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Health Status Comparison of Lebanon, Oregon, and Lobitos, Peru: A Pilot Study Using a Novel Investigative Study Tool

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Abstract

As the global burden of disease shifts away from communicable diseases toward noncommunicable diseases, new models for surveillance will improve intervention strategies. A pilot study was designed to test the hypothesis that a single survey model with direct home interviews and collection of health-related measurements could be applied globally. The study’s goal was to determine the utility of this model in two divergent communities as a means of assessing the general health status and basic medical knowledge of the community. Lebanon, Oregon, and Lobitos, Peru, are two rural communities continents apart that were chosen because they are easily accessible, representative of small underserved communities, and safe. Health questionnaire responses were compiled and analyzed as contingency tables, using two-tailed Fisher exact tests. Statistical results revealed that the answers to questions pertaining to education, preventive health care, and lifestyle differed significantly between the Lebanon and Lobitos communities. Limitations to the study reflect intrinsically flawed aspects of the door-to-door survey method, question design, and flow of the survey questions. However, the results suggest that this model may be useful for identifying gaps in medical knowledge and care access. Further, this health data collection model avoids inherent biases in self-reporting of current health status. This study allows for further development of a collective and digitized community assessment survey model that could be implemented within any global community.

Introduction

Advances in technology, communication, and economics have led to a gradual shift in the global burden of disease from communicable to noncommunicable diseases. Cardiovascular disease, respiratory disease, cancer, and type 2 diabetes mellitus are the four most common noncommunicable diseases, and they are responsible for 36 million deaths worldwide each year. Among the most common noncommunicable diseases, 80% share four common risk factors: tobacco use, physical inactivity, harmful use of alcohol, and poor diet, clearly illustrating that the most common causes of death worldwide are preventable. When targeting the areas of greatest need for improvement, global efforts toward disease prevention must be unified to understand and integrate into each community’s culture, beliefs, and value systems. Developing a universal assessment tool that can be implemented anywhere in the world to objectively measure community health will greatly improve decision making and quantify the impact of a public health intervention or program.

The sites chosen to implement the community assessment survey tool were Lebanon, Oregon, and Lobitos, Peru. These two communities differ in regard to geographic location, culture, socioeconomic status, available resources, and access to health care. A pilot study in these two locations was conducted to test a model of community health screening. The goal of this work is to develop an assessment tool that can be applied in a variety of settings to better characterize health status and identify potential areas of intervention.

Lobitos is a small fishing village located in the northwest district of Talara, within the province of Piura. According to Peru’s Ministry of Health, 1,624 individuals live in Lobitos, and there is currently only one health care worker to serve the community. Lebanon, population 15,305, is a rural city within Linn County. Its beginnings are based in the timber and sawmill industries, and more recently, it has become home to light industrial and manufacturing companies.

In 2015, Lebanon welcomed its first class of osteopathic medical students to the Northwest campus of the Western University of Health Sciences College of Osteopathic Medicine of the Pacific. Medical students are required to take a service learning course that links medical students with community programs and provides mentorship opportunities for local students. The arrival of the new medical students and their work within the city of Lebanon have focused attention on the need for clear measurable baseline data regarding health status, health information, and adoption of healthy lifestyles. Collecting such data will allow future

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assessments of the impact from the influx of osteopathic medical students involved with their community.22,23

Community health assessments are often conducted in the United States by county public health departments; however, data are reported for entire counties rather than for individual cities and towns.24 Rural communities, such as Lebanon, face circumstances that differ from other cities within Linn County, Oregon, and thus the county data are not necessarily representative.

Methods

The study design is a cross-sectional survey. The methodology, survey questions, and consent forms were approved by the Institutional Review Board of the Western University of Health Sciences in Pomona, California. Designated groups of two to three trained medical student volunteers administered the door-to-door community assessment survey. Each site was divided into districts, and teams administered surveys. Each team of survey administrators was assigned to a district. The random sampling procedure consisted of determining the geographic center of each district and choosing a direction in which the team would begin the door-to-door survey at random. A sampling interval of four was selected prior to commencement of survey administration. Every fourth house was visited to minimize selection bias. Inclusion criteria for study enrollment were as follows: 59 months of age or older and current resident of Lebanon or Lobitos. Exclusion criteria of enrollment were as follows: too ill or unable to provide required information, absent from home on more than 3 occasions, refusal to participate, or refusal to sign the informed consent. Upon meeting inclusion criteria, participants were registered with their name, sex, address, and date of enrollment. Each participant was assigned a study number based on district, household number, and number of individuals within the household. This unique identifier ensured each participant anonymity and protection of personal health information during data entry and analysis.

