the lower efficacy of condoms to prevent pregnancy compared to other birth control options, for example:

"I didn't know much of the information that was included in the birth control section."

"[I was surprised by] the number of birth control methods."

"[I was surprised by] the low efficacy of condoms."

Participants consistently highlighted their desire to learn more about birth control risks, how to implement different contraceptive methods, sexually transmitted infections, how to talk to children about sex, and cultural and emotional aspects of sexual education. These were some of their suggestions:

"[Include] the risks and side effects of birth control methods."

"[Include] how the birth control methods work."

"Include information about sexually transmitted infections."

"[Include] tips to explain sexual health to children."

"[Include] how to speak to our children about this topic."

Participants felt that the SRH educational pamphlet could be given to community members aged ≥12 years and scored the ease of understanding the pamphlet as 9.5 out of 10.

Focus group discussions

Participants in the two focus groups that were conducted mentioned the perceived need for and acceptability of the reproductive and sexual health educational pamphlet. Participants found the pamphlet useful in providing information that they were unaware of. Some participants commented that the layout and use of images was particularly useful for community members who predominately speak indigenous languages and do not understand Spanish well:

"I'm 63 years old and this is the first time I've seen this. I'm married and I have two kids. Who knew this? Seriously it's very interesting and educational."

"It's very clear and understandable, especially for people who don't understand Spanish, it's very practical. The photos are good."

A recurring theme among indigenous women in the *colonia* was that they felt that discussing sexual or reproductive health with healthcare providers or even with their spouses was stigmatising. For that reason, they mentioned some advantages that a SRH pamphlet could provide in educating them and others like them in their community:

"Here there are many indigenous people. We understand shame. We can't express this because we are embarrassed. We don't even talk to a doctor about something like 'I don't want to have kids' or 'my husband doesn't treat me well.' As an indigenous woman, I feel this [pamphlet] is helpful."

"As an indigenous woman, if I get an infection, I wouldn't tell my doctor or even my husband because I'm embarrassed, which can make it more serious or even fatal. So, this diagram is very helpful because I learned that female condoms are less visible [than] male condoms."

Some participants viewed the stigma in their community surrounding SRH as an obstacle that should be overcome to better educate the children and adolescents of the community. A common theme described by participants was that many parents would like to educate their children about SRH but were uncomfortable with the topic and did not know how to initiate these types of conversations. Participants commented that:

"The problem is the beliefs and traditions of this community. We are in a valley where half of us are conservative, we don't talk to our kids about how to prevent having babies so then they have babies."

"This [Triqui/Mixtec] community is very traditional – some are religious. Yes, there should be more understanding so that the parents can understand the information better so that they can talk to their teens."

"It would be useful to have something that the parents can open and explain to their kids. Parents are embarrassed to talk to their kids about it. If there is a little book or a little guide for the parents to talk to this with their kids, that would be good."

Important recommendations voiced by participants included creating multiple categories of pamphlets, including guides for parents about how to initiate these types of conversations, as well as pamphlets designed for different developmental ages:

"The [pamphlets] shouldn't be by age, they should be by development. Some kids develop faster than others."

"Could we add how to use the methods and a practical guide, advice for parents on how to talk to kids about sex and contraception?"

"Make multiple pamphlets – one to start the conversation with the kids and for parents who think 'now it's time.'"

Discussion

This study provides valuable information on the SRH knowledge, perceptions, and practices in a rural, predominately indigenous community in Mexico, which can be used to further inform strategies and address disparities observed in underserved indigenous communities, such as the one surveyed. Overall, we found a low prevalence of contraceptive use or HIV/STI testing among adolescent and adult participants and a high prevalence of women seeking abortion services. SRH knowledge was low, but participants expressed interest in learning more about these topics as well as sharing this information with their children. In the qualitative phase of the

study, we found that the health education materials developed through community-based research were well-received and raised interest among community members in learning more about these topics.

The birth cohort differences observed in our sample highlight a shift in certain community characteristics. The *colonia* has evolved from a migrant community to a more permanent settlement, as observed by the proportions of younger participants born in Baja California and living most of their lives in the *colonia,* compared to older participants. These findings are comparable to the trends reported in other studies in the San Quintin Valley.[69,70] Additionally, there was a notable difference in educational attainment, with younger individuals in this community receiving more education compared to older community members. We also noted a decreasing trend in family size across birth cohorts, although participants in our survey still had more children than reported among rural individuals in a national sample in 2018.[54]

We also observed important results regarding practices and attitudes related to SRH. The age at sexual debut was comparable to the average reported in a population-based sample in Mexico in 2018 and a national sample of indigenous women in Mexico in 2009 (17.5 and 17.3 years, respectively),[53,54] which did not differ significantly across generations. Compared to older participants, younger participants believed that women should start having children later, which suggests a possible shift in reproductive health attitudes that should be considered and addressed in future reproductive health interventions in the community. The proportion of participants who sought contraceptives in the past 12 months was lower than reported in a population-based survey in Mexico in 2018 (23% versus 53%, respectively),[54] yet over half of the participants in our sample reported seeking (although not necessarily receiving) abortion services in the same time frame. Considering the highly stigmatised nature of abortion in Mexico, this observed trend is likely to be associated with the lack of access to reproductive health services in the area including lack of education about family planning options and affordable access to preferred contraceptive methods.[71–73]

