



Development and validation of a questionnaire to assess preventive practices against COVID-19 pandemic in the general population

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ABSTRACT

Coronavirus Disease 2019 (COVID-19) pandemic has affected millions of people worldwide with far-reaching socio-economic implications in society. The adoption of preventive practices by the public remains the mainstay in reducing the spread of COVID-19 but there is a dearth of validated tools to assess such infection prevention practices related to pandemics. This study was conducted to develop and validate a questionnaire for the assessment of preventive practices against COVID-19 in the general population. It was done following a standardized protocol involving questionnaire development through literature review, focused group discussions, in-depth interviews, expert opinion, and pre-testing. This was followed by the validation of the questionnaire through a cross-sectional survey on 108 individuals from diverse backgrounds in New Delhi, India in July 2020. Exploratory factor analysis was used to evaluate construct validity. Internal consistency was assessed by Cronbach's alpha coefficient. The developed questionnaire for assessing preventive practices consists of two sections: the first section of 18 items to evaluate preventive practices and the second section of 19 items for assessing various reasons for deficiencies in the preventive practices. The first section has good content validity (CVR = 0.81 and S-CVI/Av = 0.97) and internal consistency (Cronbach's alpha coefficient 0.82). Thus, this questionnaire is a valid and reliable tool for the comprehensive assessment of preventive practices and barriers related to the COVID-19 pandemic. It will be useful in assessing the preparedness of the public and will be helpful to policymakers in designing appropriate interventions for protection against COVID-19.

1. Introduction

Coronavirus disease 2019 (COVID-19) has shocked the world with its rapid spread, morbidity, and mortality (Ye et al., 2020; Yuan et al., 2020). It has infected more than 68 million people leading to more than 1.5 million deaths in a year (WHO, 2020). Due to the lack of effective treatment, the major way to slow down the spread of COVID-19 is by preventing transmission of the virus among people through awareness, vaccination and adoption of proper preventive practices (Schünemann et al., 2020; Thu et al., 2020; Xiao and Torok, 2020).

Health behavior plays an important role not only in non-communicable diseases like diabetes but also in communicable

diseases like COVID-19 (Weston et al., 2018). Monitoring and supporting infection prevention and control (IPC) behaviors related to communicable diseases is crucial in pandemics to control the spread of disease but there is a dearth of scientific and validated tools for assessing them (Toussaint et al., 2020; Prachthauser et al., 2020). While the deficit in diagnostic tests is being overcome, the shortfall of validated behavioral tests is evident in the current pandemic with most studies utilizing non-validated questionnaires (Modi et al., 2020; Hou et al., 2020; Cvetković et al., 2020; Parikh et al., 2020; Reuben et al., 2020). Thus, it is imperative to develop a validated questionnaire to assess the extent to which various preventive practices are being followed by people. Also, there is a need to identify vulnerable sections and barriers to compliance

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with preventive practices so that appropriately targeted interventions for health promotion can be undertaken.

Therefore, the objective of the study was the development and validation of a concise tool that will help in assessing preventive practices concerning COVID-19 in the general public. The questionnaire was intended not only to assess the extent to which practices were being followed but also to identify the reasons for not following these practices.

2. Materials and methods

A standard methodology was followed for the development and validation of the questionnaire (Arora et al., 2017; Baitha et al., 2019; Dubasi et al., 2019). (Table 1) This included a comprehensive literature review, focused group discussions, in-depth interviews, expert opinion, pilot testing followed by validation through a cross-sectional survey. The study was approved by the Institute Ethics Committee of All India Institute of Medical Sciences, New Delhi, India. Informed consent was obtained from all participants enrolled in the study.

2.1. Development of the questionnaire

The development of the questionnaire involved the following steps:

Step 1: Review of Literature

A comprehensive literature review was done using medical search engines like PubMed and Google scholar. MeSH terms like “Surveys and Questionnaires”, “Coronavirus Infections/prevention and control”, “Health Knowledge, Attitudes, Practice” and keywords like “Preventive Practice”, “Prevention”, “KAP”, “COVID-19”, “Corona”, “MERS” and “SARS” were used. Relevant papers were selected and appropriate items were identified from them. The initial search resulted in a short-listing of 264 related articles out of which 74 articles were found to be relevant, and 28 items were generated.

