




## ORIGINAL RESEARCH

# Bidirectional needs assessment of otolaryngology–head and neck surgery short-term surgical trips to Ethiopia and Kenya

Cynthia M. Chweya MD<sup>1</sup> | C. Yoonhee Ryder MS<sup>2</sup>  | David J. Fei-Zhang BA<sup>3</sup>  |  
Katerina J. Green MB, Bch, BAO<sup>4</sup>  | Yilkal Zemene MD<sup>5</sup> |  
Samuel Okerosi MMed ENT<sup>6</sup> | Joshua P. Wiedermann MD, FACS<sup>7</sup>

<sup>1</sup>Department of Otolaryngology-Head and Neck Surgery, University of Kansas Medical Center, Kansas City, Kansas, USA

<sup>2</sup>University of Michigan Medical School, Ann Arbor, Michigan, USA

<sup>3</sup>Feinberg School of Medicine, Northwestern University, Chicago, Illinois, USA

<sup>4</sup>Department of Plastic and Reconstructive Surgery, University of Pittsburgh School of Medicine, Pittsburgh, Pennsylvania, USA

<sup>5</sup>St. Paul's Hospital Millennium Medical College, Addis Ababa, Ethiopia

<sup>6</sup>Machakos Level 5 Hospital, Machakos, Kenya

<sup>7</sup>Department of Otolaryngology-Head and Neck Surgery, Mayo Clinic, Rochester, Minnesota, USA

## Correspondence

Samuel Okerosi, Ears Nose and Throat Department, Machakos Level 5 Hospital, Machakos Wote Road, Machakos, Kenya, 90100.

Email: [snokerosi@gmail.com](mailto:snokerosi@gmail.com)

## Abstract

**Objectives:** To create an otolaryngology-specific needs assessment tool for short-term global surgical trips and to describe our findings from its implementation.

**Methods:** Surveys 1 and 2 were developed based on a literature review and disseminated to Low-Middle Income (LMIC) hosting institutions in Kenya and Ethiopia and to High-Income surgical trip participants (HIC), respectively. Respondents were otolaryngologists identified online, through professional organizations, and by word-of-mouth, who had participated in a surgical trip of <4 weeks.

**Results:** HIC and LMIC respondents shared similar goals of expanding host surgical skills through education and training while building sustainable partnerships. Discrepancies were identified between LMIC desired surgical skills and supply needs and HIC current practices. Microvascular reconstruction (17.6%), advanced otologic surgery (17.6%), and FESS (14.7%) were most desired skills and high-demand equipment needs were FESS sets (89%), endoscopes (78%), and surgical drills (56%). Frequently taught techniques included advanced otologic surgery (36.6%), congenital anomaly surgery (14.6%), and FESS (14.6%) with the largest gap between LMIC-need and HIC-offerings being in microvascular reconstruction (17.6% vs. 0%). We also highlight the discrepancy in expectations of responsibility for trip logistics, research, and patient follow-up.

**Conclusion:** We created and implemented the first otolaryngology-specific needs assessment tool in the literature. With its implementation in Ethiopia and Kenya, we were able to identify unmet needs as well as attitudes and perceptions of LMIC and HIC participants. This tool may be adapted and utilized to assess specific needs, resources, and goals of both host and visiting teams to facilitate successful global partnerships.

**Level of Evidence:** Level VI.

Cynthia M. Chweya and C. Yoonhee Ryder are co-first authors.

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## KEYWORDS

bidirectional, Ethiopia, global health, global surgery, head and neck surgery, Kenya, low middle-income country, needs assessment, otolaryngology, short-term surgical trips, sustainability

## 1 | INTRODUCTION

Global health initiatives have increasingly placed emphasis on access to surgery as a vital element for alleviating the overall global burden of disease. Essential surgical care is defined as “any and all procedures, contextually and culturally dependent, that are deemed by that region, society, or culture to promote individual and public health, wellbeing, and economic prosperity”.<sup>1</sup> Stark disparities in access to essential surgical cares exist between high-income countries (HIC) and low- and middle-income countries (LMIC). The critical need in conjunction with a low-density surgical workforce in many LMICs underlies the interest of surgical providers from HICs to engage in global surgery work. The earliest iterations of global surgery work centered on short-term, service-focused, and top-down approaches that have given way to an emphasis on sustainable partnerships and systems development.<sup>2</sup>

In 2015, the WHO outlined morbidity due to lack of access to surgical care and defined essential surgical services with the goal of providing safe and affordable surgical care around the world by 2030.<sup>3</sup> Although the majority of the 44 defined essential surgical procedures do not encompass otolaryngology-head and neck surgery (Oto-HNS) procedures, the global burden of Oto-HNS disease is significant with hearing loss, cleft lip and palate, head and neck cancer, trauma, and oral conditions contributing to a high number of disability adjusted life years.<sup>4</sup> Ultimately, Oto-HNS pathology amenable to both medical and surgical management results in preventable morbidity and mortality due to lack of access beginning at the level of availability of a surgical workforce. Global surgical trips originating from HICs have long aimed to increase access by bolstering the surgical workforce—first, by providing otherwise inaccessible surgical care and second, by contributing to the training of local surgeons and trainees.

