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## Chinese Medical Teams: Knowledge Transfer in Ethiopia and Malawi

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# CHINA★AFRICA RESEARCH INITIATIVE

## Chinese Medical Teams: Knowledge Transfer in Ethiopia and Malawi

Allison Grande *with* Sara Fischer and James Sayre



JOHNS HOPKINS  
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# ABSTRACT

**SAIS-CARI WORKING PAPER  
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“Chinese Medical Teams:  
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*by Allison Grande with Sara  
Fischer and James Sayre*

OFFICIALLY TASKED WITH PROVIDING PATIENT care and training medical professionals in host countries, China has been sending medical teams to Africa since the 1960s. Training provided by the Chinese Medical Team (CMT) program and the resulting knowledge transfer has not been thoroughly examined, however. This paper explores two CMT programs in Ethiopia and Malawi to analyze the scale and effectiveness of knowledge transfer between CMT members and host country medical personnel. Data collected from qualitative interviews with CMT members, host country medical and administrative staff, and government officials suggests that only limited knowledge transfer results from the program. Systemic constraints, including language barriers and underdeveloped program management practices, limit CMTs' ability to operate at their full potential as trainers and practitioners. These constraints also limit the program's overall ability to adapt and address evolving health needs in the host-country. The program, however, has vast potential, as demonstrated by isolated success stories identified by this research. These successes suggest that targeted strategies could leverage China's ongoing investment in the program to increase its value as a development mechanism.

## INTRODUCTION

ON JULY 3, 2018 THE TIRUNESH BEIJING GENERAL HOSPITAL hosted their Phase II project handover ceremony, celebrating the newly constructed expansion of the Chinese-built hospital complex in Ethiopia. A Chinese envoy, led by the Chinese Ambassador to Ethiopia, Tan Jian, joined Ethiopian government officials and hospital staff to mark the occasion. Chinese and Ethiopian officials touted the strengths of their countries' relationship, the importance of continued collaboration, and the significance of ongoing knowledge transfer. Ato Admasu Abebe, Ethiopia's State Minister of Finance and Economic Cooperation emphasized that, "the handover of infrastructure does not mean that support to the hospital from the Chinese will end... knowledge and technology transfer is a very important aspect of this cooperation."<sup>1</sup> Chinese Ambassador Tan Jian echoed this sentiment, "this is a handover and not a hand-off...the software is equally or more important than the hardware," suggesting hardware represents infrastructure and software represents the knowledge, skills, and efficacy of healthcare service delivery.<sup>2</sup> Jian's statement is in line with China's official foreign aid strategy, which has pledged on multiple occasions to include capacity building within their global health engagements.<sup>3</sup> Article IV of China's principles of foreign aid states that aid, "is not intended to result in the recipient countries' dependence on China, but to help recipient countries gradually become self-reliant and economically independent."<sup>4</sup>

Within the health sector, state-sponsored knowledge transfer between China and Africa mainly occurs either through Chinese Medical Teams (CMTs) stationed in Africa or through medical training programs held primarily in China.<sup>5</sup> China's 2014 white paper on foreign aid emphasized that a principal outcome of the CMT program was to train local medical staff in order to alleviate health care service shortages in the countries where they serve.<sup>6</sup> Moreover, the CMT program costs China an estimated US\$ 60 million per year, which amounted to over US\$ 1 billion between 2000 and 2018.<sup>7</sup> Despite the scale of this ongoing investment, relatively little research has addressed the program's efficacy as a development mechanism. The few studies that have been conducted suggest that knowledge transfer is inconsistent. Several studies have found that healthcare workers' training is either the CMTs' primary concern or is occurring satisfactorily.<sup>8</sup> Other studies assert that capacity building is not emphasized, although some limited capacity building is conducted by CMTs during their missions.<sup>9</sup> Aiming to contribute to the nascent body of literature, this research explores the presence and extent of knowledge transfer and skill diffusion between CMTs and local medical staff in Ethiopia and Malawi.

## METHODOLOGY

WE RELY ON QUALITATIVE EVIDENCE, WHICH COMES PRIMARILY from in-depth key informant interviews, focus groups, and document review including official Malawian, Ethiopian, and Chinese documents, press releases, news articles, and scholarly work. Interviews were conducted in Ethiopia and Malawi in July and August of 2018 with CMT members, administrative personnel, doctors, and nurses within the

hospitals where these teams are deployed. Ministry of Health staff and other relevant health sector actors in the host countries were also interviewed. Information and insights were collected from 66 professionals (23 in Ethiopia and 43 in Malawi) through 31 individual in-depth interviews (15 in Ethiopia and 16 in Malawi) and 8 focus groups (2 in Ethiopia and 6 in Malawi). These interviews and focus group discussions included 8 CMT members in each country, 28 local staff members (6 in Ethiopia and 22 in Malawi), and 22 administrative or government participants (9 in Ethiopia and 13 in Malawi).<sup>10</sup>

## BACKGROUND

THERE ARE FOUR MAIN COMPONENTS OF CHINA'S HEALTH AID to Africa: the placement of Chinese medical specialists in African hospitals through CMTs; donations of medical supplies, medicines, and equipment; health infrastructure construction, including hospitals and clinics; and public health/health security program support involving malaria and Ebola treatment and health professional training programs.<sup>11</sup> Ultimately, however, CMTs are the keystone of Chinese health aid. CMTs serve as a medium for donations as they are often placed in Chinese-built healthcare centers and facilitate recruitment for African healthcare workers to participate in training programs in China.

