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Dutch post-graduate training in Global Health and Tropical Medicine: a qualitative study on graduates' perspectives

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Abstract

Introduction The Dutch Medical Doctor-Global Health (MD-GH) prepares to work in low-resource settings (LRS) by completing a hybrid postgraduate training program of 2 years and 9 months, with clinical and public health exposure in the Netherlands and a Global Health residency in LRS. The objectives of the program include acquiring clinical skills to work as a physician in a setting with different (often more severe) pathology and limited resources. In public health teaching, emphasis is given, among other, to adapting to a culturally different environment. After graduation, MD-GH work in a wide variety of countries and settings for variable time. As part of a curriculum review, this study examines MD-GHs' perception of the quality of the training program and provides recommendations for improvement.

Methods A qualitative study was performed. Thematic analysis was applied to semi-structured interviews with 23 MD-GH who graduated between 2017 and 2021.

Results MD-GHs predominantly worked as clinicians; several were (also) involved in management or capacity building. The clinical training program adequately addressed general skills, but did not sufficiently prepare for locally encountered, often severe, pathology. During the training, adequate supervision with clear learning goals was found pivotal to a positive learning experience. Gaps included clinical training in Internal Medicine (particularly infectious diseases and non-communicable diseases) and Paediatrics. Public Health teaching as well as cultural awareness should be intensified and introduced earlier in the program. The Global Health residency was considered important, but tasks and learning outcomes varied. Teaching, supervision, and capacity building were considered increasingly important key elements of working in LRS. Consensus favoured the current duration of the training program without extension.

Discussion While the generalist nature of the MD-GH training was appreciated, the program would benefit from additional clinical training in infectious diseases, non-communicable diseases, and Paediatrics. Moving forward, emphasis should be placed on structured mentorship, enhanced public health teaching, and standardized residency programs with clearly delineated objectives to better equip MD-GH professionals for their multifaceted roles in LRS. Moreover, future revisions of the training program should incorporate the perspectives of host institutes in LRS and tailor the training needs.

Keywords Dutch, Post-graduate training, Global health, Tropical medicine, Graduates' perspectives

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Introduction

Many doctors from high-income countries (HIC) work in low resource settings (LRS), often for a limited time [1–3]. This varies from weeks in targeted and specialized missions, such as teams of ophthalmologists or plastic surgeons, to months or years for others in various capacities and with varying degrees of training and preparation. The training program of the Netherlands Society for Tropical Medicine and International Health (NVTG) in Global Health and Tropical Medicine (GHTM) was started in the 1950s and in 2014 it was recognised by Royal Dutch Medical Association as a physician profile. It is distinctive in its aims to formally train doctors combining clinical medicine and public health; it basically encompasses global health with a particular focus on LRS. [4, 5]. This unique program has never been formally evaluated to what extent it prepares Medical Doctors Global Health (MD-GHs; formerly called Physicians Global Health and Tropical Medicine [PGHTMs]) to work in LRS, and what possible gaps in training exist. The aim of this study is to perform a qualitative learning needs assessment and provide recommendations to the training institute for future curriculum adaptations.

The training consists of two clinical residencies in the Netherlands that constitute two profiles: the classical profile with residency in surgery and obstetrics & gynaecology (O&G) (1 year each), or the mother-and-child profile with residency in O&G and paediatrics (1 year each) [6]. The training hospitals often have senior staff who have worked in LRS as MD-GH or in other capacities. There are 10 additional 1-day training courses in overarching topics (e.g., transcultural rehabilitation, ophthalmology, or dental health). The 3-month course in Global Health and Tropical Medicine (NTC) at the Royal Tropical Institute (KIT), Amsterdam) is mandatory for all and includes theoretical teaching in clinical medicine, public health, health finance, health systems, cultural and ethical aspects of working in a LRS, among other components [7]. Since 2014, a 6-month supervised residency in an LRS setting is done to be optimally prepared before being graduated as MD-GH [8] (Table 1).

In 2020, the curriculum of the program was adapted to fit a modern educational model. In this new model Entrusted Professional Activities (EPAs) were formulated based on the seven Can MEDS competencies: medical expert, communicator, collaborator, leader, health advocate, scholar, professional [10].

The Training Institute International Health and Tropical Medicine (Opleidingsinstituut Internationale Gezondheidszorg en Tropische Geneeskunde—OIGT) oversees the program that is formally recognized by the Royal Dutch Medical Association (RDMA) as a Physician Profile; it is not a specialty as such [4]. Every five years the curriculum is reviewed and submitted for re-accreditation.

In recent years, increasing numbers of medical doctors have graduated in many LRS, which may influence the need for doctors from HICs to fill gaps. In addition to social, economic, political, and other determinants, the epidemiology of disease has changed with a more prominent role for (emerging) infectious diseases, as well increased attention for non-communicable diseases [11].

The NVTG has therefore commissioned a review of the training program for MD-GH by performing a Learning Needs Assessment (LNA).

