

## PEER REVIEW HISTORY

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### ARTICLE DETAILS

<b>TITLE (PROVISIONAL)</b>	Examining the prevalence, correlates and inequalities of undiagnosed hypertension in Nepal: a population-based cross-sectional study
<b>AUTHORS</b>	Hasan, Md. Mehedi; Tasnim, Fariha; Tariqujjaman, Md.; Ahmed, Sayem; Cleary, Anne; Mamun, Abdullah

### VERSION 1 – REVIEW

<b>REVIEWER</b>	Abhinav Vaidya Kathmandu Medical College Public Limited, Nepal
<b>REVIEW RETURNED</b>	11-Mar-2020

<b>GENERAL COMMENTS</b>	This is an interesting paper with focus on undiagnosed hypertension as a public health issue. The objectives of the study are clear, and the line of analysis conform to the objectives. Results are well described, although it does not touch upon the important issue of ethnicity-wise variations. However, the discussion part can be improved by including the health programs that address non-communicable diseases including hypertension. More elaboration is required on how the undiagnosed proportion of hypertension can be reduced.
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<b>REVIEWER</b>	Junmin Zhou West China School of Public Health and West China Fourth Hospital, Sichuan University, China
<b>REVIEW RETURNED</b>	17-Mar-2020

<b>GENERAL COMMENTS</b>	Thanks for inviting me to review this manuscript. I read it with some interest. It has addressed a significant public health concern: undiagnosed hypertension, which should have received more attention from researchers and practitioners. Before this paper can be published, I think several concerns listed below should be addressed: 1. All of authors are from outside of Nepal. Since this study is focusing on a issue in Nepal, it would be better to include some authors from there, mainly due to ethical reasons. 2. Patients were considered as undiagnosed "if the patient had SBP $\geq$ 140 mmHg or DBP $\geq$ 90 mmHg during blood pressure measurement of biomarker test of the survey and not once took any prescribed medicine to lower/control blood pressure or being told by health professionals to have hypertension prior survey". What if a patient who were tested positive did not take medicine but were told to have hypertension? Would he/she be considered as undiagnosed hypertensive? According to your definition, it seems yes, but actually should be no.
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	<p>3. It seems that most of citations were pretty old. For instance, when discussing the undiagnosed hypertension study in China (Page 14 Lines 36-41), some new research (e.g. Association between Undiagnosed Hypertension and Health Factors among Middle-Aged and Elderly Chinese Population) should be cited instead. Authors are recommended to thoroughly check their references.</p> <p>4. On Page 14 Lines 17-24, when discussing being male and tobacco users, I would love to see more expanded discussion on why being male and tobacco users were associated with undiagnosed hypertension.</p>
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### VERSION 1 – AUTHOR RESPONSE

Reviewer: 1

Comments 1: This is an interesting paper with focus on undiagnosed hypertension as a public health issue. The objectives of the study are clear, and the line of analysis conform to the objectives. Results are well described, although it does not touch upon the important issue of ethnicity-wise variations. However, the discussion part can be improved by including the health programs that address non-communicable diseases including hypertension. More elaboration is required on how the undiagnosed proportion of hypertension can be reduced.

RESPONSE: Thank you for your appreciations. We have improved the discussion part through incorporating the health programs for the prevention and control of non-communicable diseases including hypertension. We have incorporated a separate section in page 16-17 on this aspect and provided below for your attention:

“Several initiatives have been taken to control hypertension in Nepal. To address the burden of cardiovascular diseases (CVD), the WHO and partners launched an initiative called “Global Hearts” in 2016 [50]. This initiative took a comprehensive approach to help countries in scaling-up of affordable and adaptable measures to make their health services better able to detect and treat people at risk or suffering from CVD. This initiative comprises of three packages: SHAKE, HEARTS and MPOWER. The package “HEARTS” provides tools to incorporate CVD management best practices at the primary health care level to reduce CVD risk factors such as hypertension and high blood cholesterol. Like many LMICs, Nepal has been under this initiative to tackle the CVD. In addition, the Community-based Management of Hypertension in Nepal (COBIN) is a community-based cost-effective intervention that showed success in reducing hypertension in Nepal [51,52]. However, for designing further programs or interventions, our findings further provide insights in considering the hypertensive cases that remained undiagnosed and their uneven distributions across a spectrum of sociodemographic characteristics for the prevention of hypertension in Nepal.”

Moreover, we recommend specific strategies to reduce the prevalence of undiagnosed hypertension in Nepal. The included sentence in conclusion (page 18) as follows:

“Routine screening and strengthening diagnosis of hypertension in the primary level of health care service facilities may help Nepal in reducing cases with undiagnosed hypertension.”

Reviewer: 2

Thanks for inviting me to review this manuscript. I read it with some interest. It has addressed a significant public health concern: undiagnosed hypertension, which should have received more attention from researchers and practitioners.

Before this paper can be published, I think several concerns listed below should be addressed:

Comments 1: All of authors are from outside of Nepal. Since this study is focusing on a issue in Nepal, it would be better to include some authors from there, mainly due to ethical reasons.