CMTs were first deployed to Algeria in 1963 after the conclusion of the country's civil war and since that time over 20,000 healthcare practitioners have been sent to 51 African countries.<sup>12</sup> The CMT program's management and oversight falls under the jurisdiction of several groups within the Chinese government, including the Ministry of Commerce, the Ministry of Finance, and the National Health and Family Commission.<sup>13</sup> Despite this national framework, CMTs actual implementation and management is delegated to the provincial governments who are responsible for a particular country, while the central government plays only a coordinating role.<sup>14</sup>

Mao Ze Dong proclaimed that CMTs should be for both “helping” and “teaching”, making knowledge transfer a key element of the program from the very beginning.<sup>15</sup> In Zanzibar in 1965, Premier Zhou Enlai reminded CMTs that they were not going to stay in Africa forever, so they should train local doctors to work independently, and “leave a medical team which would never go away.”<sup>16</sup> Throughout the 1970s, China was practicing pure strategic diplomacy with its health aid to Africa, and as a result, it was provided for free. The so-called Chinese “barefoot doctors” were stationed predominantly in rural areas and provided basic preventative care. Beginning in the 1980s, China required host-governments to cover certain expenses for the CMTs. By the end of the 1990s, China began to tie their aid to the promotion and market entry of Chinese medicines and other technologies.<sup>17</sup> The evolution of the program represents China's “mutually beneficial aid” philosophy, with Africans benefiting from the medical care received and the Chinese benefitting from access to African health markets and diplomatic cooperation.<sup>18</sup> Many scholars have categorized Chinese health

assistance as a diplomacy and foreign policy tool, claiming that leveraging Chinese “soft” power is the primary goal, rather than achieving development outcomes.<sup>19</sup>

### CMT PROGRAM

IN ETHIOPIA, THE CHINESE GOVERNMENT INITIATES the process for implementing a bilateral agreement for the CMT program. A draft memorandum of understanding (MOU) is sent to the Ethiopian Ministry of Foreign Affairs from the Chinese Embassy in Addis Ababa. The Ethiopian Ministry of Foreign Affairs works with its Ministry of Health to ensure that the MOU aligns with strategic priorities for the healthcare system. Ethiopia’s MOU involves not only the CMT program, but all Chinese state-run health activities, including healthcare service delivery, the donation of medical equipment and supplies, health consultations, didactic sessions, and on-site trainings.<sup>20</sup> In contrast, as of August 2018, Malawi had three MOUs with China focused on health-related activities, of which the CMT program was only one. Both country’s agreements were similar in that they each included three main deliverables from the CMTs: human resources for medical care; teaching, mentoring, and training; and a donation of medical equipment and consumables.<sup>21</sup>

After an MOU is executed, Chinese physicians are chosen through a selection process that takes place entirely in China. The CMT program works through a “twinning” approach that pairs specific Chinese provinces to different African countries. Each provincial Chinese government that is “twinned” with an African country determines which of its hospitals participate in the program.<sup>22</sup> Ethiopia is twinned with Henan Province and Malawi is twinned with Shaanxi province.<sup>23</sup> The Ethiopian and Malawian governments have little or no opportunity to provide input on the types of medical specialists selected. Instead, the selection of individual CMT members lies with Chinese hospital leadership. Although hospital leadership encourages participation, individuals choose to join the program on a voluntary basis. Interviewed CMT members reported that the Chinese government did not force anyone to participate. Most interviewees chose to participate due to their desire to help a host country.<sup>24</sup> In both countries, the CMTs were composed of 16-17 medical specialists, one of which was the team leader.<sup>25</sup> Specialties on the Ethiopian team included cardiology, maxillofacial surgery, pathology, neurosurgery, orthopedic surgery, general surgery, obstetrics and gynecology, anesthesiology, radiology, ophthalmology (2), acupuncture (2), and ultrasound. The Malawi CMT included internal medicine, pediatrics, obstetrics and gynecology, general surgery, orthopedic surgery, anesthesiology, radiology, ophthalmology, and others. Supporting team members included a chef who cooked Chinese meals for the team, a driver, and an interpreter who was responsible for CMT daily life activities, rather than medical interpretation within the hospital.<sup>26</sup>

Historically, CMTs spent two years in each country, however between 2016 and 2017 the program transitioned to one-year tours. The switch was enacted after CMT members said two years was too long to be away from their children and families.

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Additionally, the CMT program does not offer participants opportunities to learn new skills that would be applicable to their practice in China, and as such, the two-year service can hinder professional growth for Chinese physicians.<sup>27</sup> This professional growth dynamic is particularly problematic for young physicians at the start of their careers.

### **PRE-ARRIVAL PREPARATION**

PRIOR TO CMT SERVICE, PROSPECTIVE TEAM MEMBERS leave their day jobs and spend between three and six months in preparatory training in China. CMTs prepare as a group, attending trainings organized by the provincial health bureau. The majority of training consists of English language skills, but also includes introductions to the culture of the twinned country, CMT program policies, and the host country's national medical guidelines. English language lessons are administered by Chinese professors rather than native English speakers, and the training culminates in an English exam that must be passed before deployment.<sup>28</sup>

While CMTs are preparing for their tour in China, several processes occur in the host nations as well. In Ethiopia, once the CMTs are selected, Chinese medical licenses and other documentation are sent to the Ethiopian Food, Medicine, and Health Care Administration and Control Authority. Local medical licenses are processed in advance of the CMTs' arrival, so that they may practice as soon as they arrive.<sup>29</sup> In addition, the Addis Ababa regional health bureau incorporates the CMTs directly into their staffing plan. Thus, Chinese physicians are counted as local full-time staff members within human resource plans for the health workforce.<sup>30</sup> In contrast, Malawi does not provide medical licenses until after the CMTs arrive, nor are CMTs incorporated into their official staffing plan.<sup>31</sup>

### **IN-COUNTRY ORIENTATION & PROGRAM ADMINISTRATION**

CMTS ARRIVE IN THEIR HOST COUNTRIES ALONG with donations of medical equipment, supplies, and medications, which enter duty-free. In Ethiopia, CMTs are then deployed to Tirunesh Beijing General Hospital about 45-60 minutes by car outside of Addis Ababa. The Ethiopian team also travels to Bishoftu Hospital, a smaller facility about one hour south of Tirunesh, to treat patients for one week at a time. CMTs are not permitted to practice in any other Ethiopian healthcare facilities.<sup>32</sup> The Malawian team begins their tour at Kamuzu Central Hospital (KCH) in Lilongwe where they participate in an orientation. Following orientation, half the team travels north to practice at Mzuzu Central Hospital while the other half remains at KCH.

