Community Health Assessment: La Pita, Nicaragua

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Community Health Assessment

Methods

EWB-UH employed several methods to gather information during its community health assessment (CHA). Information from the interviews and meetings, in conjunction with the results of our water quality analysis, will be used to develop a detailed health report and health maps of La Pita that may be used in the future to guide health related projects. A modified and expanded version of this report will be translated into Spanish and shared with the community, UCA-San Ramon, San Ramon's public clinic and EWB-USA. All methods and materials were approved by the Committee on Human Subjects (CHS), the Institutional Review Board at the University of Hawaii. The components of the CHA included:

1.) *The key informant interview*: 5 community leaders and outside experts were chosen for key informant interviews. The data collection tool was the "EWB Community and Health Assessment Survey", with the questions partially modified as appropriate to the profession of the subject. Follow-up questions were also asked, and supporting documents were acquired as available.

2.) *The demographic household survey*: A review of the published literature relating to community health assessments in developing countries was conducted prior to designing a 1 to 1.5 hour long demographic household interview of quantitative and qualitative retrospective and cross-sectional questions. Because of the lack of available information during the design, the survey was exhaustive, and was significantly shortened and slightly modified following the key informant interviews and pilot demographic household interview.

To ensure confidentiality, the village was mapped before conducting interviews and all houses were assigned a number on the map. These numbers were used on the data collection form, ensuring the data forms could only be traced back to the actual location through the original map. After assigning household numbers, 2 research teams were sent to collect data. A consent form was read to the household member interviewed and both verbal and written consent were obtained, including a mechanism for ensuring full understanding and consent among participants who could not read or write. After obtaining consent, pictures were taken of the household's stove, potable water source, "bathroom", and garbage disposal location. These pictures were preceded by a picture of the household number and did not include household members.

A comprehensive group of descriptive statistics was calculated from the survey data. For statistics that differ in calculations across the literature, the Population Reference Bureau's *Population Handbook, 4th International Edition* (1998) was referred to as the gold standard. Exploratory analytic statistics (basic logistic regression and correlation coefficients) were calculated using SAS. Full statistical analysis is not available at the time of writing.

Two other methods of collecting data were left incomplete:

3.) *Gender-specific focus groups*: Focus groups for men and women were arranged to identify issues that might not arise in community meetings or household interviews. The focus group for women was predicated on the notion that women might be unable or unwilling to describe their true needs and issues with men present. The focus groups were not successful, for reasons discussed elsewhere. They will be reattempted on the next trip.

4.) *Environmental health assessment*: The planned environmental health assessment had 2 components. The first would include visual inspections of households for mold, termite damage, and condition of stoves, latrines, etc. This was only partially completed, due to time constraints. The second component was a biological and chemical water quality assessment, using the Hach Portable Water Quality test kit. Only the biological water quality assessment was completed on the assessment trip. This will also be reattempted utilizing Medlab, a lab in Managua.

Results and Discussion

Key informant interviews

Key informant interviews were conducted with:

1.) Don Cesar, the President of La Pita Cooperative
2.) Dona Maria Santos, Cooperative Treasurer and Ecotourist Coordinator
3.) Juan Rodriguez, employee of UCA – San Ramon
4.) Dr. Vera Lopez, Director, *Clinica Publica de San Ramon*
5.) Carmen Maria Lira Tinoco, La Pita primary school teacher

San Ramon area health system profile: The San Ramon municipality has 32,031 people, with a population density of 62 people/km^2. It is 90% rural, and encompasses 89 communities served by 1 public health clinic. There are 7 doctors available in the clinic (1 per 5,000 persons), 4 nurses (1 per 8,808 persons), and 1 ambulance. The ambulance is unable to reach many of the communities and many communities have no phone to contact the clinic in an emergency. There are also 2 private clinics and pharmacies. The nearest emergency and long term care is at Matagalpa Hospital, approximately 20 km away.

The San Ramon health system has several strengths. Basic medical care is free to all. WHO recommended vaccinations have nearly 100% coverage. Breastfeeding until 6 months after birth is nearly universal. Confirmed cases of malaria have markedly decreased in recent years. These facts were confirmed by the demographic household interviews in La Pita. Additionally, the San Ramon clinic is improving its outreach activities, holding health fairs in the communities and offering yearly fumigation.

