

# Are Academic Orthopedic Surgeons Interested in Global Health?

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## Abstract

Two thirds of the world's population lack orthopedic services. Natural disasters such as the 2010 Haiti earthquake temporarily increased volunteering, but the decision to volunteer regularly is likely multifactorial.

In the study reported here, we investigated whether academic orthopedic surgeons are interested in volunteering abroad and identified factors that influence participation. Academic orthopedic surgeons were identified through the faculty listings of all 154 orthopedic residency programs listed by the Association of American Medical Colleges (AAMC) Electronic Residency Application Service and were sent surveys by e-mail.

Of the 3,697 eligible academic orthopedic surgeons, 600 were randomly selected, and 109 completed the survey. Of the 109 respondents, 52% had volunteered abroad previously, and 62% said they were highly likely to volunteer abroad in the future. The most common barriers were scheduling, and family and social commitments (65% and 66%, respectively), followed by lack of specialty-specific opportunities (40%). In a multivariate model, the only barrier significantly decreasing likelihood to volunteer abroad was concern for medical safety ( $P = .015$ ). Altruistic motivations ( $P = .005$ ), religious sentiments ( $P = .006$ ), international networking ( $P = .004$ ), and fulfilling the true medical creed ( $P = .015$ ) significantly increased likelihood.

Academic orthopedic surgeons are interested in volunteering abroad. Addressing common motivations and barriers may help improve care in the developing world.

The World Health Organization estimated that more than 5.1 million people die annually of injuries, mostly musculoskeletal.<sup>1</sup> For each person who dies from trauma, 8 more are permanently disabled.<sup>2</sup> More than HIV, tuberculosis, and malaria combined, these injuries account for 12% of the disability-adjusted life years (DALYs) lost annually

around the world (DALYs are the number of years lost because of premature mortality plus the number of years lived with disability multiplied by a severity factor).<sup>2,3</sup>

Despite the global burden of musculoskeletal disease, developing countries have a shortage of competent medical care.<sup>4</sup> Half of the world's population do not have access to primary care, and two thirds lack orthopedic services.<sup>5</sup> Haiti, with a population of more than 10 million, had only 19 orthopedic surgeons working at the time of the 2010 earthquake.<sup>6</sup> East Africa has only 40 orthopedic surgeons to serve its 200 million citizens.<sup>2</sup> In contrast, the United States employs 25,000 orthopedic surgeons for 300 million Americans.<sup>7</sup>

Every year, orthopedic surgeons travel around the world to provide operative assistance, education, and training. Many work in year-round programs, such as Health Volunteers Overseas or CURE International.<sup>8-10</sup> Others may be motivated to respond to natural catastrophes. The 2010 Haiti earthquake drew roughly 500 orthopedic surgeons from the United States. Professional orthopedic societies have also taken part in volunteer activities. The hip and knee societies participate in Operation Walk to raise money to surgically assist domestic and international patients without access to care. The American Academy of Orthopaedic Surgery (AAOS) has been incorporating international volunteerism topics into its general sessions, and the AAOS and the Orthopaedic Trauma Association organize a disaster preparedness project team. Prestigious Volunteer of the Year awards have been offered by the AAOS and the American Society for Surgery of the Hand.

Given residents' high interest in international volunteerism, various orthopedic residency training programs have incorporated global electives into their curricula.<sup>11-13</sup> Volunteerism has improved the health and productivity of people in developing countries and conferred satisfaction and enrichment to orthopedic residents traveling abroad.<sup>14-19</sup> Although multiple surveys have investigated why residents and medical students are motivated to travel abroad, and asked what factors keep them from doing so, to our knowledge, no study has investigated these issues in practicing orthopedic surgeons. Furthermore, previously published studies are mostly limited to single institutions with established international programs, which may not be representative of all medical institutions.

In this study, we asked a random sample of academic orthopedic surgeons about their interest in international volun-

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teerism to provide preliminary data on perceived motivations and barriers to volunteering abroad. With their involvement in resident training, academic surgery faculty have a significant influence on the next generation of surgeons. These results may have applications in guiding the design of international volunteerism programs.