Step 2: Focused group discussions (FGDs) and In-depth interviews

FGDs have an important role in understanding perception and practical problems faced by the public. Three sessions of FGDs involving 6–8 participants each were conducted on an online platform by the investigators: two with the general public and one with experts. Based on the literature review and in consultation with a clinical psychologist, the guide was created for FGD consisting of open-ended questions to understand the perspectives, practices, and problems faced by the participants. (Table 2) Active participation was encouraged and the discussion encompassed issues like social distancing, difficulties being faced during the lockdown, experiences with wearing a mask, and hand-washing practices. In-depth interviews were later conducted with six participants to understand their attitudes and practices. The data thus obtained

Table 1

Overall steps in the development of the questionnaire (FGDs: Focused Group Discussions).

Step	Nature of activity	Methods	Number of domains	Number of items at the end of step	Addition or subtraction
I	Development of construct	Literature review	–	28	
II	Development of construct	FGDs	–	52	Addition of 24 items
III	Item generation	Develop items	8	52	
IV	Establishment of face and content validity	Expert validation	8	48	Deletion of 6 items
V	Cognitive interviewing	Pilot study	7	38	Deletion of 10 items
VI	Establishment of Construct validity	Factor analysis	5	37	Deletion of 1 item

Table 2

Guide for Focused Group Discussions (FGD).

Introduction and Purpose of FGD: To explore preventive practices against COVID-19
Ground Rules Everyone is requested to participate in the discussion. Only one person should speak at a time so that everyone’s opinions are heard. Please don’t interrupt anyone else and don’t have side conversations. Respect everyone’s ideas- please do not criticize. Your active participation is important and you are encouraged to express your opinions freely.
Introduction of FGD participants
Guiding questions What things should be done to prevent COVID-19 infection? Do you believe that adopting these practices are important to prevent COVID-19? How do you protect yourself against the COVID-19 pandemic? What problems do you face while following such preventive behavior? What things that people often do should be changed/improved to avoid COVID-19 infection?
Summarization
Thanking participants for their valuable contribution and closing the session

was analyzed qualitatively and new items were added to the tool based on it. The FGDs and in-depth interviews led to the addition of 24 items.

Step 3: Item generation

Based on literature review, focused group discussion, and in-depth interviews, a construct of questions was developed. Survey items were written in an easily understandable manner avoiding double negatives. The five-point Likert scale was used in the tool for evaluation of responses with equal distance between the options.

Step 4: Expert validation

The developed tool underwent validation by a team of eight experts from diverse fields (medicine, clinical psychology, nutrition, infectious diseases) for critical review, content, and face validity. All items were evaluated for necessity, clarity, and relevance. Based on their inputs, appropriate changes were made in the questionnaire- few items were rephrased and rearranged, some items were added while others were deleted. Thus, six items were deleted after expert evaluation.

Step 5: Pilot testing

The draft of the questionnaire constructed after the above process was pre-tested on 12 participants from diverse socioeconomic backgrounds. These participants commented on the necessity, relevance, and clarity of all the items. Based on the feedback and consultation with experts, the number of items was reduced (10 items were deleted), and relevant changes were made in 4 items in the questionnaire to avoid ambiguity.

2.2. Validation of the questionnaire

Content validity of the questionnaire was assessed through qualitative and quantitative methods during expert validation. For qualitative validity, the panel of eight experts reviewed the questionnaire and was asked to comment on the accuracy and style of the items. The items were modified according to the feedback. Then for quantitative content validity, content validity ratio (CVR), and content validity index (CVI) were calculated (Lawshe, 1975; Yusoff, 2019). In this step, the experts reviewed the questionnaire and commented on the necessity, clarity, and relevance of each item. The necessity of items was assessed using a three-point scale and scores ranged between –1 (not necessary), 0 (useful but not essential), and +1 (essential). The formula of content validity ratio is $CVR = (N_e - N/2) / (N/2)$ in which N_e is the number of participants marking an item as essential, and N is the total number of participants (Lawshe, 1975). According to the Lawshe scores, the acceptable CVR values were determined. The relevance and clarity of each item were also calculated using a four-point Likert scale: (1) not relevant/clear, (2) slightly relevant/clear and needs revision, (3) relevant/clear and needs minor revision, and (4) very relevant/clear. The

CVI of each item was determined by the proportion of experts judging the item as relevant/clear/simple (rating 3 or 4) (Yusoff, 2019). Items with CVI score less than 0.7 were eliminated and those with scores between 0.7 and 0.79 were modified according to the recommendations of experts (Yusoff, 2019). Face validity was achieved with expert evaluation and pilot testing of the questionnaire on 12 participants from diverse socioeconomic backgrounds.

