

Assessment of Knowledge, Attitude and Practice of Non-Pharmaceutical Preventive Measures of COVID-19 in Tafawa Balewa Local Government Area of Bauchi State, Northeast, Nigeria

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Abstract

Background: Non-pharmaceutical interventions (NPIs) are public health strategies designed to prevent and control the transmission of SARS-CoV-2 within communities. Despite the subsequent introduction of vaccines (e.g., AstraZeneca COVID-19 vaccine), NPIs remain among the most effective, accessible, and safe public health measures against COVID-19. These interventions include social distancing, hand hygiene (sanitizers and washing), and the use of face masks. **Objectives:** This study aimed to assess the knowledge, attitude, and practice (KAP) of non-pharmaceutical preventive measures against COVID-19. **Methods:** A descriptive cross-sectional study design was employed among 290 participants aged 18 years and above using multi-stage sampling technique. Simple random sampling by balloting was used to select 20% (4 out of 20) of the wards. Subsequently, four settlements were randomly selected from each chosen ward. Data were collected using a semi-structured, interviewer-administered questionnaire and analyzed using Microsoft Excel and SPSS version 26.0. **Results:** The study revealed high awareness (96.9%) of NPIs, with radio (34.5%) being the primary source of information. The majority demonstrated good knowledge (91.7%), positive attitude (50.5%), and good practice (63.4%) regarding NPIs. A statistically significant relationship was found between knowledge and practice ($p = 0.015$). However, compliance with government stay-at-home orders was low (17.9%), and a majority (64.1%) disagreed with the obligatory lockdown measures. **Conclusion:** Good knowledge, attitude, and practice regarding COVID-19 NPIs were exhibited; a significant gap existed in compliance with specific measures like lockdowns. The study highlights the influence of socioeconomic factors, perceptions, and trust in government on adherence to public health interventions.

Keywords: Knowledge, Attitude, Practice, Non-Pharmaceutical Preventive Measures, COVID-19, Bauchi.

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Introduction

Background

Coronaviruses constitute a family of viruses responsible for illnesses ranging from the common cold to more severe conditions such as Severe Acute Respiratory Syndrome (SARS) and Middle East Respiratory Syndrome (MERS).¹ These viruses are primarily zoonotic, with SARS, for instance, transmitted from civet cats to humans and MERS from dromedary camels.¹ The novel coronavirus, SARS-CoV-2, identified by Chinese authorities on January 7, 2020, is a new strain not previously identified in humans, with human-to-human transmission confirmed.^{1,2} Clinical signs of COVID-19 infection include fever, cough, shortness of breath, and breathing difficulties, with severe cases potentially leading to pneumonia, multi-organ failure, and death. The incubation period ranges from 1 to 14 days, primarily 5-6 days, and asymptomatic transmission is possible.²

Sub-Saharan Africa experienced a relatively delayed onset of the pandemic, with Nigeria reporting its first case in late February 2020.³ Despite early implementation of preventive measures, the virus spread significantly; by mid-August 2020, Africa had recorded over one million cases and more than 24,000 deaths.⁴ Nigeria emerged as one of the top 10 African countries with high incidence rates.⁵ By late June 2020, Bauchi State in North-East Nigeria had recorded approximately 500 cases, with a notable proportion among children.⁶

Globally, the World Health Organization (WHO) reported over 5.8 million cases and more than 360,000 deaths by May 30, 2020.⁵ In the early stages of the outbreak in China, 18.5% of patients developed severe disease characterized by acute respiratory distress syndrome and septic shock.⁷ The pandemic's socioeconomic impact has been profound,

with surveys indicating that over two-thirds of African populations risked food shortages and half would deplete their savings within a week of lockdown.⁸

Sub-Saharan African countries face particular vulnerability due to fragile health systems resulting from conflicts, delayed post-military reforms, corruption, and healthcare worker emigration.^{9,10} Nigeria exemplifies these challenges, ranking poorly in healthcare system integrity among Anglophone West African countries.¹¹ Political transitions frequently change health ministry leadership, often without consideration of technical competence, while funds allocated for healthcare reform face diversion, and government officials frequently engage in medical tourism.¹² These systemic issues contribute to a high burden of chronic diseases, predisposing populations to severe COVID-19 outcomes.¹³