In this paper we report a qualitative study that assessed the needs as perceived and reported by the MD-GH. The second part of the study that examines the perspective of the host institutions to ensure the program remains demand-driven, will be published separately. The following research question was formulated: What is needed, according to recent graduates, to train and prepare Medical Doctors Global Health (MD-GHs) adequately for their work at a global level with a focus on disadvantaged communities?

Methods

Study design and setting

The study used a descriptive qualitative design, applying semi-structured interviews to provide insights into

Table 1 Structure of the MD-GH training program as delivered by the Training Institute International Health and Tropical Medicine (OIGT). RDMA Royal Dutch Medical Association

	Duration	Content	Provider
Phase 1	12 months	Surgery or Paediatrics	Dutch hospital accredited by RDMA
	12 months	O&G	Dutch hospital accredited by RDMA
Phase 2	3 months	Course in Global Health and Tropical Medicine (NTC)	Royal Tropical Institute (KIT)
Phase 3	6 months	Global Health Residency	Hospital/ organization in LRS accredited by OIGT [9]

MD-GH's perceptions towards their training after they worked in LRS [12]. The study was conducted online.

Participants and procedure

MD-GH trainees who completed the training and stayed in LRS for three months to several years were approached for the study. The register of MD-GH trainees from the OIGT included 72 trainees who completed the training between 2017 and 2021; of these 38 were approached through contact information of this register and social media. Purposive sampling was used to obtain a broad perspective. Criteria that were considered included variation in gender, graduation year, country and continent, and type of work. The recruitment was a continuous process of inviting trainees to participate and interviewing those who had agreed to partake. This process continued until two consecutive interviews did not yield new themes. Twenty-three trainees were interviewed and included in the data analysis. Interviews were between thirty minutes and one hour in length and were held online, due to the restrictions of the COVID-pandemic and some participants still working abroad.

Data collection

The topic guide was based on themes emerging from the current education program of the OIGT as presented in Table 1, conversations with field experts, and a literature search on education programs in global health and tropical medicine (Supplementary Table 1). Main topics addressed in the semi-structured interviews were 1) competencies acquired in the OIGT program; 2) work experiences in LRS; 3) perceptions regarding necessary competencies; 4) perceived changes in the field and 5) suggestions to improve the program (for questionnaire see Supplementary Text 1). A pilot interview was done to test and improve the interview guide. The interviews were conducted by a medical student supervised by a medical doctor with working experience in an LRS.

Interviews were conducted between February to August 2021. The study topic and purpose were explained to each participant. The interviews were audio recorded with a Dictaphone app on the computer and transcribed verbatim. The data was anonymized, excluding names of participant, hospitals or health institutions and, in some cases, also the country, to prevent identification as the MD-GH group is relatively small. The data was kept password protected. The interviews were sent to participants for feedback. Data saturation was achieved after interviewing 21 participants. The interviews lasted approximately 45–55 min.

For transcription two software programs were used: f4transkript™ (Audiotranscription, Marburg, Germany) for manual typing of a recording [13], and Trint™ (Trint, London, UK), an online program using artificial intelligence to transcribe audio files [14]. These transcripts were then checked manually by the Principal Investigator (PI).

Data analysis

The data were analysed using thematic analysis. The data was coded through open, axial, and selective coding [15]. Two researchers independently coded all interviews or part of the interviews. The coding framework was developed and discussed with the lead researchers. Subsequently, theme descriptions were discussed with the other authors. The final set of themes was discussed by the group of researchers to draw meaningful conclusions.

The data were imported into Atlas ti.™ (Berlin, Germany; used by first author and principal investigator, in addition to manual coding) or MaxQDA Verbi Software (Consult -Sozialforschung GmbH, Berlin, Germany), used by co-authors, depending on availability of the software [16, 17].

Rigor, reflexivity and positionality

The research team was cross-disciplinary including medical researchers with experience in LRS and non-medical researchers (nursing and psychology background) having no experience in LRS. Potential researchers bias, including the researcher's bias from the Global North, has been critically discussed throughout the process.

The interviews were conducted by a master student in medicine with a cultural background from the global north, without prior knowledge or involvement with the MD-GH education program. To limit potential researcher bias, the interview guide was supervised by researchers with working experience in LRS, comprehensive understanding of the MD-GH education program and scholar background in global health. Feedback on the interview style was given based on the pilot interview to minimalize leading questions, while obtaining a diverse scope of answers from the study population.

The research team reflected on the analytical process and had several meetings to discuss conceptual and thematic interpretations.

Informed consent and ethical clearance

The work was carried out in accordance with the Declaration of Helsinki including, but not limited to, the anonymity of participants being guaranteed and the informed consent of participants being obtained. [18].

All respondents were sent a letter stating their rights as participants; all provided informed consent. A waiver

was received from the Research Ethics Committee of KIT Amsterdam [19].