Step 6: A cross-sectional survey was conducted for the validation of the questionnaire. Participants belonging to diverse socio-economic backgrounds like businessmen, doctors, paramedical staff, government employees, college students, senior citizens, housewives, security guards, house-helpers, etc. were recruited between 25th July 2020 and 27th July 2020 using the convenience sampling method. After obtaining written informed consent, the questionnaire was administered by the investigators, and responses were recorded online on Google forms simultaneously.

2.3. Statistical analysis

Descriptive statistics were used to analyze the demographic details of the participants. The Kaiser-Mayer-Olkin (KMO) measure is used for assessing sampling adequacy and values more than 0.5 indicate the suitability of data for analysis. Exploratory factor analysis using principal component extraction and varimax rotation with Kaiser normalization was used to identify domains and establish construct validity. Internal consistency and reliability were assessed using Cronbach's alpha coefficient. Its value of more than 0.7 indicates good internal consistency. The data was analyzed using IBM® SPSS® Statistics version 24.0 software.

3. Results

The 37 items questionnaire with two sections A and B is enclosed in Appendix A. The scoring method for the questionnaire is enclosed in Appendix B.

The questionnaire comprises 37 items in two sections: 18 items in section A about preventive practices and 19 items in section B about reasons for deficiencies in preventive practices. Section A of the questionnaire is intended to evaluate the extent of adherence to various preventive practices. It comprises questions rated on a 5-point Likert scale in which the options associated with better compliance with preventive practices are given higher points. For each question, there is a continuum of responses with the minimum response as 1 and maximum response as 5 with equal distance between the options. Section B of the questionnaire deals with reasons for deficiencies in preventive practices. This consists of structured questions with various options listing the common reasons for not following preventive practices as identified in the literature review, FGDs, and interviews. This part of the questionnaire is not scored as it would be analyzed qualitatively to identify the barriers to the adoption of preventive practices.

3.1. Demographic profile of the study subjects

A total of 108 adults belonging to diverse socio-economic backgrounds completed the survey. The participants were aged 18–81 years (mean age 36.42 ± 14.40 years) with a slight female predominance (58.33% females). Sociodemographic details of the participants are given in Table 3.

3.2. Descriptive statistics of the survey result

The responses to individual items of the first section of the questionnaire are presented in Table 4 and those to the second section of the questionnaire are given in supplementary Tables 1 and 2. High adherence was observed to the preventive measure of wearing masks while going out of the home while low adherence was observed to the

Table 3

Characteristics of the participants. *according to modified Kuppuswamy scale 2020 (Saleem, 2020).

Characteristic	Frequency	Percentage
Age		
18–25	26	24.07%
26–35	35	32.41%
36–45	20	18.52%
46–55	14	12.96%
56–65	8	7.41%
66+	5	4.63%
Sex		
Male	45	41.67%
Female	63	58.33%
Educational qualification		
High school certificate	11	10.18%
Intermediate or Diploma	15	13.88%
Graduate	42	38.88%
Postgraduate	40	37.03%
Marital status		
Single	45	41.67%
Married	62	57.41%
Others	1	0.93%
Socioeconomic status*		
Upper	26	24.76%
Upper middle	49	46.66%
Lower middle	19	18.09%
Upper lower	11	10.476%

preventive measure of washing hands for an adequate duration and cleaning hands before touching eyes, nose, or mouth. Around 44% of the participants couldn't sanitize hands on all occasions due to reasons like an inconvenience in sanitizing hands frequently and lack of time. It was found that the majority of participants avoided going out of the house unnecessarily, and didn't attend social gatherings. The participants went out of the house for buying groceries (46.3%), work (43.5%), and for walking and exercising (19.4%) and the majority of them took multiple precautions while purchasing groceries. But a significant portion of them was not able to maintain social distancing at the workplace attributing it to lack of space, overcrowding, and difficulty in talking. The majority of participants obeyed government restrictions and expressed favorable healthcare-seeking behavior. The write-in responses in section B of the questionnaire were reviewed to ensure completeness. Many participants felt that ignorance and carelessness of people were responsible for the rising number of cases.