The pandemic's impact has been particularly acute in North-East Nigeria, a region already grappling with insecurity, violence, and social exclusion following over a decade of conflict. By March 2020, approximately 7.9 million people in the region required life-saving assistance, including internally displaced persons and individuals with disabilities.¹⁴

Non-pharmaceutical interventions (NPIs) have proven effective in reducing SARS-CoV-2 transmission across various contexts.¹⁵⁻¹⁸ These measures include social distancing, school closures, travel restrictions, and face mask use in public spaces. Beyond COVID-19, NPIs may also reduce transmission of other respiratory infections.^{19,20} Understanding the impact of NPI implementation on these infections remains crucial for assessing broader public health implications, particularly when considering relaxation of such measures.

Africa possesses certain demographic and climatic advantages in managing the pandemic. As the world's youngest continent with a median age below 20 years, Africa's population may experience milder disease manifestations compared to older populations.^{4,21} Early data from China indicated that most COVID-19 deaths occurred among adults aged 60 years and above or those with underlying health conditions. Only 3% of sub-Saharan Africa's population exceeds 65 years, compared to approximately 12% in China. Climatic factors, particularly air temperature, may also influence viral transmission patterns, with respiratory viruses typically spreading more readily during cold rainy seasons.⁴

In Nigeria, the Federal Ministry of Health, in collaboration with the Nigeria Centre for Disease Control (NCDC) and the National Primary Health Care Development Agency, implemented comprehensive risk communication strategies.²² These included cascade training for health facility workers, traditional leaders, and religious leaders on public health messaging, case identification, and reporting protocols.²² The National Emergency Operations Centre, supported by partners, coordinated response activities and strengthened preparedness capacity nationwide.²³

Nigeria demonstrated early preparedness by initiating planning approximately one week after China's initial case reports, drawing on experiences from previous epidemics including Ebola, Polio, and Lassa fever.^{24,25} Significant financial investments were made in preparedness and surveillance through federal initiatives and the Nigerian Private Sector Coalition Against COVID-19.²⁶ The Presidential Task Force on COVID-19 coordinated daily reviews of national response strategies and implementation activities. Deployed NPIs included stay-at-home orders, travel restrictions, border controls, rapid response teams, health

worker training, intensified risk communication, enhanced surveillance, case identification, isolation protocols, diagnosis, contact tracing, and monitoring of persons of interest.^{27,28} This study aimed to assess knowledge, attitude, and practice regarding non-pharmaceutical preventive measures for COVID-19 among residents of Tafawa Balewa LGA, Bauchi State.

Methodology

Study Area

The study was conducted in Tafawa Balewa Local Government Area (LGA), located in the southern part of Bauchi State, North-east, Nigeria, at latitude 9°45'21.77"N and longitude 9°33'22.4"E. The LGA headquarters is situated in Bununu town. Tafawa Balewa borders Plateau State to the southwest, Bogoro LGA to the south, Gombe State to the east, Alkaleri LGA to the northeast, Bauchi and Dass LGAs to the north, and Toro LGA to the northwest. The name "Tafawa Balewa" derives from two corrupted Fulani words: "Tafari" (rock) and "Baleri" (black). The area has historically experienced sectarian and ethnic violence, leading to relocation of the LGA secretariat from Tafawa Balewa town to Bununu. Major ethnic groups include the Sayawa (majority in towns and surrounding villages) and Hausawa/Fulani, with traditional rulers predominantly from the Muslim Fulani ethnic group. Districts within the LGA include Tafawa Balewa, Bununu, Bula, Danjiri, Dull, Kardam A, Kardam B, Lere South, Lere North, Tapshin, and Ball.

