

Medical Electives in Sub-saharan Africa: A 14-years Student/NGO-driven Initiative

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Abstract

Background: This article sets out the medical experience on clinical electives in Sub-Saharan Africa driven by a collaboration between a student organisation and a Nongovernmental Organization (NGO). Preclinical medical students spent 4 weeks as part of a multidisciplinary medical team in Africa. Post-elective questionnaires were administered.

Results: Of all, 141 students responded to the questionnaire. The participants came from 30 Italian universities. The main difficulties reported are due to the lack of resources for the exercise of the medical activity, and difficulties related to language and communication. The African experience had a positive impact on the progress of the studies upon return, with an increase in determination and motivation. The experience had also positive influences on the future professional choices and carriers. The experience seems to contribute not only to the professional growth, but also to the personal development.

Conclusions: A well-structured, mentored experience in international health can have a positive impact on preclinical students' attitudes, including their compassion, volunteerism, and interest in serving underserved populations. Italian medical schools should incorporate changes in their curricula to train socially responsible physicians.

Background

An editorial published more than 50 years ago in JAMA stated that, "if, as a routine, young American doctors were encouraged to spend some months working in a developing country before they became tied to the responsibilities of practice, the result could only be better medicine at home and abroad" [1]. This statement is more relevant than ever in a time of globalisation, where the intensifications of movement of people, products, and services among countries affect many aspects of public health, as the COVID-19 pandemic has dramatically showed [2]. To provide global health training and facilitate international clinical experiences for medical students has now become a necessity, because mainstream medical education remains largely focused on national - as opposed to global - health issues[3]. Electives often provide students with their first exposure to international health [4], offering participants opportunities to develop clinical skills and to explore new cultures. A Lancet editorial describes how, 'no other part of the [medical] course transforms students so rapidly and profoundly' [5].

Although a significant proportion of students either remain near home or travel to developed countries, medical students are increasingly travelling further afield to low- or middle-income countries (LMICs) to undertake electives. In addition to the opportunity to discover a new country, and experience medicine in a different cultural environment, a number of benefits have been identified to explain the growth in popularity of medical electives in LMICs [6]. These include the gaining of greater experience in working in under-resourced communities, increased diagnostic skills where the use of medical technologies is extremely limited, and a greater appreciation of public health measures and primary care medicine [7–12]. However, a number of concerns have also been raised. A key concern is whether students will take on excessive clinical responsibility, practising beyond their competence, which raises ethical and professional issues [13, 14]. Another is that electives can be perceived as a means to fulfil the students' own ends rather than to serve the needs of their host communities [15]. Finally, a matter - not always fully considered - concerns health risks associated with electives such as infectious illnesses and injuries [16].

Smith and Weaver have shown how a well-structured, mentored, medical elective experience in developing countries can have a positive impact on preclinical student attitudes [17]. Dowell and Merrylees observe [18], 'one way of achieving such structure is through establishing and developing institutional partnerships between the sending and receiving institutions'. They also emphasise that, 'the continuity of student presence provided by a partnership allows more comprehensive student preparation', and that the preparation of students for electives, 'is easier to organise and of more direct relevance for groups of students who are going to the same place as part of an institutional partnership. Continuity can also allow opportunities to expand the student contribution through, for example, student fundraising and support for specific projects'.

This present paper sets out the experience of Italian medical students on clinical electives in Sub-Saharan Africa, in an initiative called the Wolisso Project (WP) [19], driven by a collaboration between the Italian Society of Medical Students (SISM) [20] and the Non-governmental Organization (NGO), Doctors with Africa - CUAMM (DwA) [21]. DwA works to improve the

health of African populations, providing healthcare services open to all. It also works by promoting training environments and knowledge about global health issues. The WP is governed by a memorandum of understanding, signed by DWA and SISM. It takes its name from the city of Wolisso in Ethiopia, which was the location for the first medical elective site that hosted students. Later, the project expanded to include the Tosamaganga hospital in Tanzania, but the name of the project remains unchanged. The project offers undergraduates the chance to undertake a medical elective in one of the two African sites. It also aims at eliciting a vocation to work in the field of international medical cooperation. We report here the 14 years' experience of the WP, through the results of a survey distributed to all subjects who participated in the project.

