



## Research article

## Health belief model and behavioural practice of urban poor towards COVID-19 in Nigeria

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## ABSTRACT

Poor adherence to promoting health behaviours is a significant challenge for prevention and management of infectious respiratory diseases. Non-pharmaceutical Interventions (NPIs) remain a proven behavioural practice for reducing the spread of the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) currently ravaging the world. Studies on Covid-19 have primarily focused on epidemiology, virology, and potential drug treatments to the neglect of behavioural practice of low-income settings. This study examines the extent health belief model predicts the behavior of 405 urban poor residents of Ogun State, which recorded the first index case in Nigeria, towards adoption Covid-19 NPIs. A cross-sectional study was conducted to find out the relationship between study participant characteristics, HBM constructs and unhealthy behavior. Study constructs were assessed on a four point Likert scale and were mean aggregated such that higher scores indicated stronger feelings about a construct. Findings shows that urban poor in the age group 30–40 years were more likely to feel susceptible to contracting Covid-19 (mean score: 2.59 and std. dev. 0.54), they also had a higher perception of the benefit of Covid-19 preventive behaviours than participants in other age groups (mean score: 2.95 and std. dev. 0.71). Also, the most prevalent unhealthy behaviour amongst urban poor residents was the indiscriminate use of facemasks as shown by almost half (47.6%) of participants who agreed that they use facemasks all the time even when alone. The study concludes that though urban poor residents feel threatened by Covid-19, nexus of factors such as low financial earnings, inadequate knowledge, and limited access to basic medical needs hamper the effective adoption of NPIs.

## 1. Introduction

The burden of severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) pandemic is high, exerting both morbidity and mortality effect on the human population. Africa currently is the least infected globally in terms of the number of cases and mortality rate, as compared to Asia and Europe (Lone and Ahmad, 2020); however, the International Rescue Committee has observed that cases in the continent have increased by 500% within two months (IRC, 2020). Hence the World Health Organisation has warned that Africa could be the next epicentre of the disease. Months after Nigeria experienced her first index case on February 27, 2020, the number of infected persons has risen to 60,655 and 1,116 deaths (NCDC, 2020).

While there are approved vaccines, international health bodies still recommend Non-pharmaceutical Interventions usage, especially with the

challenge low production of vaccine globally (WHO, 2019a; 2019b). Non-pharmaceutical interventions (NPIs) are the key pandemic and epidemic countermeasures readily available at all times and in all countries. They are often the most available interventions at the occurrence of a pandemic as a result of or limited antiviral drugs and delays in vaccine development (Aledort et al., 2007). Studies have shown the effectiveness of NPIs in flattening the curve, reducing the peak of infection and overall decreasing mortality rate (Adams et al., 2015; Markel et al., 2007; Rajagopaian et al., 2020).

NPIs for Covid-19 include individual protective measures (hand hygiene, respiratory etiquette, face mask); environmental measure (surface and object cleaning); social distancing measures (school closure, workplace closure, crowd avoidance); and travel-related measures (entry and exit screening, internal travel restrictions and border closures) (WHO, 2019a). Studies have further noted that adoption and adherence to these

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NPI guidelines for Covid-19 would effectively control and eliminate the virus in any society (Cheatley et al., 2020; Davies et al., 2020; Ngonghala et al., 2020).

Non-Pharmaceutical measures are fundamentally essential in societies with poor health systems, especially Low and Lower-Middle-Income Countries (LICs), which will be overwhelmed if the disease widely spreads. However, the success of these NPIs depends on widespread compliance, which could be more challenging to achieve in LICs than in other parts of the world.

Adoption and adherence to non-pharmaceutical interventions have been directly associated with some Social Cognition Models (SCMs), which postulates beliefs and attitude as fundamental determinants of behavioural practices (Armitage and Conner, 2000; Jones et al., 2014). One of such is the Health Belief model, which is adopted for this study. Health belief model (HBM) is one of the most used theories in health literacy endeavours (Glanz and Bishop, 2010; Glanz et al., 2002; Janz and Becker, 1984; Rosenstock, 1966). The HBM was developed in the 1950s by social psychologist researchers working at the United States Public Health Service to find out the apathy depicted by people in public health programmes such as tuberculosis and cervical cancer screening (Rosenstock, 1974; Rosenstock et al., 1988).