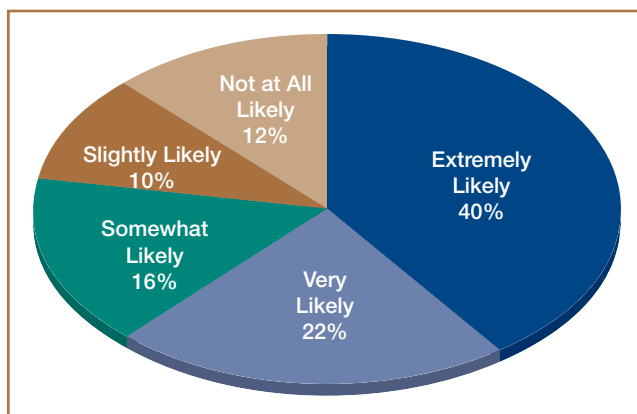
### Materials and Methods

Academic orthopedic surgeons were identified through a comprehensive review of faculty listings on the websites of all 154 orthopedic residency programs listed by the Association of American Medical Colleges (AAMC) Electronic Residency Application Service. The AAOS personnel registry was used to obtain contact information, and surgeons without both an e-mail address and a telephone number listed were excluded from the study. Of the remaining 3,697 surgeons, a random sample of 600 was chosen through a random number generation algorithm.

These surgeons were contacted by e-mail and were asked to complete a survey on their interest in international volunteering (Appendix). Surgeons rated their likelihood to volunteer on a 5-point Likert scale with points labeled *not at all likely*, *slightly likely*, *somewhat likely*, *very likely*, and *extremely likely*. Volunteering was defined as either medical volunteering abroad, or remote

**Table I. Respondent Demographic Data**

	% of 109
Male	92.7
Female	7.3
Age, y	
32-45	34.9
46-65	50.5
66+	13.8
No response	0.9
Spoke another language	35.8
Did not speak another language	64.2
Married	89.0
Single	9.2
No response	1.8
Have children	85.3
Do not have children	12.8
No response	1.8
From United States	93.6
From Canada	0.9
From another country	5.5
Have volunteered medically abroad	53.2
As a resident	15.6
Have not volunteered medically abroad	45.0
No response	1.8
Have volunteered medically in the United States	44.0
Have not volunteered medically in the United States	56.0



**Figure 1.** Likelihood for volunteering abroad. Percentages as indicated by participant (n = 109) responding to item, “How likely are you to participate in medical volunteering abroad in the future?” *Extremely likely* was the most frequent response (n = 44).

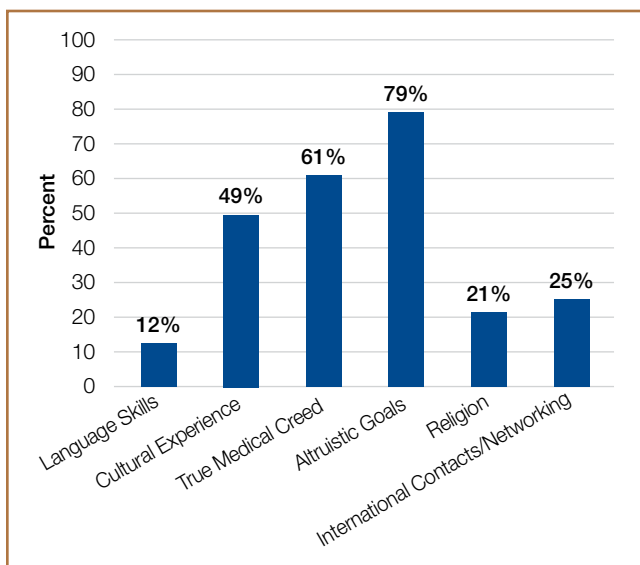
volunteering (spending 30 minutes on a personal computer a month assisting medical professionals in developing countries). This second question was motivated by the growing interest in telemedicine as a cost- and time-effective way for US surgeons to contribute to medical care internationally.<sup>20</sup> The survey takers were also asked about their motivations and barriers to participating in international volunteerism; these questions were adapted from past surveys of surgical medical students and residents.<sup>12</sup> Surgeons were also asked whether they had volunteered in the past and about basic demographic characteristics.<sup>11</sup> A follow-up survey asked all respondents whether they considered lack of awareness of specialty-specific opportunities a barrier to volunteering abroad. Surgeons who did not respond to e-mail survey requests were contacted by telephone, and incomplete surveys were excluded.