Results

Respondents

All respondents except one had worked in an LRS after graduation, mostly in Sub-Saharan Africa. While some were still working in an LRS at the time of interview, others had returned to the Netherlands and were in training or already registered as general practitioner or medical specialist (various specialties, many in O&G), or worked for the Dutch Public Health service (GGD) (Table 2).

The description of the results is divided into two parts, i.e. the training program and working in an LRS, each containing six themes.

The training

Qualitatively good residencies in the Netherlands

The quality of training in Dutch host hospitals was perceived to be good. Supervision by staff experienced in global health was found indispensable ensuring active engagement and creation of a learning-friendly environment. Nonetheless, concerns were raised regarding the competition for clinical exposure in surgical procedures with doctors in specialty training (surgery, O&G, or paediatrics) which led to extra time spent in the hospital to increase exposure. Many respondents advocated for the establishment of specific targets to facilitate acquisition of skills, such as delineating set quotas for procedures like caesarean sections and laparotomies.

Table 2 Characteristics of the study population from which respondents were selected

Variable	Study Population (*n* = 72) *N* (%)	Respondents (*n* = 23) *N* (%)
Female	58 (81)	18 (78)
Male	14 (19)	5 (22)
Classical profile	62 (86)	19 (83)
Mother–Child profile	10 (14)	4 (17)
Region	[a]	[b]
Sub Saharan Africa	36 (50)	19 (83)
Other: Pacific and Central and South America	20 (28)	4 (17)
Unknown	16 (22)	0 (0)
Graduation year		
2017	12 (17)	3 (13)
2018	19 (26)	6 (26)
2019	22 (31)	8 (35)
2020	14 (19)	5 (22)
2021	5 (7)	1 (4)

[a] At the time of entry in the OIGT register

[b] At the time of the interview

> *"You really must be assertive, show initiative and be flexible, like the real-life work of a MD-GH. No one is going to tell you what exactly you should do, you must find out for yourself. It is actually a very good basic principle." (Resp 11)*

In surgery, MD-GHs noted that training hospitals offered ample opportunities for acquiring general surgical skills and knowledge enhancement. There was consensus that mastering a wide array of surgical techniques outweighed achieving expertise in specific procedures. Some MD-GHs expressed a desire for additional practical training in surgical techniques essential for LRS, such as manual intestinal suturing for open abdominal surgeries. Questions were raised regarding the feasibility of attaining surgical proficiency within a one-year residency program.

> *"Now that I look back, I've been here a year and a half and I've done a lot of surgery, I think that was a pretty good foundation. So, I think a lot of tropical doctors at the beginning think I've only done 10 hernias, that's not enough. But I think, if you get into a setting later where you must do a lot of hernias, you'll just roll right back into it." – Resp18*

In O&G, MD-GHs sufficiently learned how to manage pregnancies and deliveries (including vacuum extraction), to do caesarean sections (CS), to perform obstetric & gynaecological ultrasound examinations and small gynaecological procedures. However, sufficient exposure to complicated (twin) pregnancies, breech deliveries, hysterectomies, and treatment of (pre) eclampsia was challenging. MD-GHs valued case discussions relevant to low-resource settings and expressed interest in additional training opportunities such as specialized courses like the breech course.

Those who did the mother–child profile, were content with their paediatric residency, but felt the emphasis was more on the surgically oriented O&G residency.

Mandatory courses during two years of internship

The ten additional one-day courses during the training in the Netherlands were felt to provide a wider perspective on the clinical spectrum of conditions.

Opinions varied regarding the relevance of certain topics such as tooth extractions, external fixation for fractures, and antibiotic use in LRS. Perspectives were often influenced by individuals' experiences in LRS. Many highlighted the significance of fostering social networks with fellow MD-GHs during these courses.

National Tropical Course (NTC) teaches the broader view on health care

MD-GHs considered the NTC to be very useful to broaden their healthcare perspective. Examples include public health, teaching, budget keeping, leadership and laboratory techniques. Some raised the importance of paying attention to cultural sensitivity and intercultural communication, and to build their social and professional network.

> *"The 2-day play in which we allocate limited resources was one of my most valuable experiences and you actually learn in what way you can achieve optimal impact." (Resp 1)*

Some MD-GHs expressed interest in a teaching course. Additionally, there was consensus regarding the challenges of assimilating extensive knowledge within tight timeframes without adequate consolidation periods. One participant recommended integrating portions of NTC into clinical rotations to alleviate this burden.

> *"The NTC has done well to discuss all these topics which change your way of thinking. However, the NTC comes late in the program, and one would have liked to be exposed earlier." (Resp 1)*

Most MD-GHs noted that the global health residency offered the opportunity to further refine their surgical and O&G skills.