The HBM states that for a change in health behaviour to happen, three variable factors must be present. An individual must feel endangered by his/her current behaviour; such a person must perceive the specific benefits (value-adding outcome) from a change of behaviour; and must feel his or her competency to implementing the recommended change (Rosenstock, 1974; Rosenstock et al., 1988). The factors that influence health behavioural actions, according to Rosenstock (1974), are Perceived susceptibility, which deals with an person's risk perception of contracting a disease, in this study Covid-19. The HBM seeks to find out, considering all the risk factors, the likelihood of being infected with the virus. Basically, factors refer to an individual's subjective perception of the risk of contracting a condition (Janz and Becker, 1984). Perceived severity is the individual's evaluation of medical disease consequences such as death, impotence, and organ disruption as well as possible social and economic implications concerning family life, social relations, and education. Questions may consist of: If I got Covid-19 disease, how serious would that be? How many more years do I have left on earth? Will I still perform my social responsibilities?

Perceived benefits is another component of HBM. While the factors of susceptibility and severity might have awoken individual's notion about a disease, they may fail to provide feasible and effective benefits to changing behaviours. To this end, the perceived benefit of action highlights the benefits embedded in taking action towards a disease. Perceived barriers are suspected adverse effects of undertaking prescribed and recommended health actions. To this end, an individual performs an analysis of the perceived benefits against some perceived difficulty of health behavioural programmes. Such perceived barriers could include cost, side effect, time effect, and inconvenience. Consequently, the combination of susceptibility and severity level according to Rosenstock (1974), provides the energy to act and the perception of benefits (fewer barriers) provided a preferred path of action."

The last of the HBM component considered in this study is the Cue to action/Stimulus. This are motivating elements (internal and external) that can influence the behavioural change of an individual towards the adoption a behavioural change practices (Becker, 1974; Cummings et al., 1980; Janz and Becker, 1984; Rosenstock et al., 1988). The internal cues are usually personal symptoms and inner feelings (Janz and Becker, 1984), while the external cue factors are disease awareness contents on mass media such as broadcast media campaigns, newspapers articles, as well as interpersonal communication networks made possible by health professionals, non-governmental organisations, and disease control and prevention agencies. The last element of Self efficacy which is an individual's confidence in his or her ability to effectively perform a behavior. This construct was added to the model in mid-1980. This was

however not considered in this study because as observed by Carpenter (2010) in actuality, self-efficacy is rarely included in HBM studies.

Scholars have tested the effectiveness of the HBM component on different issues and settings globally. Blavos, Glassman, Sheu, Diehr, and Deakins (2014), utilized the Health Belief Model to examine perceived barriers and benefits college students have towards medical amnesty. The researchers employed a survey method with 369 students. The result showed the likelihood of the students during an overdose seeking help when the situation is perceived life threatening with few barriers. Hence the result revealed the usefulness HBM in explaining medical amnesty intentions among students population.

Also, Chen et al. (2011), in a cross sectional study, applied the HBM to find out factors in the decision by caregivers to vaccinate their children for influenza. The study, through regression analysis shows the predictors of vaccination as demographic characteristics such as age, employment, and residence of the caregiver. Other predictors were children's susceptibility to influenza, perceived benefits of vaccinations to children, perceived barriers to vaccinations, and cues to action.

Mirzaei et al. (2021) carried out a cross-sectional study among 558 adult samples in Iran to investigate the predictor of Covid-19 preventive behaviours with the aid of the Health Belief Model. Findings from the result showed that components of the HBM predicted 29.3% of the pCovid-19 preventive behaviours. Although in the perceived benefits, and barriers majorly predicted the preventive behaviours, HBM components such as perceived susceptibility and severity were not significant in the regression model.