Chi-squared tests were used to determine whether responses to each survey question were significantly related to the likelihood of volunteering abroad. Significant univariate comparisons were then carried into a multivariate logistic regression model to calculate predicted probabilities with corresponding 95% confidence intervals (CIs). Two-tailed P < .05 was considered statistically significant.

### Results

Of the 600 surgeons contacted to participate in the survey, 110 responded to an e-mail or phone call (Table I). One participant was excluded from analysis because of partial form completion. There was no response bias in terms of sex; 7.3% of the 109 survey respondents were female, comparable to the 6.3% female sample population of 600 surgeons who received the survey.

Orthopedic surgeons expressed interest in volunteering abroad and were receptive to remote volunteering. Of the respondents, 61.5% stated they were very likely or extremely likely to volunteer abroad. Only 11.9% of respondents stated they were not at all likely to volunteer abroad (Figure 1). Of the physicians, 42.1% were very or extremely interested in volunteering remotely, and 13.8% were not at all interested. The most common motiva-



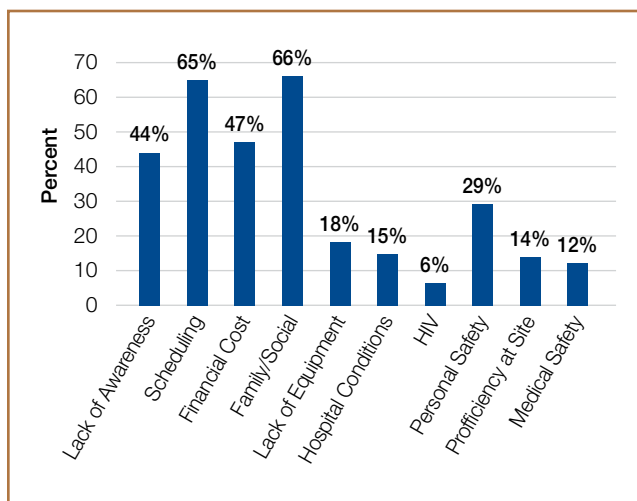
**Figure 2.** Motivations for volunteering abroad. Of the 6 motivators, all but 1 (acquiring language skills,  $P = .813$ ) were significant by univariate analysis ( $P < .05$ ).

tors to volunteering abroad were altruistic goals, fulfilling the true medical creed, and obtaining a cultural experience (79%, 61%, and 49%, respectively) (Figure 2), and the most common barriers were family and social commitments, scheduling conflicts, and financial cost (66%, 65%, and 47%, respectively) (Figure 3).

