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TABLE OF CONTENTS

LIST OF FIGURES...............................................................................................................................................v
LIST OF TABLES..................................................................................................................................................vi
ACKNOWLEDGMENTS........................................................................................................................................vii

CHAPTERS

I. INTRODUCTION...............................................................................................................................................1
II. METHODS..........................................................................................................................................................5
    Setting..........................................................................................................................................................5
    Study Sampling and Participants..................................................................................................................8
    Data Collection and Variables......................................................................................................................8
        Access..................................................................................................................................................9
        Trust..................................................................................................................................................9
        Quality.............................................................................................................................................10
        Importance.................................................................................................................................10
    Data Analysis........................................................................................................................................11
III. RESULTS.....................................................................................................................................................14
    Respondent Demographics.........................................................................................................................14
    Access..................................................................................................................................................16
    Trust....................................................................................................................................................20
    Quality...............................................................................................................................................21
Importance........................................................................................................23
Low Utilization Analysis..................................................................................24

IV. DISCUSSION..................................................................................................25

REFERENCES.....................................................................................................33

AFTERWORD......................................................................................................viii

APPENDIX

1. 2014 Nicaragua Medical Clinic Participant Survey...........................................xi
2. 2014 Clínica Medica Nicaragüense Encuesta del Participane..........................xiii
LIST OF FIGURES

Figure 1. Respondent Age Distribution by Gender.................................14
Figure 2. Respondent Age Distribution..................................................15
Figure 3. Respondent Gender Distribution.............................................15
Figure 4. Group Sizes Attending STIMC................................................15
Figure 5a. Time Spent Travelling to STIMC vs. Local Doctor.....................17
Figure 5b. Time Spent Travelling to STIMC vs. Local Doctor (2).................18
Figure 6. Question 8: What is the main reason that you would not see a doctor
regularly?...............................................................................................18
Figure 7. Question 9: Do you follow the advice of these doctors more, less, or about
the same as doctors from your local hospital or clinic?.........................20
Figure 8. Question 10: How likely would you be to soon see a doctor or hospital
nearby if you knew this medical clinic would not be here?.......................21
Figure 9. Question 7: If you are sick and need to see a doctor, would you:.......21
Figure 10. Reported Quality of Local Health Care vs. STIMC (Scale 1-10)...........22
Figure 11. Reported Importance of Visiting a Doctor for Regular Health Visits......23
Figure 12. Question 6: How many times do you see a doctor in a year?.........23
LIST OF TABLES

Table 1. Paired Samples t-test Comparing Mean Travel Times to STIMC v. Local Health Care.................................................................19
Table 2a. Analysis of Variance Comparing Travel to Local Doctors vs. STIMC.....19
Table 2b. Pair-Wise Comparisons via Tukey HSD Test..............................................19
Table 3. Paired Samples t-test Comparing Mean Quality of STIMC v. Local Health Care.........................................................................................22
Table 4. Comparisons of High-Utilizers and Low-Utilizers.................................24
ACKNOWLEDGMENTS

This thesis would not have been possible if it had not been for the hard work and dedication of everyone involved. I would like to thank everyone who lent his or her hands and mind to serve the people of Masatepe and help improve the field of global humanitarian service. To my parents – thank you for leading by example and inspiring me to think big. Dr. Robert Cain – thank you for lending your experience and knowledge. Sarvesh – thank you for your organization, brainstorming, and for always being ready to entertain my ideas. Emily – you inspire me to work the extra hour and push the extra mile. Thank you for always supporting my dreams. Missionaries Brandon and Hannah Weidman, and Pastor Rolando Mendoza – thank you for your dedication to the people of Masatepe and for your hard work behind the scenes in receiving our team. Dr. Abbey Eng – your leadership has proven invaluable in my journey through public health. Thank you for teaching me to think about problems in different ways, for your hard work during the entire thesis and data review process, and for inspiring my passion through independent research. To my Senior Honors Thesis Committee – Dr. Madhav Bhatta, Dr. Natasha Levinson, and Dr. Christopher Woolverton – thank you for your encouragement and support throughout this learning process and for always helping me improve. Lastly, thank you to my clinical team – who’s individual names are too superfluous to list in entirety here – for taking time from your busy lives, careers, and medical school to join me on a week of service in Nicaragua. Thank you.
Introduction

There is an increasing interest in global health as an area of humanitarian assistance, public health research, and religious outreach. In 1984, only 6% of graduating medical students in the United States and Canada had participated in an international health elective. By 2004, this number had risen to 22%, and by 2008, over 25% of US graduating medical school graduates had participated in a global health immersion experience. L.M. Montgomery notes that this increasing interest in global health is a result of participants seeking ‘hands-on participation,’ ‘first-hand observation,’ and an opportunity to see how their financial support is being used to impact the international community.

Short-term international medical programs, alternately referred to as ‘short-term missions,’ ‘short-term medical volunteer work,’ ‘international medical aid,’ ‘outreach,’ and ‘short-term global health service,’ are a widely prevalent yet ill-defined component of global health initiatives. For the purpose of our study, we adopt the definition used by DeCamp et al. and define Short-term International Medical Clinics (STIMCs) as programs that “…encompass trips of varied durations that provide diverse medical, surgical, and educational services to underserved communities” in international settings.

In 2010, The Working Group on Ethics Guidelines for Global Health Training (WEIGHT) published a set of guidelines and best practices for the ethical management of
STIMCs and other global health interventions. Of these interventions, researchers recommended sustained communication with local institutions in order to maintain long-term responsiveness to health issues. In order to establish sustained communication, it is important to develop an understanding of local health care systems and the perceptions from those who receive care. Although there is a wealth of literature pertaining to volunteers who deliver care, including faith-based organization members and health professionals, relatively little quantitative research has been done to explore the perceptions of health care from individuals on the receiving-end of STIMCs.

The current literature takes a qualitative approach, usually through a series of interviews, to analyze community perceptions of STIMCs. One study compares the varying perceptions of project efficacy between American volunteers and Honduran recipients. Another study evaluates access to, and medical student involvement in, STIMCs in the Dominican Republic. A 2009 study gauges trends in public perception of STIMCs through a series of structured interviews, and another interview-based study in Nicaragua examines influences to women’s health care seeking behaviors during pregnancy.

