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Covid-19 Knowledge, Attitudes and Prevention Behaviors in Punjab, Pakistan

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Abstract

The study examines SARS-CoV-2 prevention behaviors among adults in Punjab, Pakistan, focusing on knowledge, attitudes, and behaviors (KAB) related to COVID-19. Conducted from September to December 2020, this cross-sectional study surveyed 1,100 adults using a two-stage sampling method, incorporating cluster sampling and systematic random sampling. A 22-item dichotomous scale measured KAB, using descriptive statistics and Poisson regression analysis. Ninety percent believed social distancing slows COVID-19 spread. Standard practices included personal protective measures (90.4%), avoiding non-essential travel (84.5%), limiting public transport (83.1%), and refraining from social gatherings (79.0%). Higher KAB scores were linked to individuals aged 35–49, with higher household incomes, graduate degrees, and homeownership. This study emphasizes enhancing public KAB to reduce COVID-19 transmission. Public health authorities should prioritize targeted education to improve adherence to prevention guidelines, especially among vulnerable groups. This research provides a rare analysis of prevention behaviors in Pakistan, contributing to global public health strategies and informing evidence-based local interventions needs**.**

Keywords: COVID-19 Prevention Behaviors, KAB Scores, Socio-Demographic Factors, Poisson Regression

JEL Codes: I12, *I18, O15, C83, D83*

Introduction

The SARS-CoV-2 virus, first reported in Wuhan, China, in December 2019, causes COVID-19, a respiratory disease with significant health and socioeconomic impacts, particularly for those in low socioeconomic status (Shah et al., 2020). Its symptoms include fever, dry cough, fatigue, myalgia, dyspnea, septic shock, and coagulation dysfunction (Chen et al., 2020). The COVID-19 pandemic raises concerns as new variants emerge (Singh et al., 2021). The outbreak originated in Wuhan and rapidly spread worldwide. The World Health Organization declared it a public health emergency on January 30, 2020, and a pandemic on March 11, 2020 (Cucinotta and Vanelli, 2020). Before and after vaccine development, non-pharmaceutical interventions (NPIs) played a crucial role in slowing the pandemic worldwide. Both individual-led and government-led NPIs rely on people's actions to make a difference (Riad et al., 2021),

and these actions require the right attitudes and knowledge. People's attitudes and knowledge about COVID-19 are linked to the personal protective behaviors they adopt (Perra, 2021). Furthermore, research has shown that the information people get from different sources can influence their knowledge, attitudes, and behaviors (Baker et al., 2021). Pakistan is among 209+ countries facing the COVID-19 pandemic. In the first wave, Sindh province had the highest total deaths (GOP, 2021). As new variants emerge, the overall region faced the highest positive cases, while Punjab's COVID-19 mortality rate peaked at about 2.0% during the 2nd and 3rd waves (Cucinotta and Vanelli, 2020). Punjab experienced a mortality rate of 2.69%, followed by Sindh and Khyber Pakhtunkhwa (as of February 24, 2022) (Cucinotta and Vanelli, 2020). Less than half of the population is fully or partially vaccinated. Daily positive cases are rising, stressing individuals and public health. Limited testing and reluctance to seek care suggest case numbers are grossly underestimated (Montanari, 2020; Goraya, 2020). With only <0.75% of GDP allocated to health, Pakistan's healthcare system, with 0.6 beds per 1,000 people, faces challenges from rising COVID-19 cases (Noreen et al., 2020; WHO, 2019). Consequently, managing health emergencies will be nearly impossible, impacting the economy of this country of over 200 million. The World Bank (2019-20) reported GDP growth in Pakistan dropped from 2.6% in 2019-2020 to 0.2% in 2020-2021 (Pakistan Economic Survey, 2019-20). Given the COVID-19 pandemic and Pakistan's lack of preparedness, NPIs are crucial to controlling its spread. Managing the crisis without precautionary measures is challenging, and encouraging these measures requires adequate knowledge and positive attitudes. Comprehensive research on prevention behaviors in Pakistan is limited. A small-scale study in one town offers some insights, but its sample size and geographic representation limit generalizability (Shah et al., 2021). This study aims to expand that limited research through a broader sampling design to enhance generalizability, generating actionable evidence on prevention behaviors in Punjab province, Pakistan.

Methods

Study Design

This cross-sectional study uses primary data collected through a survey for the period of 4 months from September 2020 to December 2020 during the second wave of the COVID-19.

