



# Assessing Awareness of Neglected Tropical Diseases among Egyptian Medical House Officers

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## ABSTRACT

**Background:** Neglected tropical diseases (NTDs) are among the world's most prevalent communicable diseases, particularly in low-income countries. **Objective:** to assess medical house officers' awareness towards NTDs risk factors, prevalence, recognition of different NTDs and to explore their awareness towards challenges targeting NTDs elimination. **Method:** A cross-sectional study was conducted on 398 medical house officers working in Kafr-Elsheikh University Hospital, Egypt. **Results:** The average age was  $23.01 \pm 1.63$  years. Approximately 62.8% of the study participants were male and 60.3% lived in urban areas. The mean self-perceived knowledge score on NTDs terminology was  $2.14 \pm 1.14$  9, which is equivalent to  $42.8\% \pm 22.8\%$ . Social media was the primary source of NTD information (32.2%), while 26.1% had no prior exposure. Knowledge scores were highest in Obstetrics & Gynecology ( $45.6\% \pm 22.4\%$ ), though differences across specialties were not significant ( $p=0.917$ ). Environmental health threats were cited as key NTD risk factors (40.9%), followed by zoonotic emergence (29.6%) and climate change (27.1%). NTD prevalence was perceived as moderate by 34.7%, with 34.2% referring suspected cases to specialists. Leishmaniasis (27.8%) and Chagas disease (27.3%) were the most recognized NTDs, and 36.4% believed in the possibility of elimination. Barriers included lack of public awareness (39.6%), limited healthcare access (35.6%), and inadequate funding (32.4%). **Conclusions:** This study highlights an obvious gap in awareness regarding NTDs across all specialties of healthcare workers. The current finding emphasizes the importance of health education, training, and awareness campaigns targeting current and future health care workers.

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## INTRODUCTION

Neglected tropical diseases (NTDs) are a diverse group of conditions caused by a variety of pathogens (including viruses, bacteria, parasites, fungi, and toxins) and associated with devastating health, social, and economic consequences.<sup>1</sup> Neglected tropical diseases (NTDs) are among the most prevalent infectious illnesses globally, particularly in lower-income cultures in parts of Africa, Asia, and regions of

Latin America that lack hygiene and medical facilities.<sup>2</sup> The global public health consequences of NTDs are a widely recognized health threat problem. Over three billion people are in danger of NTD infection, with over 350 million already disabled. Over one billion people have been diagnosed with at least one NTD, and more than six million of them die annually.<sup>3</sup> NTDs also have several other harmful consequences, either

directly or indirectly, on individuals' livelihoods. Not only do treatment costs make impoverished people further poorer, but long-term impairments prohibit patients from going back to their prior jobs, forcing families into permanent indebtedness. The monetary cost of those illnesses is enormous.<sup>4</sup> In the Eastern Mediterranean Region, WHO forecasts that NTDs will cost 108,973 disability-adjusted life years (DALYs) in 2019 and that 75 million people will require immediate NTD actions in 2020.<sup>5</sup> Unfortunately, despite continued attempts to enhance the Egyptian community's socioeconomic situation, environmental sanitation, and ecology, Egypt has the highest prevalence of NTDs in the Middle East and North Africa region.<sup>6</sup>

Battling NTDs is critical to reaching the third goal of the Sustainable Development Goals (SDG 3) of guaranteeing healthful lifestyles and fostering well-being for people of all age classes.<sup>7</sup> Elimination of NTDs can pull millions of persons out of poverty and ignorance. Controlling these infections is the single most cost-effective way to boost school attendance and create opportunities for the next generation of workers to learn and thrive.<sup>8</sup> As a result, tackling NTD removal is critical, especially in the world facing many challenges such as climate change, outbreaks, unstable politics, immigration and antibiotic resistance. Rapid responses and coordinated action from different sectors are critical to meeting the new 2030 NTD targets.<sup>9</sup>

The education and training of medical house officers concerning NTDs are the keystones for preventing NTD. Medical house officers are future generations of medical personnel who will carry out NTD control and prevention initiatives in Egypt. Their active involvement and thorough understanding are crucial for better diagnosis, control, and other NTD-targeting measures. To the best of our knowledge, few studies examine Egyptian physicians' awareness of NTDs. Therefore, the study aims were to estimate medical house officers' experience of NTDs and determine their awareness towards challenges targeting NTDs elimination.

## METHODS

A cross-sectional study was carried out from February 2023 to July 2023, with the survey distributed to medical house officers in Kafr-Elsheikh University Hospital, Egypt.

In Egypt, after completing medical education, an additional 12 months are dedicated to full-time clinical training as a house officer at different Egyptian University Hospitals. Our study included all medical house officers who agreed to participate in the study of a total of 462 medical house officers registered in Kafr-Elsheikh University Hospital during the study period. The 12-month training period is distributed among the following departments (2 months each): General Surgery, General Medicine, Obstetrics & Gynecology, Pediatrics, Emergency & Anesthesiology and Special subjects according to the graduate's choice.