RESPONSE: Thank you for your suggestion. We appreciate your thoughts of including authors from Nepal given their knowledge and expertise in the field of this work. However, being a neighbor of Nepal and given a wide range of capacity and expertise in working global contexts, we took initiatives with courage to conduct this study by using this open source secondary data. While we are not in a best position to measure the impact of geography and culture of Nepal and bringing them in the discussion due to the lack of full knowledge, however, the use of secondary data also limits us to identify the effect of unmeasured variables due to lack of detailed information collected under the Demographic and Health Survey program. Apart from this, we have drawn some key findings on the prevalence, correlates and inequalities of undiagnosed hypertension in Nepal. We believe that our initiative will help policy makers and program managers in designing further interventions and allocating resources to reduce the cases of hypertension who remained undiagnosed.

Comments 2: Patients were considered as undiagnosed "if the patient had SBP $\geq$ 140 mmHg or DBP $\geq$ 90 mmHg during blood pressure measurement of biomarker test of the survey and not once took any prescribed medicine to lower/control blood pressure or being told by health professionals to have hypertension prior survey". What if a patient who were tested positive did not take medicine but were told to have hypertension? Would he/she be considered as undiagnosed hypertensive? According to your definition, it seems yes, but actually should be no.

RESPONSE: We have revised the definition of undiagnosed in page 7 as follows:

"A patient is considered as undiagnosed for hypertension if at the survey time he/she was diagnosed as hypertensive (SBP $\geq$ 140 mmHg or DBP $\geq$ 90 mmHg) but never took any prescribed anti-hypertensive medicine to lower/control blood pressure and never told by health professionals to have hypertension prior the survey".

Comments 3: It seems that most of citations were pretty old. For instance, when discussing the undiagnosed hypertension study in China (Page 14 Lines 36-41), some new research (e.g. Association between Undiagnosed Hypertension and Health Factors among Middle-Aged and Elderly Chinese Population) should be cited instead. Authors are recommended to thoroughly check their references.

RESPONSE: We have cited this article as an updated information in the relevant field and updated the further references accordingly. The added sentences with citations in page 15 are as follows:

"While half of the hypertensive patients remain undiagnosed in Nepal, the recent evidence shows that the prevalence of undiagnosed hypertension was 28.8% in China [40]. The reason behind this difference might be due to the differences in age of study participants. Nepal assessed participants of age 15 years or older while China included older participants (over 45 years) who assumed more aware, because of their ages, about health conditions and were more likely to visit doctors for regular health check-up."

We have also updated some references at the beginning of the manuscript. The added sentences in the introduction are as follows:

"Hypertension or raised blood pressure is recognized as a leading cause of mortality and disability [1], affecting more than one billion people every year worldwide [2]."

The updated references are:

1 Forouzanfar MH, Afshin A, Alexander LT, et al. Global, regional, and national comparative risk assessment of 79 behavioural, environmental and occupational, and metabolic risks or clusters of

risks, 1990–2015: a systematic analysis for the Global Burden of Disease Study 2015. *Lancet* 2016;388:1659–724. doi:10.1016/S0140-6736(16)31679-8

2 Fisher N, Curfman G. Hypertension-A public health challenge of global proportions. *JAMA* 2018;320:1757–1759.

40 Zhou J, Fang S. Association between undiagnosed hypertension and health factors among middle-aged and elderly chinese population. *Int J Environ Res Public Health* 2019;16. doi:10.3390/ijerph16071214

Comments 4: On Page 14 Lines 17-24, when discussing being male and tobacco users, I would love to see more expanded discussion on why being male and tobacco users were associated with undiagnosed hypertension.

RESPONSE: We have added explanations about the association between sex and tobacco use with undiagnosed hypertension. We made a separate section in discussing these issues. The additional lines highlighted with green colors in the section below are the newly added sentences in page 14 that discussed the extent of being male and tobacco use in relating to the undiagnosed hypertension:

“On the other hand, similar to risk factors of hypertension, undiagnosed hypertension were also more prevalent among males and tobacco users [6,30]. The higher rate of undiagnosed hypertension among male might be due to their lack of awareness and lower treatment rate than female [33]. Smoking, a main source of using tobacco, is well recognized to have association with increased risk of hypertension in many settings including Nepal [34,35]. However, there is lack of evidence in determining the extent of how tobacco use is affecting patients to remain undiagnosed for hypertension. Our finding demonstrates that in Nepal, factors other than tobacco use played independent role in increasing rate of undiagnosed hypertension. Although difference in lifestyle practices between male and female in Nepal may not be the key factors behind such exposure, research need to be done to identify the actual risk factors [30].”

#### VERSION 2 – REVIEW

<b>REVIEWER</b>	Junmin Zhou Sichuan University, China
<b>REVIEW RETURNED</b>	14-Apr-2020
<b>GENERAL COMMENTS</b>	None. Issues have been addressed.