In both countries, the Chinese government covers CMTs' salary, accommodations, and living expenses. The Ethiopian CMT lives on the Tirunesh Beijing Hospital campus in a separate dormitory meant only for CMTs. This includes individual dormitory rooms, a kitchen and cafeteria, offices, a conference room, and outdoor space for recreational activities. The Malawi CMT at Mzuzu Central Hospital is also



provided on-campus housing, originally built by the Taiwanese, while the team that stays at KCH is provided off-campus housing, approximately six kilometers from the hospital.

There is usually one to two weeks of overlap between teams, during which the outgoing CMT orients the incoming team to the hospital and life in the host country. Official hospital orientation takes place for approximately three months in both countries. In Malawi, this time is used for host-country medical staff to evaluate the CMTs' skills. If department leadership believes a Chinese physician is capable of practicing autonomously, he or she writes a letter of commendation to the medical council for the Chinese physician to be able to receive a license to practice.<sup>33</sup> This trial period in Malawi reduces the period of time that CMTs practice autonomously. In contrast, orientation in Ethiopia focuses exclusively on the hospital and its practices, with no probationary period. In both countries, once CMTs are properly licensed, they are meant to be counted by the hospital as regular medical staff and added to duty rosters.

#### ROLES AND RESPONSIBILITIES

CONVERSATIONS WITH LOCAL STAFF, INFORMATION from each MOU, and rhetoric from the Chinese government described three expected responsibilities of Chinese physicians while serving in a host country. First, the Chinese physician is to serve as a human resource. This involves serving as a full-time staff member, providing routine patient care, conducting relevant procedures, surgical operations, as well as participating in ward rounds, morning meetings, and hand-off meetings. Next, a CMT is meant to be an educator. This involves on-the-job training via case discussion, demonstration and explanation of procedures, formal training sessions, and the introduction of new technologies and techniques. Finally, the CMT serves as a donation's agent, who brings donated equipment, medications, and supplies with them to the host country.

The Chinese team leader serves as the liaison between the CMT and relevant administrative personnel, including the Chinese embassy and hospital administration.<sup>34</sup> Chinese team members report any administrative issues to the team leader, while problems related to hospital duties are reported to the appropriate department head. CMTs request any holidays off from the head of department in-country, as would any staff member, and observe Chinese holidays in addition to local holidays, resulting in additional days off for CMT members.<sup>35</sup>

The CMTs typical work day is meant to be the same as any other local physician; however, this is not always the case in either country. In both Ethiopia and Malawi many team members work in the hospital for only half the day. Surgeons typically work longer hours in the operating room compared to other specialists.<sup>36</sup> Given that the Chinese team in Ethiopia lives on-campus at Tirunesh Beijing, they can remain on call as consultants for complex cases throughout the day after they leave the hospital.<sup>37</sup> At the time of this research, Malawi's CMT had only arrived three months prior, so the

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entire group was still stationed at KCH for orientation. The team departed each day as a group to the residence at lunch time, with only some team members returning in the afternoon. It was reported that on a daily basis some Chinese physicians in Malawi, including the team leader, often did not show up to the hospital. It is unclear what the team did while absent from the hospital, but it was reported that the CMT was also working at the Chinese Embassy in Lilongwe.<sup>38</sup> When the team in Ethiopia was not working in the hospital, spare time typically involved activities such as grocery shopping, laundry, recreational, and leisure activities. The team assists with grocery shopping for their Chinese chef, who prepares Chinese food for the team for every meal. Some team members also reported having administrative responsibilities, such as providing accountant services for the team.<sup>39</sup> CMTs in both countries reported that their time abroad in Africa was much less stressful than their professional roles in China, and viewed this experience as a break from the daily pressures associated with serving as a physician at home.<sup>40</sup>

## SKILL DIFFUSION

### KNOWLEDGE TRANSFER

ALL STAKEHOLDERS, INCLUDING CMTS, LOCAL MEDICAL staff, hospital administration, and government officials, identified patient care as the CMT's primary role, with provision of Chinese donations as the second most important function. Education and training was viewed as an ancillary role by all stakeholders. While some African stakeholders, theoretically, envisioned the program involving formal education and training, they learned that in practice this was not the case. Notably, Chinese physicians explained that they were not explicitly instructed to train local medical staff, but instead were told by their superiors to help these hospitals in any way they could.<sup>41</sup> Consequently, any training that did occur was as a result of an individual Chinese physician's ability and desire to teach. There was no evidence of a structured, organized program focused on education and training.

Even though teaching and training local medical staff is not emphasized as the CMTs' principal role, successful knowledge transfer did occur in both countries. Three modalities for knowledge transfer were found. In order of frequency, they included observation of procedures; on-the-job interaction and discussion; and formal, organized educational sessions. The prevalence of each modality corresponded to the CMT's level of English language capabilities. Since the majority of CMTs did not have advanced English skills, observation of procedures was the most effective and frequent form of knowledge transfer. Informal interaction and discussion between CMTs and local medical staff required English language ability, therefore this modality occurred with lower frequency. Finally, formal training sessions required advanced English skills, so these rarely occurred.