According to the 2006 National Population Census, Tafawa Balewa LGA had a population of 219,988. Using national population growth rates for 2007-2020, the projected population for 2020 was 318,113.²⁹ The region's primary economic activities are farming and trading. Educational infrastructure includes numerous primary and secondary schools, with the National Open University of Nigeria as the major tertiary institution. Two

secondary health facilities are located in Tafawa Balewa and Boto towns, complemented by numerous primary health centers and clinics across all wards and settlements.

Study Design

A descriptive cross-sectional study design was employed for this study.

Study Population

The study population comprised residents of Tafawa Balewa LGA aged 18 years and above who consented were included and those that were critically ill or absent during data collection were excluded.

Sample Size Determination

Sample size was calculated using Fisher's formula:

$$n = Z^2pq/d^2$$

Where:

- n = minimum sample size required
- Z = standard normal deviate at 95% confidence level = 1.96
- d = desired precision = 5% (0.05)
- p = 22% (0.22) from previous studies³¹
- $q = 1 - p = 0.78$

$$\begin{aligned} n &= (1.96)^2 \times (0.22 \times 0.78) / (0.05)^2 \\ n &= 3.8416 \times 0.1716 / 0.0025 \\ n &= 0.6592 / 0.0025 \\ n &= 263.68 \approx 264 \end{aligned}$$

To account for anticipated non-response, the minimum sample was increased by 10%:
 $n = 264 + (10/100 \times 264) = 264 + 26.4 = 290.4 \approx 290$ respondents

Sampling Technique

A multi-stage sampling technique was implemented as follows:

Stage 1: Selection of LGA

One LGA was selected using simple random sampling by balloting.

Stage 2: Selection of Wards

Four wards were selected using simple random sampling by balloting, the selected wards are as follows:

1. Dull Ward
2. Lere North Ward
3. Morno Ward
4. Kardam Ward

Stage 3: Selection of Settlements

Four settlements were selected from each selected ward using simple random sampling by balloting:

Ward	Settlements
Dull	Taki, Budbin, Targal, Dutsen Gogu
Lere North	Lere, Sikdi, Shehu, Maigemu
Morno	Kwabtin Rimi, Zari, Daranji, Karwasa
Kardam	Kardam, Mursum, Kundum, Tarji

Stage 4: Selection of households

House numbering was conducted in selected settlements. The total population of each settlement was determined, and proportionate allocation of questionnaires was performed based on settlement population. Sampling intervals were calculated using respective settlement sample sizes and populations. The first household was determined using a random number table.

Stage 5: Selection of Respondents

. Respondent that satisfied the criteria was interviewed. A total of 290 questionnaires were administered

Study Instrument

Data were collected using semi-structured, interviewer-administered questionnaires comprising both closed-ended (multiple choice) and open-ended questions. The questionnaire was organized into four sections:

Section A: Socio-demographic characteristics of respondents

Section B: Knowledge of non-pharmaceutical COVID-19 preventive measures

Section C: Attitudes toward non-pharmaceutical COVID-19 preventive measures

Section D: Practices regarding non-pharmaceutical COVID-19 preventive measures

Data Collection Methods

Pre-tested (10%) of the questionnaire, interviewer-administered questionnaires were utilized for data collection. The questionnaire was pre-tested in a non-selected ward to assess clarity, relevance, and feasibility, with necessary modifications made before final administration.

Data Management and Analysis

Measurement of Variables

Dependent Variables: Knowledge, attitude, and practice regarding non-pharmaceutical COVID-19 preventive measures.

Independent Variables: Age, sex, occupation, educational status, marital status, ethnicity.

Statistical Analyses

Data were analyzed using SPSS version 26.0. The following statistical tools were employed:

Frequency distributions and simple percentages; Mean scores and standard deviations; Pearson's correlation coefficient for the relationship between knowledge and practice (significance set at $p < 0.05$); while knowledge, attitude, and practice scores were categorised as "good" or "poor" based on mean scores. Respondents scoring above the mean were classified as having good

knowledge/attitude/practice, while those scoring below the mean were classified as having poor knowledge/attitude/practice.