Surgical subspecialties participating in surgical trips to LMICs have devised specialty-specific needs assessment tools to facilitate global partnerships.<sup>5-8</sup> However, the primary literature indicates that this has yet to be done within otolaryngology-head and neck surgery. Needs assessments are essential in facilitating and optimizing global partnerships based on complementary goals, needs, and resources. In this study, we aimed to create standardized otolaryngology-specific needs assessment tools for host institutions and visiting surgical groups modeled after existing tools in other surgical subspecialties. Additionally, the needs assessment tool was administered to a pilot group of otolaryngologists in Kenya and Ethiopia as well as otolaryngologists from the United States and Canada participating in short-term surgical trips in the region. The objective is to identify the surgical training, education, and supply needs of both LMIC and HIC groups participating in global surgical trips as well as examine the alignment of bidirectional goals and expectations.

## 2 | MATERIALS AND METHODS

This research study was reviewed by the Mayo Clinic IRB (#20-013276) and determined to be exempt.

### 2.1 | Setting

Otolaryngologists from academic and community hospitals in the United States, Canada, Kenya, and Ethiopia participated in this study. In 2014, the number of licensed and actively practicing surgeons in Kenya and Ethiopia was 316 and 349, respectively, with otolaryngology constituting a small fraction of that surgical workforce.<sup>9</sup> This workforce corresponds to a population of 55 million in Kenya and 118 million in Ethiopia.<sup>10</sup>

### 2.2 | Literature review

A literature review on needs assessment tools for short-term surgical trips was performed on PubMed. The following search terms were used: (“Global surgery” OR “medical mission” OR “outreach”) AND

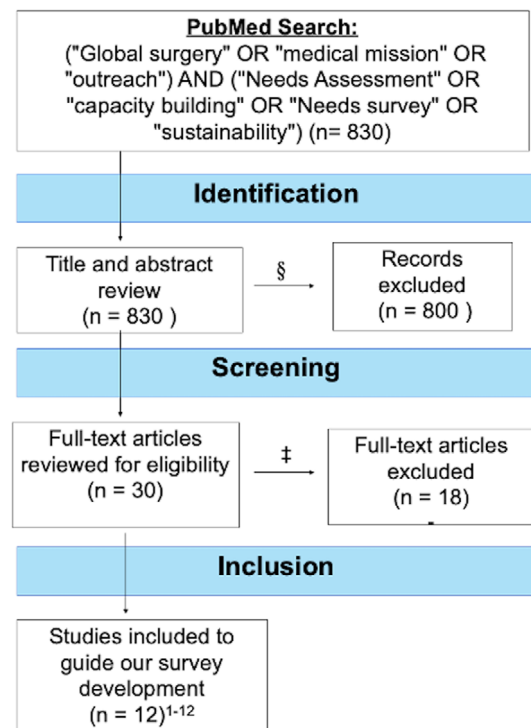


FIGURE 1 Literature review PRISMA diagram.

(“Needs Assessment” OR “capacity building” OR “Needs survey” OR “sustainability”). Exclusion criteria were non-English language, non-surgical trips, domestic needs assessments, and lack of needs assessment tool. Twelve studies met inclusion criteria and were referenced in the development of our surveys (Figure 1).

## 2.3 | Survey design

Surveys 1 and 2 were developed based on the literature review. Full surveys are provided in Appendices S1 and S2. Informed consent was obtained from all survey participants. Survey 1 included demographics, site infrastructure and personnel, surgical capacity, educational and equipment needs, and perceptions and attitudes toward surgical trips. Survey 1 was administered to host otolaryngologists practicing in Kenya or Ethiopia (Figure 2). There are three ENT training programs in Ethiopia; otolaryngologists at each were contacted to participate in this study. Kenyan respondents were identified from a list of otolaryngologists practicing in teaching referral facilities and community hospitals, this list was generated by author Samuel Okerosi. The African Head and Neck Society and Kenya ENT Society websites were also used to identify practising otolaryngologists in both countries. Survey 2 assessed visiting trips in terms of trip length and logistics, team composition, surgical procedures and education offered, equipment and supplies provided as well as attitudes and perceptions. Survey 2 was administered to otolaryngologists from HICs who have participated in at least one short-term surgical trip, defined as 4 weeks or less. Survey 2 respondents were identified via internet search and referral from the LMIC hosts.