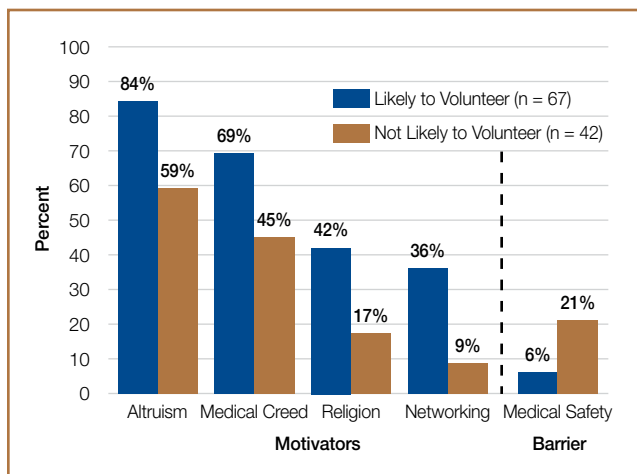
We next compared the barriers and motivations perceived by those who were very likely or extremely likely to volunteer abroad versus those perceived by respondents who were somewhat likely, slightly likely, or not at all likely to do so to investigate the determining factors in a physician’s decision to participate in an overseas program (Figure 4). Physicians who were very likely or extremely likely to volunteer abroad significantly more frequently stated that fulfilling the true medical creed ( $P = .015$ ), obtaining a cultural experience ( $P = .036$ ), pursuing altruistic goals ( $P = .005$ ), fulfilling religious aspirations ( $P = .006$ ), and building international networks ( $P = .002$ ) were motivations in a  $\chi^2$  analysis.

All these motivators reached statistical significance in multivariate logistic regression, except having a cultural experience (Table II,  $P = .118$ ). The only barrier statistically significant in univariate or multivariate analysis was concern for medical safety (multivariate  $P = .032$ ). Using statistical modeling, these results can be generalized to estimate surgeons’ attitudes toward international volunteerism, though nonresponse bias must be factored into predictions. For example, a surgeon who checked altruism but not medical safety would have an estimated probability of 80% (95% CI, 60% to 92%) of being very or extremely likely to volunteer abroad in the future. This probability would be diminished to 5% (95% CI, 1% to 20%) if a surgeon did not indicate any significant motivators but did check medical safety as a concern.

Young age ( $P = .012$ ) and volunteering abroad in the past



**Figure 3.** Barriers to volunteering abroad. Of the 10 perceived barriers, all but 1 (concern for medical safety,  $P = .015$ ) were not significant by univariate analysis ( $P > .05$ ).



**Figure 4.** Comparison of those likely to volunteer and those unlikely to volunteer according to 5 motivators and 1 barrier.  $P$ s indicate significance in multivariate logistic regression model adjusted for altruism, medical creed, religion, networking, and medical safety. For example, for a participant who checked only altruism and indicated medical safety was not a concern, the probability of likely volunteering is estimated as 80% (95% confidence interval, 60% to 92%).

were statistically significant predictors of being very likely or extremely likely to volunteer abroad in the future ( $P < .001$ ). Surgeons who had volunteered in any setting within the past year or within the past 1 to 5 years were significantly more likely to volunteer abroad than those who had last volunteered 5 or more years earlier ( $P = .005$ ).

Multiple surgeons indicated a lack of volunteer opportunities as a barrier in the Other field. When respondents to the initial survey were asked a follow-up question, 44.2% (34/77) stated they perceived lack of surgical volunteer opportunities to be a large or moderate barrier.

### Discussion

Despite soliciting responses from 600 academic orthopedic surgeons, we received completed surveys from only 109. Within our respondent pool, 62% of surgeons were very likely or extremely likely to volunteer abroad. If our respondents are representative of the 25,000 orthopedic surgeons in the US,<sup>7</sup> roughly 15,500 individuals may be very or extremely interested in volunteering abroad. Even under the conservative estimate that all non-respondents, the remaining 491 surgeons contacted, are not at all likely to volunteer abroad, our survey still suggests that at least 11.2% (67/600) of orthopedic surgeons are very or extremely interested, translating to nearly 3,000 individuals. Considering the scarcity of orthopedic care in developing areas, such as Haiti and East Africa, a pool of thousands of US orthopedic surgeons could be an invaluable resource in worldwide musculoskeletal treatment and instruction. Although this study did not include responses from any nonacademic orthopedic surgeons, if they have similar levels of interest, thousands of orthopedic surgeons in the US may hope to volunteer internationally out of the more than 25,000 currently practicing.<sup>7</sup>

Our study had limitations, the most concerning of which is the low response rate. However, respondents were not biased in terms of sex, and featured similar numbers of physicians who had and who had not volunteered abroad previously (53.2% and 46.8%, respectively). This low response rate is balanced by the generalizability gained by sampling from multiple institutions. Another limitation is that our list of motivations and barriers may not be comprehensive. Although we designed

our survey with reference from past studies and input from academic orthopedic faculty, the decision to volunteer abroad is individual and multifactorial. In addition, we surveyed only surgeons affiliated with residency training programs, and future studies will need to confirm the motivations and barriers perceived by nonacademic orthopedists.