Several problems exist. The San Ramon clinic and Health Ministry do not have complete demographic data for many communities. There are severe resource shortages in staffing, finances, supplies and services. Access remains limited to many communities.

San Ramon has the 3rd highest rate of interpersonal violence in Nicaragua. The schoolteacher reports that there have been no attempted rapes in La Pita for 6 years, but at least 2 female suicides in La Pita have been over domestic violence.

HEALTH INDICATORS	SAN RAMON REGION	LA PITA COOPERATIVE
HIV testing	21% of pregnant F	<10%
Life expectancy	M-60, F-65	Unknown, probably lower
Leading cause of death: children	Pneumonia	Pneumonia
Leading causes of death: adults	Chronic diseases	Suicide / accidents
Major causes of reported morbidity and mortality	Asthma Pneumonia Diarrhea Skin diseases Parasites Leptospirosis Dengue Fever (DF) Acute Coronary Syndromes ('heart attacks') Cerebrovascular Accidents (strokes) Diabetes Injuries Suicide Violence	Asthma Unexplained fevers (DF?) Parasites Injuries Suicide Dengue Fever Leptospirosis Diarrhea (less common) Injuries – machetes, falls Chronic Diseases

Figure 2: San Ramon municipality and La Pita comparison of health issues. Data was drawn from key informant interviews, clinic data and household interviews.

Education: A new 1-room primary school (1st through 6th grade) was recently built in the village. The secondary school is in San Ramon, and the nearest University is in Matagalpa. The primary school has one teacher and no substitutes. There are currently 32 students. The facilities are nice, but the school lacks basic supplies such as paper, notebooks, a whiteboard and marker[1]. There is a chalkboard but the teacher in allergic. School lasts 6 hours, with 1 hour dedicated to each grade. 10 minutes of each hour is dedicated to 1 discipline.

80% of students graduate from primary school, 30% graduate from secondary school, and only 1 has continued to University. Children come to school at the beginning of every year, but taper off as the year goes on. The schoolteacher states that poor children are

[1] EWB-UH has collected donated school supplies to send to Ms. Tinoco.

sick more often, attend school less and that about 60% of the children are from poor families.

The schoolteacher acts as the only village health educator and runs an adult education program that has graduated 12 adults from primary school thus far.