REDCap surveys were disseminated via email.<sup>11,12</sup> Emails contained an introductory letter and survey link. All respondents were informed that their responses may be used for research purposes and

to facilitate connections between HIC and LMIC otolaryngologists with complementary skills and needs.

## 2.4 | Analysis

Close-ended quantitative questions were tabulated using Microsoft Excel (2016) and analyzed via univariate descriptive statistics using R.<sup>13</sup> Free text responses were evaluated for themes and manually coded. These codes and thematic analysis were first conducted by one team member and checked and revised by one additional member. Open ended-question responses relating to supplies were abstracted by frequency analysis of topics generated by machine learning-bitern topic modeling with Gibbs sampling algorithms, which are methods to analyze short-form text.<sup>14,15</sup> Respondents were allowed to skip questions, and partial surveys were included in the analysis.

## 3 | RESULTS

### 3.1 | Quantitative results

#### 3.1.1 | Survey 1

Nine otolaryngologists completed Survey 1, six from Kenya and three from Ethiopia (Table 1). The response rate was 11.8% (9/76). The Kenyan responders represented six different hospitals in different cities in Kenya. Respondents from Ethiopia corresponded to the three major otolaryngology medical training centers in the country. Two Ethiopian surgeons were fellowship trained in otolaryngology subspecialties—head and neck oncology and otology. Seven out of nine respondents reported an average combined clinical and surgical volume of >100 ENT patients per week. There was an average of three otolaryngologists per facility and an average of one operating room available for Oto-HNS daily. Facilities “often” or “always” have electricity, water, oxygen, and laboratory services available (Table 2).

#### 3.1.2 | Survey 2

Twelve otolaryngologists from the United States and Canada completed Survey 2 (Table 3). The response rate was 54.5% (12/22). Survey questions were not mandatory to answer, and therefore there was variability in response rate to each question. The mean number of short-term surgical trips to any country among the respondents was 14 over the course of 16.5 years, averaging to roughly one trip per year, with each trip ranging from 1 to 2 weeks. Five had completed at least one short-term surgical trip to Ethiopia, six to Kenya, and one to both countries. The reported ideal length of trip was tied between <2 weeks (4/9) and 2–3 weeks (4/9), with only one respondent wanting >3 weeks. The majority (6/9) of respondents performed <20 surgeries per trip, with none reporting >40 operations. Respondents



**FIGURE 2** Geographic distribution and relative number of survey 1 respondents in Kenya (n = 6, purple) and Ethiopia (n = 3, green).

	Number (%) avg	Kenya (n = 6)	Ethiopia (n = 3)
Number of ENT patients weekly			
>100 patients	7 (78%)	4 (67%)	3 (100%)
20–100 patients	2 (22%)	2 (33%)	0 (0%)
Personnel available per facility			
Number of otolaryngologists	3	2	6
Number of ENT residents	4	1	11
Number of operative nurses	6	7	5
Number of perioperative nurses	6	7	6
Number of anesthesiologists	6	6	6
Number of radiologists	6	2	13
Number of oncologists	3	2	6
Number of pathologists	4	2	8
Number of ENT operating rooms per day	1	1	1
Number of postoperative beds	7	6	10

**TABLE 1** Quantitative analysis of survey 1 (Kenyan and Ethiopian otolaryngologists, n = 9 with non-responses removed)

Local utilities available	Never	Rarely	Sometimes	Often	Always
Electricity availability	0	0	0	5 (56%)	4 (44%)
Working generator availability	0	0	1 (11%)	1 (11%)	7 (78%)
Water availability	0	0	0	6 (67%)	3 (33%)
Oxygen availability	0	0	0	3 (33%)	6 (67%)
Lab services availability	0	0	0	5 (56%)	4 (44%)
Internet availability	0	2 (22%)	4 (44%)	3 (33%)	0
Hospital records availability	0	1 (11%)	1 (11%)	1 (11%)	6 (67%)
Patient follow-up	0	0	1 (11%)	2 (22%)	6 (67%)

**TABLE 2** Likert Scale Responses on infrastructure availability for otolaryngologists per country (A: all respondents, B: Kenya respondents, C: Ethiopia respondents)

participated in education at the hosting facility through didactics (82%), procedural skills/simulation training (55%), and intraoperative teaching (82%).

Eight of nine surgeon respondents reported performing a needs assessment (89%). All respondents participated in a screening day upon arrival to the country before beginning operations. These screening days were largely coordinated by host institutions. All respondents reported that patients receive post-operative follow-up via local Oto-HNS teams. Six reported receiving updates via email or Whatsapp. All respondents reported performing data collection and monitoring during their trips for primary reasons of ensuring accountability for trip outcomes followed by academic research and future program development.