Although health belief model has been found by previous studies to predict health behaviours for diseases such as breast cancer, tuberculosis, Human Immunodeficiency Virus, Acquired Immunodeficiency Syndrome, use of condom (Ellingson and Yarber, 1997; Montanaro and Bryan, 2014; Tarkang and Zotor, 2015; Tola et al., 2016), considering the novel nature of Covid-19, there is a paucity of data on how health belief model predicts the behaviour of people towards peoples adoption Covid-19 non-pharmaceutical interventions in low-income settings.

## 2. Methodology

### 2.1. Study participants

The study was conducted in Ogun State, where the first index case of Covid-19 in Nigeria was recorded. Ogun State is one of the six South-West states in Nigeria with a total land area of 16,981 km<sup>2</sup> and an estimated population of 7.1 million people (OGS, 2020), though the National census in 2006 reads 3.75 million (Idike and Eme, 2015). Specifically, participants for the study were drawn from the Ado-Odo/Ota Local Government Area. An area noted by the Nigeria Centre for Disease Control to have the highest recorded cases of Covid-19 infection in the State (NCDC 2020). The characteristics of urban poor in this study is according to indicators of the Human Rights Council Advisory Committee in their research on the Promotion of Human Rights of the Urban Poor: Strategies and Best Practices (Chung, 2012). The conditions are food insecurity and low food quality, limited employment opportunities, unequal education opportunities. Others are poor housing, poor sanitation, poor health, and insecurity. The questionnaire items were developed from the HBM components. The measurement items for unhealthy behavior were also developed in line with HBM components. Furthermore, the four point likert scale was employed to avoid response style bias (Dolnicar et al., 2011), especially considering the nature of this study.

### 2.2. Sampling procedure

The multistage sampling technique was employed in delimiting the population into a manageable size. The local government area (LGA) consists of 16 wards, with only five classified as urban, while 11 were

classified as rural or semi-urban (Azuh and Chinedu, 2014). All five urban wards were used as the study locations. Since there was no sampling frame of reach of the communities of the whole five wards, a sampling size determination technique adequate for an infinite population was employed to determine the sample size for the study.

$$n = \left( Z \frac{(d - c)}{(2e)} \right)^2$$

where Z represented the normal distribution curve value (1.96) and 'd' and 'c' stood for probability function for the incidence of Covid-19 infection and absence of the virus, represented by 1 or 0. The e is the error term.

$$= \frac{[1.96(1 - 0)/(2*0.05)]^2}{\equiv} [1.96/0.1]^2 = 384.$$

Thus, a total sample of 384 was estimated for each of the five wards. However, due to funding constraints and movement control, a quarter of this number (96) was selected from each of the locations, totalling 384.

In each enumeration area, respondents were selected following systematic sampling approach within an interval of 1–5 houses. Given our determined sample size as 405 and a random selection of five wards, a total of 81 respondents were selected from each of the ward (i.e.  $81 * 5 = 405$ ). However, since each ward has an average of 400–500 households (Adekola et al., 2019; Adesina et al., 2018; Adeyeye et al., 2021), our sampling interval becomes 400/81 (using the minimum number of household i.e. 400). This resulted into a sampling interval of approximately five houses. The procedure followed a systematic selection in a ratio of 1:5. That is, after selecting the first house, a gap of five houses are left. Hence the next possible selected house is the 6<sup>th</sup> house and so on, until the 81<sup>st</sup> is selected in the ward. This exercise was repeated in the remaining four wards. In each of the house, only willing head or available elderly one in the household was selected. Overall, the total sample size is 405.

In each of the household, prospective participant's consent was sought and only those that volunteered to participate were interviewed, where the permission for the interview was not granted, the next household or participant in the next available house were interviewed.

### 2.3. Data analysis and procedure

All items of the HBM (perceived susceptibility, perceived severity, perceived benefits, perceived barrier, and cues to action) subscales had four-point Likert-type response and were scored as follows; strongly disagree (1), disagree (2), agree (3), strongly agree (4). Subscales were then aggregated by taking the average score of all items. Higher average scores indicate stronger feelings about a construct. i.e., a higher score under susceptibility implies respondent perceives themselves as being more susceptible to coronavirus.