Methods

DWA is present in eight Sub-Saharan African countries: Angola, Central African Republic, Ethiopia, Mozambique, South Sudan, Uganda, Sierra Leone, and Tanzania. It operates through expatriated and local health professionals, technicians and administrative staff, providing support to hospitals, health districts (for public health activities, mother-child care, infectious diseases), rehabilitation centres, nursing schools, and medical universities (in Uganda, Mozambique and Ethiopia).²¹ The SISM, member of the International Federation of Medical Students Associations (IFMSA)²² provide training to medical students, through national and international initiatives. The objective is to improve the clinical skills of future physicians and raise awareness of the ethical and social aspects of the medical profession, with a global health perspective [20].

Participants' selection

The selection concerns medical students attending the year 5 and year 6 as well as newly graduated doctors. The selection is managed by SISM, which provides information, opens calls, collects applications, and selects students. In the selection process, scores are ascribed above all on motivations and expectations. Other factors are previous experience in the field of international medicine, previous collaborations with SISM or DWA, and participation in global health training activities organised by DWA. The duration of the elective is 4 weeks.

Pre-departure and post departure

The pre-departure training is also organised by SISM. It mainly concerns information on ethical, practical, and attitudinal aspects, which need to be considered in this type of experience. The pre-departure phase provides a description of the socio-political, economic, and cultural context in Ethiopia and Tanzania.¹⁹ Students are put in contact with the DWA staff in order to get pre-departure information. Any costs incurred, such as for travel and accommodation, are covered by the students. Occasionally, DWA provides funding support for the initiative. DWA offers training courses on global health and health cooperation in many Italian universities, in collaboration with SISM. For example, in 2019, 27 courses in 23 Italian universities were organised [23]. Students participating in medical electives have the opportunity to attend these training courses on a voluntary basis. However, the participation in these courses is considered an added value during the selection phase for the project [24]. At the end of the WP experience, students complete an evaluation form and attend debriefing sessions with DWA staff. Students are also encouraged to elaborate on their experience through reflective writing, published on the DWA website [25] and are invited to share their experiences at the WP annual meeting.

Setting and on-site activities

Initially, since its inception in 2005, the experience was involved only with the Wolisso hospital in Ethiopia; later in 2010 it was extended to the Tosamaganga hospital in Tanzania. For different reasons, the site in Tanzania was closed - partially or totally - in 2011 and 2017. The Wolisso hospital is a referral, non-profit facility located in Wolisso town, 115 km from Addis Ababa. Wolisso is the capital of the Southwest Shoa Zone (SWSZ) in the Oromiya region. The SWSZ has a population of about 1.1 million (Table 1). The Tosamaganga hospital is located in the district of Iringa DC, Tanzania. This is a rural area 500 km from Dar Es Salaam, the county's largest city. DWA has supported the hospital in terms of governance and human resources for more than 30 years. The Tosamaganga hospital serves an estimated population of 265 000 (Table 1). In these two African hospitals students do not have a single tutor but are supervised by all the staff, including expatriated and local health

personnel. Under supervision, the students are involved in all the daily activities of the service to which they are assigned, carrying out patient visits, case discussions, diagnostic procedures, meetings with nurses and relatives, etc. Students do not intervene on patients except - on a voluntary basis - for simple nursing activities, and again always under supervision.

Table 1
Sites of electives undertaken by participants and some hospitals indicators

Hospital	Population served	Beds	Out patients	Admissions	Antenatal visits	Births	Vaccination	Total staff	Qualified staff
Tosamaganga Hospital	687 460	165	25 850	6931	1661	2708	8298	165	109
Wolisso Hospital	1 198 149	200	78716	14742	8244	3687	5552	353	228

Data collection

The study used a mix of quantitative and qualitative methods to collect and analyse data. The survey was electronically distributed to all individuals who participated in the project. The survey was conducted from 1 January to 31 January 2019. After an initial invitation to take part, two follow-up reminders were sent out. Participants were informed that the survey would be used for research purposes. The DWA Review Board approved the study. Participants were assured of their anonymity. The questionnaire comprised four domains: i) general information: age, gender, university of provenance, medical practice before departure, and prior experience in LMICs; ii) obstacles encountered by students during the experience; iii) impact that the experience had on studies and future clinical approaches; iv) reflections, wherein the survey asked how the experience contributed to personal and professional growth, and about students' availability for future experiences in LMICs.

Results

Figure 1 shows the number of applications and departures during the 2005–2018 study period. The WP received an average of 92 requests per year, with a substantial increase over the years. In the same period, there were on average 22 departures per year.