### 3.2 | Qualitative results

Procedures currently performed by LMIC surgeons and those they desire to perform were compared with procedures offered by HIC trips (Figure 3). The three most common codes for procedures LMIC otolaryngologists report performing are adenotonsillectomy (17.3%), basic otologic surgery and procedures (15.4%), and surgery for

sinonasal disease (15.4%). Functional endoscopic sinus surgery (FESS) was reported as a procedure performed by one LMIC surgeon.

The three most desired skills were microvascular reconstruction (17.6%), advanced otologic surgery (17.6%), and sinonasal disease and FESS (14.7%). The top codes reflecting procedures offered during short-term surgical trips include advanced otologic surgery (36.6%), congenital anomaly surgeries (including cleft lip/palate, vascular lesions, microtia) (14.6%), and sinonasal disease and FESS (14.6%). The largest discrepancy between LMIC desires and HIC offerings is microvascular reconstruction (17.6%), followed by complex head and neck ablative surgery (8.8%) and anterior skull base surgery (8.8%).

Surgical trips offered didactic education for host country physicians, trainees, and other health professionals. The most desired educational topics by LMIC otolaryngologists include rhinology/skull-base (21.7%), otology (21.7%), and head and neck cancer (17.9%). The top educational topics taught by HIC visitors include pediatric otolaryngology (22.5%), otology (17.5%), and head and neck cancer (12.5%) (Figure 4). The largest difference between LMIC desires and HIC offerings is Rhinology/skull-base (14.2%).

Among LMICs, the top supply needs were FESS sets (89%), endoscopes (78%), surgical drills (56%), endoscopy-video towers (44%), and

**TABLE 3** Quantitative analysis of Survey 2 (HIC visiting otolaryngologists, n = 12 with non-responses removed)

	Number (%) avg	Kenya (N = 6)	Ethiopia (N = 6)
<i>Respondent characteristics</i>			
Length of practice			
Attending surgeon, 0–5 years of practice	4 (33%)	2 (33%)	2 (33%)
Attending surgeon, 6–10 years of practice	1 (8.3%)	0 (0%)	1 (17%)
Attending surgeon, 11–19 years of practice	2 (17%)	2 (33%)	0 (0%)
Attending surgeon, 20+ years of practice	5 (42%)	2 (33%)	3 (50%)
Specialty			
General ENT	1 (8.3%)	1 (17%)	0 (0%)
Neurotology	2 (17%)	1 (17%)	1 (17%)
Pediatric	4 (33%)	1 (17%)	3 (50%)
Facial Plastics and Reconstructive Surgery	1 (8.3%)	0 (0%)	1 (17%)
Laryngology	1 (8.3%)	0 (0%)	1 (17%)
Head and Neck Oncology	2 (17%)	2 (33%)	0 (0%)
Head and Neck Endocrine	1 (8.3%)	1 (17%)	0 (0%)
<i>Visiting trip characteristics</i>			
Annual frequency of surgical trips to Kenya or Ethiopia	1.33	1.08	1.50
Length of surgical trip (in weeks)	1.40	1.50	1.33
Total number of short-term surgical trips taken	14	5	10
Number of prior trips to Ethiopia	5	0	9
Number of prior trips to Kenya	2	4	1
Number of surgeries performed daily			
<20 surgeries	6 (67%)	2 (67%)	4 (67%)
20–40 surgeries	3 (33%)	1 (33%)	2 (33%)
Number of non-surgical patients weekly			
<100 patients	5 (56%)	2 (67%)	3 (50%)
100–150 patients	4 (50%)	1 (33%)	3 (50%)
<i>Local facility characteristics</i>			
Community center/clinic	1 (10%)	1 (25%)	0 (0%)
Local hospital	1 (10%)	1 (25%)	0 (0%)
Tertiary center	8 (80%)	2 (50%)	6 (100%)
<i>Local partner characteristics</i>			
Individual	9 (82%)	4 (80%)	5 (83%)
Government	4 (36%)	1 (20%)	3 (50%)
Medical/Academic institution	10 (91%)	4 (80%)	6 (100%)
<i>Visiting team composition</i>			
Number of otolaryngologists	3	3	3
Number of perioperative nurses	2	3	2
Number of non-perioperative nurses	2	2	2
Number of ENT residents	1	2	1
Number of anesthesiologists	2	2	2
Number of speech language pathologists	1	1	2
Number of medical students	2	2	1
Number of pathologists	0.3	0.3	0.3
Local interpreter present	5 (50%)	3 (75%)	2 (33%)
<i>Pre-trip preparation</i>			
Prerequisites required at local site prior to trip	5 (50%)	1 (25%)	4 (67%)

(Continues)

TABLE 3 (Continued)