Instrument and Sampling

A sample of 1,100 adults was chosen using a two-stage sampling design in Punjab, Pakistan, excluding adolescents under 18. Initially, clusters from nine divisions of Punjab (Rawalpindi, Sahiwal, Lahore, Gujranwala, Sargodha, Multan, Faisalabad, Bahawalpur, and Dera Ghazi Khan) were established. In the next stage, adults from diverse areas were randomly selected to meet the sample requirement. Cochran's formula estimated the sample size at 1,067.11, assuming 50% population awareness of COVID-19, with 80% statistical power, 95% CI, and a 0.05 error bound. The final rounded sample size was 1,100 participants. The survey questionnaire was adapted from (Shah et al., 2021) and collected data on knowledge, attitudes regarding COVID-19, and prevention behaviors of the participants across Punjab, Pakistan.

Outcome Variable

The "COVID-19 knowledge, attitudes, and behaviors (KAB) scale" response variable was determined by summing 22 dichotomous items, following (Shah et al., 2021). These items (listed in Table 2) aimed to better understand participants' knowledge, attitudes, and behaviors regarding COVID-19. Each item was coded as yes=1 for favorable responses and no/don't know=0 for unfavorable responses. For example, attitudes were captured through questions like "Have you ever been tested for COVID-19?" "Do you keep six feet away from others?" "Do you self-quarantine if you may have the virus?" and "Has social distancing negatively affected your life/family?" These questions assess participants' attitudes toward prevention. Attitudes and behaviors were further explored in the study. Response rates for these 22 items are in Table 2. The scale variable was computed and tested for reliability using Cronbach's alpha, which yielded a coefficient of .710, indicating acceptable internal consistency. Exploratory analyses did not support

creating separate subscales for knowledge, attitudes, and behaviors, as these items were overlapping rather than mutually exclusive.

Independent Variables

Explanatory variables include age, sex, education, profession, marital status, household members, income, organ failure, comorbidity, smoking status, home ownership, joint family, and medical history. Details are in Table 1.

Statistical Methods

Descriptive statistics summarized individuals' knowledge, behaviors, and practices. A Poisson count approach assessed the relationship between precautionary elements and the COVID-19 protective behaviors scale score. The mean and variance equality hypothesis was tested for the Poisson regression model, indicating under-dispersion (mean 17.78, variance 11.12), making the model appropriate. Goodness of fit was evaluated using Pearson's chi-square and the likelihood ratio test.

Results

Descriptive Statistics

Descriptive results of study participants' knowledge, attitudes, and behaviors concerning COVID-19 are reported in Table 1.

Table 1. Socio-demographic Features of the Study Participants Punjab(Pakistan) 2020

Variable	Variable categories	N	Percentages
Age	Under 20	129	11.73
	20-34	572	52.00
	35-49	291	26.45
	50 years or above	108	9.82
Biological Sex	Male	441	40.09
	Female	659	59.91
Education	< high school	387	35.2
	High school to intermediate	499	45.4
	Graduation/higher education	214	19.5
Profession	Unemployed	532	48.36
	Laborer	78	7.09
	Salaried person	381	34.64
	Business man	109	9.91
Marital status	Single	644	58.55
	Married	456	41.45
Household members	< 5	261	23.73
	5 – 7	612	55.64
	8 – 10	169	15.36
	>10	58	5.27
Household income	< 30,000	120	10.91
	30,000-60,000	364	33.09
	60,000-99,000	462	42.00
	> 100,000	154	14.00
COVID-19 Infection Status	Not detected	550	50.00
	No symptoms	149	13.55
	Had mild disease	312	28.36

	Had severe disease	89	8.09
Route of transmission	No disease	550	50.00
	Foreign travelling	57	5.18
	Workplace/institute	296	26.91
	Visit of family	155	14.09
	Others	42	3.82
Organ_Failure	No	1057	96.09
	Yes	43	3.91
Comorbidity	No	804	73.09
	Yes	296	26.91
Smoking_Status	No	946	86.00
	Yes	154	14.00
Own_House	No	258	23.45
	Yes	842	76.55
Joint_Family	No	682	62.00
	Yes	418	38.00
Medical_History	No	838	76.18
	Yes	262	23.82