Scales were checked for normality using the Shapiro-Wilk test, the difference in the distribution of constructs by demographics was assessed via Mann-Whitney test or Kruskal Wallis test. *P* values < 0.05 were accepted as statistically significant.

## 3. Results

### 3.1. Characteristics of study participants

A total of 405 persons participated in this study. The characteristics of the study participants are presented in Table 1. Participants were mostly between the ages of 20–40 (60.50%), male (58.02%) and married (57.04%). Majority of participants also had secondary education (57.28%) and were employed (68.89%). In addition, majority of the sampled population (30.4%) earned between 12,500 Nigeria Naira (32 US Dollars) and 15,000 Nigerian Naira (39 US Dollars) monthly.

Table 1. Study participant demographics.

	Count	Column N %
Age	Below 20 Years	48 11.85%
	20–30Years	127 31.36%
	30–40 Years	118 29.14%
	40–50 Years	88 21.73%
	55 Years and Above	24 5.93%
Period of residing at this residence	Less than 12 Month	121 29.88%
	1–2 Years	129 31.85%
	3–4 Years	50 12.35%
	5 Years and above	105 25.93%
Gender	Male	235 58.02%
	Female	170 41.98%
Marital Status	Single	167 41.23%
	Married	231 57.04%
	Divorced/Separated	7 1.73%
Main occupation	Informal Sector	184 45.43%
	Self Employed	95 23.46%
	Unemployed	45 11.11%
	Other	81 20.00%
Highest Educational Qualification	Primary	33 8.15%
	Secondary	232 57.28%
	Tertiary	140 34.57%
Monthly Income Level	3000–5000	25 6.17%
	5000–7500	92 22.72%
	7500–10000	42 10.37%
	10000–12500	95 23.46%
	12500–15000	123 30.37%
	15000–17500	23 5.68%
	17500 and Above	5 1.23%

### 3.2. Relationship between study participant characteristics and HBM scale

Table 2 shows the relationship between participant demographics and HBM scale. Persons in the age group 30–40 years were more likely to feel susceptible to contacting COVID19, they also had a higher perception of the benefit of COVID19 preventive behaviours than participants in other age groups. There was, however, no statistically significant association between any of the HBM measures and age group of participants. Male participants were more likely to feel strongly about all HBM measures assessed in this study than the female participants. There was a statistically significant association between perception of severity and gender.

Perceived severity increased with the level of education with persons having tertiary education being more likely to perceive the COVID19 disease as being more severe than persons with lower educational qualifications. The relationship between perceived severity and educational qualification was, however, not statistically significant. Participants earning 7500–10,000 were more likely to have higher perceptions of severity towards COVID19. In contrast, participants earning between 10,000–12,500 were more likely to perceive themselves as being more susceptible to COVID19 as compared to other participants. There was, however, no statistically significant relationship between income and HBM measures.

### 3.3. Unhealthy behaviours amongst participants

Table 3 presents findings for the practice of unhealthy coronavirus preventive behaviours. The most prevalent unhealthy behaviours amongst the study participants was the indiscriminate use of facemasks as shown by almost half (47.6%) of the participants who agreed that they use facemasks all the time even when alone and 33.3% who stated that