Each year, an estimated 1.5 million volunteers in the United States invest billions of dollars on STIMCs. Volunteers such as medical trainees, health professionals, and practicing clinicians participate in STIMCs through a variety of global health outlets including non-governmental organizations, charities, and faith-based organizations. Despite their growing numbers, STIMCs can also generate controversy, sometimes with criticism of ‘Duffle Bag Medicine’ and ‘Voluntourism.’ Concerns have been raised
about STIMCs lacking sustainability, focusing only on curative care rather than preventive measures, volunteers lacking formal training, and being unable to provide adequate follow-up with patients. The most cited concern of STIMCs in the available literature is that STIMCs have the potential to detract from – and often compete with – local health care systems, thus generating the potential for community dependence on STIMCs.

There have been few quantitative investigations exploring community dependence on STIMCs that operate regularly among a given population. One quantitative study examined the cost-efficiency and utilization of STIMCs in Honduras, Guatemala, and Venezuela. Another study observed the belief, attitude, and behavior changes that occurred among short-term mission volunteers and providers. In this paper, we will present findings from a survey-based, cross-sectional study evaluating community dependence on STIMCs in Masatepe, Nicaragua.

Participation in short-term medical initiatives in low- and middle-income countries is increasing among health professionals, missionaries, and trainees from high-income countries. Various authors have expressed concern that these short-term programs have the potential to harm the recipient communities; however, little quantitative research has been conducted that examines the impact of these programs on the recipients of care. In December 2014, we conducted a survey-based cross-sectional study with a sample of 92 adults receiving care from a STIMC in Masatepe, Nicaragua. Fifty-nine completed surveys met criteria for inclusion and were incorporated in the final analysis. Four major constructs were evaluated in order to
answer the research question, “Do short-term international medical clinics perpetuate a cycle of dependence on foreign health care within the local community?” These four constructs – access, trust, quality, and importance of health care – were used to assess community dependence on STIMCs as a primary source of health care in Masatepe, Nicaragua.
Methods

Setting

This study was conducted in Nicaragua: a nation that is slightly larger than the US State of Pennsylvania and has a population of approximately 6 million people.\textsuperscript{6} The average annual health expenditure per capita is US$155 compared to US$9,146 in the United States.\textsuperscript{22} In fact, Nicaraguan health spending per capita is the lowest of all of the Central American Nations (Belize US$262, Costa Rica US$1,005, El Salvador US$266, Guatemala US$222, Honduras US$196, and Panama US$796).\textsuperscript{22} The leading causes of premature mortality are lower respiratory infections and ischemic heart disease.\textsuperscript{12} Maternal Mortality is high with estimates ranging from 121 to 230 deaths per 100,000 live births, compared to 21 per 100,000 live births in the US.\textsuperscript{13,17,23} The national infant mortality rate was 29 deaths per 1,000 live births in 2008 with the poorest quintile at 35 and the richest quintile falling to 19.\textsuperscript{17,19} There are significant health disparities between wealthy and poor areas in Nicaragua.

There is also a wide variation in the scope and reach of health care services in Nicaragua. The Nicaraguan health system is mainly funded by the public sector via general tax revenue.\textsuperscript{19} The Ministerio de Salud (MINSA) covers approximately 61.2-70\% of the population and functions both as a regulatory agency and provider of health care services.\textsuperscript{17,19} The MINSA network is comprised of 1,059 health care facilities that are administered by the 17 regional departments (SILAIS) that are divided by geographical
Not all of these health care facilities are alike, however. There are 32 full-service hospitals, 28 health centers with beds for short-term inpatient stay, 144 health centers without beds, and 855 health posts. 35% of health facilities in Nicaragua do not have access to electricity, 45% do not have water, and 68% do not have adequate sterilization systems for medical supplies.

Health posts represent 80% of the health care facilities in Nicaragua and vary widely in the populations and geographic areas they serve. The facilities are poorly staffed by one or two nurses and a physician is present either on a permanent or temporary basis. On average, there is one health post per 6,400 inhabitants and insufficient staffing results in health care provider overload. This lack of coverage is partly due to financial reasons. The salaries for health care professionals are standardized nationally by MINSA, but no financial incentives are provided to health care workers who practice at remote health posts. The salaries for Nicaraguan health care personnel are also the lowest in Central America with a typical monthly salary of US$544. A study conducted by Sequeira et al. speculates that low wages and insufficient supplies combined with lack of incentives to work in difficult-to-reach areas contribute to health care professional migration to urban areas and internationally, thus resulting in disproportionate health coverage in rural and poor regions.

Masatepe is a small municipality in the Masaya department in Western Nicaragua. Masatepe covers an area of 23 square miles and is home to approximately 30,000 people. Our study took place in the small town of El Tanque in the southern region of Masatepe. The town was named El Tanque, Spanish for “the tank,” after a large rainwater collection
reservoir was erected in the center of town. Within El Tanque, there is almost no access to piped water aside from collected rainwater and electrical connection comes only from manually tapping the power lines that run through the main streets of town. Nuevos Horizontes Iglesia (New Horizons Church) is an evangelical Christian church that functions as the community center in El Tanque and has long-standing relationships with the local community, various churches in the United States, and the local government and health department. Nuevos Horizontes has been an important source of community development and religious outreach in El Tanque for more than two decades. Their facilities routinely receive international volunteers and STIMCs from the United States. These volunteers conduct a variety of STIMCs, health fairs, and construction projects at Nuevos Horizontes and in the surrounding community. Nuevos Horizontes and their international partners target the underserved populations within El Tanque and Masatepe and do not discriminate based on religion, gender, race, or ethnicity.

Heartland Community Church is one of the leading partners with Nuevos Horizontes. Based in Medina, Ohio, Heartland hosts between two and four short-term trips to El Tanque each year. At the recommendation of local leadership, Heartland volunteers conduct STIMCs, build schools, support local fire and police departments, and conduct general outreach within the community. Volunteer clinicians within the STIMCs are licensed practitioners and registered nurses in the United States. Student volunteers assist based on their individual skills and training; for example, medical students operate under the oversight of a licensed clinician and those fluent in Spanish operate as
translators. In any case, licensed volunteer practitioners from the United States are the sole providers of clinical services.