General information

Of the 308 students who took a medical elective during the study period, 257 were contacted for the survey (for the others the email address was invalid). Of those, 141 responded (a 55% response rate). The majority of the questionnaires (76 subjects, 54%) were completed by those who had had the elective experience in the last 3 years (2016–2018). The majority of students were female and carried out the electives at Wolisso hospital. At the time of departure, most of the participants were year 5 or year 6 medical students. The participants came from 30 Italian universities. The majority had already experienced some medical practice before departure and previously carried out voluntary activities. However, the majority had never been to Africa before (Table 2).

Table 2
General information and obstacles during the experience

General information	n. (%)
Sex	
Female	117 (8)
Male	24 (17)
Location	
Wolisso	95 (67)
Tosamaganga	46 (33)
Position at the time of departure	
5-year medical students	62 (44)
6-year medical students	25 (18)
Already graduates but not yet residents	50 (35)
Other conditions	4 (3)
Medical practice before departure	
Yes	77 (55)
No	64 (45)
Previous voluntary activities	
Yes	108 (77)
No	33 (33)
In Africa before	
Never	95 (67)
As a volunteer	24 (17)
As a tourist	22 (16)
Obstacles	n. (%)
Lack of resources for medical activity	78 (55)
Language and communication	49 (35)
Different system of values	42 (30)
Lack of hygiene	17 (12)
Distance from relatives and friends	14 (10)

Obstacles during the experience

The biggest difficulties reported are mainly the lack of resources, such as diagnostic and treatment tools for the medical practice, and problems related to language and communication. A minority also reported as difficulties the distance from relatives and the lack of hygiene. The analysis of the difficulties did not show significant differences either by country of destination or by year of departure (Table 2).

Impact on studies, clinical approach and future professional choices

The African experience had a positive impact on the progress of the studies upon return, with an increase in determination and motivation in 65% and 70% of cases respectively. The experience had positive influences on the future clinical approach of the students. Almost 90% of respondents say they have gained in terms of humanity and in resilience. The percentage of those who declare that they feel more courageous (73%) and empathetic (72%) is also significant. High percentages of subjects also declared a greater ability to collaborate (68%) and an increase of self-confidence (61%). An open question was related to the impact of the experience on future professional choices. Seventy-one participants (50%) reported that the experience had had an impact on their future career choices. Some of the free comments are:

'I changed my mind ... and I decided to do anesthesia'.

'I chose to become a pediatrician'.

'I became passionate about neonatology, which I had not considered before'.

'I saw how public health and hygiene are crucial topics in the management of health systems'.

A number of comments were related to the international cooperation as a whole:

I decided to undertake a post-graduate in international health cooperation

'I would like to spend part of my residency in Africa'.

'I started to think of international health cooperation as a concrete possibility for the future'.

This experience has been useful for me to understand that working permanently in a developing country is not for me; however, this experience gave me a desire to return to Africa with more skills to share.

Reflections

This section explored how the experience had had an effect on students' interest in health inequalities, their commitment to reduce the environment damage, and their awareness of the wasting health resources. Comparing pre and post-experience data (where 1 = low and 10 = high), there is a significant change in all these aspects, with an increase in interest in health inequalities (from 7 to 8/9), the commitment to reduce environmental damage (from 6/7 to 8/9) and in their awareness of the wasting of health resources (from 6/7 to 8/9). These changes were not affected by the destination or by the year of departure. A further question explored how the clinical elective experience contributes to both personal and professional growth. On a scale of 1 to 10 (where 1 = low and 10 = high), 75% of respondents chose a score equal to or greater than 7 to describe their professional growth. The same percentage of respondents chose a score equal to or greater than 8 to describe their personal growth. The final questions revealed that the majority were willing to repeat the experience, with 51% saying definitely and 46% probably. Only 3% excluded this possibility. Of all respondents, 20% have already spent additional time in a medical setting in Africa. After the African experience, 66% of respondents say they have maintained some form of contact with DWA, participating in training, awareness and support activities of cooperation projects.