**Table 2.** Relationship between sociodemographic characteristics and HBM scale for coronavirus.

		Susceptibility		Severity		Benefit		Barrier		Cues	
		Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation
Age	Below 20 Years	2.52	0.51	2.80	0.62	2.86	0.69	2.52	0.53	2.49	0.79
	20–30Years	2.47	0.58	2.90	0.60	2.94	0.70	2.51	0.54	2.57	0.76
	30–40 Years	2.59	0.54	2.81	0.63	2.95	0.71	2.50	0.57	2.61	0.75
	40–50 Years	2.47	0.53	2.75	0.63	2.84	0.88	2.53	0.64	2.49	0.91
	55 Years and Above	2.51	0.67	2.60	0.52	2.80	0.90	2.54	0.67	2.65	0.83
	<b>P value</b>	<b>0.637</b>		<b>0.167</b>		<b>0.945</b>		<b>0.998</b>		<b>0.877</b>	
Period of residing at this residence	Less than 12 Month	2.54	0.59	2.83	0.61	2.91	0.74	2.50	0.59	2.61	0.78
	1–2 Years	2.50	0.56	2.83	0.63	2.89	0.76	2.57	0.54	2.59	0.77
	3–4 Years	2.46	0.57	2.81	0.66	2.86	0.86	2.35	0.67	2.48	0.94
	5 Years and above	2.52	0.49	2.76	0.59	2.94	0.73	2.54	0.55	2.50	0.79
	<b>P value</b>	<b>0.853</b>		<b>0.669</b>		<b>0.956</b>		<b>0.246</b>		<b>0.621</b>	
Gender	Male	2.49	0.54	2.87	0.63	2.93	0.75	2.51	0.55	2.62	0.76
	Female	2.54	0.56	2.73	0.59	2.87	0.77	2.52	0.61	2.48	0.85
	<b>P value</b>	<b>0.183</b>		<b>0.007</b>		<b>0.241</b>		<b>0.990</b>		<b>0.219</b>	
Marital Status	Single	2.49	0.53	2.84	0.64	2.96	0.75	2.51	0.57	2.59	0.81
	Married	2.53	0.57	2.80	0.60	2.88	0.75	2.52	0.58	2.55	0.80
	Divorced/ Separated	2.45	0.72	2.57	0.48	2.36	0.81	2.50	0.81	2.07	0.76
	<b>P value</b>	<b>0.617</b>		<b>0.409</b>		<b>0.051</b>		<b>0.861</b>		<b>0.248</b>	
Main occupation	Civil/Public Servant	2.49	0.59	2.87	0.65	2.98	0.74	2.54	0.61	2.61	0.82
	Self Employed	2.51	0.53	2.72	0.55	2.88	0.70	2.54	0.50	2.55	0.75
	Unemployed	2.52	0.58	2.76	0.58	2.75	0.90	2.51	0.65	2.47	0.79
	Other	2.54	0.48	2.82	0.62	2.85	0.76	2.43	0.53	2.51	0.82
	<b>P value</b>	<b>0.927</b>		<b>0.187</b>		<b>0.174</b>		<b>0.274</b>		<b>0.501</b>	
Highest Educational Qualification	Primary	2.59	0.46	2.62	0.63	2.77	0.81	2.51	0.48	2.52	0.67
	Secondary	2.54	0.54	2.81	0.62	2.94	0.75	2.57	0.60	2.59	0.86
	Tertiary	2.44	0.59	2.85	0.61	2.88	0.75	2.43	0.56	2.52	0.73
	<b>P value</b>	<b>0.242</b>		<b>0.096</b>		<b>0.345</b>		<b>0.066</b>		<b>0.405</b>	
Monthly Income Level	3000–5000	2.66	0.44	2.67	0.59	2.91	0.66	2.66	0.43	2.56	0.83
	5000–7500	2.47	0.58	2.72	0.56	2.77	0.83	2.45	0.59	2.44	0.86
	7500–10,000	2.30	0.61	2.92	0.62	2.73	0.91	2.40	0.54	2.16	0.79
	10,000–12,500	2.57	0.47	2.84	0.58	3.01	0.66	2.64	0.61	2.62	0.75
	12,500–15,000	2.56	0.54	2.84	0.70	3.00	0.71	2.49	0.55	2.74	0.72
	15000–17500	2.43	0.74	2.85	0.54	2.76	0.86	2.42	0.68	2.62	0.95
	17,500 and above	2.47	0.73	2.84	0.17	3.05	0.27	2.67	0.29	2.10	0.49
<b>P value</b>	<b>0.103</b>		<b>0.293</b>		<b>0.214</b>		<b>0.191</b>		<b>0.001</b>		