Source: Author's estimation

Descriptive statistics in Table show that 60% of respondents were female. Nearly 28% reported mild COVID-19 infection, and 26% were infected at work. About 76% owned homes, and 38% lived in joint families. Organ failure affected 3.9% of participants, 26.9% had comorbidities, and 23.8% had a medical history. Most (86%) were non-smokers. Statistics for other variables are in Table 2. Table 2 shows high levels of reported knowledge about COVID-19 and preventive measures. Over 96% heard about COVID-19; 94.27% knew common signs & symptoms; 90.91% understood that social distancing slows spread. However, prevention practices were low, with only 54.36% noting their friends were social distancing, and the same percentage reported maintaining a 6-foot distance. Less than half (48.00%) were tested for COVID-19. About 60.55% stayed home instead of going to work. A larger percentage (72.45%) avoided grocery stores, 79.00% shunned social gatherings, and 83.09% refrained from using public transport. Over two-thirds (76.55%) washed their hands daily for 20 seconds with soap and water.

Table 2. Participants' Beliefs and Opinions about COVID-19, Punjab Pakistan, 2020

Variables	Yes	%
Knowledge		
Have you heard of COVID-19?	1058	96.18
Are you aware of common COVID-19 signs & symptoms?	1037	94.27
Do you think that social distancing slows COVID-19 rate?	1000	90.91
Do you think that social distancing is effective in keeping you safe from COVID-19?	939	85.36
Are most of your friends practicing social distancing?	598	54.36
Attitudes		
Has COVID-19 lockdown helped Pakistan prevent its spread?	982	89.27
Should school resume quickly post-lockdown with proper emphasis on social distancing?	642	58.36
Do you think going to schools, hospitals, or any institution is safe for you?	283	25.73
Is Pakistan prepared to care for those affected by COVID-19?	522	47.45

Is COVID-19 curable in Pakistan?	266	24.18
Behaviours		
Have you ever been tested for COVID-19?	528	48.00
Are you wearing gloves all the time when you leave home?	315	28.64
Are you avoiding nonessential travel?	929	84.45
Are you keep on six feet away from the other individuals?	597	54.27
Are you staying home rather than going to workplace or school?	666	60.55
Are you Keep inself-quarantining if have (or have faith in you have) COVID-19?	808	73.45
Are you avoiding grocery stores or pharmacies?	797	72.45
Are you avoiding large and small social gatherings?	869	79.00
Are you avoiding public transport (unless an essential worker)?	914	83.09
Are you avoiding going for walks in parks?	779	70.82
Are you washing your hands daily with soap and water for 20 seconds after you leave home?	842	76.55
Are you following basic protective measures to protect yourself from COVID-19?	994	90.36

Source: Author's estimation

Regression Results

A multivariate Poisson Regression model of COVID-19 KAB score by participants' socio-demographic characteristics is presented in Table 3.

Table 3. Poisson Regression model of COVID-19 Prevention Behaviors, Punjab Pakistan, 2020

Variables	Categories	Coeff.(b)	P-value	IRR (95% CI)
Age	Under 20*****			
	20-34	0.036	0.126	1.037(0.989-1.087)
	35-49	0.089	**0.001**	1.093(1.039-1.149)
	50 above	0.037	0.243	1.038(0.975-1.105)
Biological Sex	Male*			
	Female	-0.119	**<0.001**	0.887(0.840-0.937)
Education	< High school			
	High school or intermediate	-0.022	0.254	0.977(0.939-1.016)
	Graduation or post-graduation	0.087	**0.021**	1.091(1.013-1.176)
Profession	Unemployed*			
	Laborer	-0.052	0.181	0.949(0.880-1.024)
	Salaried person	0.029	0.172	1.030(0.987-1.075)
	Businessman	0.048	0.111	1.049(0.989-1.114)
Marital status	Single*			
	Married	-0.007	0.741	0.992(0.951-1.035)
Household members	< 5*			
	5-7	0.017	0.359	1.017(0.980-1.055)
	8-10	-0.000	0.999	0.999(0.953-1.048)
	> 10	-0.095	**0.011**	0.909(0.844-0.978)
Household income	< 30,000*			
	30,000- 60,000	0.042	0.098	1.043(0.992-1.098)