Study Sampling and Participants

We used non-probability convenience sampling to identify and recruit participants for our study, focusing on obtaining survey responses from the greatest proportion of STIMC participants. Potential study participants were identified after having received STIMC services. Exclusion criteria included being less than 18 years old and being non-fluent in either Spanish or English. Our survey was offered in English and Spanish and interpretation services were offered for participants with reading or vision difficulties. This study was reviewed in full, and declared exempt from further review by the Kent State University Institutional Review Board. Oral consent was obtained from all participants.

Data Collection & Variables

Two investigators (American researchers not financially affiliated with Heartland Community Church or Nuevos Horizontes) disseminated surveys to willing STIMC participants. Each survey began with a notice of informed consent and contact information of the researchers. The survey consisted of 13 questions designed to evaluate four main constructs pertaining to health care services: Access, Trust, Quality, and Importance. Transcripts of English and Spanish survey translations are available in the Appendix of this document. No protected health information was collected. Introductory questions collected basic demographic information such as age and gender and the
following questions consisted of multiple choice and short response questions that evaluated the four constructs, described in further detail below:

**Access**

Research participants were asked to report the approximate minutes traveled to the STIMC as well as to the nearest local health care outlet to their home. Questions were phrased in terms of minutes traveled (E.g. “How many minutes did it take you to travel to this medical clinic?” and “How many minutes does it take for you to travel to your nearest doctor?”) to account for variations in modes of transportation. In this manner, an individual who normally walks 10 minutes to local health care and an individual who normally drives 10 minutes to local health care were considered to have equal access due to the time spent travelling to and from health care services. Investigators subsequently analyzed the differences in reported travel times to compare access to the STIMC versus access to local health care services.

**Trust**

Research participants were asked various questions pertaining to their trust in local health care systems in comparison to STIMCs. Questions such as “Do you follow the advice of the doctors at this clinic more, less, or about the same as the doctors from your local hospital or clinic?” and “How likely would you be to see a doctor or hospital nearby if you knew this medical clinic would not be here?” were designed to evaluate research participants' trust of local clinicians compared to American and international doctors.
Quality

Survey respondents were asked to rate the quality of service at the STIMC and the quality of service of their local health care providers on a 10-item Likert scale (E.g. On a scale of 1-10, how would you rate the quality of service at your local hospital or clinic? (1=bad, 10=excellent)” and “On a scale of 1-10, how would you rate the quality of service at this clinic? (1=bad, 10=excellent)”)
Responses were compared to reveal the differences in reported quality between the STIMC and local health care services.

Importance

Research participants were asked several questions pertaining to their perceived importance of receiving health care services. Similar to the questions regarding the quality construct, participants were asked to report their perceived importance of health care services on a 10-item Likert scale (E.g. On a scale of 1-10, how important do you believe it is to see a doctor for regular health appointments? (1=Not important, 10=Very important)”). Participants were also asked two multiple-choice questions regarding perception and utilization of health care services (E.g. “What is the main reason that you would not see a doctor regularly?” and “If you are sick and need to see a doctor, would you…”).
Responses to these questions were analyzed to better understand the perceived importance of health care among research participants as well as motivations behind health care utilization.
Responses within these four constructs were correlated and analyzed with the purpose of evaluating Masatepe’s community dependence on STIMCs. For the purpose of this study, a community dependent on STIMCs as a primary source of health care would exhibit characteristics of dependence within the four constructs: a dependent community would have greater access to STIMCs than local health care systems, would report trusting STIMC health care providers more than local doctors, would report STIMCs as having significantly higher quality services than those of local facilities, and would not recognize the importance of health care services for the purposes of health maintenance. A community that is dependent on STIMCs as a source of primary health care would have the potential to forego local health care services in favor of receiving care from a temporary and often unreliable STIMC.

Data Analysis

Two investigators (JA and SN) independently analyzed the completed surveys to remove surveys that did not meet study criteria. Surveys that were not 100% complete or contained untranslatable or illegible writing were excluded. Of the 92 surveys received, 59 met criteria for inclusion in the study. Survey responses were evaluated with reference to the four constructs. Select survey respondents were then further categorized into a “Low Utilizer” group based upon survey responses. The “Low Utilizer” group characterizes survey participants whose responses indicated the potential to forego local health care services despite the absence of a STIMC.

Survey questions 7, 9, and 10 established the criteria for categorization into the “Low-Utilizer” group. For question 7, “If you are sick and need to see a doctor, would
you: A) Go see a doctor, B) Travel to a hospital, C) Wait for a medical clinic similar to this one, D) I will not see any doctor, E) Other (please specify),” responses “Wait for a medical clinic similar to this one” & “I will not see any doctor” were categorized as being “Low Utilizer” due to the indicated potential to forego local health care in the absence of a STIMC. Responses marked “Other” were categorized on an individual basis. For question 9, “Do you follow the advice of the doctors at this clinic more, less, or about the same as the doctors from your local hospital or clinic? A) More, B) Less, C) About the same,” responses valuing STIMC provider advice “More” were categorized as “Low Utilizer.” On question 10, “How likely would you be to soon see a doctor or hospital nearby if you knew this medical clinic would not be here? A) Very likely, B) Somewhat likely, C) Somewhat unlikely, D) Very unlikely,” responses of “Somewhat likely,” “Somewhat unlikely,” and “Very unlikely,” were classified as “Low Utilizer” due to the respondent’s potential to forego local health care in the absence of a STIMC.

Responses to survey question 8 were also compared between Low Utilizers and Non-Low Utilizer groups to estimate health care affordability between both groups. Within question 8, “What is the main reason that you would not see a doctor regularly? A) It is too expensive and I cannot afford to see a doctor, B) I cannot afford the medications that the doctor wants me to take, C) It is too far away, D) It is too difficult to make an appointment with a doctor because the doctors are always busy, E) Other (please specify),” answers “A” and “B” pertain directly to cost as a prohibiting factor to health care whereas other responses relate to issues of access. Respondents who reported
answers “A” and “B” were considered to have low health care affordability. Answers marked “Other” were classified on an individual basis.