3.3. Validity of the questionnaire

The content validity of the questionnaire was established through FGDs, interviews, expert evaluation, and pilot testing. There was a satisfactory level of agreement between experts suggesting good content validity (CVR = 0.81 and S-CVI/Av = 0.97). The face validity was established through expert evaluation and pilot testing while construct validity was assessed through exploratory factor analysis with varimax rotation with eigenvalue cut-off of 1. The Kaiser-Meyer-Olkin test (KMO) showed a reasonable fit of the model (KMO = 0.791) and Bartlett's test ($\chi^2 = 581.619$, d.f. = 153 and $p < 0.001$) confirmed the sphericity assumption. One item (question number 15) was removed as there was minimal variation in the responses. The factor analysis identified five domains in section A. The factor analysis of the remaining 18 items with associated factor loading is shown in Table 5. Overall, the total percentage of variance was 62.87%. The Cronbach's alpha coefficient for these 18 items in section A was found to be 0.82 which indicates good internal consistency.

4. Discussion

Coronavirus disease (COVID-19) has affected millions of people leading to the overburdening of the health care system with far-reaching

Table 4
Responses to the first section of the questionnaire.

S. No.	Question	Mode	Frequency
1.	How often do you shake hands while greeting people nowadays?	5	83.33%
2.	How often do you wash/sanitize your hands with soap and water/ alcohol-based sanitizer?	5	56.48%
3.	How often do you ensure that you wash /sanitize your hands for at least 20 s?	5	35.19%
4.	How often do you ensure that you cover your face with a handkerchief/ bent elbow while coughing/ sneezing?	5	68.52%
5.	How often do you ensure that you clean your hands before touching your eyes/nose/mouth?	4	41.67%
6.	How often do you maintain a minimum distance of 1 m at your workplace?	5	39.81%
7.	How often do you maintain a minimum distance of one meter while eating food with your colleagues at your workplace?	5	49.07%
8.	How often do you avoid going out of the house unnecessarily?	5	53.70%
9.	How often have you attended social gatherings in the past two months? (Like meeting friends, going to religious places, visiting malls, theatres etc.)	5	72.22%
10.	How often do you maintain a minimum distance of 1 m in public spaces (e.g. grocery shopping, social gatherings, etc.)?	5	62.04%
11.	How often do you wear masks while going out of home?	5	90.74%
12.	While wearing a mask, how often do you ensure that both your nose and mouth are covered?	5	82.41%
13.	How often do you keep your mask properly in a separate bag/dustbin after using it?	5	68.52%
14.	How often do you sanitize your personal items (e.g. purse/mobile phone, etc.) with sanitizer when you come home?	5	51.85%
15.	How often do you wash fruits and vegetables before eating?	5	89.81%
16.	How often do you take precautions when buying things to avoid virus contamination?	5	68.52%
17.	How often do you obey government restrictions regarding COVID pandemic?	5	65.74%
18.	In case you develop symptoms of disease, you will contact hospital/helpline/authority regarding it?	5	82.41%
19.	If you come in contact with COVID positive/suspect person, you would stop going to work and confine yourself to home away from friends and family members.	5	86.11%

