Educational level, gender and health practices regarding COVID-19 in N'Djamena, Chad: A cross-sectional study

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Abstract

COVID-19 is affecting different countries and populations unequally. In this sense, sub-Saharan countries represent a particularly vulnerable context due to their unique demographic and health circumstances. A holistic approach to Covid-19 is urged, one that considers the social-cultural contexts of people's lives. Using Social Determinants of Health (SDH) as framework, we explore which variables could explain the differences in health practices regarding the prevention of COVID-19 in Chad, in order to propose recommendations that allow communities to better face future health crises. The study was designed as a cross-sectional survey conducted in N'Djamena, Chad, using a convenience sampling technique that included 2,330 participants. A regression model was fitted to assess the relationship between educational level, gender, and health practices regarding COVID-19. 2,269 participants completed the survey successfully. Participants mean age was 31.04, 61.52% were male, and 40.55% had precarious jobs. 21.38% of participants answered right all questions regarding knowledge and 37.19% followed all preventive measures. Findings show that safe practices regarding COVID-19 depend on right knowledge. Gender influences knowledge mainly through its influence on education. Vulnerability is given by women's reduced access to education. The SDH approach provide with an exploratory explanation and some recommendations aimed at local authorities. Access to education for all men and women must be improved to increase health practices and better deal with future health crises.

Introduction

On March 11th 2020, the WHO declared COVID-19 a global pandemic.[1] Since then, SARS-CoV-2 has spread across five continents, causing nearly 3 million deaths.[2] However, there are important differences in the virus spread, clinical course, and mortality between countries.[3,4] It is a well-reported fact that the disease does not affect all populations equally.[5] In this regard, Sub-Saharan Africa is a case worth considering due to its unique demographic and health circumstances.[6,7] Until now, questions remain about the real impact of COVID-19 in this particular region.[8] A comprehensive approach to COVID-19 is therefore urged, one that takes into account the contexts of people's lives, social environment, as well as the emotional, financial, political and cultural contexts in which people live.

The study of Social Determinants of Health (SDH) offers a holistic framework to the design of effective measures against COVID-19, appropriately adapted to different socio-cultural contexts.[9] SDHs are those conditions in which people are born, grow up, work, live and age, and the broader set of forces and systems that shape daily life's conditions and ultimately, their health.[10] Commonly cited SDH are political institutions, income, housing, neighbourhood, and working conditions. However, among the most important determinants, gender and education have been identified as crucial elements that determine people's social position and, therefore, have a significant impact on their life conditions and health.[11]

In this paper, we focus on SDH in the Republic of Chad, one of the poorest countries in Africa, where life expectancy at birth is 55.7 years for women and 52.8 for men.[12] Regarding the impact of COVID-19, Chad reported 4,828 confirmed cases and 170 deaths as of May 4th, 2021.[13] These figures must be read in light of a non-systematic testing policy, high mortality compared to other countries (3.6%), and no COVID-19 vaccination campaign to date.[14] In addition, one should consider the impact of COVID-19 on persistent health issues (such as malaria, malnutrition, AIDS, etc.)[15] and its social and economic effect in a country that ranks 187 out of 189 in the Human Development Index.[12]

Using SDH as framework, we explore which determinants can explain the differences in health practices as regards COVID-19 prevention, to propose recommendations that allow communities to better face this and future health crises.

Materials and methods

Study design and population

We designed a cross-sectional study using a convenience sampling technique.

The structured questionnaire and the respondents' consent form were drafted by a group of health professionals at the University Hospital Complex 'Le Bon Samaritain', N'Djamena. The study was conducted between May and August 2020, a period in which the Chadian government implemented numerous preventive measures and policies in order to mitigate the spread of SARS-CoV-2.[16]

The study population included individuals living in N'Djamena at the time of the survey who were 18 or older and could provide informed consent. Study participants included the population close to the hospital, representing potential users. Recruitment occurred in the same hospital (including patients, relatives and caregivers) and in the surrounding neighborhoods. A total of 50 interviewers conducted an average of 50 surveys each. Interviewers were health students trained in the informed consent process and conducting surveys. They received specific instructions designed by local experts on how to act in order to vary the sample of participants based on sex (male, female) and age. 2,269 participants accepted and completed the

whole survey. 61 surveys were not entirely completed and were therefore discarded from the final analysis. The final number of surveys used represents approximately 10% of patients treated in one year at the University Hospital Complex 'Le Bon Samaritain', N'Djamena.

Ethical considerations

This study was reviewed and approved by the institutional authorities. Participation in this study was anonymous, consensual and voluntary, for which ORAL informed consent was provided by all prospective respondents.