	Number (%) avg	Kenya (N = 6)	Ethiopia (N = 6)
Cultural competency training prior to trip	6 (60%)	2 (50%)	4 (67%)
Medically licensed at local site	5 (62%)	2 (67%)	3 (50%)
Needs assessment conducted prior to trip	8 (89%)	3 (100%)	5 (83%)
<i>Clinical education topics taught</i>			
Didactics	9 (82%)	3 (60%)	6 (100%)
Procedural skills/simulation	6 (55%)	1 (20%)	5 (83%)
Intraoperative skills	9 (82%)	3 (60%)	6 (100%)
<i>Sources of trip funding</i>			
Home institution grant	2 (18%)	1 (20%)	1 (17%)
Outside institution grant	5 (45%)	3 (60%)	2 (33%)
Self-funded	8 (73%)	4 (80%)	4 (67%)
Fundraising	5 (45%)	2 (40%)	3 (50%)
Local community	9 (82%)	4 (80%)	5 (83%)
<i>Uses of funding</i>			
HIC team members' stipends/salaries	0 (0%)	0 (0%)	0 (0%)
Host team members' stipends/salaries	4 (36%)	2 (40%)	2 (33%)
Supplies	8 (73%)	3 (60%)	5 (83%)
Transport and logistics	9 (82%)	3 (60%)	6 (100%)
<i>Locally provided funding</i>			
Lodging for team members	4 (36%)	0 (0%)	4 (67%)
Food for team members	5 (45%)	1 (20%)	4 (67%)
Transportation	5 (45%)	1 (20%)	4 (67%)
Labor/manpower	4 (36%)	3 (60%)	1 (17%)
<i>Purpose of data collection at local site</i>			
Ensure accountability of trip outcomes	9 (82%)	3 (60%)	6 (100%)
Providing report to funders/sponsors	5 (45%)	1 (20%)	4 (67%)
Academic research	8 (73%)	3 (60%)	5 (83%)
Future program development	8 (73%)	3 (60%)	5 (83%)
<i>Perceived HIC support</i>			
Supportive	4 (44%)	1 (33%)	3 (50%)
Somewhat supportive	1 (11%)	0 (0%)	1 (17%)
Neither supportive nor unsupportive	2 (20%)	2 (67%)	0 (0%)
Somewhat unsupportive	0 (0%)	0 (0%)	0 (0%)
Unsupportive	2 (22%)	0 (0%)	2 (33%)
<i>Ideal trip length</i>			
<2 weeks	4 (44%)	1 (33%)	3 (50%)
2–3 weeks	4 (44%)	2 (67%)	2 (33%)
>3 weeks	1 (11%)	0 (0%)	1 (17%)

diagnostic-audiology-otology tools (11%). HICs provided surgical instruments (90%), needles-syringes-sutures (90%), personal protective equipment (60%), electronic-monitoring devices (40%), and medications (20%). These supplies were sourced from local distributors/manufacturers (56%), out-of-country distributors/manufacturers (44%), and the on-site hospitals (22%). Additional comments offered

by two HIC survey respondents expressed the challenge of equipment being damaged within the time between their trips.

Shared overarching goals included increasing access to specialized surgical care, improving patient care, transfer of knowledge and skills, research, and establishing mutually beneficial long-term partnerships. LMIC surgeons also prioritized receiving supplies and equipment and