The sample size was estimated using the Epi-info statistical software tool.<sup>10</sup> The following criteria were used to calculate sample size: The study has a 95% confidence limit, an 80% power, and a 5% margin of error (d). The expected outcome for NTD knowledge was 26%.<sup>11</sup> Based on the previously mentioned criteria, the overall sample size was 181 people.

Data collection tool: An anonymous self-administered English questionnaire was introduced to the study participants to assess their awareness towards NTDs. Before completing the questionnaire, respondents were given a short description of the study and its main objectives. *The questionnaire included five domains:* (1) Sociodemographic and general characteristics of the studied participants: include data about age, sex, residency, rating their knowledge about NTDs on a scale from 1-5 (1 indicates no knowledge, 2 indicates minimal knowledge, 3 indicates moderate knowledge, 4 indicates good knowledge, and 5 indicates excellent knowledge) and Source of information about NTDs. (2) Awareness of NTD risk factors such as inadequate housing, climate change, socio-economic inequalities, and emerging zoonotic and environmental health threats. (3) Awareness of the prevalence of NTDs, such as the extent of the spread of NTDs in Africa, the frequency of encountering patients with NTDs in their practice, and the referral of suspected patients with NTDs. (4) Awareness of different NTDs such as leishmaniasis, leprosy, lymphatic filariasis, onchocerciasis (river blindness), schistosomiasis (bilharzia), dengue fever, trachoma, chagas disease, buruli ulcer and soil-transmitted helminthiasis (intestinal worms). (5) Awareness of challenges targeting NTDs elimination, such as lack of funding/resources, limited access to

healthcare services, lack of public awareness, political instability/conflict and climate change.

To assess the validity of the questionnaire, the current study's tools were given to three professor experts of different specialties (Public Health & Community Medicine and Tropical Medicine) to assess the degree to which the questionnaire matches the study's objectives and the target group.

Table 1: Socio-demographic & Basic characteristics of the studied participants (N=398)

Characteristics	Values	
Age (years)*	23.01±1.63	
Gender		
Male	250	62.8
Female	148	37.2
Residency		
Rural	158	39.7
Urban	240	60.3
Department of training		
General surgery	83	20.8
General Medicine	68	17.1
Obstetrics & Gynecology	46	11.5
Pediatrics	73	18.3
Emergency& Anesthesiology	57	14.3
Other specialties	71	17.8
Self- perceived knowledge rating about NTDs term*		
Points	2.14±1.14	
Percentage	42.8%±22.8%	
Source of information about NTDs		
Never heard about it	104	26.1
Medical background	76	19.1
Social media	128	32.2
Medical conferences	53	13.3
TV/ Radio	37	9.3

\*Values are presented as number and percentage or \*mean ± standard deviation

A pilot study was conducted on 20 of the studied youth (10% of the sample size) to examine the study instruments regarding clarity, feasibility, and application, as well as the time needed to fill out the questionnaire. Based on the results of the pilot study, the necessary modifications and enhancements were made before gathering data.

Data management and analysis plan: The data were analyzed using the Statistical Package for the Social Sciences" SPSS 22.0 software (IBM Microsoft). Quantitative data normality was tested by

Kolmogorov's test. Qualitative variables were prescribed using numbers and percent and numerical variables were expressed as means and standard deviations. Kruskal Wallis Test was used for comparison between groups. P-value (< 0.05) was adopted as the level of significance.

## RESULTS

Table 1 presents sociodemographic data of the study participants where more than half of them were male, and lived in urban areas (62.8%, and 60.3%) respectively. Considering self-perceived knowledge rating about NTDs terminology, the mean score was 2.14±1.14. Regarding knowledge about neglected tropical diseases (NTDs), nearly one-third of them (32.2%) heard about NTDs in social media while more than one quarter (26.1%) never heard about it. Also, less than one quarter reported knowledge through medical background and medical conferences (19.1%), (13.3) respectively, and only 9.3% heard about it on TV/radio.

Table 2 illustrates awareness towards NTDs risk factors among the studied participants, where more than one-third of them (40.9%) answered that the most important risk factors for NTDs were environmental health threats while less than one-third considered emerging zoonotic and climate change were other contributing factors (29.6%), and (27.1%) respectively. Regarding awareness towards NTDs prevalence, nearly one-third of them (34.7%) answered that the extent of the spread of NTDs was moderate, nearly more than one-quarter of them (28.6%) reported that they rarely contacted patients with one of NTDs in their practice, others reported monthly and weekly (24.6%), (18.8%) respectively. Regarding the frequency of referral, nearly one-third of them (34.2%) referred a patient with suspected NTDs to a specialist. Regarding recognizing NTDs types, more than one quarter (27.8%) answered leishmaniasis and Chagas disease (27.3%).

