

# Public Health Research in a Study Abroad Medical Service

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## Introduction

Huamachuco, Peru is a small town in the Northern Andes Mountains with a population of approximately 58,402 (2010 figure).<sup>1</sup> Local officials say that approximately 60 percent of the local population is displaced from routine healthcare and that their average per capita income is \$4.73/day or \$141.90/month. The area is considered to be one of the 20 poorest areas within Peru. Public health issues abound in terms of accessibility, environmental quality, and educational needs related to the general well-being of the inhabitants.

Starting with a team of 12 students and four doctors in 2008, our annual medical service team has grown to approximately 30 to 50 (expected in 2013) Michigan State University College of Osteopathic Medicine (MSUCOM) students, residents, and physicians visiting Peru annually in August. Students and faculty visit rural areas of Peru to conduct research as well as provide clinical services to the underserved population. The process starts in January as students enroll in an elective course, ranging from 1 to 24 credits, depending on involvement. Students who are accepted into this program start with lots of training and engage in fundraising activities leading up to the 10-day service trip in August. In this monograph, we describe the research aspect of the course and share with readers the processes and outcomes.

## Background

Initially, we began our medical service to Peru without the research component of the trip. Students raised money to buy medicines and other supplies such as blankets, clothing, and shoes, donating more than \$100,000 worth of supplies

annually. The purpose of these trips is to service those individuals who have no access to care in the rural areas of Peru; but the reward of providing patient care to the indigenous people touched the hearts of the participants. Within the Peruvian culture, hospitality and gratitude is paramount. After our physicians were showered with praise, hugs, and kisses from grateful patients, our faculty gained a new perspective of the needs of the approximately 600 patients who entered our clinic daily.

Youth make up more than 60 percent of the population of Huamachuco. According to the Institute of Development Studies, chronic malnutrition within Peru hovers at 31.3 percent (2010 figure) in rural areas for children under age five.<sup>2</sup> Although this figure has been touted as an improvement from the past decade, in the mountainous regions, such as the isolated areas of Huamachuco, that rate is higher. Moreover, reports have shown that most of the clean water is polluted by the local mines.<sup>3</sup> During our visit in 2008, we hypothesized that local open pit mining practices and the occupational status of the parents may mean that children carry higher than normal lead levels in their blood.

Much of the problems of the underserved can be resolved with education and cultural change towards efficiency. We saw the need to study the environmental conditions of the natives, so that we could first educate ourselves and then develop the level of care and concern that is needed to educate the patients effectively. We wanted to study the people of Huamachuco and pioneer models of rural living that not only sustain but enrich the lives of its natives.

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## Goals of the Research Program

By establishing a research component within these medical service trips, a mutually beneficial program was created. While the natives needed clinical care and health education, the literature showed that medical students need to learn basic research skills to foster life-long learning. Educational philosophers who studied undergraduate medical students' exposure and attitudes towards conducting research state that students need more training and opportunities for research.<sup>4-5</sup> Lack of exposure leave the students insecure and reluctant to pursue research, and thus ill-prepared for the research requirement facing them as residents.

Therefore the faculty approached the research component with the following goals in mind: 1) Approach research as a means to providing better healthcare that is integrated and incremental. 2) Educate medical students about global health at both MSUCOM and at Cesar Vallejo University to foster compassion towards underserved populations around the world and at home. 3) Conduct sustainable research that will impact the health of women and children, but enable data collection over the short duration of these 10-day medical service trips. Because we had these goals, our research began focusing on clinically-based health outcomes.

## The Research Team Structure

Literature about teamwork shows that differing ability levels in teams allow for maximized learning as students scaffold each other.<sup>6</sup> Most students are second year undergraduate medical students, but a few past attendees who are now third or fourth year medical students also attend. Each student applies to the service trip by filling out a form describing their interest in participating. As students apply to the study abroad course, their topic-interest area is sorted through and leaders are selected. They are then grouped according to interest and skills needed for each research team. The new (or younger) members are assigned with older members, either based on their research interest area, or by tasks they will perform such as: project (background) development, data manager, data collector, processing and analysis, or project investigators (for Institutional Review Board entry).

Thus far, over 65 students have been involved in clinical research teams, although many lacked prior research experience. By working in teams, students shared their knowledge and skills, collaborating to maximize their research skills. Led by students, more participants have joined the research teams each year, with recent undergraduate students from

Michigan State University and University of Michigan joining the teams.

## Research Topics

The research topics are selected on perceived need for public health, student interest, and from similar topics that are offshoots of the original. For example, after realizing the possibility of lead poisoning from local mines, we collected and sampled blood as part of a research study to test lead levels in 2009. In addition, students began conducting a body mass index study in 2009 using a sample population of 300 children to monitor and document malnutrition in these patients.



*Figure 1: Children were measured for their height and weight to monitor and document malnutrition.*

This study was expanded each year to include other aspects of children's health, including a high-altitude aerobic fitness study in children ages 9-16 using the Progressive Aerobic Cardiovascular Endurance Run (PACER) test. In recent years, studies have implemented osteopathic manipulation to relieve muscular and joint pain of farmers and miners within this community (See Table 1, Appendix).

## Outcomes of the research program

The establishment of a research component of the medical service trips opened the eyes of many students to the public health conditions of the medically indigent in Huamachuco. These experiences also engendered further understandings of systems-based practice as students researched and obtained a community-based health assessment as background for individual patient's health. Students admit that a deeper understanding about the environment and public health conditions of the patients have led to better patient care as well as intellectual stimulation and emotional involvement with patients.