**Table 3.** Unhealthy behaviours.

	Strongly Disagree		Disagree		Agree		Strongly Agree	
	Count	Row N %	Count	Row N %	Count	Row N %	Count	Row N %
I wear facemask all the time even, when am alone	92	22.7%	120	29.6%	148	36.5%	45	11.1%
I reuse my facemask for more than two days before washing it.	124	30.6%	146	36.0%	83	20.5%	52	12.8%
I reuse my tissue before disposing it	183	45.2%	145	35.8%	48	11.9%	29	7.2%
I take lot of alcohol now to protect myself against Coronavirus	176	43.5%	154	38.0%	44	10.9%	31	7.7%
I use hand sanitizer to rob my entire body	183	45.2%	144	35.6%	58	14.3%	20	4.9%

they use their facemasks for more than two days before washing or replacing it. The least prevalent unhealthy behaviour was to do with the consumption of alcohol to protect against contacting the coronavirus (18.6%).

Practice of unhealthy behaviours varied significantly by age group with persons aged 55 years and above practising unhealthy behaviours as

compared to persons in other age groups. No significant differences were found between the practice of unhealthy behaviour and gender; however, male participants were more likely to indulge in unhealthy behaviours than female participants. Unhealthy behaviours were lowest in persons with tertiary educational qualification as compared to persons with lower levels of education; however, the difference was not statistically

significant. No trend was observed between income and the practice of unhealthy behaviour; however, persons in the highest income bracket were less likely to practice unhealthy behaviours (Table 4).

### 3.4. Relationship between study measures

Table 5 presents the correlation between HBM measures and the practice of unhealthy preventive coronavirus behaviours. The highest correlation was observed between cues to action and perceived benefit. There was a statistically significant positive correlation between cues to action and perceived benefit. Results also showed a positive but weak relationship between perceived barriers and the practice of unhealthy preventive coronavirus practices. Additionally, there was a positive correlation between perceived severity and perceived benefit amongst study participants.

## 4. Discussion

The study focused on examining the health belief model components and the behavioural practice of urban poor residents. To the best of our knowledge, as a result of the novel nature Covid-19, there are paucity data on health belief model and the behavioural practice of people towards Covid-19, especially in the context of urban poor population. In the present study, the result reveals the differences in the susceptibility,

severity, benefit, and cues to action by gender, marital status, occupation, educational qualification, and monthly income of urban poor population.

The relationship between perceived susceptibility and likely adoption of behavioural practice as shown in this study is consistent with findings on changes exhibited in sexual behavior as a response to the threat of HIV infection; childhood vaccination, influenza immunization among elderly, stroke, cancer and diabetes (Chen et al., 2011; Ferebee, 2000; Wang et al., 2009; Yep, 1993; Adesina et al., 2020a). Generally, urban poor residents across all the demographic variables in the study feel threatened by Covid-19; however, the female respondents feel more susceptible. Gender as a demographic variable more often than not has been noted to play a fundamental role in susceptibility perception, with the feminine gender feeling more threatened by disease than their male counterpart (Lee et al., 2015; Olatunji et al., 2012; Tybur et al., 2011). Two significant factors have been attributed to this; firstly, the male gender has been noted to exhibiting more fitness qualities and the higher risk behavior they undertake (Cook and Bellis, 2001; Oaten et al., 2009). Secondly, women tend to be more prepared to avoid disease threats than men as a result of their higher investment of energy in raising children. Consequently, the female gender would likely take on the responsibility of infectious disease protector (Fessler et al., 2005; Fessler and Navarrete, 2003; Adesina et al., 2021).

The perception of individuals, according to their age, also played a significant role in the adoption of behavioral practice. Our study shows that respondents in the age range of 20–30 feel more threatened by Covid-19. Studies conducted on preventive behavior for respiratory infections have demonstrated that age is a significant predictor for the adoption of preventive (Adesina et al., 2020b, c; Lau et al., 2007; Leung et al., 2003; Pawlowski et al., 2008; Taylor et al., 2009).