Responses rated in the form of (1) Rarely (less than 10% times), (2) Occasionally (approx. 25% times), (3) Commonly (approx. 50% times), (4) Mostly (approx. 75% times), and (5) Always (more than 90% times), except question number 1 rated as (1) Always (more than 90% times), (2) Mostly (approx. 75% times), (3) Commonly (approx. 50% times), (4) Occasionally (approx. 25% times), and (5) Rarely (less than 10% times); question 9 rated as (5) Never, (4) Once, (3) Twice, (2) Thrice, (1) More than three times; question 18 and 19 rated as (5) Strongly agree, (4) Agree, (3) Can't say, (2) Disagree, (1) Strongly disagree

socio-economic implications in society. There is an urgent need to reduce the transmission of disease and adherence to proper preventive practices by the general population is essential for it. Recently, researchers from different parts of the world have done a couple of qualitative studies to develop questionnaires and assessed aspects like the practice of preventive measures, psychosocial and behavioral functions in the context of the COVID-19 pandemic (Kumari et al., 2020a, 2020b; Chopra et al., 2020; Ranjan et al., 2020; Öcal et al., 2020; Chakrawarty et al., 2020; Agarwal et al., 2021). However, a valid and practical tool for assessing preventive practices in the general population is lacking.

Various studies have been done all over the world for assessing the knowledge, attitude, and practices of the general population for protection against COVID-19 but most of them have not covered preventive practices comprehensively (Modi et al., 2020; Hou et al., 2020; Cvetković et al., 2020; Parikh et al., 2020; Reuben et al., 2020; Machida

Table 5
Factor loading of the items. Factor loading of more than 0.5 is presented.

	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5
q13	0.717				
q10	0.696				
q17	0.663				
q19	0.651				
q18	0.624				
q6	0.591				
q7	0.568	0.541			
q14		0.843			
q2		0.663			
q16		0.655			
q5		0.634			
q9		0.596			
q3		0.558			
q8			0.865		
q12			0.601	0.568	
q11				0.826	
q1					0.669
q4					0.663

et al., 2020; Chopra et al., 2020). Most studies have targeted health care workers and specific subgroups of the population, with sparse studies on the general population (Modi et al., 2020; Parikh et al., 2020; Chakrawarty et al., 2020; Dkhar et al., 2020; Agarwal et al., 2021). With most of them using unvalidated tools, there is a need for scientifically validated tools for a comprehensive assessment of preventive practices. Few such tools have been developed for the COVID-19 pandemic but they cover limited aspects of preventive practices and have been developed in a less representative sample (Toussaint et al., 2020; Prachthauser et al., 2020). These tools also don't measure barriers to the adoption of preventive practices.

This questionnaire is concise and easy to use tool covering all major aspects of preventive practices. The questionnaire has two sections: Section A comprising of 19 items for evaluating preventive practices in the last 2 weeks, which cover major areas like the use of masks, hand hygiene, social distancing, awareness, and social etiquettes and Section B: comprising of 18 items which evaluate reasons for inadequate practices if any. The options of these items enlist various common reasons with the flexibility to give another reason according to local circumstances. Thus, the questionnaire comprehensively addresses the adherence to preventive practices and reasons for non-adherence in a simple, easily administered manner.

In the present population, the scale finds avoidance of shaking hands to be a commonly followed preventive practice. Probably, this can be attributed to the fact that shaking hands is not culturally ingrained in the Indian setting, and a respectful or amiable greeting is generally conveyed through the folding of hands together as 'namaste' (Singh et al., 2020). However, efforts are required to promote hand hygiene especially before touching facial parts, and optimize social distancing at the workplace. The first section of the questionnaire presents a five-factor solution in the factor analysis, suggesting the questionnaire delves into multiple issues. A high Cronbach alpha suggests that the scale has good internal consistency.

The applications of this tool are manifold. It can be used to assess the preparedness of the population to deal with the current pandemic and future waves if and when they occur. It can be used to monitor the impact of health awareness programs, especially which are community-based. It would help policymakers in identifying target populations and designing appropriate interventions for overcoming barriers to preventive practices. It would be a readily available tool to assess preparedness in future outbreaks of similar nature. It could be helpful at the individual level in conjunction with diagnostic testing to assess individual risk and provide counseling for risk reduction. It would also be helpful to behavioral epidemiologists to understand predictors of behavior in pandemics and test their theories regarding the same. Further use of the tool in different population groups is recommended.

This questionnaire has several strengths. It is among the first of its kind and ensures a comprehensive assessment of preventive practices and related barriers. It also allows for flexibility in the identification of barriers in preventive practices across diverse socio-cultural populations. This crisp questionnaire can be administered online or through telephone and takes 5–10 min to complete. This study has some limitations, which include limited representation of lower socioeconomic strata, over-representation of the population with higher educational degrees, a predominance of participants from north India, and inability to establish predictive or concurrent validity.