Table 3 illustrates that nearly one-third (36.4%) thought NTDs could be eliminated. More than one-third of them thought that the biggest barriers to eliminating neglected tropical diseases were lack of public awareness (39.6%), limited access to healthcare services (35.6%), and lack of funding /resources (32.4%). While only 26.6% of them considered that climate change was the biggest barrier.

Table 2: Awareness towards NTDs among the studied participants (N=398)

	Number	percentage
<i>Awareness towards NTDs risk factors</i>		
What do you think the factors contributing to NTDs? *		
Inadequate housing	71	17.8
Climate change	108	27.1
Socio-economic inequalities	158	39.6
Emerging zoonotic	118	29.6
Environmental health threats	163	40.9
Don't know	94	23.6
<i>Awareness towards NTDs prevalence</i>		
How do you see the extent of the spread of NTDs in Africa?		
Low	190	47.7
Moderate	138	34.7
High	70	17.6
How often do you encounter patients with neglected tropical diseases in your practice		
Weekly	75	18.8
Monthly	98	24.6
Rarely	114	28.6
Never	111	27.9
Have you ever referred a patient with a suspected neglected tropical disease to a specialist?		
Yes	136	34.2
No	262	65.8
<i>Awareness towards different NTDs</i>		
Which disease you consider to be neglected tropical diseases?*		
Leishmaniasis	111	27.8
Leprosy	92	23.1
Lymphatic filariasis	96	24.1
Onchocerciasis (river blindness)	87	21.8
Schistosomiasis (bilharzia)	99	24.8
Dengue fever	104	26.1
Trachoma	59	14.8
Chagas disease	109	27.3
Buruli ulcer	58	14.5
Soil-transmitted helminthiasis (intestinal worms)	68	17.1

\* More than one answer allowed

## DISCUSSION

Neglected Tropical Diseases (NTDs) constitute one of developing countries' most prevalent infectious illnesses. Spread by contact with polluted soil or water or by insects like flies and mosquitoes.<sup>12</sup> One of the main obstacles to managing and eradicating NTDs is ignorance. The level of medical education and training received by the health care professional throughout their early undergraduate studies is reflected in their lack of understanding, diagnosis, and management of NTDs.<sup>13,14</sup> Egypt's Vision 2030 is to ensure that all Egyptians live healthy and have secure lives.<sup>15</sup> In

Egypt, NTDs are a significant public health issue.<sup>16</sup> As a result, the 2030 vision objectives must be achieved to tackle NTDs. Increasing public knowledge of NTDs can be effective and reasonably priced infection control measures. Additionally, the high level of awareness among healthcare workers can potentially have a major and lasting impact on managing these diseases. In this study, we highlighted the problem of poor knowledge regarding NTDs among healthcare workers; we included medical house officers to estimate their awareness of NTDs.

Table 3. Awareness of challenges targeting NTDs elimination among the studied participants (N=398)

	Number	percentage
Do you think NTDs can be eliminated?		
Yes	145	36.4
No	61	15.3
Not sure	110	27.6
Don't know	82	20.6
What do you think are the biggest barriers to eliminating neglected tropical diseases? *		
Lack of funding/resources	129	32.4
Limited access to healthcare services	142	35.6
Lack of public awareness	158	39.6
Political instability/conflict	118	29.6
Climate change	106	26.6
Don't know	104	26.1

\* More than one answer allowed

Regarding sex and residency, in our study, more than half of them were male and lived in urban areas. This came in agreement with Emeto et al. in Nigeria 2021.

<sup>17</sup> Regarding awareness towards (NTDs), almost a third of them learned about NTDs through social media. This is consistent with Adje et al.'s findings from Nigeria 2023, who reported that half of the people acquired this knowledge through the media, particularly the internet and that this is because the internet is widely used as an information source and has 50% higher retentive capacity than knowledge from other sources.<sup>18</sup>

More than 25% of individuals in our study had never heard of NTDs. Additionally, fewer than a quarter indicated that they knew their medical background and medical conferences. This highlighted the lack of knowledge about NTDS and the inadequate medical education that failed to underline the significance of neglected tropical illnesses. There is a demand for workforce professional capacity building beyond information learned through the media and the internet is further suggested by the fact that formal training of health workers in the NTDs management is either nonexistent or inadequate. This was consistent with Elfar et al. 2020 study in Egypt, which found that just a quarter of the studied students recognized what NTDs were; only a small number properly knew the names of certain NTDs; and only a very small fraction of the participants overall recognized the unique Egyptian NTD prevention and control methods.<sup>11</sup> Also, Rahman et al. in Bangladesh 2023 revealed that One-third had no idea what was meant by the term NTD and had never heard of any NTD, indicating that the majority of their subjects had