We also observed promising findings regarding norms about SRH education. The majority of our sample believed that children should learn about SRH in secondary or high school. Most parents reported already speaking to their children about sex, although with some hesitancy about which topics might promote sex earlier. Parents were identified as the preferred delivery agents for SRH education, yet many participants lacked general knowledge regarding reproductive health and HIV transmission. Participants found the contents of the developed SRH pamphlet to be informative and helpful, highlighting the potential acceptability and utility of this type of educational pamphlet for this community.

Considering the longstanding collaboration between this underserved rural farming community and VIIDAI undertaken following the philosophy of community-based participatory research, public health efforts in the *colonia* should capitalise on the present opportunity to improve SRH-related outcomes. Our findings suggest that a culturally tailored SRH intervention in this community should focus on increasing knowledge about SRH among adolescents and adults, and that training peer educators including parents and teachers who can then go on to educate others on these topics would increase community knowledge.[74] Public health efforts should also work to destigmatise topics related to SRH, emphasise family planning options to empower individuals in this community (including how to mitigate barriers like limited access to preferred contraceptive methods), and target specific community attitudes (e.g. the age a woman should start having children) as well as potential gender power imbalances (e.g. negotiating safer sex).[49,56,75]

Some limitations of our study must be considered. First, the exploratory nature of this study resulted in a small sample size that was recruited partly through convenience sampling in two settings (i.e. the VIIDAI community clinic or households in the *colonia*). We cannot assess potential differences by recruitment setting as these data were not collected, and should be explored in future SRH research in this community. Moreover, our sample size and use of convenience sampling limits the generalisability of our findings to the entire *colonia*. However, to our knowledge, this is the first SRH study in this isolated community and our findings can inform future SRH interventions in the area. Second, male participants were underrepresented in our sample and some of our age categories had insufficient observations. Age- and gender-stratified sampling were beyond the capability of our

study, and future research should build upon our findings and examine SRH topics in a larger sample with equal distributions of men and women and comparable subgroups of participants across ages to better assess important differences in SRH perspectives. Third, sensitive topics in our study might have resulted in socially desirable responses (i.e. underreporting of stigmatised SRH-related topics) if participants were embarrassed or thought they would be judged by their answers to the questions. To mitigate this form of bias, we trained interviewers to carefully review the study procedures during the informed consent process so that participants were aware of the steps to ensuring their responses were kept confidential, which included not collecting names or other personal identifiers from the participants. Additionally, we utilised sex-matched interviewer pairs so that participants could feel more comfortable disclosing sensitive information in the presence of an interviewer that was their same sex. Fourth, we did not collect demographic data for the participants in our qualitative individual interviewers and focus groups, precluding our ability to attribute the perspectives captured in this work to specific segments of the study population. Still, the descriptions provided by our study participants shed valuable insight into the utility of a reproductive and sexual health educational pamphlet in this community.

Conclusion

Overall, we found that individuals in this rural Mexican farming community agreed that adolescents should receive SRH education, preferably from their parents, although parents' knowledge regarding these topics was low. Health education materials developed through community-based research were well-received and raised interest among community members in learning more about SRH. Continued community-informed efforts and future interventions in this community could help address important inequities faced by these community members pertaining to their SRH.

Acknowledgements

The authors thank the study participants for their trust and participation. The authors would also like to thank the community leaders, local stakeholders, and VIIDAI organisers and volunteers for their support throughout this study, including the students from UABC, UCSD, and SDSU who volunteered to be quantitative survey interviewers.

Authors' contributions

***CEDS:** conceptualisation, investigation, supervision, project administration, methodology, data curation, data collection, formal analysis, software, validation, visualization, writing – original draft, writing – review & editing.* ***MS:** conceptualisation, investigation, supervision, project administration, methodology, writing – review & editing.* ***ARSL:** formal analysis, writing – review & editing.* ***LSP:** investigation, methodology, writing – review & editing.* ***SB:** conceptualisation, investigation, supervision, project administration, methodology, writing – review & editing, funding acquisition.* ***MAF:** conceptualisation, investigation, supervision, project administration, methodology, writing – review & editing.* ***TBD:** conceptualisation, investigation, supervision, project administration, data collection, methodology, formal analysis, writing – review & editing.* ***NCC:** conceptualisation, investigation, supervision, project administration, methodology, writing – review & editing.* ***JMH:** conceptualisation, investigation, resources, supervision, project administration, writing – review & editing.* ***MM:** conceptualisation, investigation, supervision, project administration, writing – review & editing.* ***RSG**: conceptualisation, investigation, supervision, project administration, methodology, writing – review & editing.*

Disclosure statement

No potential conflict of interest was reported by the author(s).