Global health residency, the first encounter in an LRS

The global health residency was perceived as an opportunity where they could learn and practice what they were not able to do in a Dutch setting (different pathologies, different way of organizing hospital work, etc.), increasing the feeling of being competent as a medical doctor. It was felt important that they could learn while not carrying final responsibility. Moreover, there was less supervision compared to their experiences in the Netherlands, enabling them to acclimate to greater autonomy and familiarize themselves with limited diagnostic resources.

> *"I really liked the fact that the global health residency was also included. […] During your internship abroad, I noticed that […] I had confidence to carry out procedures independently." (Resp 19)*

The global health residency was for most trainees the first time they were exposed to a different cultural setting which could be confronting.

> *"It is a very tough place where you must work many hours and it is culturally difficult with women being treated badly. [...] Patients are also not well taken care of by their relatives, and coping with this is difficult. The residency is therefore also useful because you are exposed to other cultures." (Resp 11)*

Many MD-GHs in the classical profile felt the global health residency was key to gather knowledge in pediatrics.

> *"I did my residency in [DR]Congo for 6 months, under supervision of a Congolese doctor; I simply loved this. I learned a lot also about paediatrics that was not in my training profile, but it is an important component of the training." (Resp 13)*

It provided the opportunity to put theory into practice, for example, how to treat (tropical) infectious diseases (such as malaria, tuberculosis, HIV), how to work with colleagues from a different culture, and how to handle situations where you as a guest in the hospital disagree with your local supervisor. Most MD-GMs said that at the end of the six months they felt capable of starting to work as a MD-GH although others mentioned the limited scope of exposure and challenges encountered when working independently.

> *"In India there is little malaria and HIV, so I have little knowledge about these conditions; the teaching in the NTC on tropical conditions is too limited. […] I lacked knowledge on Internal Medicine; we have a lot of non-communicable diseases (NCDs) here and we are not trained in this." (Resp 15, currently in sub-Saharan Africa)*

Gaps in knowledge and skills after the training

Gaps in knowledge raised by MD-GHs included Internal Medicine, specifically NCDs. Gaps in skills included performing a spinal tap, administering and supervising anaesthesia, and knowing how to use ultrasound for other purposes than obstetrics. Many MD-GHs described they overcame these gaps by learning where to find information or using their network to receive advice about treatment issues and specific patient cases.

> *"I did not even know how to treat hypertension or diabetes, which are common in the rural areas. And you do not learn this at the surgical or O&G departments or at the NTC while these are actually pretty basic skills." (Resp 8)*
>
> *"We had a lot of heart failure, also because of hypertension. And in the beginning, I had no idea how to deal with this." (Resp 11)*
>
> *"It would be very nice if one could do spinal taps for a whole week [...] And do ultrasounds, give anaesthesia, that sort of subjects could be added to the training program." (Resp 10)*

Reflection on the profiles, duration of training and supervision

Most respondents acknowledged constraints within the training program stemming from its relatively short duration and deficiencies in exposure, particularly in certain surgical competencies. The presence of a supervisor with prior experience in LRS settings was widely regarded as a significant asset. Many respondents highlighted the challenge of striking a balance between optimal learning and the limited timeframe allotted for training, although there was a consensus against extending the duration of the program. Many agreed that the training focused on basic skills, and implied that none of the skills or knowledge was profound, but sufficient. Some indicated that a MD-GH needs knowledge of both profiles, i.e., surgery, O&G and paediatrics, because in LRS diseases that transcend all disciplines are common. However, it should not be obligatory because not all MD-GHs had interest in, for example, surgery. In general, many welcomed an overlap in profiles to some extent to increase knowledge but on a voluntary basis.

> *"You know, the most difficult is to find the balance between the short duration of the training program, learning as much as possible and then going abroad. [...] Personally, I do not think the training should be longer." (Resp 18)*
> *"Yes, I think the training program could be improved by letting those with the classical profile also do 6 months of paediatrics. […] If you do the classical profile and do your residency in India and perform mainly caesarean sections, you will learn nothing about paediatrics." (Resp 2)*

It was found very useful to have worked in other medical departments (e.g. an emergency department) prior to the training to broaden clinical knowledge.

> *"Before I started the training program, I did not have experience as a doctor; the residency in surgery was my first job. It was tough. I think they (OIGT, i.e. the selection committee) know now that it seems essential to first gain experience as a doctor before you start the training program." (Resp 9)*

Working in a low-resource setting

In different settings and capacities

Most MD-GHs worked in a district government hospital where they were (one of) the highest qualified MDs engaged in clinical, organizational, and supervising activities. They were exposed to a wide range of conditions with limited diagnostic and surgical facilities and limited referral options (which may take more than eight hours to reach) which was felt challenging. Some MD-GHs were employed by private or university hospitals with more diagnostic means and treatment options available, working with highly trained local colleagues. In these hospitals emphasis was often more on NCDs. Others worked for Doctors without Borders (Médecins sans Frontières—MSF) where one would work as a medical coordinator with few clinical duties because MSF employs surgeons and other specialists for clinical duties.