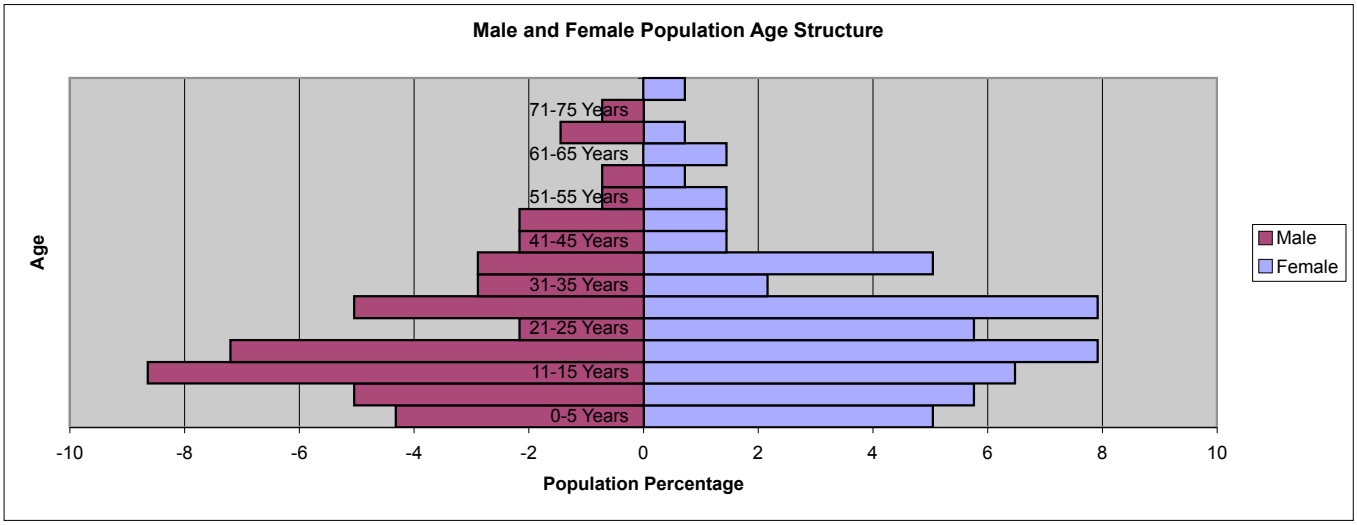
- Demographic Household Surveys

Response and a note on methods: The response rate for the household surveys was 95.5% (21/22). One household member refused, and no other member of that household was available to complete the survey. Researchers were able to obtain information about number, age and sex of occupants only for this household.

All other households completed the basic demographic information portion, a full birth history and 10 year mortality / emigration / fertility history. All but several households completed chronic symptom-based questions experienced by household members in the previous year. All but several households completed questions about lifetime diagnoses with specific illnesses known to exist in Nicaragua. Approximately half of the households answered additional qualitative questions about food, water, sanitation, quality of life, behavioral factors and health education.

The qualitative portion of the questionnaire was considered to be a pilot survey. While the potential for bias exists in the fact that the pilot was conducted on the first 12 households surveyed, the researchers believe that is unlikely because households to interview were selected haphazardly and without virtue of a consistent order. These assumptions will be tested in exploratory statistical analysis, but the small sample size will likely result in similarities in these households due to chance alone.

Demographic Summary: Of the 143 resident of La Pita, 66 are male and 77 are female.



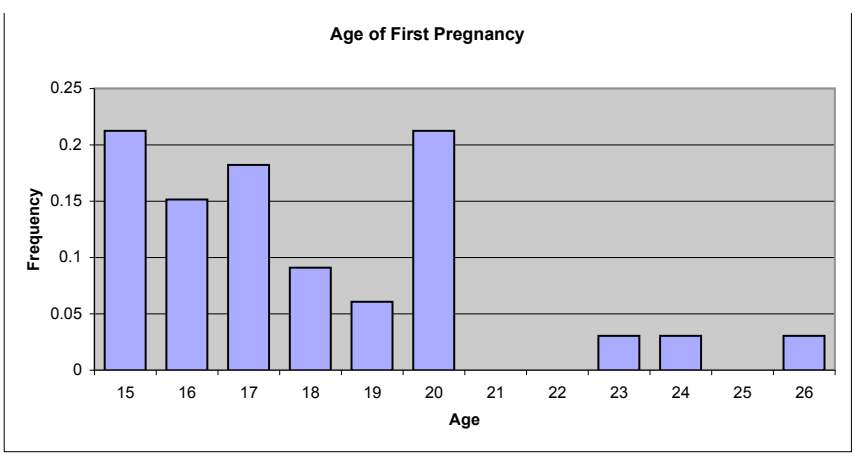


Figure 3: Age structure of La Pita
Figure 4: Age of first birth among women with children

The population of La Pita is quite young (Figure 3). The age-dependency ratio measures the ratio of persons in the "dependent" ages (under 15 and over 64) and is high in areas with high birth rates. La Pita's age-dependency ratio is 56.2.

The average age of 1st birth among women with children in the last 10 years was 17.94, with a range from 15 to 26 (Figure 4). Note that this does not include the 4 currently pregnant women, as their birth outcomes are as yet unknown, and it does not include women who have yet to bear children, many of which are in their mid-20s. *In other words, this figure is misleadingly low*, but still indicative of an absence of family planning services.

Literacy is high among those under 30 years old, but less so in houses with greater degrees of poverty. Crude literacy is 69.8%, lower than the national average of 77%. There is a gender disparity in literacy, with 78% of men able to read and write versus only 61.5% of women. The difference in crude literacy between La Pita and all of Nicaragua may be confounded by the gender ratio found in La Pita, which is skewed toward women. Age-specific literacy suggests that education is improving (Figure 5), and a cruel sort of cohort effect may also drive the crude literacy downward. Many of La Pita's residents were forced to fight for the Contras in the "civil war" in the 1980s and those who were young and educated were likely to be recruited and/or killed. There does appear to be a "missing generation" in the age diagram.