5. Conclusions

This questionnaire can serve as a concise and flexible tool for the comprehensive assessment of preventive practices and barriers in the general population related to the COVID-19 pandemic. It has satisfactory validity and internal consistency. It would be useful in assessing and monitoring the preparedness of the public in the COVID-19 pandemic. It would assist policymakers in designing appropriate interventions for target populations to protect people against pandemics of such nature.

CRediT authorship contribution statement

Ayush Agarwal: Conceptualization, Methodology, Investigation, Data curation, Writing - original draft. **Piyush Ranjan:** Conceptualization, Methodology, Validation, Resources, Writing - review & editing,

Project administration. **Priyanka Rohilla:** Investigation, Resources, Data curation, Writing - review & editing. **Yellamraju Saikaustubh:** Investigation, Resources, Data curation, Writing - review & editing. **Anamika Sahu:** Conceptualization, Methodology, Validation, Resources, Supervision. **Sada Nand Dwivedi:** Methodology, Formal analysis, Writing - review & editing. **Aakansha:** Conceptualization, Methodology, Resources. **Upendra Baitha:** Resources, Supervision. **Arvind Kumar:** Resources, Supervision.

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.

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Appendix A.: Questionnaire to assess prevention practices against COVID-19 in the general population

SECTION A: Prevention practices against COVID-19 in the general population

Kindly fill the questionnaire below based on your routine for the last two weeks.

S No.	Item	Options
1.	How often do you shake hands while greeting people nowadays?	• Always (more than 90% times) • Mostly (approx. 75% times) • Commonly (approx. 50% times) • Occasionally (approx. 25% times) • Rarely (less than 10% times)
2.	How often do you wash/sanitize your hands with soap and water/ alcohol-based sanitizer?	• Always (more than 90% times) • Mostly (approx. 75% times) • Commonly (approx. 50% times) • Occasionally (approx. 25% times) • Rarely (less than 10% times)
3.	How often do you ensure that you wash /sanitize your hands for at least 20 s?	• Always (more than 90% times) • Mostly (approx. 75% times) • Commonly (approx. 50% times) • Occasionally (approx. 25% times) • Rarely (less than 10% times)
4.	How often do you ensure that you cover your face with a handkerchief/ bent elbow while coughing/sneezing?	• Always (more than 90% times) • Mostly (approx. 75% times) • Commonly (approx. 50% times) • Occasionally (approx. 25% times) • Rarely (less than 10% times)
5.	How often do you ensure that you clean your hands before touching your eyes/nose/ mouth?	• Always (more than 90% times) • Mostly (approx. 75% times) • Commonly (approx. 50% times) • Occasionally (approx. 25% times) • Rarely (less than 10% times)
6.	How often do you maintain a minimum distance of one meter at your workplace?	• Always (more than 90% times) • Mostly (approx. 75% times) • Commonly (approx. 50% times) • Occasionally (approx. 25% times) • Rarely (less than 10% times)
7.	How often do you maintain a minimum distance of one meter while eating food with your colleagues at your workplace?	• Always (more than 90% times) • Mostly (approx. 75% times) • Commonly (approx. 50% times) • Occasionally (approx. 25% times) • Rarely (less than 10% times)
8.	How often do you avoid going out of the house unnecessarily?	• Always (more than 90% times) • Mostly (approx. 75% times) • Commonly (approx. 50% times) • Occasionally (approx. 25% times) • Rarely (less than 10% times)
9.	How often have you attended social gatherings in the past two months? (Like meeting friends, going to religious places, visiting malls, theatres, etc)	• Never • Once • Twice • Thrice • More than three times
10.	How often do you maintain a minimum distance of one meter in public spaces (eg. grocery shopping, social gatherings, etc)?	• Always (more than 90% times) • Mostly (approx. 75% times) • Commonly (approx. 50% times) • Occasionally (approx. 25% times) • Rarely (less than 10% times)
11.	How often do you wear masks while going out of home?	• Always (more than 90% times) • Mostly (approx. 75% times) • Commonly (approx. 50% times) • Occasionally (approx. 25% times) • Rarely (less than 10% times)
12.	While wearing a mask, how often do you ensure that both your nose and mouth are covered?	• Always (more than 90% times) • Mostly (approx. 75% times) • Commonly (approx. 50% times) • Occasionally (approx. 25% times) • Rarely (less than 10% times)
13.	How often do you keep your mask properly in a separate bag/dustbin after using it?	• Always (more than 90% times) • Mostly (approx. 75% times) • Commonly (approx. 50% times) • Occasionally (approx. 25% times) • Rarely (less than 10% times)
14.	How often do you sanitize your personal items (eg purse/mobile phone, etc) with sanitizer when you come home?	• Always (more than 90% times) • Mostly (approx. 75% times) • Commonly (approx. 50% times) • Occasionally (approx. 25% times) • Rarely (less than 10% times)
15.	How often do you take precautions when buying things to avoid virus contamination?	• Always (more than 90% times) • Mostly (approx. 75% times) • Commonly (approx. 50% times) • Occasionally (approx. 25% times) • Rarely (less than 10% times)
16.	How often do you obey government restrictions regarding the COVID-19 pandemic?	• Always (more than 90% times) • Mostly (approx. 75% times) • Commonly (approx. 50% times) • Occasionally (approx. 25% times) • Rarely (less than 10% times)
17.		• Strongly agree • Agree • Can't say • Disagree • Strongly disagree