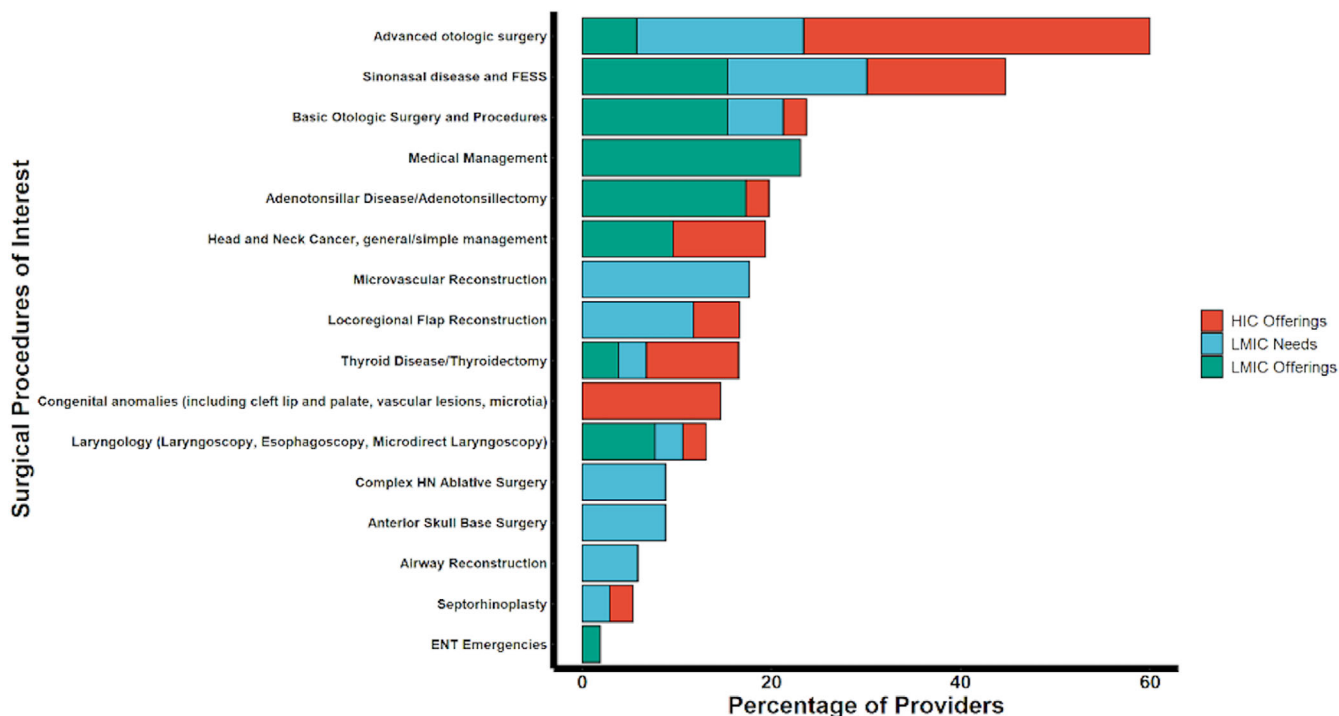


FIGURE 3 Qualitative analysis procedures.

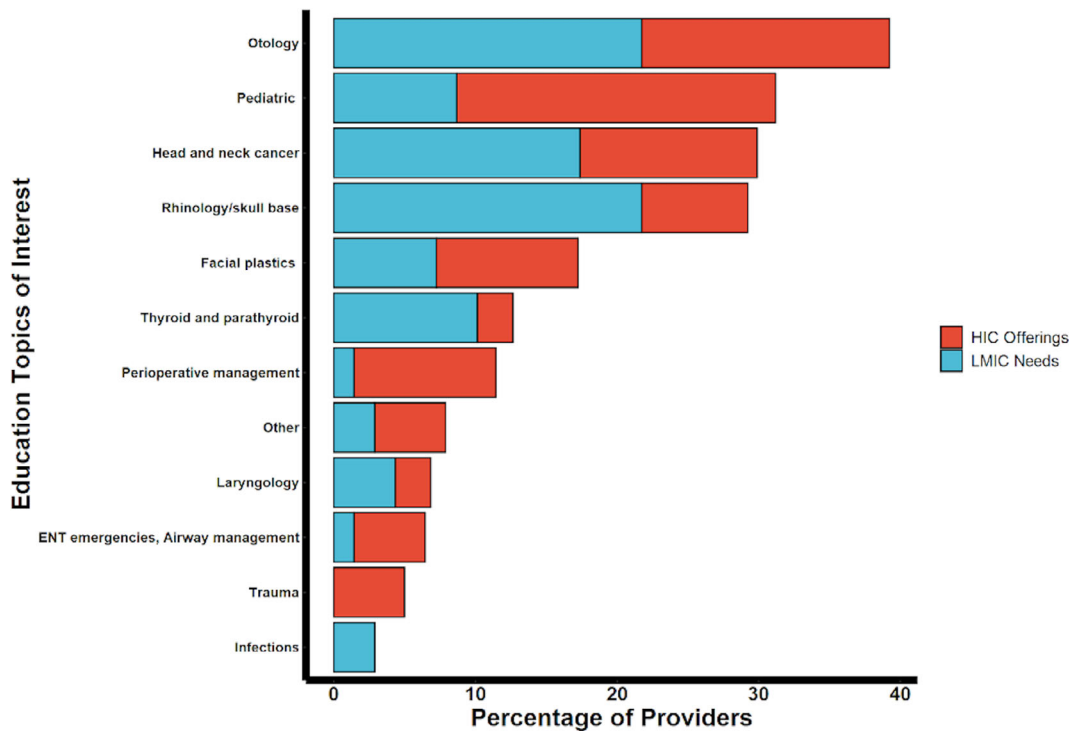


FIGURE 4 Qualitative analysis educational topics.

reducing referrals to the national hospitals which often function above capacity.