According to the survey data, approximately 70% of children ages 5 to 12 are currently in primary school, lower than the national average of 87%.

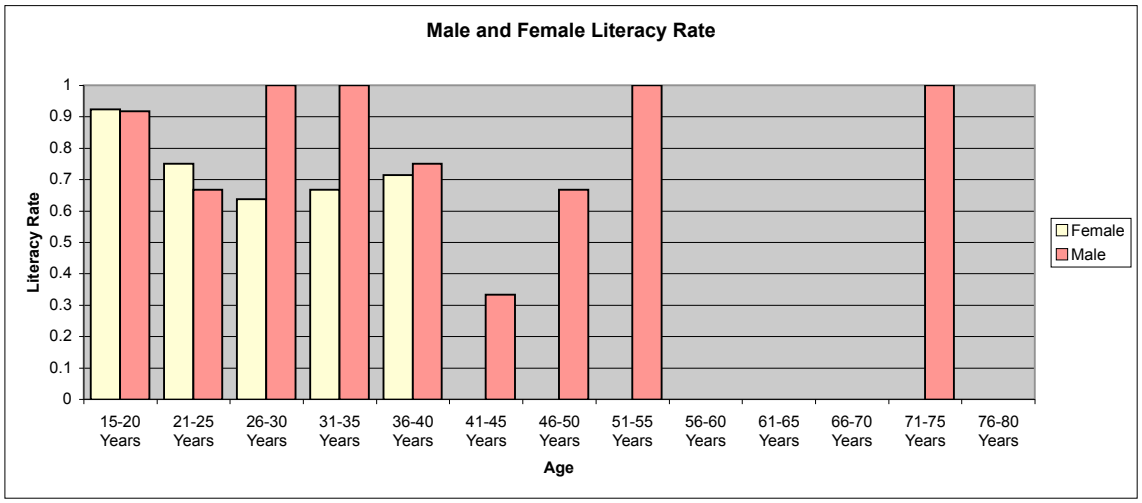


Figure 5: Literacy rates among adults 15 and over (1=100%).

Mortality

The average yearly crude mortality rate of La Pita from 1998-2008 is almost exactly identical to that reported by the United Nations Development Programme for Nicaragua for the 2005-2010 period (Figure 6). Infant mortality was much higher than that reported by the UNDP. Because of the small sample size, this may be a statistical anomaly. Nonetheless, there are compelling epidemiological mechanisms to expect an increased infant mortality in La Pita, including poor access to prenatal care and pervasive indoor smoke. There were 2 miscarriages reported during the 10 year period.

There may be underreporting of at least 2 deaths that the researchers heard about from several sources, including a second suicide and something that sounded like kidney failure, perhaps secondary to diabetes. The inclusion of 2-3 more deaths among such small numbers would raise our estimate of the crude mortality rate significantly. Suicide cases are apparently by liquid rat poison. Researchers were unable to confirm this.

There is strong evidence to suggest that La Pita's overall health has greatly improved over the last 10 years. From complete birth history data taken for surviving women, it is clear that the lifetime infant mortality per mother was much greater before 1998. It was not uncommon for middle-age women to have had more than 50% of their total children die as infants or miscarriages. In fact, many deaths that were described to the interviewers occurred 11 or 12 years ago, just outside of the period for which 10-year mortality rates were calculated. From the birth and miscarriage history data available, the lifetime rate of miscarriages for La Pita among women alive in December 2008 was 6.76 miscarriages per 100 pregnancies (or approximately 1 miscarriage for every 15 pregnancies). No maternal mortality was reported.

Alarmingly, 100% of the women over 40 in La Pita report some form of chronic, debilitating illness or disability.

Crude mortality rate	4.761904762
UNDP Nicaragua crude mortality rate 2005-2010	4.7
Infant mortality	76.92307692

Household	Year of Death	Cause of Death	Age of Death
2	2002	unknown	12
2	2002	alcohol related	30
13	2004	suicide	20
21	2005	pneumonia	<1
22.3	2003	cancer	48
23	2000	congenital heart probl	<1
23	2004	stillbirth	0

Figure 6: Mortality rates and deaths.