Despite interest in international volunteerism, respondents identified significant barriers hindering their participation. Some barriers are easier to address than others. Services such as Health Volunteers Overseas already allow surgeons to share their international experience through written reviews. Development of enhanced online forums such as this would allow surgeons to connect and share their experiences, as well as their international contacts and resources. This may help ameliorate concern about medical safety.<sup>1,10,19</sup> These programs should expand publicity to reach surgeons who have not heard of their offerings (40% in this study). Additionally, they should promote remote telemedicine volunteering technologies, which both received significant interest in the survey, and also eliminate the concern for medical safety. Sacrificing clinical income, giving up family vacation time, and paying for living expenses abroad also make travel difficult for orthopedic surgeons. This barrier can be addressed in part through increased partnerships and sponsorships from hospitals, industry and international organizations, or even subsidies from the governments being assisted. The quality and scope of services provided by existing international surgical volunteer programs have been assessed elsewhere.<sup>21,22</sup>

Although no study to our knowledge has analyzed orthopedic surgery faculty interest in global health, a few studies have surveyed residents. Among orthopedic residents at the University of Washington, 24% were very interested and 61% were very committed to volunteering abroad in the school's international rotation program,<sup>23</sup> though this study may have over-represented interest, as students could select their residency matches based on availability of international programming. Roughly 90% of general surgery residents, in nationwide and single-institution studies, were interested in going abroad.<sup>12,24</sup> The only other national survey on interest in international volunteerism, which sampled surgical residents, also had a low response rate, 11%.<sup>24</sup> Despite limitations in low response rate and nonresponse bias, taken together, past surveys of residents and this study suggest concern about global health among surgeons in all phases of their careers. However, motivations and barriers

**Table II. Barriers and Motivations to Volunteering Abroad**

Variable	Likely to Volunteer Abroad, %	Unlikely to Volunteer Abroad, %	P	
			Univariate	Multivariate
<b>Perceived Motivations</b>				
Acquiring language skills	14.3	13.2	.880	—
Obtaining a cultural experience	46.4	26.2	.036*	.118
Fulfilling the true medical creed	68.7	45.2	.015*	.032*
Altruistic goals	83.6	59.5	.005*	.008*
Religious aspirations	41.8	16.7	.006*	.006*
Building international contacts	35.8	9.5	.002*	.004*
<b>Perceived Barriers</b>				
Scheduling	65.7	64.3	.883	—
Financial cost	44.8	50.0	.595	—
Family/social obligations	62.7	71.4	.348	—
Lack of equipment	14.9	23.8	.244	—
Hospital conditions	10.4	21.4	.115	—
HIV	3.0	11.9	.064	—
Personal safety	25.4	38.1	.159	—
Inefficiency at site	10.4	19.0	.205	—
Medical safety	6.0	21.4	.015*	.023*

\*P < 0.05 represents statistical significance

in surgeons and residents may differ; surgeons in our study were less likely than residents to be concerned about financial costs but more likely to worry about family and social commitments,<sup>12</sup> so international volunteerism programs outside of medical training should be tailored to attending surgeons' specific needs.