Survey respondents were classified as Low Utilizer and Non-Low Utilizer for each of the three questions. Only one respondent (2%) met criteria as a Low Utilizer in all three qualifying questions, five respondents (8%) met criteria as Low Utilizers in two of the qualifying questions, and 28 respondents (47%) met criteria as Low Utilizers in at least one qualifying question. For the purpose of this study, participants who responded as Low Utilizers in any of the three qualifying questions were classified as Low Utilizers. The Low Utilizer and Non-Low Utilizer groups were evaluated for differences within the four main constructs: Access, Trust, Quality, and Importance. In this way, particular constructs could be identified as being influential upon utilization of local health care among STIMC participants.
Results

In the following sections we outline and interpret the most salient findings from each main construct and differences between Low Utilizer and Non-Low Utilizer groups. We also provide basic demographic information that describes the study sample and an overview of trends that were observed with regards to health care utilization.

Respondent Demographics

Of the 92 surveys received, 59 met criteria for inclusion in our study. Participants’ ages ranged from 18 to 88 with a median age of 49. Our sample consisted of 42 females (72.9%) and 17 males (28.81%). Most participants did not attend the STIMC alone; the median group size attending the clinic was three people with group sizes ranging from one to eight people. Characteristics of these participants are outlined in further detail in Figures 1-4.

Figure 1 – Respondent Age Distribution by Gender

<table>
<thead>
<tr>
<th>Age</th>
<th>Number of Survey Participants</th>
</tr>
</thead>
<tbody>
<tr>
<td>18-22</td>
<td>8.00</td>
</tr>
<tr>
<td>23-27</td>
<td>4.00</td>
</tr>
<tr>
<td>28-32</td>
<td>2.00</td>
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<tr>
<td>33-37</td>
<td>0.00</td>
</tr>
<tr>
<td>38-42</td>
<td>2.00</td>
</tr>
<tr>
<td>43-47</td>
<td>2.00</td>
</tr>
<tr>
<td>48-52</td>
<td>2.00</td>
</tr>
<tr>
<td>53-57</td>
<td>2.00</td>
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<td>58-62</td>
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<tr>
<td>63-67</td>
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<td>68-72</td>
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<tr>
<td>73-77</td>
<td>2.00</td>
</tr>
<tr>
<td>78-82</td>
<td>2.00</td>
</tr>
<tr>
<td>83-88</td>
<td>8.00</td>
</tr>
</tbody>
</table>

Female  Male
Figure 2 – Respondent Age Distribution

Figure 3 – Respondent Gender Distribution

Figure 4 – Group Sizes Attending STIMC
Access

Survey respondents in our sample traveled an average of 26 minutes (SD=23.161) to receive care at our STIMC. Travel times ranged from two minutes to 2 hours. In contrast, respondents reported traveling an average of 47 minutes (SD=59.735) to their nearest local doctor with travel times ranging from one minute to 7 hours. Detailed travel times reported by our sample can be found in Figures 5a & 5b. A paired sample t-test comparing mean travel time to the STIMC versus local health care facilities at alpha=.05 found a significant difference in travel time to each of the destinations (p=0.005307) (Table 1). Survey respondents reported traveling significantly less time to our STIMC than local points of health care.

Respondents were placed into three groups based on travel time to local health care. The closest group was 1-30 minutes, followed by 31-60 minutes, with the furthest group travelling over 60 minutes. Analysis of Variance was used to determine if the groups had significantly different mean travel times to our STIMC using alpha=.05. The analysis revealed significant disparities in access among those who traveled greater than an hour to local health care facilities (p=0.004303) (Table 2a). Post Hoc testing using Tukey HSD Test (Table 2b) that compared those who reported travelling 1-30 minutes, 31-60 minutes, and greater than 61 minutes to local health care. The Tukey HSD Test revealed that survey respondents who normally travel greater than one hour to local health care also traveled significantly farther to reach our STIMC than those who reported travelling less than an hour to local health care. However, their mean of 52 minutes does not fall within the 61 or more minutes reported time traveled to local health
care facilities. Respondents who traveled 31-60 minutes to local health care did not differ significantly from the closest group traveling 1-30 minutes. Although this group lived further from local health care, they reported mean travel times to our STIMC of 21 minutes for the closest group and 23 minutes for the middle group. Those who traveled 31-60 minutes to local health care had the greatest difference in access to our STIMC. When asked to report the primary reason why they would not see a doctor regularly, 52 respondents (88%) reported that they could not afford health care services, medications, or transportation to/from these points of care, while 7 respondents (12%) reported that local health care was too far away and travel was out of their personal means (Figure 6).

**Figure 5a** – Time Spent Travelling to STIMC vs. Local Doctor

![Time Spent Travelling to STIMC vs Local Doctor](chart)
Figure 5b – Time Spent Travelling to STIMC vs. Local Doctor (2)

![Bar Chart: Time Spent Traveling to STIMC vs Local Doctor (2)]

- **Frequency of Responses**
  - Close Range (Travel Time 1-30 Minutes)
  - Medium Range (Travel Time 31-60 Minutes)
  - Far Range (Travel Time 61+ Minutes)

- **Traveling to STIMC**
  - Close Range
  - Medium Range
  - Far Range

- **Traveling to Local Doctor**
  - Close Range
  - Medium Range
  - Far Range

Figure 6 – Question 8: What is the main reason that you would not see a doctor regularly?

![Pie Chart: Reasons for Not Seeing a Doctor Regularly]

- a. It is too expensive and I cannot afford to see a doctor (42%)
- b. I cannot afford the medications that the doctor wants me to take (31%)
- c. It is too far away (10%)
- d. It is too difficult to make an appointment with a doctor because the doctors are always busy (5%)
- e. Other (Please Specify) (12%)

### Table 1

#### Paired Samples t-test

<table>
<thead>
<tr>
<th>Paired Samples t-test</th>
<th>Mean</th>
<th>Std. Deviation</th>
</tr>
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<tbody>
<tr>
<td>Traveling to STIMC</td>
<td>25.931</td>
<td>23.161</td>
</tr>
<tr>
<td>Traveling to Local Health Care</td>
<td>47.328</td>
<td>59.735</td>
</tr>
</tbody>
</table>

#### Paired Differences

<table>
<thead>
<tr>
<th>Mean</th>
<th>Std. Deviation</th>
<th>Std. Error</th>
<th>95% Confidence Interval of the Difference</th>
<th>t</th>
<th>df</th>
<th>Sig (two-tailed)</th>
</tr>
</thead>
<tbody>
<tr>
<td>21.397</td>
<td>56.686</td>
<td>7.443</td>
<td>6.495</td>
<td>36.298</td>
<td>2.899</td>
<td>57</td>
</tr>
</tbody>
</table>