The weaknesses reported by both groups including inability for HIC providers to participate in follow up first-hand, clinical volume

that exceeds the capacity of the trip, disruption of OR days and surgical workflow, and minimal reinforcement of acquired skills reflect a discontent with the short-term trip approach. Pointed criticisms of HIC teams included that they “take too many photos in the OR,”



“bring their own residents who get priority to scrub,” and “do operations that can easily be handled by domestic ENT surgeons.” Nonetheless, the relationship with visiting groups and the overall impact was characterized positively. Respondents advocated for development of a year-round program to assist with planning and promote continuity and were proponents of longitudinal STS and long-term surgical trips.

Funding is a constraint for both HIC and LMIC surgeons. Ten out of twelve visiting teams reported that expenses are shared to some extent, and four out of twelve HIC visiting teams reported compensating local providers. All in all, LMIC and HIC otolaryngologists participate in surgical trips with time allotment dictated by their primary employer and incur personal expense doing work that is largely uncompensated.

The largest divergence between perceived and ideal LMIC host responsibilities related to research. HIC respondents express that ideally the majority of research responsibility should fall upon the Kenyan and Ethiopian host institutions, whereas in reality, on average only about one-third of the research is being done by the host institution. However, based on the LMIC open-response questions, research activities may be perceived as self-serving—one of the LMIC respondents noted that some groups “have a greater tendency for reporting than doing the actual work.”

## 4 | DISCUSSION

The aim of this study was to create an otolaryngology-specific bidirectional needs assessment to outline the needs of host LMIC otolaryngologists and visiting HIC otolaryngologists participating in surgical trips to Kenya and Ethiopia. Common goals included expanding the capacity and skills of hosting surgeons through education and training as well as building sustainable partnerships. Disparities emerged when examining surgical education and equipment needs compared with the available training for advanced surgical techniques. The desire by LMIC surgeons to acquire advanced operative techniques was hindered by limitations in locally available equipment and technology. Our study highlighted differing expectations regarding responsibility for trip logistics, research participation, and patient follow-up. HIC and LMIC participants recognized similar strengths, challenges, and weaknesses of the short-term surgical trip model and expressed that it is generally inadequate, but practical. The value of these trips is in expanding access to specialized surgical care, training local surgeons, and improving patient care. Results of our surveys found a strong agreement among LMICs and HICs that training local surgeons is critical to ensuring local sustainability.

A salient finding of this study is the unmet need for advanced surgical training in anterior skull base surgery, advanced otologic surgery, and complex head and neck cancer ablative and reconstructive techniques. There was notable demand for rhinology surgical training and didactic topics and interestingly, none of the HIC respondents were rhinologists. This may be due to the technology-intensive nature of the subspecialty that could be perceived as prohibitive in resource-

limited settings. Training in advanced otologic surgery was offered by HIC in proportion to LMIC request, however, the degree of geographic overlap is unclear. This suggests that there may be a mismatch of visiting HIC groups and hosting LMIC institutions that could be rectified with predefined goals established by both parties or geographic rearrangement of visiting surgical trips based on their focus and a host institution's needs. Formal long-term collaborations with local and subspecialty-specific organizations such as the African Head and Neck Society, can also facilitate this. It is important for HIC groups to recognize that LMIC otolaryngologists may desire to increase their capacity for rhinologic and otologic surgery to strengthen their presence within the local healthcare ecosystem. In the long-term, a high investment of time and resources from key stakeholders on both sides is required to advance the complexity of surgical practice. Finally, LMIC otolaryngologists expressed that some trips may perform operations that could readily be performed by local surgeons such as tonsillectomies and simple resections. This may be detrimental to LMIC surgeons because existing services are undermined, and the value added in the long-term is diminished.

Although the unmet need for advanced surgical training is multifactorial, it is heavily attributable to the corresponding equipment needs. Without adequate surgical equipment, a ceiling is imposed on the transfer and acquisition of advanced techniques. In our study, highly sought-after equipment included FESS sets, mastoidectomy sets, endoscopes and towers, surgical drills, and operating microscopes. This contrasts with the primarily consumable supplies that were provided by surgical trips. The main obstacles cited to obtaining this equipment include expense and long-term repair and maintenance without the presence of appropriately trained personnel. Medical equipment donation guidelines have been published and they stipulate careful consideration of each stage of donation and highlight that funding for maintenance teams is often neglected.<sup>16</sup> The effectiveness of judicious equipment donation coupled with targeted skills transfer has been documented in the global neurosurgery literature.<sup>17,18</sup> Following this example, a greater emphasis on concerted donation efforts is an approach that can be adopted by otolaryngology surgical trips to address the need for advanced surgical training. Although the equipment is key, it is only one component of infrastructure that supports specialized surgical practice, and other elements are outside the scope of this discussion.<sup>19-21</sup>