	60,000- 99,000	0.082	**0.001**	1.085(1.033-1.140)
	> 100,000	0.082	**0.006**	1.085(1.024-1.151)
Route Of Transmission	No disease*			
	Foreign travelling	0.069	0.192	1.071(0.965-1.188)
	Work place/institute	0.043	0.303	1.044(0.961-1.134)
	Visit of family	0.014	0.729	1.015(0.932-1.104)
Organ_Failure	No*			
	Yes	-0.064	0.110	0.937(0.866-1.014)
Comorbidity	No*			
	Yes	0.042	0.111	1.043(0.990-1.100)
Smok_Status	No*			
	Yes	-0.013	0.601	0.986(0.936-1.038)
Own_House	No*			
	Yes	0.086	**0.000**	1.090(1.053-1.128)
Joint_Family	No*			
	Yes	-0.037	**0.017**	0.964(0.934-0.993)
Medical History	No*			
	Yes	-0.014	0.447	0.986(0.949-1.023)

Source: Author's estimation

Note:*Designates reference category, CI=Confidence interval, IRR= Incidence rate ratio,

Table 3 presents Poisson regression results for KAB scores—knowledge, attitudes, and preventive behaviors—of surveyed participants, including incidence rate ratios (IRR) and confidence intervals. Significant variables ($p \leq 0.05$) linked to higher expected KAB scores are age, sex, education level, household size, income, homeownership, and family structure (joint vs. nuclear). Being in the 35-49 age group (IRR, 1.093; 95% CI, 1.039-1.149) led to a significantly higher expected KAB score than participants under 20. Female participants had a higher expected KAB score than males (IRR, 0.887; 95% CI, 0.840-0.937). Highly educated participants (IRR, 1.091; 95% CI, 1.013-1.176) scored significantly higher than those with less than high school education. Participants with more than ten family members had a lower expected KAB score (IRR, 0.909; 95% CI, 0.844-0.978) than those with fewer than five members. Participants with household incomes of 60,000-99,000 PKR and over 100,000 PKR had significantly higher expected KAB scores (IRR, 1.085; 95% CI, 1.033-1.140; IRR, 1.085; 95% CI, 1.024-1.151) compared to those earning less than 30,000 PKR. Homeownership (vs. renting) was associated with a higher expected KAB score (IRR, 1.090; 95% CI, 1.053-1.128). Participants living in a joint family with parents/siblings had a lower expected KAB score than those in nuclear families (IRR, 0.964; 95% CI, 0.934-0.993).

Discussion

This study examined knowledge, attitudes, and behaviors (KAB) regarding COVID-19 among residents of Punjab, Pakistan, using Poisson regression analysis. The analysis revealed that older participants, higher-income individuals, highly-educated participants, and homeowners had significantly higher KAB scores. Conversely, females, those living in joint family settings, and participants in larger households of up to six members had lower KAB scores. Additionally, our findings supported the benefits of adhering to prevention guidelines to mitigate future outbreaks. Our study showed that participants aged 35 to 49 had a higher expected KAB score than those under 20. This aligns with previous research indicating older participants are more likely to comply with preventive measures than younger ones (Alahdal et al., 2020; Dagne et al., 2020; Elayeh et al., 2020; Yousaf et al., 2020; Amsalu et al., 2021; Islam et al., 2021; Asmelash et al., 2020; Lin and Chen, 2021; Yu, 2020). However, it contradicts some studies (Nguyen et al., 2021; Azlan et al., 2020) suggesting older participants are less likely to follow precautions. Young adults