Ethical Considerations

Ethical clearance was obtained from the Health Research Ethics Committee of Ministry of Health. Permission was secured from the head of each selected ward. All data collected were treated with utmost confidentiality. Signed or thumb-printed informed consent was obtained from all respondents prior to participation.

Results

All 290 distributed questionnaires were completed and returned, yielding a 100% response rate.

Socio-Demographic Characteristics of the Respondents

Table 1: Socio-Demographic Characteristics of the Respondents (n=290)

Characteristics	Frequency (n)	Percentage (%)
Age Group		
18-30 years	114	39.3
31-60 years	148	51.0
61-80 years	28	9.7
Mean Age $\pm$ SD	38.6 $\pm$ 12.4 years	
Religion		
Islam	188	64.8
Christianity	102	35.2
Gender		
Male	190	65.5
Female	100	34.5

Characteristics	Frequency (n)	Percentage (%)
Marital Status		
Single	94	32.4
Married	169	58.3
Divorced	13	4.5
Widowed	14	4.8
Occupation		
Civil Servant	70	24.1
Farmer	100	34.5
Business/Trader	83	28.6
Housewife	30	10.3
Others	7	2.4
Ethnicity		
Hausa	98	33.8
Fulani	60	20.7
Sayawa	68	23.4
Jarawa	62	21.4
Others	2	0.7
Total	290	100

Table 1 shows that the majority of respondents (51.0%) were aged 31-60 years, with a mean age of 38.6 ± 12.4 years. Only 9.7% were above 60 years. Most respondents were Muslims (64.8%), male (65.5%), and married (58.3%). Farming was the predominant occupation (34.5%), followed by business/trading (28.6%). The Hausa ethnic group constituted the largest proportion (33.8%), followed by Sayawa (23.4%), Jarawa (21.4%), and Fulani (20.7%).

Knowledge of Non-Pharmaceutical Preventive Measures of COVID-19

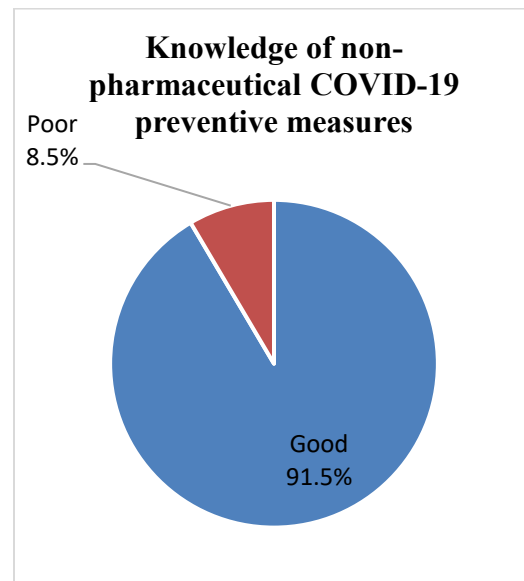


Figure 1: Knowledge Score Distribution

Figure 1 illustrates that the vast majority of respondents (91.7%) demonstrated good knowledge of non-pharmaceutical COVID-19 preventive measures, while only 8.3% exhibited poor knowledge.

Table 2: Knowledge of Non-Pharmaceutical COVID-19 Preventive Measures (n=290)

Variable	Frequency (n)	Percentage (%)
Heard about non-pharmaceutical measures of COVID-19?		
Yes	281	96.9
No	9	3.1
Source of information (n=281)		
Radio	100	35.6
Television	71	25.3
Health Care Facility	35	12.5

Variable	Frequency (n)	Percentage (%)
Friends/Relatives	54	19.2
Other sources	21	7.5
Know importance of non-pharmaceutical measures?		
Yes	261	90.0
No	9	3.1
Not sure	20	6.9
Types of non-pharmaceutical measures known*		
Use of face mask	100	34.5
Social distancing	80	27.6
Hand sanitizer use	35	12.1
Hand washing	54	18.6
Other measures	21	7.2
Is hand washing important?		
Yes	281	96.9
No	9	3.1
Recommended hand washing duration		
Less than 20 seconds	20	6.9
20 seconds to 1 minute	52	17.9
1 minute to 1 minute 30 seconds	209	72.1
Not applicable	9	3.1
Total	290	100