### Table 2a

#### Analysis of Variance Comparing Travel to Local Doctors vs. STIMC at alpha=0.05

<table>
<thead>
<tr>
<th>Time Traveled to Local Doctor</th>
<th>n</th>
<th>Mean Time Traveled to STIMC (Std. Dev)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-30 Minutes</td>
<td>30</td>
<td>21.733 (8.043)</td>
</tr>
<tr>
<td>31-60 Minutes</td>
<td>21</td>
<td>23.19 (15.838)</td>
</tr>
<tr>
<td>61+ Minutes</td>
<td>7</td>
<td>52.143 (34.624)</td>
</tr>
<tr>
<td>p-value</td>
<td></td>
<td>0.004</td>
</tr>
</tbody>
</table>

### Table 2b

#### Pair-Wise Comparisons via Tukey HSD Test

<table>
<thead>
<tr>
<th>Travel Time to Local Doctor</th>
<th>31-60 Minutes</th>
<th>61+ Minutes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-30 Minutes</td>
<td>n/s</td>
<td>p&lt;0.01</td>
</tr>
<tr>
<td>31-60 Minutes</td>
<td></td>
<td>p&lt;0.01</td>
</tr>
</tbody>
</table>

n/s = not significant
Trust

Forty-one survey respondents (69%) reported following the advice of STIMC providers “about the same” as local doctors, while 18 respondents (31%) reported following STIMC provider advice more than local doctors (Figure 7). No respondents reported following the advice of STIMC providers less than local health care providers. In addition, 49 respondents (83%) reported that they would be “very likely” to see a local doctor or hospital in the event that a STIMC would not be available, eight (14%) reported being “somewhat likely,” and two (3%) reported being “very unlikely” to see a local doctor (Figure 8). Fifty respondents (76.92%) reported that they would utilize local health care facilities if they fell ill while five respondents (7.69%) would wait for a STIMC and 1 respondent (2%) reported that he/she would not see any doctor (Figure 9).

Figure 7 – Question 9: Do you follow the advice of these doctors more, less, or about the same as doctors from your local hospital or clinic?
Figure 8 – Question 10: How likely would you be to soon see a doctor or hospital nearby if you knew this medical clinic would not be here?

![Pie chart showing the likelihood of seeing a doctor or hospital nearby. Very Likely: 83%, Somewhat Likely: 14%, Very Unlikely: 3%, Somewhat Unlikely: 0%]

Figure 9 – Question 7: If you are sick and need to see a doctor, would you:

![Pie chart showing the choices for seeking medical care. a. Go see a local doctor: 48%, b. Travel to a hospital: 29%, c. Wait for a medical clinic similar to this one: 8%, d. I will not see any doctor: 2%, e. Other: 14%]

Quality

On a 10-item Likert scale, the mean reported quality for our STIMC was 9.3 compared to a mean value of 6.2 for local health care facilities (Figure 10). A paired
sample t-test conducted at Alpha=.05 revealed that the reported quality for the STIMC was significantly greater than that of local health care facilities (p<0.00001) (Table 3).

**Figure 10** – Reported Quality of Local Health Care vs. STIMC (Scale 1-10)

![Graph showing the comparison of reported quality ratings between Local Health Care and STIMC](image)

**Table 3**

<table>
<thead>
<tr>
<th>Paired Samples t-test</th>
<th>Paired Samples Statistics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quality STIMC</td>
<td>Mean: 9.3051, Std. Dev: 1.2071</td>
</tr>
<tr>
<td>Quality Local Health Care</td>
<td>Mean: 6.2034, Std. Dev: 2.9112</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Paired Differences</th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>Std. Error</th>
<th>95% Confidence Interval of the Difference</th>
<th>t</th>
<th>df</th>
<th>Sig (two-tailed)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>3.1017</td>
<td>3.2308</td>
<td>0.4206</td>
<td>2.2596, 3.9438</td>
<td>7.3742</td>
<td>58</td>
<td>p&lt;0.00001</td>
</tr>
</tbody>
</table>
**Importance**

When asked about the importance of seeing a doctor for regular health appointments, survey respondents rated this importance as a mean of 9.3 on a 10-item Likert Scale with 41 respondents (69%) rating this importance as a 10 out of 10 (Figure 11). Survey respondents reported visiting a doctor a mean of 5.6 times per year with a median value of three doctor visits per year (Figure 12).

**Figure 11** – Reported Importance of Visiting a Doctor for Regular Health Visits

**Figure 12** – Question 6: How many times do you see a doctor in a year?
Low Utilization Analysis

A consolidated analysis of Low Utilizers and Non-Low Utilizers for survey questions 7, 9, and 10 can be found in Table 4. There were significant differences between Low Utilizers and Non-Low Utilizers within the study sample. Low Utilizers were significantly younger and had greater access to health care facilities – both STIMCs and local health care – than Non-Low Utilizers. Low Utilizers lived closer to the STIMC than local health care facilities while Non-Low Utilizers lived closer to local health care facilities than the STIMC. When asked to rate the quality of local health care, Low Utilizers responded with significantly lower ratings than Non-Low Utilizers, however there were no significant differences in the reported quality of the STIMC between the two groups. There were also no significant differences in gender, health care affordability, or reported importance of health care between Low Utilizers and Non-Low Utilizers.