The community assessment survey was conducted within the participants’ homes. Survey administrators read each question aloud, and the participants provided verbal responses to be recorded. Due to language barriers in Lobitos, each team had an assigned translator to assist this process. Survey questions were divided into different categories for assessment. Categories included demographics and health status consisting of education, general health, lifestyle, behavioral health, recent medical conditions, and immunization history. After all community assessment survey questions were completed, vital signs were collected, including height, weight, pulse, respiration rate, and blood pressure. The same three lead investigators trained each medical student volunteer in interview techniques and vital sign collection.

After completing the survey, data were compiled and entered into contingency tables for all nominal and ordinal data. Contingency tables were created using location (Lebanon or Lobitos) as the independent variable in the rows. Dependent variables were placed in the columns. All 2x2 contingency tables were analyzed with GraphPad Prism 6.01™, using a two-tailed Fisher exact test statistical analysis to attain direct p values. Contingency tables larger than 2x2 were analyzed with R version 3.0.1 statistical software. The significance level for this study was set as p less than or equal to 0.01 (p value ≤ 0.01).

Results

Education

Level of education attained and employment status questions were asked of both the Lebanon and Lobitos communities. Level of education attained and employment status were significantly different between Lebanon and Lobitos. All respondents in Lebanon had completed primary school, ensuring a more representative sample of the population.

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18. Papesch M. http://www.entcare.co.uk/cawthorne_cooksey_excercises.html

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Figure 1. Comparison of percent of responders in Lobitos, Peru, and Lebanon, Oregon, for survey questions focused on (a) tobacco use, (b) regular primary care physician (PCP) visits, (c) surgeries, (d) dental exams, (e) eye exams, (f) Pap smears, (g) mammograms, and (h) prostate exams. ** Denotes a significant difference between the two locations ($p \leq 0.01$).
and the majority had completed secondary education. The majority of those in Lobitos had not progressed past primary school. No respondents in Lobitos had attained bachelor’s degrees or higher, while one third of respondents in Lebanon had bachelor’s degrees or higher.

Although the level of education of respondents was higher in Lebanon, there was significantly more unemployment. Of the people surveyed in Lebanon, 46% were unemployed compared with 3.2% in Lobitos. There were many more students and self-employed people in Lobitos than in Lebanon. None of the responders from Lebanon worked “in home,” while the majority of workers in Lobitos worked “in home.” Of workers surveyed in Lebanon, 83% worked “outside the home.”

**General Health**

The general health section included questions on sleep, substance use, dental health, screening exams, and past medical history. There were no significant differences observed between tobacco or recreational drug use in Lebanon and Lobitos. While smoking is a valuable indicator of health status, only 5% of respondents in Lobitos reported smoking, while 12% of those in Lebanon did. Not a single responder in either community reported recreational drug use.

The reported number of primary care provider (PCP) visits differed significantly between the Lebanon and Lobitos respondents. As shown in Figure 1B on page 33, more than 80% of those surveyed in Lebanon said that they regularly see their PCPs, compared with only 19% of those in Lobitos. These statistics are supported by the significant difference in the number of PCP visits in the last year. Only one respondent (3.8%) in Lebanon had not been to a PCP in the last year compared with 32% of responders in Lobitos. In addition to the differences in PCP visits, the survey revealed a significant difference in the number of surgeries between Lebanon and Lobitos, while the number of hospitalizations in the previous year was not significantly different. More than 80% of the survey population in Lebanon had surgery compared with 25% in Lobitos (Figure 1C).

The dental health questions revealed significant differences in brushing, flossing, and dental exam incidence (Figure 1D). Significantly more respondents in Lebanon had had dental exams at least once and floss their teeth more than those in Lobitos. However, respondents in Lobitos brush their teeth significantly more often than those surveyed in Lebanon. In fact, 49% of respondents in Lobitos brush their teeth 3 times or more per day compared with only 12% in Lebanon. This is intriguing in the context that 100% of respondents in Lebanon have had a dental exam compared with 40% in Lobitos.