An optimistic finding is that 79% of all respondents, including 59.5% of those who did not anticipate volunteering abroad at all, perceived altruism as a major motivator. Although past studies have asserted that interest in altruistic activity wanes after residency,<sup>5,13,25</sup> our results suggest otherwise. Residents returning from international volunteering trips have reported the desire to travel abroad again because of a feeling of obligation to the medically underserved.<sup>11,26</sup> Speculation by residents about their plans may not fully take into account the exigencies of a full professional and family schedule, but our study confirmed that surgeons who had volunteered abroad in the past were more likely to state they were very likely or extremely likely to volunteer abroad in the future. An 8-year follow-up of past residents in the international elective at University of California San Francisco (UCSF) revealed that those who completed the elective were 3 times more likely to have volunteered since residency than those who had not participated in the program.<sup>11,26</sup>

Our survey of academic orthopedic surgery faculty revealed that a significant percentage of orthopedic surgeons—11.2% or more—is very interested in volunteering abroad. Future attempts to increase the presence of US orthopedic surgeons internationally may want to focus on emphasizing the altruistic, medical, religious, and networking opportunities to be had in international trips, while addressing concerns about safety, cost, family and social obligations, and scheduling difficulties and increasing publicity on volunteer opportunities. Providing pathways for continued participation in international volunteerism to orthopedic surgeons to sustain the high degree of interest noted in past studies of residents will help provide desperately needed care to those in need in the developing world while also promoting the personal and professional satisfaction of orthopedic surgeons.

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## References

- Mock C, Cherian MN. The global burden of musculoskeletal injuries: challenges and solutions. *Clin Orthop.* 2008;466(10):2306-2316.
- Beveridge M, Howard A. The burden of orthopaedic disease in developing countries. *J Bone Joint Surg Am.* 2004;86(8):1819-1822.
- Zirkle LG Jr. Injuries in developing countries—how can we help? The role of orthopaedic surgeons. *Clin Orthop.* 2008;466(10):2443-2450.
- Taira BR, Kelly McQueen KA, Burkle FM Jr. Burden of surgical disease: does the literature reflect the scope of the international crisis? *World J Surg.* 2009;33(5):893-898.
- Dormans JP, Fisher RC, Pill SG. Orthopaedics in the developing world: present and future concerns. *J Am Acad Orthop Surg.* 2001;9(5):289-296.
- Thomas R. Reflections on Haiti. *Orthop Today.* October 2010. <http://www.healio.com/orthopedics/foot-ankle/news/print/orthopedics-today/%7B9be8ddee-ef91-41f0-93a4-8f84fb8ead21%7D/reflections-on-haiti>. Accessed June 12, 2013.
- American Academy of Orthopaedic Surgeons. Orthopaedic surgeon quick facts. <http://www.aaos.org/research/stats/Surgeonstats.asp>. Accessed June 12, 2013.
- Harrison CS. Evolving volunteerism. *Clin Orthop.* 2002;(396):84-88.
- Derkash RS, Kelly N. The history of orthopaedics overseas. *Clin Orthop.* 2002;(396):30-35.
- Coughlin RR, Kelly NA, Berry W. Nongovernmental organizations in musculoskeletal care: Orthopaedics Overseas. *Clin Orthop.* 2008;466(10):2438-2442.
- Disston AR, Martinez-Diaz GJ, Raju S, Rosales M, Berry WC, Coughlin RR. The international orthopaedic health elective at the University of California at San Francisco: the eight-year experience. *J Bone Joint Surg Am.* 2009;91(12):2999-3004.
- Powell AC, Mueller C, Kingham P, Berman R, Pachter HL, Hopkins MA. International experience, electives, and volunteerism in surgical training: a survey of resident interest. *J Am Coll Surg.* 2007;205(1):162-168.
- Woloschuk W, Harasym PH, Temple W. Attitude change during medical school: a cohort study. *Med Ed.* 2004;38(5):522-534.
- Huang AH, Rhodes WR. Hospital-based plastic surgery volunteerism: a resident's international experience. *Ann Plast Surg.* 2012;68(4):396-400.
- Alterman DM, Goldman MH. International volunteerism during general surgical residency: a resident's experience. *J Surg Educ.* 2008;65(5):378-383.
- Rinsky L. Personal experiences with overseas volunteerism. *Clin Orthop.* 2002;(396):89-97.
- McCool R. Medical volunteerism ... you get more than you give. *Iowa Med.* 1991;81(1):8-11.
- Gainor BJ. The comfort zone and the fun zone: a case for volunteerism in hand surgery. *J Hand Surg Am.* 2001;26(3):392-397.
- Cobey JC. Physicians and surgeons volunteering in developing countries: a personal perspective. *Clin Orthop.* 2002;(396):65-72.
- Branding-Bennett HA, Kedar I, Pallin DJ, Jacques G, Gumley GJ, Kvedar JC. Delivering health care in rural Cambodia via store-and-forward telemedicine: a pilot study. *Telemed J E Health.* 2005;11(1):56-62.
- Tollefson TT, Larrabee WF Jr. Global surgical initiatives to reduce the surgical burden of disease. *JAMA.* 2012;307(7):667-668.
- McQueen KA, Hyder JA, Taira BR, Semer N, Burkle FM Jr, Casey KM. The provision of surgical care by international organizations in developing countries: a preliminary report. *World J Surg.* 2010;34(3):397-402.
- Jense RJ, Howe CR, Bransford RJ, Wagner TA, Dunbar PJ. University of Washington orthopedic resident experience and interest in developing an international humanitarian rotation. *Am J Orthop.* 2009;38(1):E18-E20.
- Powell AC, Casey K, Liewehr DJ, Hayanga A, James TA, Cherr GS. Results of a national survey of surgical resident interest in international experience, electives, and volunteerism. *J Am Coll Surg.* 2009;208(2):304-312.
- Grudzen CR, Legome E. Loss of international medical experiences: knowledge, attitudes and skills at risk. *BMC Med Educ.* 2007;7:47.
- Haskell A, Rovinsky D, Brown HK, Coughlin RR. The University of California at San Francisco international orthopaedic elective. *Clin Orthop.* 2002;(396):12-18.