Crude Birth Rate (per 1000)	Totals
2003 Denominator	147
Crude Birth Rate	17.7
UNDP Nicaragua Crude Birth Rate 2005-2010	25
General Fertility Rate	57.8
Child-Woman Ratio (per 1000)*	244.44

* A child is someone less than 5 years old

Houshold and Family Data

	Totals
Household Number	22
Average Household Size	6.5

Population Data

	Totals
2003 Denominator	147
Migration Rate	13.6
Emmigration Rate	102
Natural Increase (10 year)	19
Net Migration (10 year)	-88.4
Growth Rate (10 year)	4.1
Doubling Time (years)	17.5

Figure 7: Birth rate and net migration

The most common symptoms reported in the last year were dry & productive cough, persistent shortness of breath, undifferentiated chest pain and flu-like symptoms in children.

There is strong evidence to suggest that respiratory problems secondary to poor air quality are a significant problem in La Pita. The high prevalence of respiratory

symptoms in the last year, the visible smoke in most houses from cooking with burning wood and poor ventilation and reports of smoke being a problem for most of those surveyed all support this conclusion. The prevalence of chronic difficulty breathing in the last year was 21 per 100 persons, a very high rate. The prevalence of a racking, dry cough in the last year was 14.9 per 100 persons. The prevalence of persistent wheezing, the most severe of the listed symptoms and the clearest indicator of asthma, in the last year was 6.4 per 100. In addition to smoke inhalation resulting in chronic obstructive pulmonary disorders, environmentally induced asthma, hypertension, cancers and heart problems, the smoke may also act to increase the incidence of respiratory infections among the very young and therefore increasing infant mortality.

Vulnerable populations suffer the worst effects of the poor indoor air quality. Women and children spend more time in the house and also more commonly report symptoms secondary to the smoke. The higher proportion of women reporting chronic illness or disability compared to men may be a result of this.

The interviewers heard from several sources that the smoke kept potentially malarial mosquitoes out of the house. Anecdotal data suggest that men more commonly catch Dengue Fever and other mosquito-borne illnesses in La Pita and this may be a result of spending more time outside the house in the fields.

While our NGO contact reported that residents used mosquito nets, we did not find this to be the case.

There has been very little HIV/AIDS testing of La Pita residents. There is little epidemiologic reason to suspect that HIV/AIDS would be a significant risk for residents, however, as there are no known clusters of men who have sex with men (MSM), injection drug use (IDU) or commercial sex work in the immediate area, and the men do not go to work in nearby towns where they might engage in these behaviors. There is a small potential for HIV/AIDS being brought into the community by the day laborers, about whom little is known.

There appear to be at least 2 cases of active tuberculosis in the village. Treatment and transmission patterns are unknown.

Additionally, it is reported that when community members get prescriptions at the pharmacy or clinic, they rarely finish them, increasing the risk for selecting for resistant pathogens. The lack of access to the health center is also a risk factor for allowing communicable diseases a longer circulation time.

Oral health is generally (and visibly) poor, despite 9 out of 10 houses asked claiming that children brushed teeth daily, and in the last year there had been as many as 4 cavities in 1 household. The water does not have fluorine and many families do not use toothpaste. Although no formal data exists, many of those interviewed reported that vision problems were common in the village and that few could afford glasses.

There is little tobacco use in the village. Some of the men reportedly binge drink, but the true extent of the problem is unknown (Figure 8).

Households Sampled - Alcohol	***Households Sampled - Tobacco***	***% persons that Drink***	***% persons that Smoke***
13/22	*12/22*	*9.47%*	*5.68%*

Figure 8: Behavioral factors

Disparities: There is electricity in most of the village, and households have radios and/or televisions. Several villagers have cell phones. There is no community vehicle.