Measures

The survey instrument used in this study was designed according to the recommendations for awareness and prevention of COVID-19 described by WHO guidelines.[17] The questionnaire was designed by a group of health professionals from the University Hospital Complex 'Le Bon Samaritain'. Then, a group of experts, consisting of 10 Chadian health professionals, including men and women, reviewed the questionnaire, in order to achieve *expert's validation* as a first step of a psychometric process.[18] These experts made suggestions regarding the accuracy of the test in evaluating knowledge, attitudes, and practices relative to COVID-19, as well as the appropriateness of the questions based on the study population.

The final instrument designed for this study contained questions assessing sociodemographic information along with general knowledge, attitudes and practices regarding COVID-19. Based on the planned behavior theory, we assume that knowledge and attitudes have an impact on health practices.[19] Sociodemographic variables included age, gender, marital status, level of education, occupation, and work situation. Occupation was analyzed independently and was transformed into a dichotomous variable (precarious job) following the advice of local experts. The 'knowledge' section included 5 items surveying awareness of COVID-19, sources of information, causes, modes of transmission, symptoms, individuals at risk and preventive measures. The 'attitudes' section comprised 3 items

including attitudes towards COVID-19 preventive measures, feelings and adaptive measures towards the pandemic, and perceptions towards the COVID-19 pandemic. The 'practices' section included 4 items such as adherence to government disease prevention orders, use of face masks, and the appropriate ways for coughing and sneezing.

Statistical analysis

Descriptive analysis was made for demographic variables, using mean and standard deviations. Associations between variables were analyzed with t-tests. Four regression models were built to assess the relationship among variables, based on a theoretical model of Social Determinants of Health.[11] These models were compared with each other through adjustment metrics using RMSEA and CFI. R software version 4.0.4 (R Foundation for Statistical Computing, Vienna, Austria) was used to carry out the statistical analysis.

Results

The survey was completed by 2,269 participants who accepted participation. The mean age of the participants was 31.04, 61.52% were male, and 40.55% had precarious jobs. More demographic characteristics of the participants are shown in Table 1. Participants' answers regarding knowledge (right/wrong), attitudes (positive/negative) and practices (safe/unsafe) are shown in Table 2. General results on knowledge, attitudes and practices in N'Djamena, Chad, have been presented elsewhere.[20]

The correlation coefficient between the variables is shown in Table 3. RMSEA and CFI values of the models are shown in Table 4. These results suggest that model 4 is the one that better explains the differences in practices related to COVID-19. However, due to the close values of RMSEA, a chi^2 test was performed as a confirmatory test to compare models, confirming that selection of model 4.

According to model 4, safe practices regarding COVID-19 depend on right knowledge and positive attitudes towards protection. Besides, positive attitudes are in

Table 1. Demographic characteristics.

Characteristics	N (%)
Age (years); mean (SD)	31.04 (10.96)
Gender (female)	873 (38.48)
Marital status	
Married	1,047 (46.14)
Single	1,018 (44.87)
Widowed	109 (4.8)
Divorced	95 (4.19)
Educational level	
Never attended	228 (10.05)
Primary	274 (12.08)
Secondary	789 (34.77)
Higher education	978 (43.1)
Occupation	
Student	999 (44.03)
Trader	312 (13.75)
Employee	260 (11.46)
Executive	90 (3.97)
Peasant	55 (2.42)
Housekeeper	175 (7.71)
Unemployed	215 (9.48)
Craftsperson	163 (7.18)
Precarious job (yes)	920 (40.55)

Table 2. Knowledge, attitude and practices.

	Number of correct/negative answers (%)					Total
	0	1	2	3	4	
Knowledge	356 (15.69)	636 (28.03)	792 (34.91)	485 (21.38)	-	2,269
Attitudes	157 (6.92)	590 (26)	975 (42.97)	547 (24.11)	-	2,269
Practice	44 (1.94)	327 (14.41)	366 (16.13)	688 (30.32)	844 (37.19)	2,269

Table 3. Correlation coefficient between the variables.

	Age	Sex	Education	Precarious job	Knowledge	Attitudes
Age						
Gender	0.00					
Education	-0.23**	-0.23**				
Precarious job	-0.35**	-0.12**	0.44**			
Knowledge	-0.09**	-0.16**	0.44**	0.27**		
Attitudes	0.00	-0.02	0.12**	0-10**	0.16**	
Practice	-0.10**	-0.06*	0.31**	0.24**	0.24**	0.14**

p<0.0001**, p<0.01*.

Table 4. Statistical analysis of the models.

	DF	RMSEA	UPPER RMSEA	LOWER RMSEA	CFI	AIC	BIC
Model 1	6	0.119	0.106	0.134	0.780	18478.63	18530.18
Model 2	7	0.204	0.191	0.217	0.551	24667.42	24730.42
Model 3	6	0.119	0.106	0.134	0.870	27388.83	27469.01
Model 4	5	0.116	0.101	0.132	0.898	27347.86	27433.77

turn influenced by knowledge, making the latter the most important factor to explain safe practices. Knowledge, on the other hand, is related to educational level, job precariousness and gender. Remarkably, the effect of gender on knowledge is mainly through its influence on education, and the direct effect of gender on the level of knowledge has a factor of 0.128, *i.e.*, 3.5 times less than the effect of education on the level of knowledge (0.449). Regarding job precariousness, a relevant factor explaining knowledge and practices, gender again has an effect through differences in education. These results show that a well-educated woman in Chad has the same kind of job as a well-educated man, and a similar level of knowledge. Hence, in this context, reduced access to education is the most important factor rendering women more vulnerable than men. This model and the coefficients are shown in Figure 1.