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(continued)

S No.	Item	Options
	In case you develop symptoms of the disease, you will contact the hospital/helpline/ authority regarding it?	
18.	If you come in contact with COVID positive/suspect person, you would stop going to work and confine yourself to the home away from friends and family members.	• Strongly agree• Agree• Can't say• Disagree• Strongly disagree

SECTION B: Reasons for preventive practices in the general population

Kindly give answers to the following questions based on your routine in the last 2 weeks. You can mark more than one option and provide other reasons.

S No.	Item	Options
Hand Hygiene		
1.	What is/are the reason(s) due to which you can't avoid shaking hands in the current scenario (COVID 19 pandemic)?	• Not applicable• Don't know that COVID spreads through handshakes• Avoiding handshaking will not prevent COVID infection• Difficult to change the habit• Looks rude not do so when the opposite person extends a hand for a handshake• Other reasons (Kindly specify):
2.	What is/are the reason(s) for not washing/sanitizing hands at frequent intervals?	• Not applicable• Don't know that washing hands prevents the spread of COVID• Frequent hand-washing will not prevent COVID infection• It leads to wastage of water and resources• Difficult to change the habit• Non-availability/shortage of water/sanitizer• Lack of time• Cumbersome to sanitize hands too many times• Other reasons (Kindly specify):
3.	What is/are the reason(s) for not washing hands for at least 20 s?	• Not applicable• Don't know that hands have to be washed for at least 20 s• Time duration is not important while washing hands• Unable to check the time while washing hands• Cumbersome when washing hands multiple times• Other reasons (Kindly specify):
4.	What is/are the reason(s) for not coughing/sneezing into the handkerchief/bent elbow?	• Not applicable• Don't know that coughing into the elbow stops the spread of infection to others• It is not important in preventing the spread of disease• Sometimes I forget• Difficult to change the habit• Other reasons (Kindly specify):
5.	What is/are the reason(s) for touching eyes/nose/mouth without cleaning hands?	• Not applicable• Don't know that touching eyes/nose/ mouth with unclean hands can cause the spread of COVID• Not important in preventing COVID• Don't remember• Difficult to change the habit• Other reasons, Please specify:
Social Distancing		
	• Attempt Q6 and 7 if going out of the house for work	
6.	What is/are the reason(s) for not maintaining social distance in the workplace?	• Not applicable• Don't know that at least 1–2 m distance should be maintained• Social distancing is not important in the prevention of COVID• Lack of space• Difficulty in talking• Overcrowding• Other reasons (Kindly specify):
7.	What is/are the reason(s) for not maintaining at least one-meter distance while having food with colleagues?	• Not applicable• Don't know that at least 1–2 m distance should be maintained• Social distancing is not important in the prevention of COVID• Lack of space• Difficulty in talking• Overcrowding• Other reasons (Kindly specify):
8.	What is/are the reasons for going out of the house?	• Not applicable• Work• Grocery shopping• Walking/exercising• Socializing• Visiting religious places• Entertainment (Club, visiting friends, etc.)• Other reasons (Kindly specify):
9.	What is/are the reason(s) for not maintaining social distancing in public spaces?	• Not applicable• Don't know that at least 1–2 m distance should be maintained• Social distancing doesn't help in preventing COVID• Lack of space• Difficulty in talking• Overcrowding• Other reasons (Kindly specify):
Masks		