*Multiple responses

Table 2 reveals that 96.9% of respondents had heard about non-pharmaceutical

COVID-19 prevention measures, primarily through radio (35.6%). The majority (90.0%) understood the importance of these measures. Regarding specific NPIs, face mask use (34.5%) was most frequently mentioned, followed by social distancing (27.6%). Almost all respondents (96.9%) acknowledged the importance of hand washing, and 72.1% correctly identified the recommended hand washing duration of 1 minute to 1 minute 30 seconds.

Attitude toward Non-Pharmaceutical Preventive Measures of COVID-19

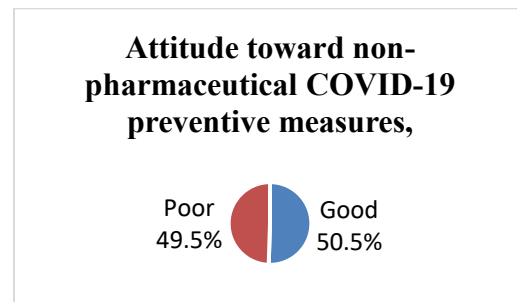


Figure 2: Attitude Score Distribution

Figure 2 demonstrates that slightly over half (50.5%) of respondents exhibited a positive attitude toward non-pharmaceutical COVID-19 preventive measures, while 49.5% demonstrated a negative attitude.

Table 3: Attitude toward Non-Pharmaceutical COVID-19 Preventive Measures (n=290)

Variables	Frequency (n)	Percentage (%)
Perception of non-pharmaceutical measures		
Can prevent COVID-19 infection	159	54.8
Against my religion	34	11.7
Against my culture	26	9.0

Variables	Frequency (n)	Percentage (%)
Feel discomfort when practicing	71	24.5
Protective measures against COVID-19*		
Proper hygiene (hand washing)	111	38.3
Social distancing	98	33.8
Use of face mask	56	19.3
Prayer	25	8.6
Other measures	0	0
Is social distancing effective?		
Yes	197	67.9
No	93	32.1
Who should wear face masks?		
Everyone	56	19.3
Only sick people	134	46.2
Health workers only	77	26.6
Suspected persons only	20	6.9
Others	3	1.0
Complying with government stay-at-home order?		
Yes	52	17.9
No	226	77.9
Maybe	12	4.1
Should people avoid crowded areas?		
Yes	123	43.4
No	167	56.6

Variables	Frequency (n)	Percentage (%)
Crowded areas to avoid (n=123)*		
Church	23	18.7
Mosque	14	11.4
Market	44	35.8
Hospital	33	26.8
Night club	9	7.3
Total	290	100

*Multiple responses

Table 3 indicates that 54.8% of respondents perceived NPIs as effective for COVID-19 prevention. However, 24.5% reported discomfort when practicing these measures, while 11.7% and 9.0% cited religious and cultural barriers, respectively. Hand washing (38.3%) was most frequently identified as protective, followed by social distancing (33.8%). Although 67.9% acknowledged social distancing's effectiveness, only 43.4% agreed that crowded areas should be avoided. Notably, 46.2% believed that only sick people should wear face masks, and 77.9% reported non-compliance with government stay-at-home orders.

Practice of Non-Pharmaceutical Preventive Measures of COVID-19

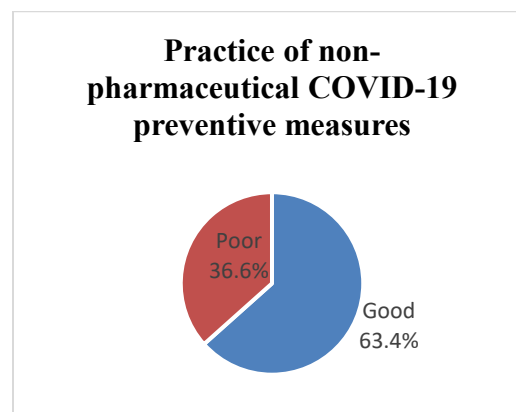


Figure 3: Practice Score Distribution

Figure 3 illustrates that 63.4% of respondents demonstrated good practice of non-pharmaceutical COVID-19 preventive measures, while 36.6% exhibited poor practice.