Other employment could be as medical superintendent or medical manager in charge of a variety of management tasks, for example logistic issues, hospital finance, or preparing audits of maternal and neonatal morbidity and mortality. Some were involved in modernizing hospital equipment and technical renovations, for example water supply and electricity.

> *"The position as medical superintendent is really tough. You do clinical work and a lot of management and organization, so quite broad." (Resp 5)*

MD-GHs also provided training and education related to, for example, improving the logistics of hospital care and setting up a referral network (for medical officers). Teaching basic medical principles such as treatment of malaria, infection prevention, criteria for blood transfusion, recognizing symptoms of dehydration (for nurses). Furthermore, they participated in community work such as setting up a malnutrition project and were involved in a range of public health issues such as poverty, improving knowledge about a healthy diet and hygiene.

> *"I do first line health care for all our staff, but I also work for the local population in the health centre together with community workers and traditional birth attendants." (Resp 9)*

Clinical work – scope, newly encountered diseases, high morbidity, and mortality

MD-GH encountered a broad range of pathologies that were often new to them and often more severe, and many patients died. The lack of diagnostic tools felt frustrating. In these situations, it was important to reflect on one's capacity as a medical doctor and knowing one's limitations. Often improvisation was needed.

> *"Recently I had a pregnant patient with a traumatic splenic rupture, and I had to do an abdominal operation to stop the splenic haemorrhage." (Resp 5)*
> *"I was not prepared for the serious pathology we see here. [...] People are much more ill; cases are more severe. A lot of people die." (Resp 7)*

A more detailed description of common presentations can be found in Fig. 1.

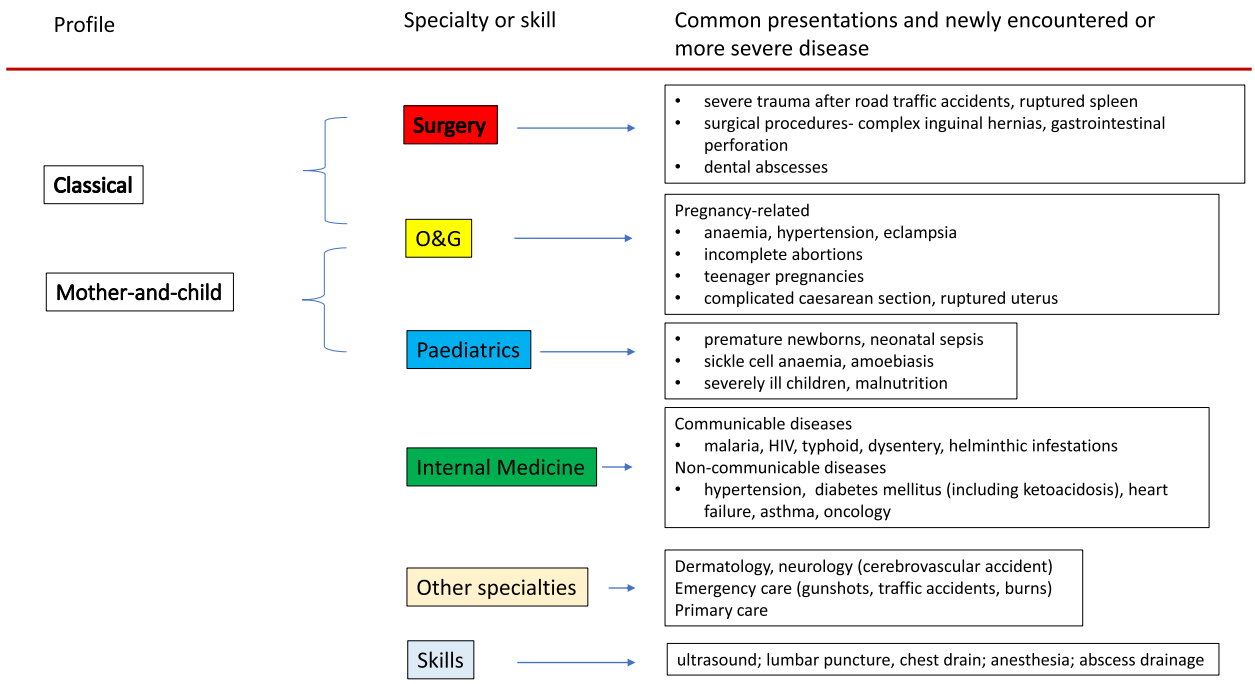

Fig. 1 Most common presentations and newly encountered or more severe disease perceived after start working in low-resource setting, according to training profile and clinical specialty or skills

The training profile influenced the preferred setting. For example, those who did the mother–child profile looked for a position in a setting where surgically experienced doctors are present.

Frustration occurred when the training profile did not match the hospital's requirements because they were not sufficiently equipped to function as an independent doctor. This caused feelings of falling short which was aggravated by patients with severe morbidity and high mortality and the lack of diagnostic tools.