Discussion

In this study nearly all students gave positive feedback about the overall experience. Most students were positively influenced personally and professionally, and said they were willing to repeat the experience. The biggest difficulties reported are a lack of resources for the practice of the medical activities, and problems with communication. Apparently, as observed by Mutchnick *et al.* [3], 'living in alternative social environments creates an educational experience unmatched in any textbook or classroom exercise'. Professionally, students declare that they have returned home with a greater sense of empathy towards patients, an augmented confidence in their clinical skills, and a better appreciation of the importance of issues such as health inequalities. The experience also seems to influence the orientation of the students' careers, increasing the interest in public service. The

students also report an increased awareness of problems concerning the use of resources. Similar results have been found in other studies [17, 26–31].

Jeffrey *et al.* [32], carried out a literature review examining the potential role of international health electives in improving students' professional growth and career choices. Key findings from the review suggest that a medical elective experience gives opportunities for medical students to strengthen self-confidence in medical practices, increase knowledge of tropical diseases, gain a better awareness of environmental health and public health actions. In addition, medical electives seem to influence the career choices of medical students. The results of Jeffrey *et al.*, are in line with the results of the present study, where the vast majority of students declare that the experience has had a positive impact on a personal level, and that the experience led them to reflect more deeply on future choices at post-graduated level.

The number of students doing a medical elective in a LMICs has progressively increased over the years [11]. It is also confirmed by the present study. In the first 5 years of the project (2005–2009) there was each year an average of 52 applications. This increased to 142 in the last 5 years of the project (2014–2018). During the course of the project there was a corresponding increase in the number of departures, from an average of 15 over the first five years to 33 over the final five years. It should be noted that increase occurred despite the fact that travel and accommodation costs are incurred directly by students and that the recognition of experience with credits does not seem to be widespread in many universities.

Although educational and other potential benefits offered by elective periods in LMICs are recognised, the experience presents a number of challenges. For instance, electives may falsely raise student expectations, and put strain on local human resources. As observed by Ackerman [33], 'on-site supervisors, the back-bone of most electives, are only possible with a reciprocal, long-term relationship either through a local university and medical school, a Nongovernmental Organization (NGO), or an International Nongovernmental Organization (INGO) working in the area. The educators must ensure that the host organization is appropriately integrated into the community and that community goals are at the forefront'. Willott *et al.* [34], highlights that, 'even if sending institutions oblige that students pre-prepare objectives and receive guidance about what is expected of them during elective, effective monitoring of students' activities on the ground is nearly impossible'. In addition, he observed that, 'students frequently want to be able to decide for themselves where they go and how they spend their electives, but this may not be what is best for hosting institutions, nor for global health more generally'. As pointed out by Edwards and colleagues [13], a major concern regarding medical electives is that students may practice, 'beyond their competence, to their own and their patients' detriment. This may be more common in developing countries where supervision is scant and students may assume that limited health care resources justify their adopting roles or performing procedures which would be restricted to fully trained staff at home'.

These reflections highlight the benefits of an experience like the WP, which is organised and implemented by an NGO with long-term working relationships with the African populations and is well integrated into the community. The project is carried out in health facilities where DWA staff have been working for many years. Having well-known locations for electives reduces the potential risks connected with this type of experience, and better ensures a satisfactory level of supervision, the lack of which being a serious problem in many similar experiences [35].

The project described herein was possible thanks to the initiative and collaboration of an NGO and a medical students' organisation, without any direct support from a university. To the best of our knowledge, only a small number of Italian universities facilitate pre-graduate medical elective experiences in LMICs. The WP has enabled pre-graduate medical elective experiences to students from 30 different Italian universities (there are 43 faculties of medicine in Italy). The WP therefore, seems to be making up for the lack of international experience in LMICs offered by universities. The situation is different in other countries. For example, in Australia electives are a compulsory component of all medical curricula. They usually last 2 to 8 weeks, either in Australia or overseas, including LMICs [11]. In the UK approximately 90% of medical students undertake medical electives, with 44% of them doing so in LMICs [36]. A study from Germany (Munich University) found that 17% of pre-graduate medical students undertake medical electives in LMICs [37]. However, at post-graduate level the situation seems better structured. A number of initiatives appear to be going in the right direction, including agreements between DWA and

some Italian universities, concerning collaboration on global health and medical experience and operational research in Africa [38].

We should note that before medical schools allocate substantial resources for international medical education, more rigorous evaluation of the effectiveness of medical elective experience is needed to demonstrate whether they add value to medical training [39], and what impact they may have on the communities and institutions involved [40]. Long-term follow-ups of elective participants after medical school in relation to their career choices (e.g., type of medical practice, career developed in public or private sectors) can provide more convincing arguments to medical schools that investing in medical electives will pay dividends in the long run [32].