Our data highlighted discrepancies in expectations relating to trip logistics, research activities, and follow-up. The LMIC otolaryngologists often felt burdened with arranging transportation and housing for visiting teams; however, this logistical duty was an expectation from visiting teams. These tasks can be time-consuming and clear roles should be defined for trip planning. HIC teams indicated that LMIC surgeons should take on more responsibility with research efforts. Although LMIC respondents recognize the importance of research collaborations, there were concerns regarding the intentions and goals of the research. This skepticism likely stems from exclusion of LMIC surgeons in the conception phase for the research—surgeons who can ask contextually relevant and clinically meaningful questions to ensure that appropriate trip and patient-related outcomes are



**TABLE 4** Our key recommendations for successful short-term surgical trips

Keys for bidirectionally beneficial short-term surgical trips	Recommendations
Needs assessment	At minimum perform a needs assessment using tools in this study that can be adapted to other specialties and environments
Return trips	Returning to the same location can help build trust and sustainability in the bidirectional relationship providing sequential learning opportunities and continuity of care
Donations	Strive to donate both consumable and reusable equipment while ensuring capacity for long-term maintenance
Academics	Academic endeavors should be bidirectional, focusing on the host institution and their trainees. Expectations for research are discussed before the trip
Follow-up	Post-operative outcomes should be tracked to the best of the abilities of the host and visiting teams' based on a joint decision driven by stakeholder expertise
Outsourcing	If needs assessment identifies a need the visitor cannot address, another group would likely be able to contribute toward a common goal
Collaboration	If other short-term trips provide care in the same local institution, consider collaborating to ensure the needs of the local community are met
Awareness	Be cognizant that the presence of visiting short-term surgical trips disrupts workflow and workplace norms and do whatever possible to mitigate this disruption

evaluated. Finally, in our study, follow-up was performed by local surgeons and complications and outcomes were communicated to the visiting surgeons by WhatsApp or email. HIC teams report challenges with consistent communication and recognize that internet access is unreliable while LMIC physicians report lack of proper postoperative follow-up by visiting teams. Both are citing inherent challenges related to low-resource settings and short-term trips that may not be easily reconciled including patient factors. Interestingly, interventions such as phone call reminders for follow-up have been shown to be effective in increasing follow-up rate and SMS-based follow-up is an emerging avenue to explore.<sup>22,23</sup>

It was clear that both HIC and LMIC otolaryngologists prioritize the model of “training the trainer” to foster long-term sustainability. Both should also recognize there is an opportunity for exchange of knowledge and skills particularly relating to unique local pathology and cultural and social determinants of health. For example, there may be alternative medicine practices and beliefs that influence patients' approaches to seeking care and should be accounted for to ensure that culturally competent care is being delivered.<sup>24</sup> The limited data on the experiences and perspectives of front-line surgical providers in LMIC's conveys that it is critical to actively seek input from local stakeholders as they have the best contextual understanding of the challenges.<sup>20</sup>

There are several limitations to this study. The LMIC and HIC respondents do not represent all otolaryngologists who host or participate in short-term surgical trips in this region. Notably, there was a low survey response rate. Comparison of their responses provides an approximation since paired comparisons between LMIC and HIC otolaryngologists participating in the same surgical trip were not possible. The needs assessment tools themselves were developed in a stepwise fashion whereby the HIC survey was based on responses from the LMIC responses resulting in an asymmetry between the tools. Participants in global surgery are encouraged to perform their own needs

assessment at the outset of a collaboration that is unique to the participants, goals, and location of a surgical trip, and approached as an iterative process. The authors have outlined basic recommendations to facilitate establishing a bidirectional relationship and ameliorating the discrepancies surfaced by this needs assessment (Table 4). Future directions include further refining the needs assessment tools, validation within long-standing HIC and LMIC collaborations, and matching local and visiting surgeons and institutions based on coinciding goals and needs. Ultimately, a needs assessment in isolation does not lead to safe and sustainable global surgical work but may facilitate it when performed with the goal of forming long-term partnerships.

## 5 | CONCLUSIONS

In conclusion, there are no otolaryngology-specific needs assessment tools published in the literature. We developed a needs assessment tool that can be adapted and utilized to assess needs, resources, and goals of host institutions and visiting teams to optimize and facilitate global partnerships. Implementation of this bidirectional needs assessment tool with HIC and LMIC otolaryngologists participating in surgical trips in Ethiopia and Kenya revealed that despite shared core goals, deficiencies in infrastructure, equipment, and the short-term trip model itself dampen their efforts.

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## CONFLICT OF INTEREST

The authors have no conflicts of interest to disclose.

## ORCID

C. Yoonhee Ryder  <https://orcid.org/0000-0003-0950-4822>

David J. Fei-Zhang  <https://orcid.org/0000-0002-4485-8274>

Katerina J. Green  <https://orcid.org/0000-0001-5937-4822>

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## SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

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