Preventive health screenings were significantly more common in the Lebanon responder group, with more people receiving eye exams, Pap smears, mammograms, and prostate exams, as seen in Figures 1E, 1F, 1G, and 1H, respectively.

Family history questions focused on heart disease, high cholesterol, diabetes, cancer, and high blood pressure. In Lebanon, 65% of respondents had family histories of cancer, 62% had family histories of high blood pressure, 50% had family histories of heart disease, 46% had diabetes, and 38% reported family histories of high cholesterol. Only one Lebanon respondent (4%) reported no families history of disease. In Lobitos, 50% of respondents reported no family histories of disease, while 20% reported family histories of hypertension; 20%, high cholesterol; 17%, cancer; 16%, diabetes; and 6%, heart disease.

**Lifestyle**

The survey collected data on the number of meals, the kind of food people ate, and physical activity levels.

With regard to nutritional intake on a daily basis, respondents in Lebanon consume significantly more supplements, eat more servings of vegetables, and eat more servings of meat or dairy than those in Lobitos. Fruit consumption and number of meals per day were not significantly different between the two communities.

The data suggest that respondents in Lebanon get significantly more physical activity than those in Lobitos. Of those surveyed in Lebanon, 73% got more than 5 hours of physical activity per week compared with 39% in Lobitos. There was no significant difference in the amount of time spent on sedentary behavior.

**Behavioral Health**

The survey’s behavioral health questions attempted to assess satisfaction levels, interpersonal relationships, and stress levels. The mental health questions did not show any significant differences between the two communities. Overall, most people were satisfied with their current situations, had a trusted person to talk to, and were split when it came to current stress levels and whether stress had impacted their health. Current stress levels were higher in Lebanon and approached significance (p=0.03), but they did meet the p value ≤ 0.01 threshold for this study.

**Recent Medical Conditions**

A total of 38 different medical conditions were assessed. When questioned about symptoms in the previous month, only pain and stuffy nose were significantly different from responders in the two locations, as shown in Figures 2A and 2B on page 35, respectively. In Lebanon, 77% of people had some sort of chronic or acute pain in the previous month.
Figure 2. Comparison of percent of responders in Lobitos, Peru, and Lebanon, Oregon, for survey questions focused on (a) pain in last month, (b) stuffy nose in last month, (c) influenza immunization, (d) influenza immunization knowledge, (e) polio immunization, (f) polio immunization knowledge, (g) measles or MMR immunization, and (h) measles or MMR immunization knowledge. ** Denotes a significant difference between the two sites ($p \leq 0.01$).
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cmpared with 23% in Lobitos. Discrimination between the types or causes of pain was not recorded. Stuffy nose was more common in Lebanon than in Lobitos.

When asked about symptoms during the previous three months, only type 2 diabetes mellitus (T2DM) showed significance. The results revealed that 19% of respondents in Lebanon have been diagnosed with T2DM compared with no respondents in Lobitos.

**Immunizations**

Immunization status and knowledge among study respondents was assessed. Lebanon had significantly higher immunization status for influenza, polio, and measels or measles, mumps, and rubella (MMR) as shown on page 35 in Figures 2C, 2E, 2G, respectively. Lobitos had a higher immunization status for hepatitis (data not shown). Knowledge of immunization status was significantly higher for influenza, polio, measles/MMR in Lebanon responders compared to those in Lobitos. Similar data were obtained for *neisseria meningitidis* and tetanus toxoid (Td/TT data not shown). While the results were not significant, respondents in Lobitos had more knowledge of immunization status for hepatitis B than did respondents in Lebanon (data not shown).

**Vital Signs**

There was no significant difference in body mass index (BMI) or blood pressure between study sites. However, there were 10 overweight individuals in Lobitos compared with none in Lebanon. The majority of people in both communities had BMIs above the normal range, yet very few people in either community reported feeling overweight or obese in the previous 30 days (Figures 3A and 3C on page 37). In contrast, the observed and self-reported data related to hypertension were closely aligned in both communities.

**Discussion**

**Education**

The trend among Lobitos respondents to be less educated than those in Lebanon may be partially a result of a younger sampling population in Lobitos. However, some useful trends still emerge. Most apparent was the lack of any bachelor’s degrees or higher education in Lobitos. This may be due to a difference in opportunity or access to higher education. If this trend held true in a larger sampling, it may represent a need for the Lobitos community.