Conclusion

This study has some shortcomings. The students interviewed did electives on sites only within one region: sub-Saharan Africa. Therefore, the findings presented here cannot automatically be applied to electives in other LMICs. The study utilised a self-administered questionnaire, without any corroborating measures available to address potential self-reporting bias (e.g., clinical skills performance testing, feedback from hosting institutions, etc.). The study did not have a control group. Finally, although the majority of questionnaires were completed by those who had the experience in the last 3 years (2016–2018), there was significant variation in the time elapsed between the experience in Africa and the administration of the questionnaire. Future objectives of the WP are to improve the selection procedure (e.g. through mini interviews as a pre-departure tool [41], to better quantify the impact of the elective experience through questionnaires administered before and after departure, and to develop additional outcome measures (other than self-reports) focusing on provider behaviour, clinical knowledge, and quality of patient care [14].

The mission of the medical school should be not only to train good clinicians, but also to be more community oriented, reconciling individual and community health needs [36, 42]. Cross-cultural exchanges like medical electives have the potential to help medical students become culturally-aware and globally-competent physicians [3]. Despite its limitations, the present study provides evidence that international electives in LMICs develop students' idealism about their role as future physicians. As noted by Godkin and Savageau, 'even if international electives do nothing more than preserve idealistic values, they have served a useful purpose' [28].

Abbreviations

LMICs: Low- or Middle-Income Countries; WP: Wolisso Project; SISM: Italian Society of Medical Students; NGO: Non-governmental Organization; Dwa: Doctors with Africa – CUAMM; SWSZ: Southwest Shoa Zone; INGO: International Nongovernmental Organization.

Declarations

Ethics approval and consent to participate

This study was approved by the Ethics Committee of Dwa-CUAMM.

Consent for publication

Not applicable.

Availability of data and material

The datasets used and/or analysed during the current study are available from the corresponding author on reasonable request.

Competing interests

The authors declare that they have no competing interests.

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Authors' contributions

GQ, GP and CDB contributed to the conception and design of the study. CC, MB and AL contributed to data acquisition. All authors contributed to the literature review, data analysis and interpretation, and the drafting and revision of the article. All authors approved the final manuscript for publication.

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References

1. Overseas medical aid. *JAMA*. 1969;209(10):1521-1522.
2. James H. Could coronavirus bring about the 'waning of globalization'? World Economic Forum web site. <https://www.weforum.org/agenda/2020/03/globalization-coronavirus-covid19-epidemic-change-economic-political>. Accessed 15 October, 2020.
3. Mutchnick IS, Moyer CA, Stern DT. Expanding the boundaries of medical education: evidence for cross-cultural exchanges. *Acad Med*. 2003;78(10 Suppl):S1-S5.
4. Banerjee A, Banatvala N, Handa A. Medical student electives: potential for global health?. *Lancet*. 2011;377(9765):555.
5. The overseas elective: purpose or picnic?. *Lancet*. 1993;342(8874):753-754.
6. Kumwenda B, Royan D, Ringsell P, Dowell J. Western medical students' experiences on clinical electives in sub-Saharan Africa. *Med Educ*. 2014;48(6):593-603.
7. Thompson MJ, Huntington MK, Hunt DD, Pinsky LE, Brodie JJ. Educational effects of international health electives on U.S. and Canadian medical students and residents: a literature review. *Acad Med*. 2003;78(3):342-347.
8. Ramsey AH, Haq C, Gjerde CL, Rothenberg D. Career influence of an international health experience during medical school. *Fam Med*. 2004;36(6):412-416.
9. Drain PK, Primack A, Hunt DD, Fawzi WW, Holmes KK, Gardner P. Global health in medical education: a call for more training and opportunities. *Acad Med*. 2007;82(3):226-230.
10. Drain PK, Holmes KK, Skeff KM, Hall TL, Gardner P. Global health training and international clinical rotations during residency: current status, needs, and opportunities. *Acad Med*. 2009;84(3):320-325.
11. Law IR, Worley PS, Langham FJ. International medical electives undertaken by Australian medical students: current trends and future directions. *Med J Aust*. 2013;198(6):324-326.
12. Umoren RA, Gardner A, Stone GS, et al. Career choices and global health engagement: 24-year follow-up of U.S. participants in the Indiana University-Moi University elective. *Healthc (Amst)*. 2015;3(4):185-189.
13. Edwards R, Piachaud J, Rowson M, Miranda J. Understanding global health issues: are international medical electives the answer?. *Med Educ*. 2004;38(7):688-690.
14. Murdoch-Eaton D, Green A. The contribution and challenges of electives in the development of social accountability in medical students. *Med Teach*. 2011;33(8):643-648.
15. Dharamsi S, Osei-Twum JA, Whiteman M. Socially responsible approaches to international electives and global health outreach. *Med Educ*. 2011;45(5):530-531.
16. Johnston N, Sandys N, Geoghegan R, O'Donovan D, Flaherty G. Protecting the health of medical students on international electives in low-resource settings. *J Travel Med*. 2018;25(1):10.1093/jtm/tax092.