### Table 4

<table>
<thead>
<tr>
<th>Low Utilizer?</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Age</strong></td>
<td>40.07 (19.06)*</td>
<td>53.23 (19.13)*</td>
</tr>
<tr>
<td><strong>Gender</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M</td>
<td>32.14%</td>
<td>25.81%</td>
</tr>
<tr>
<td>F</td>
<td>67.86%</td>
<td>74.19%</td>
</tr>
<tr>
<td><strong>Reported Difficulty Affording Health Care</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Y</td>
<td>75% (n=21)</td>
<td>80.65% (n=25)</td>
</tr>
<tr>
<td>N</td>
<td>25% (n=7)</td>
<td>19.35% (n=6)</td>
</tr>
<tr>
<td><strong>Minutes Traveled to Local Health Care</strong></td>
<td>44.571 (79.897)*</td>
<td>49.9 (32.499)*</td>
</tr>
<tr>
<td><strong>Minutes Traveled to STIMC</strong></td>
<td>26.679 (21.231)</td>
<td>25.233 (25.173)</td>
</tr>
<tr>
<td><strong>Reported Quality of Local Health Care</strong></td>
<td>5.25 (3.09)*</td>
<td>7.06 (2.49)*</td>
</tr>
<tr>
<td><strong>Reported Quality of STIMC</strong></td>
<td>9.04 (1.60)</td>
<td>9.55 (0.62)</td>
</tr>
<tr>
<td><strong>Reported Importance of Health Care</strong></td>
<td>9.00 (1.41)</td>
<td>9.58 (1.06)</td>
</tr>
</tbody>
</table>

* = Significant at p<0.05
Discussion

Our data provide preliminary findings that support conclusions of prior research and establish a basis of knowledge conducive for future study. First, we observed patients with minimal access to health care services, which reinforces the need to improve access to primary medical care, especially in rural areas.\textsuperscript{11} We also found that 88\% of survey respondents noted high cost as a prohibiting factor to receiving regular health care services, a trend observed by several studies previously conducted in Nicaragua\textsuperscript{12,18} In addition, our findings revealed that, despite Nuevos Horizontes and Heartland Community Church having a long-standing relationship conducting STIMCs in Masatepe, survey respondents did not exemplify characteristics of dependence on STIMCs as a primary source of health care services.

For the purpose of our study, a community dependent on STIMCs as a primary source of health care would demonstrate this dependence in four constructs: Access, Trust, Quality, and Importance. A dependent community would have greater access to STIMCs than local health care systems, would report trusting STIMC health care providers more than local doctors, would rate STIMCs as having significantly higher quality services than those of local facilities, and would not recognize the importance of health care services for the purposes of health maintenance. Thus, a community that is dependent on STIMCs as a source of primary health care would have the potential to
forego local health care services in favor of receiving care from a temporary and often unreliable STIMC.

Participants of our study demonstrated varying degrees of dependence within the four constructs. On one hand, 47% of respondents met criteria as Low Utilizers, meaning that they demonstrated a potential to forego local health care services despite the absence of a STIMC. In addition, 88% of study respondents reported cost-related barriers to receiving care. On the other hand, 83% of survey respondents reported being “Very likely” to visit a local doctor or hospital in the event that a STIMC would not be available to attend to their health care needs. Study participants also reported median travel times of 17.5 minutes to our STIMC and 30 minutes to local health care facilities; a difference of 12.5 minutes. Additionally, 69% of participants reported trusting STIMC providers and local doctors “About the same.” On average, participants reported their perceived importance of health care to be 9.3/10 on a 10-item Likert scale. Overall, respondents had relatively equal access to local health care facilities and our STIMC, reported trusting STIMC providers and local doctors equally, and valued the importance of receiving regular doctor visits for the purpose of health maintenance. We speculate that the reduction of economic barriers to care may reduce the overall number of Low Utilizers in Masatepe and therefore reduce the prevalence of dependence on STIMCs in the community.

With regards to quality as a construct of dependence, respondents rated the quality of service at the STIMC to be significantly greater than that of local health care services. This could be the result of several factors: response bias, cost of services, and
location of the STIMC. First, respondents may have been more inclined to rate our STIMC as higher quality than local health care stemming from a desire to ensure that STIMC services continue in Masatepe. As cited in other literature, participants may have responded favorably with regards to STIMC quality in order to convey appreciation for the services received or to encourage return visits. Second, respondents may have rated the quality of care at the STIMC as higher due to the fact that our clinic freely prescribed necessary medications. Free medications, in contrast with expensive medications from local health care facilities, may have also provided incentive to rate STIMCs as being higher quality. Lastly, because the STIMC was conducted at Nuevos Horizontes, respondents may have been more inclined to rate the STIMC as being higher quality because the clinic was conducted in partnership with a respectable organization that is known to provide charity and outreach within the surrounding community. The novelty of receiving care from an American practitioner may have also contributed to higher STIMC quality ratings.

In contrast with potential bias, survey respondents may have rated STIMC quality as being higher due to shorter wait times, high physician and caregiver density per patient served, and additional specialty services such as podiatry, dental care, and an eyeglass clinic; services for which patients in Masatepe have limited access. The local health department in Masatepe has only a handful of physicians, yet the health post is responsible for the care of thousands of local residents. Short staffing often contributes to long wait times, physician overload, and rapid depletion of pharmaceuticals and medical supplies. During the clinics, patients would approach our STIMC with written
prescriptions in hand, asking to fill certain prescriptions because the local pharmacies were out of stock or the patients could not afford the necessary medications. Physicians would evaluate these patients and prescribe accordingly. Specialty services such as podiatry and dentistry are more commonly offered in the capital city of Managua, a one-hour drive from Masatepe. This journey is impossible for many patients who are unable to access reliable transportation.\textsuperscript{13}

An analysis of Low Utilizers revealed several trends warranting future research. First, Low Utilizers were significantly younger than non-Low Utilizers with mean ages of 40.07 (SD = 19.06) and 53.23 (SD = 19.13), respectively. This age difference among Low Utilizers could suggest that younger populations in Masatepe have lower health care utilization in comparison to older populations. Because Low Utilizers are younger, we theorize that the prevalence of chronic disease may be lower, thus prompting health care seeking only in the event of an acute illness, injury, or special condition. Low Utilizers also live significantly closer to local health care facilities than non-Low Utilizers with reported mean travel times to local health care facilities being 44.57 minutes (SD = 79.89) and 49.9 minutes (SD = 32.49), respectively. Low Utilizers reported mean travel times of 26.67 minutes (SD = 21.23) to our STIMC compared with 25.23 minutes (SD = 25.17) reported by non-Low Utilizers. Our data suggests that younger working-age populations are more likely to live closer to city centers, and as a result, closer to various health care facilities. Additional research is necessary to determine the contributing factors regarding diminished health care utilization trends among Low Utilizer populations despite their younger age and significantly greater access to local and STIMC health care facilities.
than non-Low Utilizers. Successful identification of these factors may assist with improvement of methods for reaching this high risk Low Utilizer population and reducing the prevalence of dependence on STIMCs.