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## MEDICAL SPECIALTIES MATTER

INTERNAL MEDICINE REQUIRES A PHYSICIAN TO BOTH UNDERSTAND a patient's verbal description of the ailment, as well as the ability to discuss the treatment plans and rationale for a course of action with colleagues. Surgeons and procedural clinicians, however, can demonstrate technical hands-on skills that can be observed without the need for verbal communication and in-depth discussion. Therefore, it is not essential for Chinese surgeons and procedural clinicians to speak English proficiently for knowledge transfer to occur. While it would be helpful for the CMT to explain techniques and the rationale behind each step of the procedure, trainees have the ability to reference textbooks afterwards to fully comprehend the particular surgical approach. In addition to observation, there are also instances when a Chinese surgeon will operate together with a local physician on a case, which enhances the opportunity for knowledge spillover.<sup>42</sup>

Fortunately, there were several of these types of specialists as part of the CMTs in both countries. In Ethiopia, 5 of the 15 specialists practiced in areas that allowed for observation of procedures at Tirunesh Beijing Hospital. These specialists included an orthopedic surgeon, maxillofacial surgeon, general surgeon, gynecologist, and anesthesiologist. In Malawi, both Kamuzu and Mzuzu Hospitals each had a general surgeon, gynecologist, and anesthesiologist, so six team members in total performed procedures that could be observed. A Malawian surgeon highlighted that observing a Chinese surgeon operating allowed him to learn a new technique or approach for solving the same problem in a given case.<sup>43</sup> Additionally, even though internal medicine does not primarily involve procedures, a Chinese specialist at KCH performed endoscopies that were often observed by local colleagues, providing additional opportunities for knowledge transfer.<sup>44</sup>

## ON-THE-JOB TRAINING

A CENTRAL DOGMA OF MEDICINE, RECOGNIZED WORLDWIDE, is that more experienced specialists working with novice colleagues will educate those colleagues as part of their daily routine. Therefore, as CMTs treat patients alongside host country practitioners, knowledge transfer should happen organically. This does occur when Chinese physicians are able to communicate effectively with local colleagues in a common language: English in the cases of Ethiopia and Malawi. English-proficient CMTs are able to provide explanations and engage in dialogue with host-country medical staff during diagnoses, treatment, ward rounds, and daily and weekly meetings, in all types of medical specialties. A Malawian physician explained how he often sat with the Chinese physician on his team to discuss how they would manage the patient from initial diagnoses through post-operative management.<sup>45</sup> Moreover, some CMT members participated in a department's morning meeting every day, when each case was discussed and ideas were shared. Other Chinese specialists were applauded by their host country colleagues on their ability to integrate into the team

and support the department. These English proficient CMT members regularly interacted with the teams during medical operations, staff meetings, and planning sessions. One CMT member's local counterpart explained how the CMT member consistently taught the host hospital staff and was always there to supervise.<sup>46</sup> These instances demonstrate the importance of English language skills for the effectiveness of knowledge transfer in the CMT program.

## FORMAL TRAINING

WITH SOME NOTABLE EXCEPTIONS, FEW LOCAL STAFF MEMBERS who were interviewed attended formal CMT organized training sessions. Originally initiated by an English doctor who preceded the CMT, a Chinese specialist posted in Malawi hosted regular training sessions for Malawian interns and students in her department. Sessions consisted of lectures and case reviews with ten Malawian medical students, five days a week. This same Chinese specialist also provided regular training for nurses and students in the operating theater.<sup>47</sup> In Ethiopia, a Chinese anesthesiologist started his own training program in his department after observing his colleagues' needs.<sup>48</sup> Another Chinese specialist provided a formal week-long training for nurses and midwives in the OB/GYN department.<sup>49</sup> Although many hospital administrators and local medical staff were able to cite isolated efforts by CMTs to organize formal trainings, they were a rare occurrence and were reported to break down often due to scheduling constraints or CMT trainers' low English language skills.<sup>50</sup> Ultimately, these trainings were fully dependent on each individual team member's ability and desire to conduct them.

## HOST-COUNTRY KNOWLEDGE TRANSFER RECIPIENTS

LOCAL PHYSICIANS INTERACT WITH CMTS DURING WARD rounds, at times in the operating theater if sharing a case, or for consultations on complex cases. However, the hospitals we examined were understaffed and faced high volumes of patients, which limited the amount of time physicians were able to collaborate with CMTs one-on-one. Most consistently, CMTs worked closely with nurses and nurse practitioners, clinical officers, residents, interns, and medical students assigned by the hospital to accompany CMTs in their daily work. This pairing was required to provide CMTs assistance with patient interactions that required language interpretation. Nurses who worked with Chinese physicians in all practice areas, other than Traditional Chinese Medicine, reported that they did not learn anything new.<sup>51</sup> Since nurses and clinical officers generally do not learn techniques relevant to their roles from CMTs, knowledge transfer was more effective when CMTs were paired with medical students and trainees. Local staff cited that CMTs did, in most cases, take time to provide explanations to students at patients' bedsides. Furthermore, medical students in Ethiopia reported to hospital administration that some Chinese physicians provided them excellent explanations throughout the patient care process.<sup>52</sup>

All three hospitals have residency programs and host medical students on a consistent basis. In Ethiopia, medical students may apply for internships at Tirunesh Beijing Hospital, where if selected, they conduct three-month rotations in pediatrics, surgery, internal medicine, and gynecology during a year-long program. Mzuzu Hospital in Malawi has MOUs with several academic institutions throughout the country, including Mzuzu University and the University of Malawi College of Medicine. Annually, Mzuzu Hospital hosts approximately 30 interns from medical schools across the country. Kamuzu Hospital also hosts students from various universities and clinical programs, including students from the College of Medicine in Blantyre.<sup>53</sup> These programs enable a multitude of medical students the opportunity to benefit from CMT knowledge transfer.

