



Short communication

Survey of Nepali doctors on the perception of climate change and health effects

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ABSTRACT

Introduction: Physicians are often the first to witness the health effects of climate change and this allows them a unique platform to advocate for patients' health. Developing countries are disproportionately impacted by climate change but less is known about the health effects related to climate change in these countries. This survey was done to summarize the observations of Nepali physicians on patients' health as affected by climate change, as well as to assess the need for educational opportunities in the medical community.

Methods: An electronic survey on health effects related to climate change and climate change awareness was sent to Nepali physicians by email and social media.

Results: Almost all Nepali physician respondents (99%, $n = 177$) reported climate change is happening, and 67% of respondents mentioned time and 53% of respondents noted knowledge as the main barriers for communicating about climate change with patients. Nepali physicians mentioned training (87%), continuing professional education (85%), health action alerts (84%), patient education materials (84%) and policy statements by professional associations (79%) would be helpful for climate change communication.

Conclusion: This survey presents a unique case study describing the health effects of climate change witnessed by physicians in Nepal. This survey highlights that Nepali physicians are keenly aware of the harmful effects of climate change on health, duly acknowledge gaps in education in this topic and report interest in future educational activities to enhance education and to improve their ability to communicate effectively regarding the health impacts of climate change with patients.

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1. Introduction

Nepal is a landlocked country in South Asia with a unique geography of the Himalaya mountains in the North and flatlands in the South. Nepal's diverse geo-climatic system, which combines heavy monsoons, steep terrain, mountains, glacial lakes, and remoteness, renders the country vulnerable to natural disasters such as Glacial Lake Outburst Floods (GLOFS), landslides, droughts, and waterborne diseases. The impact of disasters is pronounced in marginalized populations, who are already hampered by poverty and disempowerment [1]. Nepal is considered one of the most vulnerable countries to climate change requiring investment and innovations to improve climate change adaptation [2].

Air pollution, heat stress, water scarcity, drought, flood, physical and mental stress, and vector-borne diseases are the major climate

risks faced by Nepal, and air pollution was reported to account for 19 % of deaths in 2021 [3]. In Nepal, under a high emissions scenario, the number of days of warm spell is projected to increase from 20 in 1990 to 245 in 2100, and dry spell is expected to increase by about 14 days [4]. Climate change may affect health through a range of pathways—increased frequency and intensity of heat waves, cold-related deaths, increased floods and droughts, changes in the distribution of vector-borne diseases, and effects on the risk of disasters and malnutrition [5]. Most virulent infections are highly sensitive to climate parameters of temperature, precipitation and humidity [4] and climate change is believed to be the major factor contributing to the widespread increase of dengue fever in summer 2022 in Nepal [6]. Climatic variability also has an influence on the spread of malnutrition and diarrheal disease which is expected to double in Nepal [7]. Climate change can also influence mortality through various environmental and weather events [8].

Internationally, most health professionals understand that climate change is affecting their patients; however, many feel they have

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insufficient knowledge about the topic [9]. To our knowledge, there are no prior studies conducted to assess knowledge and perceptions about climate change related to health effects in Nepal. In response, this survey was conducted to analyze perceptions of climate change and health impacts amongst Nepali physicians, to ascertain the need for educational opportunities, and to identify barriers for future educational development.

2. Method

A validated survey tool was adapted for better suitability for the region [10]. The Nepal Medical Association (NMA) provided email addresses for a total of 267 medical professionals. A Qualtrics survey was shared with these email addresses beginning October 2021. Three reminder emails were sent monthly to non-respondents and 53 responses were obtained after three months. Due to a low response rate, the survey was also distributed via social media outlets such as Viber and Facebook and was forwarded further by recipients to their contacts.

Data were analyzed using IBM SPSS version 26 and are presented in the form of tables and figures. Descriptive statistics were calculated by using mean and standard deviation for continuous data and frequency and percentage for categorical data.

The survey included 67 questions. Themes addressed opinions about climate change, human impacts, climate change related worry, health effects of climate change in Nepal, communication patterns, resources, and priorities. The survey can be viewed under supplemental information; it was approved by the Institutional Review Board of Nepal Health Research Council (NHRC 299/2021P) with embedded consent required prior to participation.

3. Results

There were 177 Nepali physician participants. These respondents included physicians from five out of seven regions in the country along with 22 participants who were Nepali physicians residing overseas. There were more male (61 %) than female (37 %) participants. There were no responses from the Madesh (South-eastern) and Sudurpaschim (Far-western) provinces of Nepal and most participants ($n = 56$) were from Kathmandu. (Fig. 1).

Almost all respondents (99 %) reported climate change is happening, and a majority (95 %) were worried about climate change (Tables S1 & S2, and Figure S1). 48 % of the respondents felt climate change would cause harm to the community and to their patients but more were worried about personal harm (66 %) and future generations (71 %) (Table S3). Most respondents ranked air quality (90 %), water

and food-borne diseases (87 %), vector-borne infectious diseases (83 %), and heat illness (72 %) as the main concerns for climate change (Fig. 2 and Table S4). Air pollution and heavy rainfall/drought were ranked higher than increased temperature and water/river level rise as the climate change effects most impacting health outcomes in Nepal (Figure S2). Lack of time in the clinical setting (67 %) and lack of knowledge (53 %) were considered as the main barriers that prevented communication to the public regarding climate change (Table S5), and training (87 %) and professional education (85 %) were considered priorities (Table S6). Nepali physicians agreed about their responsibility to bring the health effects of climate change to the attention of the public (94 %) and policy makers (93 %) (Table S7).