Our study is successful in identifying several measures precipitating low health care utilization: access, trust, quality, importance, and cost. Of these factors, access and quality metrics proved the most accurate in determining Low Utilizer populations. There were significant differences between Low Utilizer and non-Low Utilizer groups with respect to access and quality. Low Utilizers had greater access to both local health care and STIMCs than Non-Low Utilizers and rated local health care as being lower quality than Non-Low Utilizers reported. However, there were no significant differences in gender, health care affordability, or reported importance of health care between Low Utilizers and Non-Low Utilizers. Additional research is necessary to determine what factors, with respect to access and quality, contribute to low health care utilization.

Another strength of this study is that the findings can assist with developing strategies for identifying and targeting high-risk subpopulations within Masatepe for future STIMCs. Despite the frequency STIMCs being conducted in Masatepe, our study revealed that there exists a low healthcare utilizing population of patients who are reluctant to utilize health care services despite having greater access to points of health care than the surrounding Non-Low Utilizer population. It would be beneficial for future research to identify additional risk factors contributing to low health care utilization with the purpose of expanding the reach of health care services to those low utilizing populations.
Our STIMC also had the added benefit of allowing medical student volunteers in our team to experience various elements of an international medical clinic firsthand while working under the supervision of several American and Nicaraguan primary care doctors, dentists, and specialists. Although it was not an aspect of our research, additional studies conducted in Latin America indicate that STIMC recipients approve of medical student involvement and note that their exposure is beneficial to their professional development, helpful for the recipient communities because of the care delivered, and conducive for future volunteer work, especially pertaining to involvement in those communities.10

Our study has several limitations. There is a general lack of statistical data about the rural populations of Masatepe and the El Tanque community. Therefore, our study faces difficulties in comparing our results to trends in Nicaragua and abroad. Our study also used a non-randomized convenience sampling method that focused primarily on receiving survey responses from the greatest number of STIMC participants. We disseminated surveys only to patients ages 18 and above despite serving a large child population. Surveying parents of children in future studies may increase sample sizes, however survey responses made on behalf of others might also introduce additional bias into the study. Our sampling criteria significantly reduced our sample size to critical numbers where more in-depth statistical analysis was not practical. We did not survey any members of the community that did not participate in the STIMC. Consequently, we did not develop a statistically significant comparison group in order to contrast the results of our survey and suffered losses to both internal and external validity.
Our sample was also overwhelmingly female. Women accounted for 72.9% of survey responses. This could possibly be a result of several factors. First, our STIMC operated from 8:00am to 4:00pm, a timeframe that most men would be at work in Masatepe. These operating hours help explain why we received only 3 completed surveys (5%) from working-aged males ages 28-62 while we received 25 surveys (42%) from women in the same age group. In addition, prior studies indicate that gender disparities exist pertaining to health care utilization in Nicaragua and that women’s health care utilization may be influenced by the husband’s financial capacity and recognition of the importance of health care.\textsuperscript{12} This trend is supported in our study. The high female utilization of free STIMC services is indicative that the reduction of socioeconomic barriers may increase overall female participation in health care.\textsuperscript{12} Expanding STIMC operating hours into the evening may also prove beneficial in prompting increased male participation after the work day has ended.

In future research, it would be beneficial to use random sampling procedures while also sampling members of the community and patients being seen at various points of local health care. Among sampled patients receiving care at local health care facilities, it would also be important to evaluate patient awareness of STIMCs being conducted concurrently. These data would aid in comparing beliefs and attitudes between recipients of STIMC services and recipients of local health care. These data may also aid in identifying techniques to improve awareness of STIMC services in order to increase community utilization of these services.
Additionally, further research is necessary to identify attitudes among local health care providers. Various studies conducted in Latin America criticize STIMCs as detrimental to the local health care arena because they have the potential to compete with services already offered in the community.\textsuperscript{11} Although this is not the goal of STIMCs, which are intended to focus on high risk populations that cannot access or afford reliable health care services, one study in Guatemala revealed that local health care providers criticized STIMCs as offering free health care to patients who, in fact, were able to afford local services.\textsuperscript{11} Effectively gauging attitudes and recommendations from local health care providers may provide insight to improve the relationship between STIMCs and local health care as well as developing strategies for reaching high-risk populations, such as Low Utilizers, who do not frequent local points of health care. Current literature cites various benefits of partnership between STIMCs and local health care - including, but not limited to - increasing the capacity for sustainable development of local health care, providing follow up services,\textsuperscript{1, 13} increasing trust in local health care systems, improving identification and surveillance of priority community health issues,\textsuperscript{10} improving cultural appropriate health care delivery,\textsuperscript{15} expanding the scope of services delivered in a community, and maintaining balance between STIMC prevalence and the financial and/or volunteer support of local systems.\textsuperscript{20} Partnership with local providers and facilities is essential for the sustainable development of health care in a community.
References


Afterword – 2015 and Beyond...

The health status of Masatepe and El Tanque has evolved since we conducted our research in December 2014 and subsequent publication in May 2016. This afterword briefly outlines key updates as noted by missionaries Brandon and Hannah Weidman who have been serving the community since 2012. After the departure of our STIMC in 2014, our clinical team left a fully equipped pharmacy of medical supplies to encourage future health clinics organized by local doctors. For several months following the STIMC, local doctors and dentists conducted weekly clinics at Nuevos Horizontes. Although this intervention was employed to improve health care sustainability, community participation gradually tapered and the clinics closed their doors after only a handful of sessions.

Brandon speculates that this lack of community interest is a result of the absence of resources such as free medicines and other medical supplies, stating “The truth is, most Nicaraguans have access to Nicaraguan doctors at the local health clinics for no charge, by just walking another ten minutes into Masatepe. In socialistic medicine, everything is free and nothing is affordable.”

From late 2015 to early 2016, the Zika Virus epidemic caused the same fears in Nicaragua as it did around the globe. As a result, Nuevos Horizontes has hosted significantly fewer STIMCs due to Zika Virus travel warnings broadcasted in the United States. However, the health department in Masatepe has only confirmed one case of Zika Virus in the recent months. It is yet to be determined if this low reported incidence is a
result of low Zika Virus prevalence or low health care utilization in the community.

Brandon notes, “Dengue Fever continues to be the bigger concern here locally, of all the mosquito-borne viruses, but it’s been around for a while so it no longer makes the headlines... Because [Zika and Dengue] are mosquito-borne... it’s a larger problem than most brigades can attempt to fix. Which leads me back to a firm belief that I personally hold, which is that our medical partners internationally should be more concerned about mosquito elimination approaches and strategies.”