## TRADITIONAL CHINESE MEDICINE

CMTs AT THE TIRUNESH BEIJING HOSPITAL CREATED an official Traditional Chinese Medicine department that offers multiple services to local patients, with acupuncture being the most popular. Large numbers of patients travel from across Ethiopia to Tirunesh Hospital for acupuncture, as it is the only public hospital in Ethiopia that offers this treatment. Many private, traditional Chinese medicine clinics exist in both Ethiopia and Malawi; however, patients prefer public hospitals due to financial accessibility and their trust in the public healthcare system. The service is extremely affordable at Tirunesh, where insurance covers the treatment, resulting in an out-of-pocket cost of only 10 birr per session (less than US\$ 0.50).<sup>54</sup>

Traditional Chinese Medicine is a unique specialty that allows for nurses to also benefit from knowledge transfer. At Tirunesh, a Chinese acupuncturist works with Ethiopian nurses throughout the day, who learn how to administer the treatment through observation and informal training, contingent on the CMT acupuncturist's language ability.<sup>55</sup> These nurses, and other medical staff, are also given the opportunity to travel to China to train in acupuncture. While Traditional Chinese Medicine is not formally offered in public hospitals in Malawi, one Chinese anesthesiologist utilized these techniques in her practice at KCH. She explained how, "there is no medicine for anesthesia post-operations. So, all the patients' post-operations, they feel sick and pain. I told them to do some local anesthesia and Traditional Chinese Medicine to control the pain and nausea after operations."<sup>56</sup> This may become more common in Malawi soon, as a representative from the Ministry of Health confirmed that there is an MOU for acupuncture in development.<sup>57</sup>

## CMTs AS A CONDUIT FOR TRAINING IN CHINA

A NUMBER OF LOCAL MEDICAL STAFF IN ETHIOPIA AND MALAWI noted that they, or someone they worked with, have participated in a professional education program in China funded by the Chinese. Although healthcare professionals across

Africa have been given the opportunity to attend training programs and educational conferences in China, hospital administrators noted that the likelihood of participating increased dramatically for those who worked in hospitals that hosted CMTs. Training opportunities are mainly short-term and focus on a wide range of topics. In many cases, particularly among physicians, African participants noted that the trainings they attended did not correlate with their respective medical specialties. One Ethiopian doctor helped describe how the program he attended was full of cultural exchanges, although it lacked expansive medical training. Specifically, he explained:

“When I was a general practitioner, I had a chance to go to Beijing and at that time there was a training. But when I was there, there was some visiting of the country, and the training was general, on HIV prevention and control... we were visiting their country, and the Great Wall and so on. But the main topic doesn't give any additional sense because it is only on prevention and control of HIV, I didn't need to go all the way there for that.”<sup>58</sup>

Thus, while many African practitioners appreciate the opportunity for exposure to the Chinese health system, they also feel that the lack of specialized training limits the value and effectiveness of these programs. On the other hand, Ethiopian nurses were enthusiastic about the acupuncture programs they attended in China, as they were able to employ the techniques they learned in China when they returned to Tirunesh.<sup>59</sup>

## TECHNOLOGY & KNOWLEDGE TRANSFER

### OBSTACLES AND ADVANCES

ALTHOUGH THE MAJORITY OF EQUIPMENT DONATED BY THE CHINESE government is standard, universal, and familiar to host country medical professionals, there are instances when certain equipment requires training or translation support to be fully functional, such as with EKG machines or CT scanners. In some cases, CMTs provide this support by training specific staff on the use of a machine or by translating Chinese language interfaces and user manuals into English. However, equipment often malfunctions or breaks down, and local engineers are not trained to provide service and maintenance on these instruments.

Chinese technicians sometimes travel to host countries to repair broken equipment. However, they do not provide training for local technicians during these visits, which ultimately leads to an excess amount of nonfunctional equipment. For example, since in-house Tirunesh engineers were unable to repair, and the hospital could not afford to fix, a CT scanner donated by the Chinese government, the machine has been inoperative for approximately two years.<sup>60</sup> At Mzuzu Hospital, there is a large warehouse filled with donated Chinese equipment that hospital engineers were unable to repair due to a lack of necessary spare parts or lack of know-how. Engineers are

usually provided with a user manual, but the manual is in Chinese as well as the machine interface, and CMTs do not translate everything, nor do they work directly with engineers responsible for the machines' upkeep. These findings corroborate prior research that has found that considerable amounts of donated equipment remain out of service, most often due to either the engineers' lack of training on service and maintenance or language barriers since the interface of both the equipment and user manuals are often only provided in Chinese.<sup>61</sup>

There are specific instances, however, when CMTs brought new and unique equipment with associated techniques to Africa. A successful case of technology transfer was found in Tirunesh Beijing's anesthesia department. Previously, Ethiopian anesthetists were only using general anesthesia in cases where other methods would be much more effective for the patient. A CMT member that brought anesthesiology materials and equipment to Ethiopia recognized this gap in patient care and introduced the use of epidurals and nerve blocks. In his first ten months, this Chinese anesthesiologist taught three Ethiopian anesthetists how to do nerve blocks and epidurals.<sup>62</sup> Local staff were receptive and appreciative of his efforts. A member of the anesthesia team at Tirunesh described this Chinese physician:

“He is a really nice person and he tries his best to communicate even with that barrier of language...he was also interested to teach us all. [He says] ‘even if I leave I want you to be good at this and if you have the equipment you should be able to work it yourself.’ He made it so simple and sometimes when you don’t know much about something you might be afraid of it. But he made it so simple.”<sup>63</sup>

This case illustrates how CMTs serve not only as a conduit, delivering donations provided by China, but also how an individual's efforts can make a difference and maximize the effect of in-kind donations.