One of the questions asked respondents to share personal observations regarding their experiences with health-related consequences of climate change. One physician commented that an increase in respiratory conditions such as asthma, and chest radiographs with increased patchy opacities now being reported as normal were likely due to increased air pollution (Table S8). Extreme weather events such as floods or droughts were noted to have caused economic hardships for farmers. In one situation, a physician described relapse of mental illness for his patient, who lost access to psychotropic medications after he was displaced from his home following flash floods. Another case of suicidal poisoning was mentioned due to economic hardships. Fresh drinking water sources were reported as drying up leading to consumption of unclean water which has shown an increase in waterborne diseases. Dengue was also mentioned as being an epidemic in regions such as Pokhara which was never reported in the past.

4. Discussion

Worldwide, surveys of health professionals have noted climate change is happening, caused by humans, an important and growing cause of harm and that health care professionals have a responsibility to educate the public and policymakers [11]. Almost all respondents in this study agreed that climate change is happening, which is much higher than reported in Minnesota, USA (75 %; [12]), but similar to other studies (89–95 %) [11].

Healthcare professionals recognize and are responsible for responding to the impacts of climate change on their patients, however they feel unprepared and uncomfortable discussing climate change with their patients [12]. Similar to other countries and professionals [10,13], physicians in Nepal feel unprepared to discuss climate change with their patients and support related training.

Documenting observations by health care professionals helps provide further evidence of human health effects related to climate



Fig. 1. Distribution of the participants by districts and the number of participants.

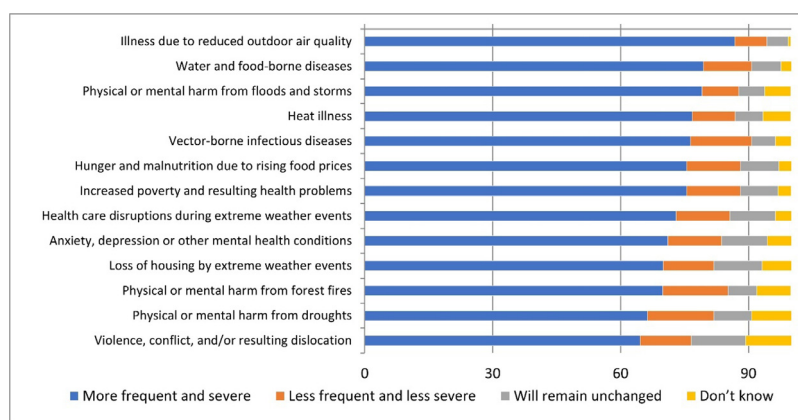


Fig. 2. Effect of climate change on frequency and severity of health issues over the next 10 years.

change. As this survey shows, health care professionals in Nepal observe health impacts routinely amongst their patients and recognize pertinent climate and health impacts. A lack of time and knowledge are communication barriers, and they request further education and training which, theoretically, could help promote mitigation and adaptation strategies.

Health care professionals have reported a lack of climate change topics in medical education hinders their ability to communicate effectively about the public health issues related to climate change [12,14,15]. Developed countries may face challenges arising from political and funding priorities [16].

Although the majority of respondents ranked air pollution as the highest among the effects related to climate change, there may be some bias because most respondents were located in urban locations and in the capital city, Kathmandu where particulate matter levels often exceed air quality guidelines by several times [17] and there is a high prevalence of non-normal lung function amongst occupational workers such as traffic police in Kathmandu [18]. Still, air pollution remains one of the major concerns related to climate change in other studies too. 77 % of respondents mentioned observing chronic air pollution related illnesses as the impacts of climate change among a survey of American Thoracic Society members [10]. A multinational study including the US also ranked poor air quality as the first concern for health impacts related to climate change [11].

Personal statements provided by doctors reveal various health effects including fertility and mental health issues (Table S8). These statements highlight the broader unseen impacts such as financial burdens and mental health problems of an at-risk population, who lack community resources and support.

In this study our sample size was small and does not adequately represent the total population of the physicians in Nepal with responses from only five out of seven provinces and most responses from Kathmandu. Future studies should attempt to capture the responses from all provinces of Nepal. Some surveys were also partially completed. Climate change impacts vary by geographical regions and a lack of responses from certain terrain may have limited the variation in responses. The limited response may also suggest it was biased because it was completed by respondents who are interested in climate change. Additionally, responses from 22 Nepali physicians living outside of Nepal are included in our results. Because of small sample size and their residence from developed and developing countries, we did not separately compare the responses of Nepali physicians living inside and outside of Nepal.

5. Conclusions

To our knowledge, this is the first survey done amongst Nepali physicians to assess climate change awareness and impacts on

health. Most respondents agreed that climate change is happening and cited air pollution as the topmost related cause of illness in their patients, followed closely by water and food-borne illnesses. Respondents supported future educational activities and events to better understand the impacts of climate change on health. Educating Nepali physicians about climate change can help to document the impacts of climate change on human health in developing countries and assist in future adaptation planning.

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Data statement

Data is available on request.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

CRediT authorship contribution statement

Pragya Rai: Writing – review & editing, Writing – original draft, Project administration, Methodology, Investigation, Conceptualization. **Eva Gauchan:** Writing – review & editing, Writing – original draft, Investigation, Formal analysis, Conceptualization. **Richa Pradhan:** Writing – review & editing, Writing – original draft, Investigation. **Kabindra M. Shakya:** Writing – review & editing, Writing – original draft, Investigation, Conceptualization.

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Supplementary materials

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