Of all public health initiatives in Masatepe, Brandon notes that economic stimulus may have the greatest impact on both health care affordability and utilization. “In a poor country like Nicaragua, poverty impacts everything from healthcare to education to faith. Empowering nationals to improve their standard of living by improving their local economy can drastically improve their overall lifestyle and sense of being in a very dignified way. By improving the economy, I refer to job creation, entrepreneurialism, and tapping into the global economy in order to give ‘fisherman access to the bigger pond.’”

Our research supports this initiative. In our study, we found that 88% of survey participants reported cost as a barrier to health care. Brandon also delineates other culturally relevant initiatives such as diet and nutrition programs to curb growing micronutrient deficiencies, hypertension, diabetes, and obesity, mosquito elimination to reduce the incidence of vector-borne disease, and dust control to curtail respiratory infections and asthma among the large child population in Masatepe. It is essential for
future STIMCs to partner with local public health authorities to provide appropriate, sensitive, and sustainable care to those who need it the most.
Appendix – 2014 Nicaragua Medical Clinic Participant Survey

2014 Nicaragua Medical Clinic Participant Survey

You are being invited to participate in a research study. By participating in this survey, you agree that your anonymous responses may be used for the purpose of better understanding the effects of international medical clinics on a community. Although this research may not benefit you directly, your participation in this study will help us to better understand how to improve future medical clinics. No personally identifying information will be collected, nor will identifying information be included in the information that you provide. Your responses will be kept confidential. Thank you for helping to improve our medical clinics!

1. How old are you? _________________
2. Are you:
   a. Male
   b. Female
3. How many people came with you to receive care at this medical clinic? _______________
4. How many minutes did it take for you to travel to this medical clinic? _______________
5. How many minutes does it take for you to travel to your nearest doctor? _______________
6. How many times do you see a doctor in a year? _______________
7. If you are sick and need to see a doctor, would you:
   a. Go see a local doctor
   b. Travel to a hospital
   c. Wait for a medical clinic similar to this one
   d. I will not see any doctor
   e. Other (please specify) __________________________________________
8. What is the main reason that you would not see a doctor regularly?
   a. It is too expensive and I cannot afford to see a doctor
   b. I cannot afford the medications that the doctor wants me to take
   c. It is too far away
   d. It is difficult to make an appointment with a doctor because the doctors are always busy
   e. Other (please specify) __________________________________________
9. Do you follow the advice of the doctors at this clinic more, less, or about the same as the doctors from your local hospital or clinic?
   a. More
   b. Less
   c. About the same

10. How likely would you be to soon see a doctor or hospital nearby if you knew this medical clinic would not be here?
   a. Very likely
   b. Somewhat likely
   c. Somewhat unlikely
   d. Very unlikely

11. On a scale of 1-10, how would you rate the quality of service at your local hospital or clinic? (1=bad, 10=excellent)
   a. 1 2 3 4 5 6 7 8 9 10

12. On a scale of 1-10, how would you rate the quality of service at this clinic? (1=bad, 10=excellent)
   a. 1 2 3 4 5 6 7 8 9 10

13. On a scale of 1-10, how important do you believe it is to see a doctor for regular health appointments? (1=Not important, 10=Very Important)
   a. 1 2 3 4 5 6 7 8 9 10
Appendix – 2014 Clínica Medica Nicaragüense Encuesta del Participante

2014 Clínica Medica Nicaragüense Encuesta del Participante

Ud. está invitado para participar en una investigación. Por participar en esta encuesta, Ud. está de acuerdo de que sus respuestas van a quedarse anónimos y existen sólo para el propósito de entender mejor los efectos de las clínicas médicas internacionales en la comunidad. Es posible que esta investigación no le dé a Ud. ningún beneficio directamente, su participación en esta investigación nos ayudará a entender mejor cómo podemos mejorar clínicas médicas en el futuro. Ninguna información personal será coleccionada ni dada a nadie. Sus respuestas se mantendrán confidenciales. ¡Gracias por ayudar a mejorar nuestras clínicas médicas!

1. ¿Cuántos años tiene Ud. ________________
2. Ud. es
   a. Mujer
   b. Hombre
3. ¿Cuántas personas le acompañaron para recibir ayuda médica en esta clínica? ______________
4. ¿Cuánto tiempo duró el viaje para llegar aquí? __________________________
5. ¿Cuánto tiempo dura el viaje para ir al médico más cerca de su casa? __________________
6. ¿Cuántas veces va Ud. al médico en un año? __________________________
7. Si Ud. estuviera enfermo/a y necesitara ir al médico, Ud.:
   a. iría a un doctor
   b. Viajaría a un hospital
   c. Esperaría que viniera una clínica médica similar a ésta
   d. No iría ningún medico
   e. Otro (favor de explicar)

8. ¿Por qué no visita Ud. a un médico regularmente?
   a. Es demasiado caro y no tengo suficiente dinero para ir.
   b. No tengo el dinero para los medicamentos que me recomienda el medico
   c. Está demasiado lejos
   d. Es muy difícil hacer una cita porque los médicos siempre están ocupados.
   e. Otro (favor de explicar)
9. ¿Sigue Ud. los consejos de los médicos en esta clínica más, menos o igual que los médicos de su propio hospital o clínica?
   a. Más
   b. Menos
   c. Igual que los de aquí
10. Si averiguara que una clínica no vendría, ¿Iría Ud. a un médico u hospital cerca de Ud.?
   a. Muy probable
   b. Poco probable
   c. Poco improbable
   d. Muy improbable
11. Utilizando los números 1-10, ¿cómo califica Ud. la calidad de servicio en su propio hospital o clínica en su ciudad? (1-pésimo – 10 sobresaliente)

   1 2 3 4 5 6 7 8 9 10
12. Utilizando los números 1-10, ¿cómo califica Ud. la calidad de servicio en esta clínica? (1-pesimo – 10 sobresaliente)

   1 2 3 4 5 6 7 8 9 10
13. Utilizando los números 1-10, ¿Cree Ud. que sea importante ver al médico para citas regulares para mantenerse sano? (1-no es importante – 10 muy importante)

   1 2 3 4 5 6 7 8 9 10