Table 4: Practice of Non-Pharmaceutical COVID-19 Preventive Measures (n=290)

Variable	Frequency (n)	Percentage (%)
Ever used/practiced any non-pharmaceutical measure?		
Yes	200	69.0
No	87	30.0
Not sure	3	1.0
Type of measure practiced (n=200)*		
Face mask use	77	38.5
Hand washing	58	29.0
Hand sanitizer use	50	25.0
Social distancing	75	37.5
Other measures	0	0
Complying with government stay-at-home order?		
Yes	80	27.6
No	157	54.1
Maybe	53	18.3
Agree with obligatory lockdown measures?		
Yes	80	27.6
No	188	64.8
Maybe	22	7.6

Variable	Frequency (n)	Percentage (%)
Follow NCDC/FMOH recommendations during social distancing?		
Yes	188	64.8
No	102	35.2
Sometimes	0	0
Total	290	100

***Multiple responses**

Table 4 shows that 69.0% of respondents reported having practiced at least one non-pharmaceutical measure. Among these, face mask use (38.5%) and social distancing (37.5%) were most commonly practiced. However, only 27.6% reported complying with government stay-at-home orders, and 64.8% disagreed with obligatory lockdown measures. Notably, 64.8% indicated following NCDC or Federal Ministry of Health recommendations during social distancing.

Relationship between Knowledge and Practice**Table 5: Correlation between Knowledge and Practice Scores**

Measure	Value	Asymptotic Standard Error	Approximate T	Approximate Significance
Pearson's R	0.947	0.022	5.093	0.015
Spearman Correlation	0.884	0.062	3.273	0.047

Table 5 reveals a statistically significant positive correlation between knowledge and practice scores (Pearson's $R = 0.947$, $p = 0.015$). The correlation coefficient approaching 1 indicates a strong association, leading to rejection of the null hypothesis and acceptance of the alternative hypothesis that a significant relationship exists between knowledge and practice of non-pharmaceutical COVID-19 preventive measures.

Discussion

This community-based cross-sectional study assessed knowledge, attitude, and practice regarding non-pharmaceutical COVID-19 preventive measures among residents of Tafawa Balewa LGA, Bauchi State, Nigeria. The findings provide valuable insights into community preparedness and response to the pandemic in a resource-limited setting.

The study revealed high awareness (96.9%) of non-pharmaceutical COVID-19 measures, consistent with findings from other African settings.^{33,35} Radio emerged as the predominant information source (35.6%), reflecting its accessibility and reach in rural Nigerian communities. This aligns with previous research indicating that mass media, particularly radio, plays a crucial role in health communication in low-resource settings.³⁶ Health facilities contributed modestly (12.5%) as information sources, suggesting opportunities for strengthening facility-based health education.

The high proportion of respondents with good knowledge (91.7%) is encouraging and comparable to findings from Ethiopia (85.7%)³⁵ and China (90%).³³ This likely reflects the intensive risk communication campaigns implemented by Nigerian health authorities.^{22,23} Most respondents correctly identified face mask use, social distancing, and hand hygiene as key preventive measures, with 72.1% accurately recognizing the recommended hand washing duration of at least one minute. This knowledge level suggests effective message

dissemination, though the 27.9% who underestimated the required duration indicate a need for continued education.

Despite good knowledge, attitude scores revealed important disparities. While 54.8% perceived NPIs as effective, substantial proportions cited religious (11.7%) and cultural (9.0%) barriers, or discomfort with practice (24.5%). These findings echo studies from Northern Nigeria where religious and cultural beliefs influenced COVID-19 prevention perceptions.³⁷ The proportion believing that only sick people should wear masks (46.2%) contradicts WHO and NCDC recommendations for universal masking in public spaces,^{38,39} highlighting a critical knowledge-practice gap requiring targeted health education.