## KNOWLEDGE TRANSFER

CMTs IN BOTH COUNTRIES HAVE THE OPPORTUNITY to learn from their host colleagues. In some cases, this results from the fact that CMTs will see different types of cases, in different volumes than they see in China. A Malawian staff member noted that Chinese physicians were open to learning from them in cases where they were less familiar.<sup>64</sup> Not only are the types of cases unique, but the equipment and resources available to CMTs at home in China are largely absent in service countries. As a result, CMTs must sometimes learn new techniques from their local colleagues given these resource constraints. A CMT member highlighted this knowledge transfer mechanism, “I think because medicines and equipment here bad, so simple cases are full of challenges. So, I think I learn something here.”<sup>65</sup>

## CHALLENGES TO EFFECTIVE KNOWLEDGE TRANSFER

### LANGUAGE BARRIERS

ENGLISH LANGUAGE SKILLS ARE PARAMOUNT to facilitate effective knowledge transfer in the CMT program. Meusburger outlines a model for the effective delivery and receipt of information that results in attained knowledge, with many opportunities for miscommunication and misunderstanding.<sup>66</sup> The complexity of this model emphasizes the importance of verbal communication in successful knowledge transfer, and the significant obstacles faced if the originator and recipient do not speak the same language. To that end, English skills are crucial to facilitate effective knowledge transfer through the CMT program. As medical training is administered in English in Ethiopia and Malawi, English is expected to be a common language among physicians in both countries. Furthermore, CMTs receive language training in preparation for the program, and must pass an English language examination prior to deployment.<sup>67</sup>

Despite CMTs' preparation, it was apparent that there were very few Chinese physicians in both Ethiopia and Malawi who could speak English beyond an elementary level, severely limiting their ability to communicate professionally. Not only did this language impediment inhibit knowledge transfer, but many CMTs were also unable to provide patient care. One of the authors observed a local physician request that a Chinese radiologist interpret a patient scan; however, the Chinese radiologist did not understand what was being asked of him. Consequently, he could not perform his duty as a radiologist nor explain his analysis of the image. As described by several respondents, these habitual encounters have led a number of Chinese physicians to sequester themselves in their offices for several hours a day, with the remainder of their time spent in the residence. A local medical staff member explained how a Chinese pediatrician circumvented his language handicap by caring for infants in the neonatal unit, which did not require verbal communication with his patients and only limited interaction with the patients' guardians.<sup>68</sup> Another Malawian physician described how their team was, "frustrated because we feel we have an extra pediatrician but they are working well below the level of an intern," mainly due to the language barrier.<sup>69</sup> Many Chinese physicians in Malawi do not receive a letter of commendation from local department heads to practice autonomously during and after the three month orientation period. Instead, they may spend up to six months or the entire year unable to treat patients on their own.

Two of the most high-volume units at Tirunesh Hospital, the outpatient department and inpatient ward, require constant communication with both patients and staff. Since many CMT members are unable to converse effectively, an Ethiopian physician was tasked with shadowing Chinese physicians to assist with patient interaction. This arrangement negates the value of CMTs as additional staff members, burdening a workforce that is already stretched thin. As a solution, medical staff and



CMTs at Tirunesh arranged for Chinese physicians to serve primarily as consultants on difficult cases rather than regular staff physicians.<sup>70</sup> While CMTs do add value by advising on complex cases, the opportunity for knowledge transfer is limited since the majority of their time is not spent working alongside local medical staff. Furthermore, the Ethiopian Ministry of Health considers CMTs permanent staff and includes them in workforce planning. Therefore, since the majority of Chinese team members are not actually working full-time due to the language barrier, Tirunesh Hospital is consistently operating shorthanded.

Chinese physicians with limited language ability described how local colleagues were uninterested in their expertise. The lack of interest created a barrier for both interpersonal and professional relationships between the CMTs and local staff. Furthermore, local physicians at times interpret the CMTs' language barrier as a lack of knowledge or skill, limiting their inclination to even want to learn from them. One Chinese specialist mentioned that she felt local medical staff viewed her as less competent than she actually is, since she was not able to effectively communicate her thoughts. Unfortunately, there are multiple other accounts of language barrier issues showing how this problem is not unique to CMTs in Ethiopia and Malawi.<sup>71</sup>

#### **LACK OF EQUIPMENT AND TECHNOLOGY**

IN BOTH COUNTRIES, CMT MEMBERS STATED THAT they were unable to perform procedures on patients that they normally would in China due to a lack of equipment and technology. This shortage of equipment and technology encumbers CMTs' ability to introduce new techniques that would elevate the level of patient care in Africa. In Ethiopia, a Chinese neurosurgeon was unable to perform surgery on a patient with a lumbar disc protrusion due to lack of necessary equipment and facilities, for example. Chinese orthopedic surgeons encountered a similar problem, with insufficient materials available in the hospital or necessary equipment to do many procedures, many patients were referred elsewhere.<sup>72</sup> As a result of these resource constraints, one Ethiopian physician believed that Tirunesh Hospital was "using [CMTs] at five percent of their capabilities."<sup>73</sup> Similarly, Zambian physicians noted that CMTs in their hospitals were underutilized, in large part due to the lack of modern equipment.<sup>74</sup>

In both countries, open surgery is conducted far more frequently than other procedures that require additional equipment, such as laparoscopy. Due to lack of training and perceived risks, Chinese surgeons often chose not to participate in procedures for which they would normally utilize modern medical technologies unavailable to them in the host country.<sup>75</sup> Self-selecting out of so many procedures removed an additional opportunity for knowledge transfer between host country physicians and their Chinese counterparts.

## MONITORING, EVALUATION & LEARNING

### PROGRAM DURATION

HOST COUNTRY MEDICAL STAFF DREW A DIRECT correlation between the length of time spent by a CMT in the host country, and their effectiveness as both trainers and practitioners. When the CMT program transitioned from a two-year to a one-year commitment, host country medical staff and administration witnessed a noticeable drop-off in CMT effectiveness. Both Ethiopian and Malawian stakeholders emphasized that it takes at least six months to become acclimated to the work environment, which involves language skill development, familiarity with hospital processes and guidelines, and comfort with the team. With the shift to a one-year program, this leaves only about six months of autonomous work from the CMTs before they leave. Furthermore, a recent study shows that the language barrier that prevents knowledge transfer can be overcome given sufficient time in the new environment.<sup>76</sup> A Malawian staff member confirmed these findings, saying that, “the limitation comes in because of the communication. But the longer they stay, they get better.”<sup>77</sup> Additionally, local staff must train and acclimate new CMTs every year, which pulls them away from their regular responsibilities and does not assist with capacity building.