> *"I am going back now, and I want to become a GP, simply because I want to be good at what I do. And currently that is not the case. Not at all. I am failing people because of my poor skills." (Resp 9)*

Coping with difficult clinical situations

Respondents mentioned that being unfamiliar with some of the diseases encountered and the severity thereof made them feel unprepared and prompted improvisation. Although it was realized that it is very difficult to be well-prepared for situations that do not occur in the Netherlands, MD-GH suggested to improve training in improvisation including instructions how to deal with serious cases. Some lacked specific training and knowledge because the training profile (most followed the classical profile) did not cover the other specialties which they encountered in practice. It was also found important to learn one's limitations and refer to other hospitals if the diagnosis was not clear or in case of a serious or life-threatening illness.

> *"It is about knowing your limitations, asking for help early. About things you do not know so that you can learn." (Resp 12)*

Among the options to cope with these conditions were access to different sources of information (books, apps, etc.), and interaction with local colleagues or nurses, colleagues in referral centres or visiting doctors or specialists. Another source of help was online consultation of a colleague, locally, in the Netherlands, or elsewhere. Here, the importance of building a network was emphasized.

> *"I have learned a lot from colleagues who had been there for some time, and from visiting surgeons. But mostly it was possible to find a solution using Consult Online [a Dutch clinical specialist network] or by approaching colleagues in the Netherlands. And if that did not work out, I would refer to a larger hospital." (Resp 13)*

Adjusting to a different cultural environment

Many MD-GH reported that adjustment to other cultures, culture-specific communication and habits was challenging. The problems they raised included difficulty to integrate in a completely different society, and dealing

with gender disparities, 'inaction' when there was an emergency or nurses who did not follow the orders. The Dutch, more directive, style of communication when giving orders to e.g. nurses, was indicated as a cultural difference that they had to adjust to.

> *"I found it quite complex to integrate in another society and it took a lot of effort. […] You will still do not really feel at home, because you are not one of them, as a white, western person." (Resp 8)*

Respondents reported that gaining trust was important. Regardless of the setting, when starting a new job, they need to get to know their colleagues and not to forget one holds a guest position.

> *"You must get to know people, you must understand work processes, people must get to know you, know what you can do. I now have a lot of trust from the other doctors as well as the nurses and clinical officers." (Resp 10)*
> *"The most important thing I learned is the remark from a former MD-GH that you are a guest in another country and that you must listen to your colleagues and never raise your voice". (Resp 5)*

Working in a Low Resource Setting increased professional and personal growth

The experience of working abroad was found very valuable, contributing to both personal and professional development, and leading to a broader and more comprehensive view of healthcare problems encountered.

> *"You learn to deal with very complex and broad problems. But you also learn to literally look beyond frontiers. And you learn to look at patients and the whole system in which the patient functions, so to speak." (Resp 4)*

Many discovered the significance of social importance of the medical profession and the impact they had on the community they serve. This motivated some to a career to work with cultural minorities and refugees, after returning home. This social involvement motivated one person to embark on training other MD-GHs.

> *"That training program, and particularly having worked and lived abroad, that has tremendously shaped me as a human being and a doctor …. That is really such a valuable experience, I would never have wanted to miss that […] This influenced me to work as a GP for and with minorities, and refugees." (Resp 8)*

But working in a small, remote place may also be stressful and could lead to burn-out.

> *"You are in the middle of nowhere with 2 other Dutch colleagues. […] Relationships may not be friendly […] Lack of sleep makes it worse. […] The work is stressful, small things become big and conflicts occur. […] There is a risk of burn-out" Resp 16*

Perspective on the role of MD-GH: Towards capacity building

MD-GHs stressed the need for capacity building and sustainability through knowledge transfer. They felt that as more local doctors have graduated in LRS, suitable positions for MD-GHs are decreasing which was considered a positive development. They believe the need for MD-GH persists in areas with a lack of medical health professionals, or where the healthcare system is unstable, for example in disaster relief settings or warzones. Some criticized the white saviour complex, the perception to rescue people as a medical professional. It was felt more important to implement sustainable projects that contribute to a better healthcare system and access to care.

> *"I think it should in any case be a project aimed at capacity building, with knowledge transfer. I think that places where you only work as a clinician, you clinically don't really add anything, well maybe now, but in the end not really for a long time. A project in which you can make a link with public health or primary care, I think, those are places where we can really add value." (Resp 7)*
> *"I do not think the MD-GHs are a sustainable solution for lack of health care. […] There may be role for the MD-GH in natural disasters, conflict zones and countries with poor government and hence a gap in health care" (Resp 16)*

Summary of findings within a conceptual framework

The findings were summarized within the COM-B framework. COM-B is a behavioural change framework that proposed three obligatory components (capability, opportunity and motivation) for any behaviour to occur. [20, 21] The targeted behaviour in our study was conceptualized as the preparedness to work in a LRS which needs sufficient knowledge and skills (capabilities), physical and social opportunities that facilitate learning (opportunities) and adequate beliefs about capabilities, intentions, goals and reinforcement (motivation) to cope with the challenges of working in a LRS. Figure 2 presents facilitators (green blocks) and barriers (red blocks) within the four training components that helped or prevented to adequately prepare for the job. Regarding the work experience, green blocks indicate aspects of the work they were well-prepared for versus aspects they were not well-prepared for (red blocks).