10.	What is/are the possible reasons for not wearing masks while going out of home?	• Not applicable• I didn't know wearing a mask prevents the spread of COVID• I believe masks are useless• Lack of availability• Not comfortable• Difficult to breath• Doesn't look good• Other reasons, please specify
11.	What is/are the reason(s) for not covering both nose and mouth while wearing masks?	• Not applicable• Don't know that both nose and mouth have to be covered• Not useful to cover nose and mouth• Not comfortable wearing it• Difficult to breath• Due to loose fit, it slides down• Other reasons (Kindly specify):
12.	What is/are the reason(s) for not keeping the mask properly in separate bags/bins after using it?	• Not applicable• Don't know it should be kept properly in a separate bag/bin• Don't know how to dispose of the mask• Not important to dispose it of properly• Too tired after work• Don't find a suitable place to dispose of the same• Other reasons (Kindly specify):
Gadgets/Fomites		
13.	What is/are the reason(s) for not cleaning personal items (e.g. purse/mobile phone, etc) when you reach home?	• Not applicable• Don't know that I should clean it after work• Not useful to clean it• Not needed as there is no contact with COVID positive patients• Too tired to do so• Using sanitizer on personal items like mobile will damage it• Other reasons (Kindly specify):
14.	What precaution(s) do you take while purchasing groceries from local stores/vendors?	• Not applicable• Opting for home delivery• Shopping at a time when it is less busy• Wearing a face mask• Carrying hand sanitizer or wipes with you• Using mobile pay/debit cards/credit cards for making payments• Buying 1–2 weeks-worth of groceries at a time• Others (Kindly specify):
Technology and Law		
15.	Have you installed the Aarogya Setu app (or a similar health monitoring app) on your phone?	• Yes• No• Initially installed then deleted
16.	What is/are the reason(s) for not using the Aarogya Setu app (or similar health monitoring app)?	• Not applicable• Don't know about it• Don't find it useful• Don't have space in the phone for it• Don't have a smartphone• It drains battery• Other reasons (Kindly specify):
17.	What is/are the reason(s) for not obeying government restrictions?	• Not applicable• Don't know about government restrictions• They are not effective• Not applicable• Other reasons (Kindly specify):
Preparedness		

(continued on next page)

(continued)

S No.	Item	Options
18.	What is/are the reason(s) for not being aware of any helpline/authority/hospital to contact in case you develop symptoms of the disease?	• Not applicable • Don't know that there is any helpline/authority • Prefer to treat oneself at home if develop symptoms • Other reasons (Kindly specify):
19.	What do you think is the cause of the rising number of COVID cases among the general population? Kindly give solutions to them in the next column.	(Solutions)

Appendix B: Scoring instructions for the questionnaire to assess prevention practices against COVID-19 in the general population

For Part A, each item has 5 options. Except for items 1, 9, 17, and 18, the items are scored as given below:

- 5 = Always (more than 90% times),
- 4 = Mostly (approx. 75% times),
- 3 = Commonly (approx. 50% times),
- 2 = Occasionally (approx. 25% times),
- 1 = Rarely (less than 10% times),

Item 1 is scored as

- 5 = Rarely (less than 10% times),
- 4 = Occasionally (approx. 25% times),
- 3 = Commonly (approx. 50% times),
- 2 = Mostly (approx. 75% times),
- 1 = Always (more than 90% times),

Item 9 is scored as

- 5 = Never, 4 = Once, 3 = Twice, 2 = Thrice, 1 = More than three times

Items 17 and 18 are scored as

- 5 = Strongly agree, 4 = Agree, 3 = Can't say, 2 = Disagree, 1 = Strongly disagree

Appendix C. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.pmedr.2021.101339>.

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