The role of educational qualification and urban poor perception of HBM construct varies, as shown in this study. For instance, while participants with the least educational qualification feel more threatened by Covid-19, respondents with tertiary qualifications perceive the severity of the disease more. Also, participants with secondary educational qualifications have a higher perception of benefits in engaging Covid-19 preventive behaviours. Kamal, El-Borgy, and Wahba (2017); Louis (2016) have also noted such variances in educational qualification and perception of HBM construct. Again respondents with the lowest monthly income of 3000–5000 Naira see themselves to be more susceptible. This finding is in tune with the result of Costa (2020), which reveals that people with a low-income had greater susceptibility of the coronavirus. Such perception by low-income earners cannot be disassociated from their inaccessibility to Non-pharmaceutical interventions such as face mask, soap, and water.

Unhealthy behavioural practices of urban poor towards Covid-19 is further shown in the study as almost half of the sampled respondents noted that they wear face mask all the time, even when they are alone. Although face mask usage is one of the NPIs being advocated by the World Health Organisation in avoiding droplet transmission of respiratory infections (X. Chen et al., 2020; Sim et al., 2014; WHO, 2020); however, there are some mask-wearing abuse ranging from reusing facemask without washing for days, just using a face mask to cover the chin as against the nose, among others. This finding is in tune with Ogoina (2020), who observed that some people wear face masks irrationally for a long time.

Judy et al. (2020) have submitted that such unhealthy behaviour cannot be disassociated with the meager economic situation of the urban poor population informal workers, as revealed in this study. According to the International Labour Organisation, urban poor population engage in casual works such as domestic work (maids, housekeepers, nannies, care providers); home-based work (subcontractors for factories (garment makers), artisan or craft makers, mechanics/repairers); street vending (food stalls, retail kiosks), construction work, and waste picking (ILO, 2013). Conditions of such engagements, however, come with little wage, hence the inability to afford facemask or maintain it.

**Table 4.** Relationship between unhealthy behaviour and participant characteristics.

		Unhealthy behaviour		P value
		Mean	Standard Deviation	
Age	Below 20 Years	2.02	.55	0.010
	20–30Years	1.96	.69	
	30–40 Years	1.93	.63	
	40–50 Years	1.98	.52	
	55 Years and Above	2.39	.72	
Period of residing at this residence	Less than 12 Month	2.09	.61	0.001
	1–2 Years	2.06	.65	
	3–4 Years	1.76	.59	
	5 Years and above	1.90	.63	
Gender	Male	2.00	.65	0.997
	Female	1.97	.61	
Marital Status	Single	2.02	.66	0.614
	Married	1.98	.62	
	Divorced/ Separated	1.74	.51	
Main occupation	Civil/Public Servant	2.05	.69	0.092
	Self Employed	2.01	.56	
	Unemployed	1.94	.55	
	Other	1.84	.60	
Highest Educational Qualification	Primary	1.95	.52	0.1
	Secondary	2.04	.65	
	Tertiary	1.91	.63	
Monthly Income Level	5000–10000	2.12	.77	0.227
	10000–15000	1.94	.51	
	15000–20000	1.86	.78	
	20000–25000	2.07	.57	
	25000–30000	2.00	.67	
	30000–45000	1.91	.69	
	45000 and Above	1.80	.28	

**Table 5.** Correlation of study constructs.

		Susceptibility	Severity	Benefit	Barrier	Cues
Susceptibility	Correlation Coefficient	1.000				
	Sig. (2-tailed)					
Severity	Correlation Coefficient	-.068	1.000			
	Sig. (2-tailed)	.175				
Benefit	Correlation Coefficient	.052	.304**	1.000		
	Sig. (2-tailed)	.294	.000			
Barrier	Correlation Coefficient	.195**	-.135**	.004	1.000	
	Sig. (2-tailed)	.000	.006	.936		
Cues	Correlation Coefficient	.253**	.374**	.473**	.025	1.000
	Sig. (2-tailed)	.000	.000	.000	.610	
Unhealthy behaviour	Correlation Coefficient	.127*	.032	.051	.134**	.232**
	Sig. (2-tailed)	.011	.527	.306	.007	.000

\* implies significance at 0.05.