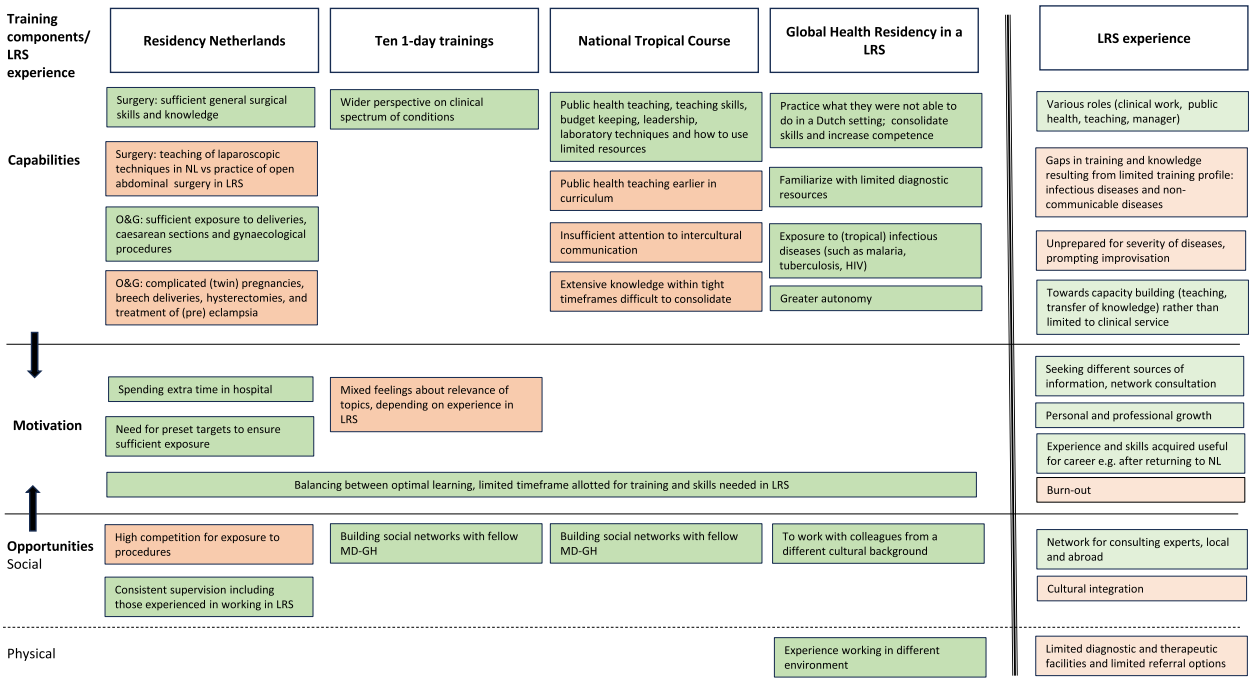

Fig. 2 A summary of the study findings within the COM-B framework. The first four columns represent the training components; the last column represents the work experience in a low resource setting (LRS). The green blocks indicate aspects of the training that were perceived as facilitators (i.e., adequate or helpful) to prepare for the work in LRS whereas the red blocks indicate aspects that were perceived as barriers. NL the Netherlands. O&G Obstetrics and Gynaecology. MD-GH Medical Doctor Global Health

Discussion

This study explored the perceived adequacy of the Dutch training program from the MD-GHs' perspectives since the introduction of a new curriculum in 2014. In general, most respondents were positive about the broad scope of the training that includes a broad array of aspects of clinical medicine, public health teaching (including cultural social and economic determinants), and leadership. This enabled them to work in different functions such as hospital manager (including procurement and fund raising), teacher, or combinations, beyond their clinical work. This agrees with the principles of the 2020 training plan, and is in line with recommendations from other studies [22, 23].

Among the training components, the global health teaching in the NTC was highly appreciated although participants preferred to start this early in the training program for a better perception of the scope of work and the integration of clinical and public health skills [24]. Cultural training could be intensified as MD-GHs sometimes felt inadequate in communicating with local colleagues. Another highly valued component of the program was the 6 months Global Health residency. It provided an opportunity to learn and work more autonomously and with limited diagnostics tools. However, the scope of work and exposure depended on the host hospital (country, patient population, most common pathologies) and therefore the exposure across the spectrum of specialties and pathologies was not homogenous and learning outcomes may be influenced by students self-regulation [25].