Surprising disparities in socioeconomic status, the benefits of development projects and health outcomes exist within La Pita. The houses that existed on the community outskirts were often the worst off, without electricity, latrines, garbage pits or roofs effective at keeping out water (Figure 9). These houses also were less educated, had lower literacy rates, higher infant mortality, greater numbers of members either chronically ill or disabled, higher incidence of diarrhea and had a greater numbers of occupants. Furthermore, they reported greater food and water insecurity. The only way in which these houses were "better" than those of the village center were in indoor air quality. The poorer building construction led to increased ventilation in the kitchens of these fringe households. Analytic data analysis of this is pending – because of the sample size, we are unconcerned with "statistical significance"; correlations between decreased SES and poor health will be considered evidence worthy of intervention from an equity standpoint.

The causes of the failure of the most vulnerable households to receive the benefits of development projects are likely a form of benign neglect, but they represent a major failure on the part of NGOs to adequately survey the village. Indeed, failing to reach those that most need development projects likely greatly exacerbated existing disparities within the community. Redressing these failures is a potential intervention point, but may not be cost or resource effective for EWB-UH to take on.

% People w/ Bathroom Access	55.56%
% Households w/ Bathroom Access	53.85%
% of Households w/ Access that Use Outdoor Latrienes	100.00%
% of Households that Burn Trash	100.00%
% of Households that Throw Trash in Field/Plants	66.67%
% of Households that Put Trash in a Hole	25.00%

Figure 9: Sanitation

Health education: Disparities in access to health education were also discovered based upon SES. Limited health education was available at central locations, but problems in diffusion of information made this effectively unavailable for households outside the central village. There is a need for targeted health educated delivered directly to each household. Of the sub-sampled households, 67% had access about preventing malaria, and 62.5% had education about sanitation, but less than half had both (Figure 10). There are no traditional birth attendants, community health workers, or traditional health care providers in the village.

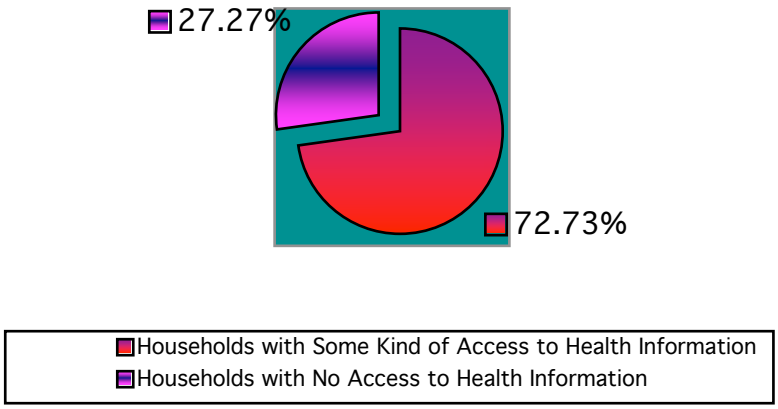


Figure 10: Health education

Food/water/nutrition security: The most common meal is a plate of rice and beans, with or without a tortilla. This diet is supplemented with eggs, bitter melon, and occasional chicken. There is little difference between the diet of women and men. 4 out of 12 subsampled households reported hunger was sometimes a problem, and 3/12 reported seasonal food scarcity. No obvious visible signs of malnutrition were observed.

100% of subsampled households report running water, and this was verified. However, 25% of sub-sampled households report occasional water scarcity. Given the variations in flow rate and quality of running water witnessed by EWB-UH, this is unsurprising. The 3 highest elevation houses use well water.

The village was formerly home to a goldmine, and was reputedly chosen as a site for a clean water project because there had historically been a high rate of birth defects in the community. There did appear to be a high reported number of mental disabilities in the demographic survey, but the data is not clear on this point. Undoubtedly, the clean water project is an additional draw for ecotourists.

The NGO that put in the water source is unknown, but the project cost $30,000. No testing of its efficacy was conducted after its installation, and the cooperative President

asked EWB-UH to test the water. The water source is a spring high up the mountain and travels down a pipe to a distribution box, where it is filtered and chlorinated. It travels downstream to the villagers, and in most cases, to a pump or faucet outside a household, at which there is another clay filter. The cooperative President states that the storage container is cleaned every 8 days. EWB-UH collected samples for chemical and bacteriologic analysis at the source, along the piping and at a household. We were unable to test for chemical composition but were able to bring the samples for quantitative testing for *E. coli*, total coliform and fecal coliform testing.