may underestimate the risk of COVID-19, believe they are not personally at risk, and exhibit a general lack of responsibility. This finding aligns with studies from Ethiopia and India on COVID-19 (Defar et al., 2021; Narayana et al., 2020). We found lower expected KAB scores for participants in larger households (e.g., 10+). (Kassa et al. 2020) found that participants in households of up to six members were 30% less likely to follow precautionary measures than those with two members. However, a study in Iran by (Kakemam et al. 2020) reported no association between household size and engaging in prevention practices. Higher-income participants had a higher expected KAB score, consistent with several studies (Saqlain et al., 2021; Kasemy et al., 2020; Ayele, 2021; Firdous et al., 2020; Qeadan et al., 2020). In our study, female participants had a lower expected KAB score, aligned with findings from (Negera et al., 2020). This contrasts with (Shah et al., 2021), which indicated that females were more likely to comply with preventive practices. Some studies found sex had an insignificant association with preventive measures (Saqlain et al., 2021; Yalew et al., 2021; Ayele, 2021). The discrepancies regarding sex may result from socio-demographic differences in study populations and settings. Highly educated participants were more likely to have higher expected KAB scores than those with less than a high school education. They may quickly grasp the disease's nature and are better equipped for preventive measures. Several studies (Saqlain et al., 2021; Asmelash et al., 2020; Firdous et al., 2020; Ayele et al., 202; Lee et al., 2020; Dire et al., 2021) reported similar findings. Homeowners had a higher expected KAB score than renters or others. Compared to nuclear families, joint family participants had a lower expected KAB score. In Pakistan, joint family structures can both support and hinder compliance with prevention measures: they encourage eating at home but also lead to violating social distancing. In a recent study, Shah et al. (2021) explored COVID-19 prevention behaviors and identified the most commonly used were avoiding public parks (81%), staying home (72.6%), and handwashing (64.0%). Our study found the most reported behaviors to be adhering to protective measures (handwashing and mask-wearing) (90.4%), avoiding non-essential travel (84.5%), and avoiding gatherings (83.1%). Shah et al. reported only 33% observed all protective measures, hypothesizing low numbers due to costs for masks and sanitizers and low health literacy. The ongoing COVID-19 threat may also impact behaviors. Self-quarantining (73.5%) was commonly used in our study, aligning with Dires et al. (2021), which reported intentions to follow guidelines when advised. Perceived benefits of lockdowns encouraged adherence to preventive behaviors: participants believing lockdowns helped prevent spread in Pakistan were more likely to follow measures. Nguyen et al. (2021) similarly found that those who found lockdown instructions difficult were less likely to comply. Shah et al. (2021) concluded that high perceived benefits from prevention are significant predictors of compliance in the Okara District of Pakistan. To contain COVID-19, Pakistan's governments are experimenting with lockdowns (Hina, 2021). The federal government opposes a nationwide lockdown due to economic concerns. Sindh imposed a curfew-like lockdown, while Balochistan and Khyber Pakhtunkhwa implemented partial lockdowns. Punjab's lockdown was less restrictive initially. Despite low testing capacities, the federal government has taken minimal actions such as partial lockdowns, limiting market hours, closing schools, and banning gatherings to control the virus (Noreen et al., 2020). Pakistan faces severe health impacts from COVID-19, struggling to contain the fourth wave that began in late July 2021 (GOP, 2021). The second and third waves increased cases in Punjab and Khyber-Pakhtunkhwa provinces. Additionally, like many underdeveloped countries, Pakistan grapples with low vaccine acceptance and insufficient availability. During the first and second waves of coronavirus in Pakistan, the general public was likely more frightened and implemented better personal precautions. The community is expected to be less fearful of COVID-19 now. Such community adaptation to the COVID-19 outbreak and the resultant lapses in using precautionary measures have likely contributed to alarmingly high positive cases of COVID-19, (Perra, 2021)and have hindered COVID-19 eradication efforts. Our findings indicate that federal and provincial efforts to reduce COVID-19 (and other infectious diseases) can greatly benefit from policies promoting health education on lockdown, quarantine, and preventive measures. Additionally, COVID-19 prevention policies should be tailored to the risk factors of different population groups. For example, middle-aged adults may approach prevention differently than adolescents and older adults.

Overall, factors like age, gender, and socio-economic status can influence perceptions of risk and adherence to restrictions, suggesting that "one-size-fits-all" policies may be ineffective compared to those designed with specific risk factors in mind.

Limitations

Several limitations exist. Our study used survey data from adults in Punjab, Pakistan, relying on self-reports of COVID-19 attitudes, knowledge, and behaviors. These self-reported data weren't independently verified. Data were mainly collected in public areas like shopping malls and parks, resulting in oversampling of highly educated individuals. Future studies could use probability sampling through household surveys for more generalizable findings. Despite these limitations, this study provided valuable insights with primary data obtained during the COVID-19 pandemic.

Conclusion

This study revealed a significant correlation between the KAB scale score (knowledge, attitudes, and behaviors regarding COVID-19 in Pakistan) and various socio-demographic factors (age, sex, education, household size, income, homeownership, and family structure). Most participants held positive attitudes towards the pandemic and believed in the effectiveness of social distancing. However, there is a knowledge gap in practicing social distancing to curb COVID-19 spread. We recommend that public health authorities collaborate with stakeholders, such as NGOs, to address barriers to COVID-19 preventive practices. Resources should enhance health education programs to improve understanding and self-efficacy regarding preventive measures, especially social distancing. Furthermore, the Ministry of Health should promote risk communication through health education targeting high-risk groups. The Ministry should also account for community demographic and attitudinal characteristics when devising public health policies for COVID-19 prevention.

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