Challenges in their clinical work focused on the newly encountered and severe disease with high mortality and lack of diagnostics. Skills that were felt important include adapting to the needs of the patient and perception of disease, and adjustment to a different culture and communication. Many mentioned that learning to prioritize, setting boundaries, learn to improvise, reflect on one's own clinical skills were of utmost importance to deal with the unknown and severe pathology. Additional courses on communication and intercultural management may be needed [26–29]. Training of local staff was considered crucial for capacity building, engagement and health system strengthening for which more extensive and designated training would be needed [30, 31]. In general, most MD-GHs seemed to cope well. For some, it was hard to deal with these situations leading to feelings of falling short which could be a reason not to extend the stay in LRS.

Other clinical challenges included the management of infectious diseases and NCDs. The NTC provides theoretical teaching, but clinical exposure is limited to the current two training profiles. Many MD-GHs with the classical profile suggested to include more training on internal medicine and paediatrics; this is particularly

relevant in the field of non-communicable diseases and infectious diseases, and could include epidemic preparedness, and antimicrobial resistance. While including clinical residencies in these fields seems appropriate, it would mean extending the training period considerably.

Reflecting on the training program in general, several suggestions were made. To ensure learning goals in Dutch hospitals, defining clear goals of what is expected from each residency, as well as designated supervision was felt essential, preferably by senior staff with experience in LRS. Additional courses may be considered as it was not uncommon for MD-GH to attend self-initiated additional training or courses to fill gaps according to perceived needs during their training, particularly in infectious diseases, non-communicable diseases and the use of ultrasound; similarly, most MD-GHs had purposely gained experience working in the hospital prior to starting the training program. Reflections on the different profiles revealed that it may be useful to consider a "surgical '' training pathway (surgery and O&G) and a ''medical" training pathway (internal medicine and paediatrics) which could be an attractive for those who have already a career perspective, and could lead to a more targeted 6 month global residency and satisfactory position in LRS; it may also be useful in finding appropriate employment or specialty training after returning.

MD-GH experienced major personal and professional growth as the result of major exposure in clinical medicine and public health and by acquiring of unique skills which broadened their view on health and clinical practice when back in the Netherlands. More research is needed to explore if the needs from a Dutch setting should be used for further revision of the MD-GH training to work, for example, with underprivileged populations after returning [32].

Opinions about the future role of MD-GHs varied. Training of local staff was considered crucial for capacity building, engagement and health system strengthening for which more extensive and designated training would be needed [28–30]. They also pointed to a role in disaster management and think the MD-GH may still be relevant in rural areas with limited medical services.

Strengths and limitations

Strengths of this study include the use of purposive sampling representing a wide variety of experiences. To ensure credibility, this study is part of a larger effort to, through triangulation, critically review the training needs perceived by graduates (MD-GH) as well as host institutions in LRS. This part of the larger study is focussing on Dutch graduates, while the other part of the research focuses on colleagues from the host institutions in the Global South. The impact of researcher bias by the interviewer was critically discussed between group members with experience in teaching and working in a LRS, though all researchers are born and trained in the Global North. Bias in interpretation of data was reduced as also researchers were involved without experience in the training program; consensus was reached by group discussions.

As all participants were likely to have entered the MD-GH training program on the assumption that this would adequately prepare them to work in LRS, this could have introduced a participant bias. Another limitation could be researcher reflexivity bias.

Conclusion

This study evaluated the training program from the MD-GHs perspective after having worked in LRS. Overall, the broad and generalist scope was appreciated but the severity of (newly encountered) diseases could be challenging to manage. Goals should be set for clinical skills to be acquired during training, with consistent supervision. The global health residency could be more consistently structured according to training needs of the MD-GH and expectations of the host institutions. While overall the training is well aligned with capacity, there are opportunities for improvement although not all shortcomings can be managed during the time spent while training in the Netherlands. More clinical training in infectious diseases and NCDs is warranted. In agreement with a perceived future role of the MD-GH, intensified training in teaching skills may be considered for transfer of knowledge and capacity building.

Supplementary Information

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Supplementary Material 1.

Supplementary Material 2.

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Authors' contributions
I.T., M.v.E., M.F., E.J. and J.S. designed the study; I.T., N.v.L., and H.H. performed the data analysis; E.Z. provided oversight and coordination. E.Z., I.T., and N.v.L. wrote the main manuscript. All authors reviewed the manuscript.

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Data availability
The datasets generated and/or analysed during the current study are not publicly available. While the data are anonymised, identity of participating individuals could be derived from work details, employment, training and career perspectives mentioned. A specific (reasonable) request should be addressed to the corresponding author.

Declarations

Ethics approval and consent to participate
All respondents were sent a letter stating their rights as participants; all provided informed consent. A waiver was received from the Research Ethics Committee of the KIT Amsterdam.

Consent for publication
All respondents provided informed consent.

Competing interests
The authors declare no competing interests.

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