OVER THE PAST HALF CENTURY, WITH THE INTRODUCTION of new strategies for patient access and care, the healthcare ecosystem in which CMTs practice has evolved. Similarly, the global health aid community has progressed over time and plays a large role in the healthcare environment where CMTs practice. These changes require the CMT program to adapt and evolve in order to maintain its effectiveness and positive impacts. However, the CMT operating model has remained largely unchanged since its inception in 1963, and has not undergone an internal or external review of the program since it first began.<sup>78</sup> For instance, although the language barrier has been consistently cited in multiple countries as a serious impediment since as early as 2011, there have not been any programmatic changes to address language development.<sup>79</sup>

Although program administration and logistics run smoothly, the CMT’s program structure lacks strategic management and oversight. All stakeholders, including CMTs, described the absence of adequate feedback mechanisms for program participants. Without formalized communication channels, systemic challenges remain unresolved and breed frustrations among stakeholders. For example, China continues to send physicians of varying specialties without consulting recipient countries to understand their needs. Although this strategy may have been effective in the first few decades of the program when Africa’s healthcare workforce was more limited and medical technology in China was less developed, in recent years this dynamic has resulted in wasted resources. Hospital administration and medical staff in both Ethiopia and Malawi stressed that they would like to be a part of CMT program planning, specifically opportunities to provide input on the type of CMT-specialists recruited. Local administrators at Tirunesh Beijing lamented that the CMT program has not

coordinated with the hospital or ministry of health to provide the types of specialists that would address their specific human resource gaps.<sup>80</sup> One administrator in Ethiopia said that, “we used to request, but they do not accept [our suggestions] there. They send the specialties that they like. On this point, we cannot agree with them...We lack some specialties where we need, but they are sending the same ones always.” Likewise, a Malawian physician commented that “[The Chinese] never ask us, they just send them.”<sup>81</sup>

The program also lacks reporting mechanisms to ensure that all parties meet their obligations as outlined in the MOU.<sup>82</sup> Progress against stipulated targets is not measured, as is the case in mainstream health aid programming. As one administrator in Malawi noted, “We’re revising all the MOUs because they’re all actually not doing anything particular in terms of...evaluating, reporting, everything.”<sup>83</sup> Representatives from the Ministries of Health (MOH) in both countries expressed that the lack of progress monitoring is an issue that should be addressed moving forward.

Missing feedback loops also affect the impact of CMT’s donated medical equipment. While there is generally a positive outcome from CMTs bringing equipment to their hospitals, it would be helpful for local medical staff to have input on what equipment is needed so that resources are not wasted. In these cases, hospital administrators wish to be included in the planning process with the MOH, and local medical staff would like to be included in conversations with hospital administration. Better communication would ensure that the equipment provided fit local needs and could also afford CMTs opportunities to introduce and train host-country staff in the use of new, targeted technologies.

## CASE STUDY **COMPARING ETHIOPIA AND MALAWI**

OUR FINDINGS SUGGEST THAT KNOWLEDGE TRANSFER is most effective when CMTs speak English, and therefore correlates with each individual physician’s language skills. However, hospital administration and medical staff in Ethiopia were much more positive regarding the prevalence and effectiveness of knowledge transfer in comparison to the same stakeholders in Malawi. On the whole, Ethiopia’s general perception of the program was much more positive than that of Malawi. Many stakeholders in Malawi believe that the program is more burdensome to the hospital than beneficial. Given that the language abilities of both teams were similar, ancillary factors may have influenced the amount and effectiveness of knowledge transfer conducted by a specific CMT, as well as the accompanying perception of that knowledge transfer by local stakeholders.

In her piece on a Chinese rice project in Kpatawee, Liberia, Bräutigam states that, “successful technology transfer depends in part on similarities between the source environment and the destination, and in part on successful adaptation.”<sup>84</sup> Schumacher and Leung also observe that the ability to adapt to a new environment is an important

factor in facilitating or hindering knowledge transfer, shown through the study of Zambian CMTs.<sup>85</sup> This study yielded similar results, demonstrating that the CMT program in Ethiopia, which became more integrated into the local community and adapted better to the new environment, was more successful in knowledge transfer. At Tirunesh Hospital in Ethiopia, the CMT housing complex was located on campus, allowing CMTs to spend more time at the hospital with local colleagues. One CMT member in Ethiopia responded saying he regularly socialized with local medical staff outside the hospital, and in many cases considered his colleagues true friends. While it should be noted that this same members' English skills were excellent, he also mentioned that local medical staff members often came to the Chinese residence on campus to socialize, share a meal, play basketball, or join the rest of the CMT for other recreational activities.<sup>86</sup> Such interactions provided opportunities for CMTs in Ethiopia to strengthen relationships with local staff. CMTs with strong relationships noted that host country physicians were eager to learn from them. Additionally, the CMT in Ethiopia had been stationed in-country for ten months when this research was conducted and seemed to have already adapted to their new environment.

In contrast, the CMT in Malawi had arrived only three months before this research was conducted. The majority of Chinese physicians were still in orientation and had not yet received their endorsement to practice autonomously. In addition, the CMT at KCH in Lilongwe lived a car ride away from the hospital rather than on campus. As such, they were transported back and forth from home to work as a group at all times, including lunchtime each day. A Malawian medical staff member described how the CMTs routine was reflected in the daily hospital routine:

“In Lilongwe, they [are] living in Area 9, so when it's lunch hour then the whole team goes at once and you say, “ah, you have a duty here,” but he will leave even when [we] are understaffed...I think when we talk of a hospital job, everywhere in the world, sometimes you know you change the way you work depending on the situation on the ground. Sometimes you can skip lunch for about 30 minutes, one hour so you can sort out a problem. This is normal to our profession. But not with the Chinese when they are here.”<sup>87</sup>