17. Smith JK, Weaver DB. Capturing medical students' idealism. *Ann Fam Med*. 2006;4 Suppl 1(Suppl 1):S32-S60.
18. Dowell J, Merrylees N. Electives: isn't it time for a change?. *Med Educ*. 2009;43(2):121-126.
19. Italian Secretariat of Medical Students (SISM). Wolisso Project website. <http://wolisso.sism.org/>. Accessed 15 October, 2020.
20. Italian Secretariat of Medical Students (SISM). SISM website. <https://nazionale.sism.org/>. Accessed 11 October, 2020
21. Doctors with Africa-CUAMM (DwA-CUAMM). CUAMM website. <https://doctorswithafrica.org/>. Accessed 15 October, 2020
22. International Federation of Medical Students Associations (IFMSA). IFMSA website. <https://ifmsa.org/>. Accessed 15 October, 2020.
23. Doctors with Africa-CUAMM (DwA-CUAMM). Annual report 2019. CUAMM website. https://www.mediciconlafrica.org/wp-content/uploads/2020/07/CUAMM_annual_report_2019_eng_web-1.pdf. Accessed 15 October, 2020
24. Doctors with Africa-CUAMM (DwA-CUAMM). Global health: ideas on education and public awareness website. <http://www.educationglobalhealth.eu/en/>. Accessed 15 October, 2020
25. Doctors with Africa-CUAMM (DwA-CUAMM). Italian Society of Medical Students (SISM). Guest book website. <http://www.educationglobalhealth.eu/it/blog>. Accessed 15 October, 2020.
26. Haloburdo EP, Thompson MA. A comparison of international learning experiences for baccalaureate nursing students: developed and developing countries. *J Nurs Educ*. 1998;37(1):13-21.
27. Haq C, Rothenberg D, Gjerde C, et al. New world views: preparing physicians in training for global health work. *Fam Med*. 2000;32(8):566-572.
28. Godkin MA, Savageau JA. The effect of a global multiculturalism track on cultural competence of preclinical medical students. *Fam Med*. 2001;33(3):178-186.
29. Esfandiari A, Drew CR, Wilkerson L, Gill G, Drew CR. An international health/tropical medicine elective. *Acad Med*. 2001;76(5):516.
30. Kollar SJ, Ailinger RL. International clinical experiences: long-term impact on students. *Nurse Educ*. 2002;27(1):28-31.
31. Stys D, Hopman W, Carpenter J. What is the value of global health electives during medical school?. *Med Teach*. 2013;35(3):209-218.
32. Jeffrey J, Dumont RA, Kim GY, Kuo T. Effects of international health electives on medical student learning and career choice: results of a systematic literature review. *Fam Med*. 2011;43(1):21-28.
33. Ackerman LK. The ethics of short-term international health electives in developing countries. *Ann Behav Sci Med Educ*. 2010;16:40-43.
34. Willott C, Khair E, Worthington R, Daniels K, Clarfield AM. Structured medical electives: a concept whose time has come?. *Global Health*. 2019;15(1):84.
35. Watson DA, Cooling N, Woolley IJ. Healthy, safe and effective international medical student electives: a systematic review and recommendations for program coordinators. *Trop Dis Travel Med Vaccines*. 2019;5:4.
36. Miranda JJ, Yudkin JS, Willott C. International Health Electives: Four years of experience. *Travel Med Infect Dis*. 2005;3(3):133-141.
37. Störmann S, Angstwurm MW. What do international health electives and state examination scores have in common? - A cohort study to compare the results of written medical licensing examinations with the participation in international health electives during the final year of undergraduate medical education in Germany. *GMS J Med Educ*. 2018;35(5):Doc54.
38. Da Dalt L, Putoto G, Carraro D, Gatta A, Baraldi E, Perilongo G. International child health elective for pediatric residents. *Ital J Pediatr*. 2014;40:13.
39. Wiskin C, Barrett M, Fruhstorfer B, Schmid ML. Recommendations for undergraduate medical electives: a UK consensus statement. *Med Educ*. 2018;52(1):14-23.