The average age of the sampled population in Lebanon was 53.5 years whereas the average age in Lobitos was 33.8. This suggests that the data may be biased to have fewer students and more retirees in Lebanon. As a result, *retired* may be a good option to add in future iterations of the survey because in the current survey, retired individuals were counted as *unemployed*. Furthermore, individuals who self-identified as employed students also created inconsistencies in the data, as there were only selections denoted for *student* or *employed*. In future surveys, it may be better to remove *works in home* and *employed outside the home* and instead look at *self-employed* or *employed* to differentiate between the two economies and increase the clarity of the question.

**Tobacco and Drug Use**

Interview-based questioning pertaining to drug use is notably unreliable.26 Plus the group interview setting created a situation in which sensitive and private information could have been revealed to other household occupants, thus violating the confidentiality of participants. Additionally, these questions were placed at the beginning of the survey, leaving little time for the investigators to build rapport with the interviewees. These questions are better suited for the lifestyle section later in the survey, as they might fit better for study organization and cadence. Finally, there was no question about alcohol use. Such a question should be included in future surveys, as it has been shown that alcohol use is a large contributing factor to the incidence and prevalence of noncommunicable diseases.4

**General Health**

Considering the lack of oral health professionals in Lobitos, it is interesting that the respondents indicated a higher frequency of brushing per day in comparison with respondents in Lebanon. However, Lebanon respondents reported a greater amount of flossing.15 The higher frequency of brushing in Lobitos may be attributable to local nongovernmental organizations and government health programs in the area.27 A follow-up question as to how residents obtain dental health care knowledge may be appropriate.

All of the questions pertaining to preventive health screenings revealed significant differences between sites. A greater number of participants in Lebanon regularly visited primary care physicians and obtained eye exams, Pap smears, mammograms, and prostate exams compared with the Lobitos sample. It is well established that early screening is paramount to better outcomes for breast cancer, cervical cancer, and prostate cancer, as well as for ensuring or improving quality of life.28 The lower incidence of visits to primary care physicians and screening exams in Lobitos may suggest a need for preventive health programming within the community. The lack of primary care and preventive screenings may directly contribute to the lack of knowledge of disease status, which in turn may contribute to the discrepancies in reported family medical histories between Lebanon and Lobitos. The survey did not standardize the questioning about family history.

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In future studies, for reliability, this question should only ask about the medical histories of the respondents’ children, siblings, parents, and grandparents.

**Lifestyle**

Although both sites had the same number of meals per day, respondents in Lebanon had more servings of vegetables and meat and/or dairy per day. In a future expansion of this study, it may be important to separate these questions to allow for more specific data, as some study respondents had difficulty discussing meat and dairy together. The questionnaire did not ask about servings of grains, which may be valuable information for obtaining a true comparison of food habits. Future versions of the questionnaire should probably have one fruit category to minimize confusion created by asking about servings of fruits and servings of whole fruits per day. Supplement use is a very broad label, and a follow-up question regarding specific supplements would allow for greater understanding of the differences between communities.

**Behavioral Health**

The behavioral health questions addressed some of the basic indicators of mental health and well-being. Expanding on these questions to investigate whether people have ever felt depressed and then following up with a question about clinical diagnoses of depression may provide greater insight into the mental health status of communities. This may provide valuable information for groups trying to provide care in these communities.

**Recent Medical Conditions**

Questions regarding acute or chronic pain in the previous month elicited a broad spectrum of responses. It could not be determined whether the pain was due to a medical condition or an accident. Taken literally, the question would likely have a 100% response rate, indicating some episode of pain in the previous month. As a result, this question gives more insight on the cultural perception of pain. With regard to this study, it would appear that respondents in Lebanon had a lower threshold for pain. However, it is also possible that the results are due to a difference in translational meaning, or they may be due to which investigator asked the question. As a result, this question should likely be split into two questions, asking about acute pain and chronic pain separately. In future studies, a follow-up question pertaining to the source of pain would generate more specific information.