Community leaders	Community members
1. Bridges and roads	1. Poor indoor air quality (stoves) - 10/16
2. Stoves	2. Road construction / travel related - 3/16
3. Roofs	3. Poor home construction – 3/16
4. School supplies	4. Distance from health center – 3/16
5. Health education	5. Febrile illness
6. Latrines	

Figure 11: Comparison of top needs / problems from key informant interviews and household interviews. Some community members could not think of any major inconveniences without prompting. This information would likely be better obtained through focus groups.

Water quality: Bacteriological analysis of samples from the potable water source at the top of the mountain, the pipe that leads to the community and at a randomly selected tap at the community were all negative for total coliform and fecal coliform. Additional chemical and heavy metal analysis will be necessary upon EWB's next visit to the community.

Conclusions

There is little evidence of increased mortality among adults in La Pita or reason to suspect high levels of infectious disease prevalence or incidence. The former may be due to underreporting of deaths. The burden of chronic disease and ongoing stressors that negatively impact quality of life appear to be the most profound health issues in the area. There is some evidence that preventable infant mortality may also be high. Injuries and access to needed health services is also a serious concern. In summary:

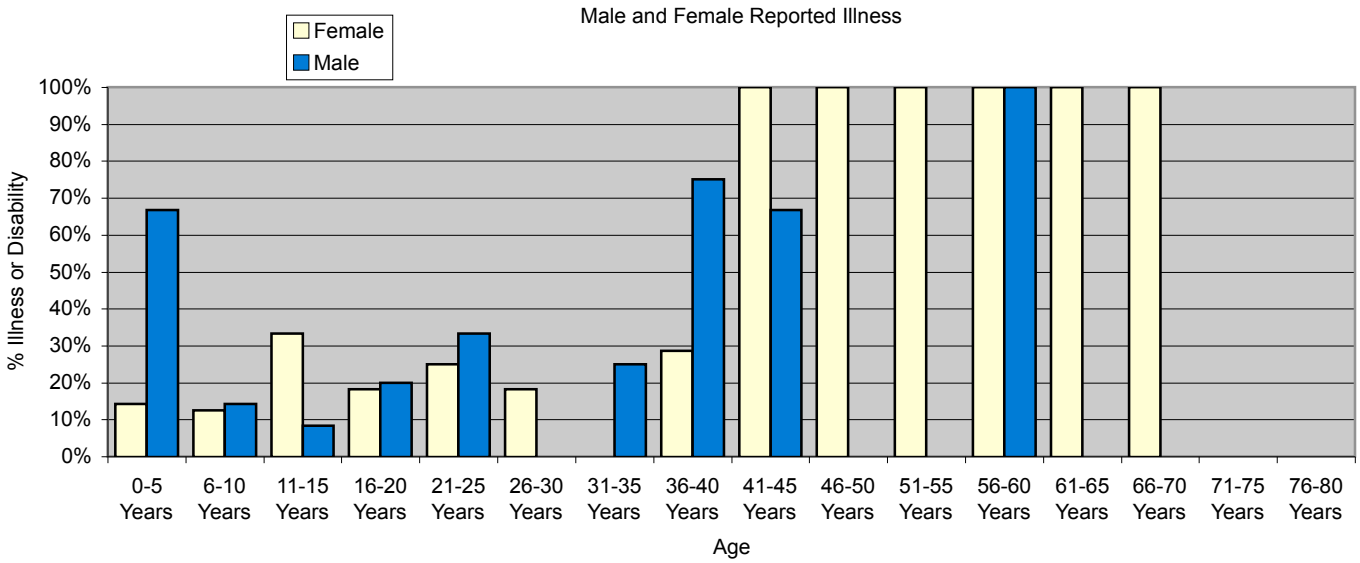
1.) *The roads and bridge are a major deterrent to **access**ing health services and negatively impact the community in a number of other ways*

2.) *Poor **ventilation** is a major source of discomfort and likely increases the burden of chronic disease*

3.) *Targeted and long-term health education is needed in a number of areas, particularly first aid, sanitation, mosquito-borne illness prevention and health behavior*

4.) *The fruits of development projects have failed to reach the most needy, resulting in widening inequalities*

Figure 12: Proportion of men and women reporting chronic debilitating illness or disability.