Compliance with government stay-at-home orders was notably low (17.9%), and 64.8% disagreed with obligatory lockdown measures. This finding is consistent with studies from sub-Saharan Africa where economic necessity often overrides public health directives.^{40,41} The region's high poverty rates and reliance on daily income for survival make sustained lockdowns impractical for many households.^{8,42} This underscores the need for balanced public health interventions that consider socioeconomic realities and provide adequate support for vulnerable populations during movement restrictions.

The proportion of respondents reporting good practice (63.4%) is moderate but lower than knowledge levels, indicating a knowledge-practice gap common in health behaviour studies.^{34,43} The statistically significant correlation between knowledge and practice ($p = 0.015$) suggests that improved knowledge contributes to better practice, supporting continued investment in health education. However, the gap between knowledge and practice indicates that education alone is insufficient; addressing structural, economic, and social barriers is essential.

Face mask use (38.5%) and social distancing (37.5%) were the most commonly practiced measures, while hand sanitizer use (25.0%) was less frequent. This likely reflects limited access to alcohol-based hand sanitizers in rural communities, as many respondents reported hearing about sanitizers without ever seeing them. This finding highlights the need for governments and partners to ensure equitable distribution of preventive supplies, particularly in underserved areas.

The low compliance with stay-at-home orders (27.6%) and disagreement with lockdown measures (64.8%) align with findings from other African studies.^{44, 45} Murphy et al.⁴⁶ found that compliance with COVID-19 restrictions was influenced by perceived duty rather than self-interest, suggesting that fostering collective responsibility may enhance adherence. In the Nigerian context, trust in government and health systems emerged as a critical factor, consistent with research showing that institutional trust significantly influences public health compliance.⁴⁷

The relationship between socio-demographic factors and KAP warrants attention. Younger age and higher education levels appeared associated with better understanding, consistent with previous studies.^{48, 49} This suggests the need for tailored interventions targeting older adults and those with limited formal education. The predominance of male respondents (65.5%) may reflect cultural norms regarding household representation but could limit generalizability to female perspectives.

Comparing these findings with other Nigerian studies, Habib et al.³⁷ reported similar knowledge levels in Northern Nigeria but found higher compliance with preventive measures, possibly reflecting urban-rural differences or temporal variations in pandemic phases. Hager et al.⁵⁰ documented comparable KAP patterns across multiple African countries, noting that misinformation and misconceptions

remained significant challenges despite high awareness.

The finding that 24.5% reported discomfort with NPIs aligns with research on the psychosocial impact of pandemic restrictions.^{51, 52} Prolonged implementation of measures like social distancing may cause fatigue, anxiety, or social isolation, particularly in collectivist cultures where social connections are highly valued. This suggests that public health messaging should acknowledge these challenges while promoting adaptive strategies for maintaining social connections safely.

Limitations of the Study

The followings limitations should be considered when interpreting these findings. First, the cross-sectional design captures data at a single time point, limiting inference about causal relationships or changes over time. Second, reliance on self-reported practices may introduce social desirability bias, potentially overestimating compliance. Third, the study's focus on a single LGA limits generalizability to other regions with different socio-demographic profiles. Finally, the study was conducted during the pandemic's earlier phases; knowledge, attitudes, and practices may have evolved with subsequent waves, new information, and vaccine introduction.

Conclusions

This study demonstrates that residents of Tafawa Balewa LGA exhibited good knowledge, attitude, and practice regarding COVID-19 NPIs; significant gaps existed between knowledge and consistent implementation, particularly regarding compliance with stay-at-home orders and lockdown measures. The study identified important barriers to NPI adherence, including religious and cultural beliefs, physical discomfort, economic necessity, and limited access to preventive supplies such as hand sanitizers. Younger age and higher education levels were associated with better understanding and compliance. The significant correlation between knowledge

and practice supports continued health education, but findings emphasize that education alone cannot overcome structural barriers. The study highlights the influence of socioeconomic factors, perceptions, and trust in government on adherence to public health interventions.

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