Staying together as a group to travel to and from home at all times prevented individual physicians from remaining at the hospital to finish work or to respond quickly if needed. As a result, some local colleagues harbored negative feelings towards the CMT and were more reluctant to collaborate with them in work or training. Informal social interactions were also less likely for the CMT in Kamuzu, given that they ate breakfast, lunch, and dinner at their residence, and engaged in recreational and leisure activities outside the hospital complex. Chinese physicians were also not allowed to go anywhere alone outside of the hospital or the residence, obligated to do everything as a group.<sup>88</sup>

Another key distinction between the two groups was their diplomatic responsibilities. Hospital administration in both Ethiopia and Malawi commented that the CMTs not only serve as physicians, but also act as a liaison between China and

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*Differences in perception of knowledge transfer may also be related to the quality and placement of each hospital within its own national healthcare system. In Ethiopia, CMTs operate within a smaller regional hospital that is extremely understaffed and does not attract the best talent. CMTs in Malawi work in two of the four Central Hospitals in the country, which employ the nation's best specialists. Additionally, given that KCH is the top hospital in Malawi, it continually hosts many foreign clinicians. Malawian staff have much more exposure to international physicians that both practice and teach, compared to Ethiopian staff at Tirunesh Hospital.*

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the host country health sector. Ethiopian stakeholders viewed the diplomacy positively, stating that CMTs, “are the bridge between us and the Chinese government...And they take our opinion to their government, but the decision will be done by the government.”<sup>89</sup> These activities were not described by any Ethiopian stakeholders as negatively impacting the CMT’s role as hospital practitioners. On the other hand, Malawian staff perceived the program as a diplomatic tool rather than a development mechanism. A Malawian stakeholder, describing challenges with the CMT program, stated:

“The issue is that it is international relations, so what is important is that they’re contributing, not that they’re operating at 100 percent capacity [as physicians]...we’re doing this so they can take a picture, make a video with them, say this is what they’re doing, make a ceremony, etc....To us some of them are just tourists. We just take them as tourists who whether they are there are not, it doesn’t matter. It doesn’t affect the functioning of the hospital.”<sup>90</sup>

Separately, one Chinese CMT member told a Malawian colleague that he was sent mainly for technical issues rather than clinical issues, and subsequently spent the majority of his time at the Chinese Embassy in Lilongwe. CMTs in Malawi also traveled to other countries in Africa for up to two weeks at a time to see visiting Chinese government officials.<sup>91</sup> The location of KCH in the capitol city of Lilongwe and its proximity to the Chinese Embassy might also explain why these CMTs spent less time at the hospital. CMTs stationed in Tirunesh Beijing and Mzuzu Central Hospitals were farther removed from the political sphere and could thus spend more time at the hospital focused on their work.

Differences in perception of knowledge transfer may also be related to the quality and placement of each hospital within its own national healthcare system. In Ethiopia, CMTs operate within a smaller regional hospital that is extremely understaffed and does not attract the best talent. CMTs in Malawi work in two of the four Central Hospitals in the country, which employ the nation’s best specialists. Additionally, given that KCH is the top hospital in Malawi, it continually hosts many foreign clinicians. Malawian staff have much more exposure to international physicians that both practice and teach, compared to Ethiopian staff at Tirunesh Hospital. The University of North Carolina Project-Malawi, based at KCH, sends experienced American and European physicians to practice alongside Malawian staff in multiple specialties. Baylor University of Medicine also has a partnership with KCH that allows Baylor clinicians to practice at KCH.<sup>92</sup> These programs allow Malawian medical staff and hospital administrators to compare their experiences with the Chinese to other foreign teams. For instance, a Malawian clinician was adamant that there was a clear difference between working with the Chinese and a previous Ukrainian colleague that spent time at KCH. The Ukrainian and Malawian physicians spent time together outside of work socializing, whereas the Malawian’s interactions with the Chinese physicians were limited.<sup>93</sup> Further, the programs involving other visiting clinicians were

described as structured and effective. Visiting clinicians identify knowledge gaps and work collaboratively with local medical staff to develop training plans to meet those needs.

Finally, the history of ties to China and the longevity of the CMT program in Ethiopia and Malawi are quite different, which could also explain why there are more positive perceptions of the CMTs in Ethiopia compared to Malawi. Ethiopia has a long-standing diplomatic relationship with China, dating back to 1970. There have been 19 CMTs from Henan province since 1974, with only two interruptions in 1979 and 1984.<sup>94</sup> In contrast, Malawi established formal diplomatic ties with China in late 2007, and the first CMT arrived in 2008.<sup>95</sup> The Ethiopians have much more experience working with the CMT program and vice versa, which has refined all parties' expectations. In Ethiopia, the CMT members were very open about their work and had no qualms about discussing various aspects of the program. They welcomed the research team and invited us to lunch. In Malawi, however, the CMTs were extremely hesitant to speak. When interviewed as a group, they were defensive and secretive about their work at the hospital. They refused to answer several questions and did not permit interviews to be recorded.

## CONCLUSION

THE CMT PROGRAM DEMONSTRATES POSITIVE IMPACTS on patient care in both Ethiopia and Malawi. However, the effectiveness of the program as a vehicle for knowledge transfer remains limited, despite its emphasis in official CMT program documentation and messaging. This discrepancy reveals a disconnect between Beijing's rhetoric and program implementation on the ground. The CMT program in Malawi, and to a smaller extent in Ethiopia, suggests that diplomacy, and not capacity building, is the core objective of the program. Whereas the Chinese government pays close attention to the program's visibility and messaging, far less attention is given to program improvement and performance against basic indicators. CMT's diplomatic and capacity building roles, however, are not necessarily mutually exclusive. The financial and human resources provided by China are significant. With a few program improvements, these resources could be leveraged to vastly improve the CMT's contributions to healthcare delivery in Africa. Improved English language training, introduction of program management practices, and an extension of the term of service represent just a few low-touch, high-impact modifications. Implementing necessary improvements, however, will require government leadership in Beijing to prioritize the program's impact as a health development tool to the same extent that it prioritizes its diplomatic role. ★

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