\*\* implies significance at 0.01

Unhealthy mask-wearing habits can also be attributed to inadequate knowledge of the urban poor population. The findings of [Yap et al. \(2010\)](#) shows there is a relationship between knowledge and the positive behavioural practice of people towards Non-pharmaceutical interventions for respiratory infections. Specifically, their study reveals that health workers were more compliant with proper mask-wearing as compared to the general population as a result of their first hand dealing with respiratory infections.

Although the Government of Nigeria has approved the administration of Oxford-AstraZeneca and Johnson and Johnson Covid-19 vaccines to populace, however just an estimate of 0.6% of a 202 million population have been vaccinated ([Reuters, 2021](#)). This therefore can be attributed to factors such as vaccine hesitancy as well as poor roll-out mechanism of the vaccine. Adherence to non-pharmaceutical protocols is therefore fundamental, especially for a low-income population such as urban poor.

#### 4.1. Contribution to knowledge

This study contributes to knowledge by filling the empirical gap on urban poor population as it relates to adoption of non-pharmaceutical interventions for Covid-19 prevention. More importantly, such a data as provided in this study can engender the achievement of the Sustainable Development Goal 3 and 11. The growing rate of urban population in Nigeria is disturbing, consequently leading to increased slum dwellers, overburdened infrastructures as well as worsening urban sprawl. The United Nations has observed that the effect of COVID-19 will be most disturbing in poor and densely populated urban area, especially as it will be difficult to follow recommended measures social distancing and self isolation.

#### 5. Limitations of the study

Health belief Model components in this study were limitedly examined vizaviz non-pharmaceutical interventions for Covid-19 as advocated by International health organisations. It is therefore suggested that other studies would examine HBM in relations to vaccine acceptance in the context of urban poor population. This study was also restricted to Ogun State, where the first index case of COVID-19 in Nigeria was recorded. Respondents in other local governments and others states of Nigeria were not included in this study. Including samples from these regions would have further improved the robustness of data, allowing for a richer comparative study and generalizability across the country. Furthermore, this study substantially depended on self-reported data and this is limited by facts that can rarely be independently verified. Consequently, the researcher had to accept the views of the respondents to the interviews

and questionnaires at face value. Self-reported data has several potential sources of biases that serve as limitations to this study.

#### 6. Conclusion

Reducing the global pandemic of Covid-19 will be a mere mirage, if adequate attention is not given to the disadvantaged populations, especially in low-income countries. The Health Belief Model provides a framework for understanding the behavioural practice of people towards Covid19. Such understanding is fundamental in furthering our knowledge of the processes by which cognitive factors determine and modify the adoption of non-pharmaceutical interventions behaviours. Generally, urban poor residents across all the demographic variables in the study feel threatened by Covid-19 however, nexus of factors such as low financial earnings, inadequate knowledge as well as limited access to basic medical needs could hamper the effective adoption of NPIs as being propagated World Health agencies. There is, therefore, an urgent need for government agencies to prioritise investment that will engender the economic activities and jobs of urban-poor. Also, non-government organizations should provide intensive education for the disadvantaged population to adopting healthy behavioural practice for Covid-19 prevention.

#### Declarations

##### Author contribution statement

Evaristus Adesina and Babatunde Adeyeye: Conceived and designed the study; Analyzed and interpreted the data; Wrote the paper.

Olusola Oyero, Darlynton Yartey and Lanre Amodu: Contributed reagents, materials, analysis tools or data.

Emmanuel Amoo: Analyzed and interpreted the data; Wrote the paper.

Kehinde Oyesomi: Contributed reagents, materials, analysis tools or data; Wrote the paper.

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##### Data availability statement

Data will be made available on request.

### Declaration of interests statement

The authors declare no conflict of interest.

### Additional information

No additional information is available for this paper.

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