*"This experience has changed the way I see medicine. Being an osteopathic physician means more than treating symptoms; it means working to find the source of symptoms and disease, and working towards prevention. By taking the time to observe trends and having the ingenuity to find correlations, I am realizing new ways to treat communities," said Shane Sergent, the Student Director of Research (and co-author).*

Another learning outcome is research integrity. All research has been IRB approved (Michigan State University IRB) either through faculty or student application under the guidance of faculty. As the students learned more about the process, they taught new participants and are serving as mentors to underclassman. Today, with continued faculty mentorship, these students are responsible for their yearly IRB renewal and revisions. Additionally, students have learned about research integrity while on the research field. For example, some data were lost in 2009, thereby teaching students the importance of data security and management. Also, students were taught the importance of consistent accuracy of measurements (with pediatric anthropometry and instrumental use), which were emphasized through training.

Our students report that they feel much more confident about research and look forward to pursuing additional research opportunities in the future. The nature of the research elective is to introduce second year medical students to clinical research because they are often the only ones whose schedule can accommodate the elective during their rigorous medical training. It is unclear if other students seek research options outside of this elective once they conclude this course. There is, however, some evidence that most students do seek

to continue their research. Two years ago, we began including fourth year medical students in the elective, many of whom were previous participants and had experience working within this research elective. To date, 100% (n=11) of these fourth year medical students have participated in research, either working on ongoing projects or coming up with original projects, which were mentored by Michigan State University faculty.

The only possible downside to research while studying abroad is dividing ones attention between two very crucial tasks. Study abroad is an enriching, eye-opening experience that is very valuable to medical training. If a student is also concerned about getting their research completed, they may be too preoccupied to fully learn from the clinical experience.

Although we are reporting anecdotal evidence, in summary, student participants in the research projects show many of the same traits that past studies have shown: 1) a positive attitude towards science and research.<sup>7</sup> Each year, the number of students participating in research has grown with several repeat participants. 2) Students develop skills in critical literature review, data interpretation, and an investigative approach to medical problems.<sup>8</sup> Our students, for example, have also presented posters and have written articles for publication. Funding these research projects has been obtained from various medical foundations such as the American Medical Association (AMA), American Osteopathic Association (AOA), Michigan Osteopathic Association (MOA), and Student Osteopathic Medical Association (SOMA). 3) Students who engage in research are more likely to be recruited into academic medicine and become more productive in research.<sup>9</sup> To date we have published 12 abstracts, been highlighted in various publications, and we are currently working on a publishable paper. The student leader has also given lecture presentations and was a podium speaker at the National American College of Physicians Internal Medicine conference. 4) Team-based learning has shown positive outcomes in research, and the growth of our research teams as well as continued application to the program by older, past-attendees show that students attitudes about team-based research is a positive one.<sup>10</sup>

## Community Outcomes

Each year we share the research results with the communities in which we serve and offer suggestions in which prevention can be initiated. Each of the projects has manifested different outcomes in the community. Some recent examples of changes which impact these communities are as follows:

The pediatric growth and development study has caught the interest of a Peruvian medical school, and our researchers have been asked to collaborate with them on a larger scale. Together, we hope to provide better clinical outcomes in communities to reduce double burden and provide sustainable solutions.

One project which provided the most immediate impact on the health of the community was a water quality study. It found that numerous synthetic and toxic chemicals existed in the rivers which the community used for drinking water. It has been speculated that it is from run-off secondary to mineral mining in the Andes Mountains and may be the cause of the high prevalence of kidney dysfunction we see in the clinic. This project is being further investigated and includes many local organizations and institutions who hope to remedy this problem.

As a result of our presence in the community, we were able to spread our knowledge of osteopathic manual medicine (OMM) through a research study. This initiative fostered international interest and recognition of osteopathic medicine in South America. It was highlighted in numerous local publications and even on the national Peruvian news.



**Figure 2:** In recent years, studies have been implemented to examine osteopathic manipulation and ability to relieve muscular and joint pain of farmers and miners.

## Conclusion

Adding a research component to the medical service elective course taught students not only how to conduct research, but also helped them learn how to work in teams and to deliver patient care with a more systems-based understanding. Our outcomes in the community confirm what the literature says about research as a means to a community of practice in which learners create knowledge by interacting with one another and the environment. Successful teamwork has led to students “feeding knowledge back to the community of research practice and supports the model of communities of practice as not just internal but histories of articulation with the rest of the world.”<sup>6</sup>

## Key Words

Student Research; Study Abroad; Medical Student Education; International Medicine.

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## APPENDIX

**Table 1:** Types of research conducted. The numbers (n) indicate the number of students involved in the research topic.

### Research in Peru by Michigan State University College of Osteopathic Medicine Students:

#### 1. Environmental

- Several studies on water, soil, & blood lead toxicity in Peruvian Children (9)

#### 2. Osteopathic Principles and Practices

- OMT: Reducing Pain and Changing International Patient Perceptionm (14)
- Transcending the International Osteopathic Identity: Cross-sectional Analysis of Osteopathic Principles and Practices in Peru (23)

#### 3. Public Health

- Assessment of Maternal and Reproductive Health in Women of Mala, Peru (5)
- Assessing Pediatric Health Care Needs in Huamachuco, La Libertad, Peru (22)

#### 4. Pediatric Growth and Development

- Assessment of Pediatric Anthropometry of Peru (26)
- Assessing the Risk of Pediatric Double Burden in International Models (10)
- Cardiovascular Assessment of Peruvian Children with PACER Fitness Test (8)
- Examining the prevalence of overweight and obese adolescents in contrasting elevations of rural Peru (18)