Funding

This work was supported through multiple funding sources, including the Fred J. Bixby Foundation under Grant C03093, the National Institute on Drug Abuse under Grant T32DA023356 (CEDS), the National Institute of Aging under Grant T32AG058529 (ARSL), and the National Heart, Lung, and Blood Institute under Grant K01HL169414 (LSP). Additional support were also provided by Rotary International, Ensenada Centenaria Rotary Club, Old Mission Rotary Club, Rotary District 5340, and Rotary District 4100. The funders did not have input into the conduct or analysis of the study, the writing of the manuscript, or the decision to submit the manuscript for publication.

Provenance statement:

This article was not commissioned and went through external review.

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Résumé

Au Mexique, les populations autochtones rurales rencontrent des obstacles pour accéder aux ressources et aux services de santé sexuelle et reproductive (SSR). Étant donné le manque d'information pour guider les matériels éducatifs adaptés aux besoins de ces communautés autochtones, nous souhaitions: (a) caractériser quantitativement les connaissances et les pratiques en matière de SSR chez les adolescents et les adultes d'une communauté rurale, principalement autochtone, dans le nord du Mexique, et (b) évaluer qualitativement les points de vue de la communauté sur une brochure éducative contenant des informations sur la SSR (par exemple les options contraceptives). Le recueil des données quantitatives a eu lieu en novembre 2018 et avril 2019 en utilisant un échantillonnage de commodité dans un dispensaire communautaire et un échantillonnage aléatoire pour les ménages de la communauté. La collecte de données qualitatives s'est déroulée en novembre 2019 avec des entretiens individuels et des discussions de groupe pour évaluer les avis de la communauté sur une brochure éducative sur la SSR mise au point à partir des données quantitatives. Les participants à la phase quantitative de notre étude ($n = 217$) avaient un âge médian de 30 ans, 71% étaient des femmes et celles qui avaient des enfants ont déclaré en avoir un nombre médian de trois (fourchette = 1–11). Les connaissances en matière de SSR étaient faibles, tout comme les activités autodéclarées pour obtenir des contraceptifs ou des tests de dépistage du VIH/des IST. La plupart des participants pensaient que les enfants devaient être informés sur la SSR vers l'âge de 10–15 ans, et 94% estimaient que les parents devaient impartir cette éducation. Les participants avaient peu de connaissances sur la SSR, mais une forte motivation pour instruire les enfants et les adolescents sur ces questions, ce qui indique le potentiel pour des campagnes de SSR dans cette communauté. Les matériels d'éducation à la santé ont été bien accueillis dans la phase qualitative de notre étude ($n = 17$ lors d'entretiens individuels; $n = 22$ dans les discussions de groupe), et ont suscité l'intérêt des membres de la communauté pour en savoir plus sur ces questions.

Resumen

Las poblaciones indígenas rurales de México enfrentan barreras para acceder a los recursos y servicios de salud sexual y reproductiva (SSR). En vista de la falta de información para adaptar los materiales educativos a las necesidades de estas comunidades indígenas, propusimos: (a) caracterizar cuantitativamente los conocimientos y las prácticas de SSR entre adolescentes y adultos en una comunidad rural principalmente indígena del norte de México y (b) evaluar cualitativamente las perspectivas comunitarias en un panfleto educativo con información sobre SSR (p. ej., opciones anticonceptivas). En noviembre de 2018 y abril de 2019, se realizó la recolección de datos cuantitativos utilizando muestreo por conveniencia en una clínica comunitaria y muestreo aleatorio de viviendas comunitarias. En noviembre de 2019, se realizó la recolección de datos cualitativos por medio de entrevistas individuales y discusiones en grupos focales para evaluar las perspectivas comunitarias acerca de un panfleto educativo sobre SSR elaborado con datos cuantitativos. Las personas que participaron en la fase cuantitativa de nuestro estudio ($n = 217$) tenían una edad media de 30 años, el 71% era mujeres y aquéllas con hijos informaron tener tres en promedio (rango = 1–11). Se determinó que había poco conocimiento de SSR y pocos esfuerzos autodeclarados por obtener métodos anticonceptivos o pruebas de VIH/ITS. La mayoría creía que los niños deberían aprender sobre SSR al cabo de 10 a 15 años, y el 94% opinaba que los padres deberían impartir esa educación. Los participantes tenían poco conocimiento de SSR, pero mucha motivación para educar a niños y adolescentes sobre estos temas, lo que indica el potencial de realizar campañas de SSR en esta comunidad. Los materiales de educación sobre salud fueron bien recibidos en la fase cualitativa de nuestro estudio ($n = 17$ de las entrevistas individuales; $n = 22$ de las discusiones en grupos focales) y despertaron el interés de la comunidad en conocer más sobre estos temas.