Figure 1. Model 4 explaining the interaction between the social determinants of health and knowledge, attitudes and practices regarding COVID-19.

Discussion

According to our findings, health care practices regarding COVID-19 are primarily affected by the population's educational level. In other words, education is a more determining factor for health practices in relation to COVID-19 than gender or the type of job by themselves. Our study suggests that a well-educated woman in Chad would have a similar kind of job as a man in terms of precariousness. Therefore, vulnerability is given by women's reduced access to education. Once that barrier is overcome, women would have a man-like vulnerability. These findings are consistent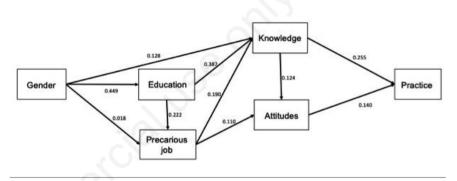 with the literature on SDH.[9, 21] Studies on health inequalities confirm that people with a lower level of education, lower occupational status or lower income tend to live shorter lives and have a higher prevalence of diseases.[22] Our results are particularly relevant, as a specific goal of the Global Commission on SDH set out to promote programs that address key determinants of women's health. In this case improving access to education would be the most suitable alternative.[23]

In the context of the current pandemic, our findings highlight the importance of SDH in understanding the health practices of the population. However, the causal pathways through which SDH affect people's health are not yet fully elucidated. SDH have been organized in many different models, from linear in shape to more organic and complex in structure.[24] According to our study, Chadian women are in a worse-off position compared to men and this effect is mostly due to differences in education. Remarkably, once this barrier is overcome, women's disadvantage is significantly reduced. These women face a significant barrier regarding education and the level of literacy among women is half that of men (57.6% for men and 28.1% for women).[25] Moreover, there is a huge difference in mean years of schooling, only 1.3 for women compared to 3.8 for men.[12] However, the well-educated Chadian women may constitute a particular group who has been able to challenge other cultural norms and may even reach important governmental positions. Before the current political crisis, 26% of cabinet members were women.[26] In the UK, on the other hand, both genders have the same years of schooling, 13.2,[27] but only 21.7% of cabinet positions are held by women.[26] These data may challenge some of the common views and beliefs regarding Muslim and African societies. Furthermore, the causal pathway that we propose reinforces the argument that SDH have an effect on people's health and, therefore, health actions should entail social actions. Our findings show that women are particularly vulnerable to

COVID-19 and public (health) policies should be designed to overcome this issue. However, our model was constructed based on data gathered in Chad and this causal pathway may not be applicable to other social and cultural contexts.

Along these lines, health workers should advocate for the population's access to education. Likewise, public health policies should go beyond the usual hospital environment and influence other areas such as education or employment, but these actions should be based on current local information and knowledge. Strategies that work in one country may not bring about the expected outcomes in another. Local problems demand local solutions. To acknowledge the role that social disparities, play in health inequalities is consistent with the well-known saying of Virchow: Public health is politics, medicine is a social science, and politics is nothing else but medicine on a large scale.[28]

Strengths and limitations

Some of the strengths of this study correspond to its novelty in a developing country such as Chad, following internationally standardized methodological criteria. The statistical model independently analyzes the role of gender, education and job insecurity. Our results shed light on which aspects should be prioritized to achieve successful preventive policies. In addition, this work can be a contribution to placing the context of sub-Saharan countries in a global discussion on gender and education. The main limitation of this study is that participants represent only a geographical area of Chad, who live in the city of N'Djamena, so it is difficult to extrapolate the results to communities that live in rural areas of the country.

Conclusions

The findings of this study highlight the urgency of driving community health strategies that go beyond biomedical aspects. In the global health crisis that we are currently facing, efforts to find adequate vaccines and treatments against COVID-19 have been the priority on the health research agenda. However, health strategies reduced exclusively to immediate biomedical aspects are not enough. It is necessary to design long-term strategies that allow populations to better face this type of crisis, and the SDH provides us with useful information in this regard. Hence, the health sector is increasingly appealed to engage in strategies that include social and community aspects, such as contributing to educational and gender equality programs.

Many questions and challenges open up in the light of our study. On one hand, they point out new necessary elements for a responsible health practice in a developing country. On the other hand, they call for deeper reflection on potential solutions that are respectful and sensitive to local realities, even recognizing internal heterogeneity within any country.

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