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**Figure 3.** Comparison of perception of being overweight (panels A,C) with calculated BMI > 24.9 (Panels B,D) in Lobitos, Peru (A,B) and Lebanon, Oregon (C,D). **Denotes a significant difference between perception of being overweight with a BMI of 24.9 (p ≤ 0.01).**

![Figure 3](image)
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The results for prevalence of type 2 diabetes mellitus (T2DM) within the respondent groups revealed that 19% of Lebanon respondents have this diagnosis compared with no respondents in Lobitos. Although we feel this is a significant number, the data are likely skewed because of the age difference between the sampled populations. Conversely, the lack of health screenings in Lobitos may contribute to the low number of responses for T2DM. The addition of a glucose test in future studies would yield very interesting results and potentially help communities identify the prevalence of T2DM.

**Immunizations**

One of the more challenging groups of survey questions is related to immunizations because many people do not know or do not remember what immunizations they have obtained in their lifetime. Some general trends emerged. For instance, those in Lebanon received more immunizations and remembered getting them more often than did those in Lobitos. This was true for most immunizations with the exception of the hepatitis B immunization. Not only were respondents in Lobitos more likely to be immunized for hepatitis B than for any other disease, but they also knew their immunization status for hepatitis B better than did respondents in Lebanon. Hepatitis B was also the only immunization for which Lobitos responders had a higher immunization status than Lebanon responders. The reason for this result is not apparent but would be an interesting topic for further investigation.

**Vital Statistics**

Above-normal body weight is an issue among responders in both sites, as the majority of those surveyed had a BMI above the normal range. While this is not surprising given the obesity pandemic, it is interesting to observe that the majority of respondents did not feel overweight. Our data revealed that the perception of being overweight was significantly lower than the vital statistics collected (Figures 3A, 3B, 3C, and 3D on page 37). Given the direct correlation between increased BMI and the prevalence of cardiovascular disease, diabetes, and cancer, this finding is significant because a simple survey without measuring vital statistics would not reveal the disparity between the perception of obesity and an objective measure of obesity.

**Study Assessment**

The assessment tool was found to be useful in several aspects. Questions that elicited significant differences in responses between Lebanon and Lobitos identified areas that may be a result of differences in health care infrastructure and cultural norms. Furthermore, responses revealed similarities between the two communities in risk factors that contribute to noncommunicable diseases.

Strong attributes of the design of this community assessment survey were specific questions regarding lifestyle and recent medical conditions that are not currently available via county community health assessments. This assessment tool could allow a community to identify subclinical diseases and ailments and develop health programming and interventions to prevent or treat specified symptoms.

There are intrinsic aspects to the study design that contributed to low participation and skewed results. First, most of the data collected relied on self-reporting from participants. Specifically, survey questions pertaining to lifestyle choices, such as diet, exercise, tobacco, and drug use, were asked by medical students, which may have contributed to inaccurate reporting of these data. Modifying the survey to allow the participants to read and record their own responses could address the issue of reliability and biased reporting. However, if the survey were to accommodate self-administered responses, wording of the survey must take into consideration the education level of the studied population.

Increasing the number of participants is of high importance for data to be complete and generalizable to the population. On average, the survey took 1 hour to complete. The lack of a foreseen benefit or incentive for participation combined with the time commitment led to decreased study enrollment. Paring down the number of questions in the survey would mitigate the time commitment and possibly lead to greater enrollment.

The lack of interest on the part of volunteer investigators was detrimental because the study had to rely on high numbers of investigators to blanket the two communities. The low volunteer turnout resulted in a decreased number of visited households and, thus, a low study enrollment. Creating an incentive for medical students to volunteer by incorporating the survey administration into the requisite service learning course in the medical school curriculum would easily rectify this obstacle.

The usefulness of the collected data is limited in that the results of this assessment survey can be used as a baseline only if future surveyors follow the same participants without enrolling new participants. If the survey were to continue to be conducted in the original manner with enrollment of new participants, information could not be analyzed to directly measure the impact of health programs and interventions. However, continuous cross-sectional surveys could be administered to obtain a general picture of health status as long as investigators are careful to not report information as a health baseline.

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Conclusions

The purpose of this pilot survey was to identify the current health status, health maintenance behavior, and lifestyle choices of citizens in Lebanon, Oregon, and Lobitos, Peru. The collected data did provide valuable insight into the health status of the two communities, and the data provided insight into the survey design and protocol. The necessary infrastructure for administering this survey in the future must include a set of institutional goals so that the survey can be optimized to track those goals. With significant modification, the impact of health programs, interventions, and institutions could be measured and followed with this survey tool.

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References


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