Recommendations

1.) *Fix / replace bridge and/or grade road to improve access to San Ramon:* Commensurate with this are simple low-cost actions such as providing a community cell phone and/or community truck for emergencies.

2.) *Implement "train the trainer" program in 1st aid and other health education with a curriculum tailored to community needs, to include provision of a community first aid kit and a cell phone / solar charger in addition to AEDs to UCA-San Ramon and the public clinic, and funding to ensure resupply.*

3.) *Improve indoor air quality and implement mosquito-borne illness prevention;* Provision of solar-powered stoves or new, effective chimneys in these houses has the potential to cut incidence of chronic diseases in adults and respiratory infections in children. The smoke within the houses may be keeping mosquitoes out, leading to the gender disparity in mosquito-born illness. To ensure that we do not help to solve one problem when creating another, any indoor air quality intervention program should be coupled with a mosquito-born illness prevention program. This could include the provision of insecticide-treated mosquito nets and training on use in addition to education on eliminating mosquito breeding areas. Novel methods such as using endemic copepods to control mosquito larva

will be considered. Additionally, the remarkably high prevalence of symptoms that suggest asthma suggests that an asthma management education program would increase quality of life greatly.

4.) *Ongoing and improved Community Health Assessment*: All interventions should be evaluated as to their effect on health. Barriers to participation in the process should be addressed within the community by soliciting feedback from the community after translating, distributing and presenting the Community Health Assessment report and sharing data. Additionally, community members might be brought into the CHA process more fully by training and payment of community members and local health workers for health surveillance and health promotion activities.

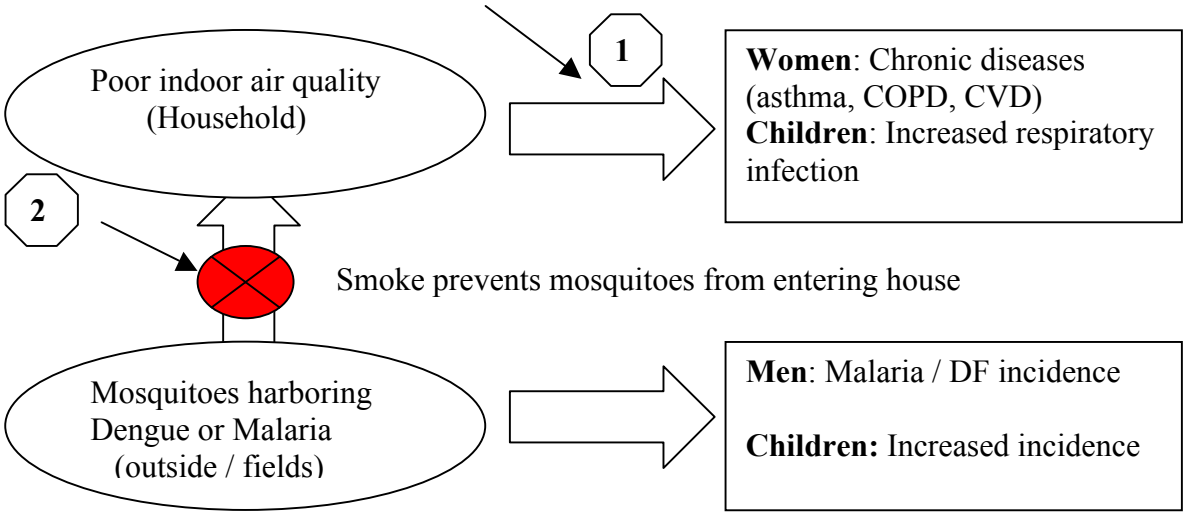


Figure 13: ↘ *signifies an intervention point. If you intervene at point 1 by eliminating smoke, the block on mosquitoes entering the house is removed, increasing risk of mosquito-borne disease in women and children. You effectively create another necessary intervention point.*