*This paper will be judged for the Resident Writer's Award.*

Appendix. Survey of Interest in International Volunteerism, Sent to Orthopedic Surgery Faculty Members

**Demographics**

Gender

- Male
- Female

Age \_\_\_\_\_

Married or Single

- Married
- Single

Do you have children?

- Yes
- No

Do you speak another language?

- Yes
- No

Are you originally from:

- United States
- Canada
- Outside United States (excluding Canada)

**Volunteer Experience**

When was the last time you volunteered (medical or otherwise)?

- This month
- This year
- 1-5 years ago
- 5-10 years ago
- 10 or more years ago/Never

Have you ever participated in medical volunteering in the United States?

- Yes
- No

Have you ever participated in medical volunteering abroad?

- Yes
- No

Were you a resident or medical student at the time?

- Yes
- No

Were you required to make up the time spent away from medical school or residency?

- Yes
- No, I was not required to make up time
- I used my vacation time

**Motivations and Barriers**

How likely are you to participate in medical volunteering abroad in the future?

- Extremely likely
- Very likely
- Somewhat likely
- Slightly likely
- Not at all likely

How likely are you to participate in a program that allows you to volunteer 30 minutes every month from your personal computer to assist medical professionals in developing countries?

- Extremely likely
- Very likely
- Somewhat likely
- Slightly likely
- Not at all likely

Please indicate your motivations for volunteering abroad (check as many as apply):

- Developing other language skills
- Obtaining other cultural experience
- Fulfilling the true medical creed
- Fulfilling personal altruistic goals
- Religious obligations/aspirations
- Developing international contacts/networking
- Other (please specify below)
- Other \_\_\_\_\_

Please indicate which barriers make you less likely to volunteer abroad (check as many as apply):

- Scheduling conflicts
- Financial cost
- Family/social responsibilities
- Lack of equipment
- Hospital conditions
- HIV
- Personal safety
- Expectation of inefficiency/disorganization at site
- Medical safety
- Other (please specify below)
- Other \_\_\_\_\_