an intermediate level of awareness and knowledge.<sup>19</sup> In contrast to the Nigerian study, which showed that 57.2% of medical personnel had good knowledge of NTDs.<sup>17</sup> This can be connected to the medical education program, which might strongly emphasize NTDs in the educational course materials. Furthermore, in some countries, NTDs are studied in the communicable diseases' module, which is why students are unfamiliar with the expression NTD. Additionally, comprehensive and efficient practical training is lacking in medical education related to NTDs. This may also be explained by the fact that public health disease initiatives like those for malaria, HIV, and TB receive more attention, financing, and emphasis than those for the treatment and management of NTDs.

In our study, more than one-quarter of them reported that they rarely encountered patients with NTDs in their practice, and less than one-quarter reported monthly and weekly. This contrasted with the Bangladeshi study 2023, which revealed that Half of the participants stated that they had never seen anyone with NTD.<sup>19</sup> Similar results were found in the Elfar et al. 2020 study, where the vast majority of respondents there had no prior experience with NTD patients.<sup>11</sup> This could be due to a misunderstanding of the meaning of NTD. and the fluctuating level of knowledge due to the varied region of respondents furthermore because the prevalence of diseases differs across the country. In our study, more than one-third answered that environmental health threats were the most important risk factors for NTDs. This came in line with the Nigeria study, which stated that environmental factors such as unclean water, lack of

sanitation and unclean environment were the most reported risk factors for NTDs as current environmental changes lead to the reappearance of NTDs.<sup>18</sup>

Although the most frequent NTDs in Egypt are schistosomiasis and lymphatic filariasis.<sup>20</sup> In our study, less than one quarter could identify them. This agrees with the Elfar et al. 2020 study in Egypt 2020, which stated that Only 15% of the respondents recognized them as NTDs.<sup>11</sup> Regarding barriers towards neglected tropical diseases (NTDs), more than one-third of participants thought that the biggest barriers to eliminating neglected tropical diseases were lack of public awareness and limited access to healthcare services. This came in line with the Elfar et al. 2020 study in Egypt, which stated that the low level of public awareness about the disease in Egypt is a big problem in controlling the disease.<sup>11</sup> Emeto et al. in Nigeria 2021 stated that The most commonly stated challenges to recognizing some NTDs among healthcare personnel were a lack of knowledge and awareness of NTDs and a lack of training and availability of suitable diagnostic instruments.<sup>18</sup>

## CONCLUSIONS

In conclusion, this study shows that medical house officers have insufficient knowledge and awareness of NTDs, which poses a problem for NTD control and elimination. While familiarity with the terminology is a necessary starting point, it is crucial to recognize that true understanding involves a comprehensive grasp of the diseases themselves, their diverse modes of transmission, and the complexities of their management. Health education, training, and awareness constitute important measures in reducing the NTDs burden. As a result, training and workshops for medical professionals should be organized. Also, students' education curriculum should be updated. Also, raising public awareness and knowledge of NTDs in order to combat them as public knowledge may benefit policy formulation and its application. Continuous evaluation of current training and research efforts is strongly encouraged. Increased donor money and suitable resources for NTD programs are also required. Overall, this study presents a call to raise awareness and prioritize NTDs control and elimination in Egypt.

## Ethical Consideration

Approval was obtained from the Committee of the Tanta Faculty of Medicine IRB (approval code: 36264PR324/9/23) Tanta University, and official permission was obtained from Kafr-El Sheikh University Hospital. The purpose of the research was stated at the beginning of the questionnaire, and participants could accept or refuse to participate. They could withdraw from the survey at any time before its completion. Participants' answers were anonymous and confidential.

*Strengths and limitations:* This study emphasizes the need to monitor medical house officers' awareness of NTDs while highlighting a crucial gap in eliminating NTDs. Plus, our results provide important data on which future researchers could utilize for developing organized research and teaching methodologies. However, there are certain limitations to consider. Firstly, the study used a cross-sectional design, which inhibits the capacity to prove causality or the temporal relationships between the variables. Secondly, data were collected by applying self-reported measurements prone to recall and social desirability bias. Moreover, the study focused solely on medical house officers at Kafr El Sheikh University Hospital; this may restrict the findings' generalizability to other healthcare workers in Egypt.

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*Authors' Contributions:* Conceptualization H.A.A.A.; Methodology; H.A.A.A. Data Analysis; H.A.A.A., Data Curation; H.A.A.A., Writing—Original Draft Preparation; H.A.A.A., S.M.M.K, Writing—Review and Editing; H.A.A.A., S.M.M.K, and all the authors have read and agreed to the published version of the manuscript.

*Data Availability:* All data are available upon request from the first author.

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