- 40. Renaud-Roy E, Bernier N, Fournier P. Host perspective on academic supervision, health care provision and institutional partnership during short-term electives in global health. *Med Educ.* 2020;54(4):303-311.
- 41. Satterfield CA, Dacso MM, Patel P. Using multiple mini interviews as a pre-screening tool for medical student candidates completing international health electives. *Med Educ Online.* 2018;23(1):1483694.
- 42. Boelen C. Prospects for change in medical education in the twenty-first century. *Acad Med.* 1995;70(7 Suppl):S21-S31.

Figures

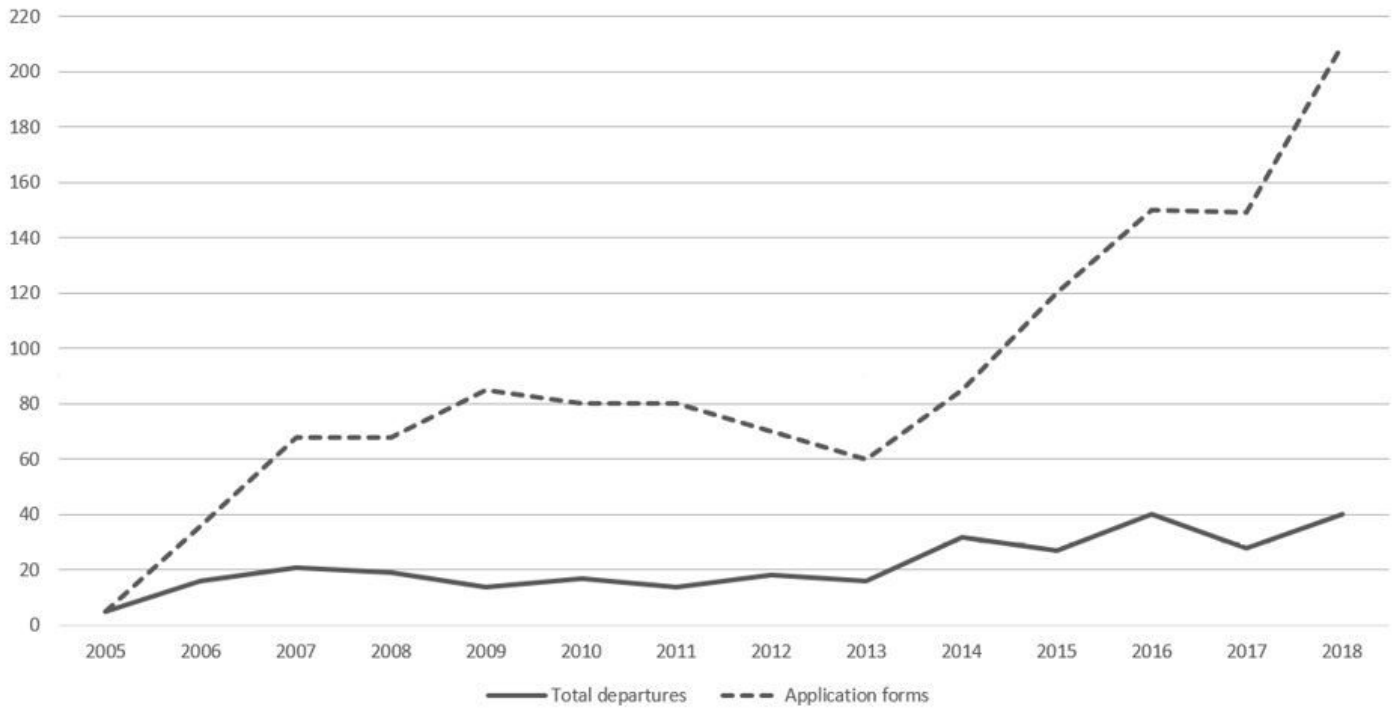


Figure 1

Number of total applications and departures, period 2005-2018