# Determinants of COVID-19 in Pakistan: Evidence from Public Opinion from Karachi

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### Abstract

COVID-19 seems to be one of the most dangerous pandemics which originated from Wuhan, China and spread all over the globe. There are several studies which are covering various aspects of COVID-19 although one that may aid in the understanding of major predictors for the outbreak is massively important. Therefore, this study has been conducted to identify the perception and understanding of the population of Karachi. The study follows public opinion not just because of the unavailability of data & the major reason for the use of public opinion is to gauge the severity of different predictors according to the inhabitants of Pakistan. The data has been collected through a selfdeveloped questionnaire which is based on the indication of WHO and research work on pandemics. These indications were linked to the Likert scale & analysis was incorporated through SMART-PLS which indicated that contact transmission and droplet transmission are the major predictors of COVID-19.

Keywords: COVID-19, Major Predictors of COVID-19, Pakistan, Public Opinion, Habit of Smoking and Pandemic

# 1. Introduction

Coronavirus is from the family of viruses that are common in animals although under very rare situations these viruses affect human beings. World Health Organization (WHO) labelled the virus as 2019 novel coronavirus. The virus initially found in Wuhan city of China on 29<sup>th</sup> of December 2020 which caused severe damage to the lower respiratory tract (Adhikari, Meng, Wu, Mao, Ye, Wang & Zhou, 2019) of several visitors of the seafood market (Lake,2020). Some of the other resultants of the virus are pneumonia, fever, breathing difficulty & lung infection. Although the virus is from the family of zoonoses therefore the current virus is termed as (SARS-CoV-2) severe acute respiratory syndrome coronavirus 2 (Adhikari et al., 2020). H1N1, H5N1, SARS & MERS etc. are some previous versions of pandemics that prevailed across borders (Verikios, Sullivan, Stojanovski, Giesecke, & Woo, 2016) & affect all forms of economies (Dimitri, 2015). Studies indicated that the spread of pandemics are also



supplemented with fear and risks as of their unpredictable consequences e.g. Spanish Flew in 1918 killed almost 50 million people around the globe (Petropoulos & Makridakis, 2020). COVID-19 is the recent nightmare for the entire world (McKibbin & Fernando, 2020) having a high resemblance to Severe Acute Respiratory Syndrome (SARS) and (MERS) Middle East Respiratory Syndrome (Gao, Cao, Hong, Tang, Chen, Jin & Yan, 2020).

### 2. Statement Of Problem & Theoretical Framework

COVID-19 has a higher rate of transfer and thus found to be riskier than SARS COV-1 and also spreading quickly to several other countries since its outbreak in China (Petropoulos & Makridakis, 2020). Thus Adhikari et al. (2020) posited the requirement of research & ask the global research community to deal effectively with emergency and render efforts to manage issues of public health in the short and long term. These requirements are valid as the progression of COVID-19 is not losing pace. Hence communication strategies of any government must be effective enough to inform the population regarding techniques to avoid affection (Anderson, Klinkenberg & Hollingsworth, 2002). Especially in South-East Asia where countries must emphasize their communication & make these strategies effective to educate the mass population as to 5 million lives as pandemic otherwise may cost 7.6 million deaths (Shah, 2020).

Hence following Mertens Gerritsen Salemink and Engelhard (2020) it is required to understand the potent predictors of COVID-19. Although WHO is still recommending contact and droplet precautions for all those who are taking care of patients of the pandemic. Moreover there some reports which indicated the probability of the presence of COVID-19's RNA in airspaces. WHO also wishes to include the presence of COVID-19 RNA in the air in the list of major predictors of COVID-19 for careful investigation (World Health Organization, 2020). Some studies also indicated three major predictors of COVID-19 i.e. droplet transmission; contact transmission & aerosol transmission (Petropoulos & Makridakis, 2020). Previously there was a doubt regarding the spread of COVID-19 but since incidents of Wuhan, it has been predicted that the virus is also spreading through tertiary and quaternary sources (Yuen, Ye, Fung, Chang & Jin, 2020).

Further confirmed by Adhikari et al. (2020) that people who did not visit Wuhan nor had any association with wildlife were also getting infected. Hence to help the government for devising of better communication strategies for public health it is mandatory to explain three major predictors of COVID-19 (Petropoulos & Makridakis, 2020). These types of strategies are even more required for a city like Karachi where 60% of the population does not have proper access to clean water and sanitation. Thus washing hands for 20 seconds several times a day looks quite impossible (Karachi Urban Lab, 2020).

Moreover study is massively important for Pakistan were lacking the COVID-19 test highlights the presence of potentially infected people. This can be confirmed by the stats of tests i.e. 6,449 till 26<sup>th</sup> March 2020 and still there is no factual data regarding the

kits which country have for assessing the potentially infected ones (Goraya, 2020). Although there is a severe lacking of sources that may provide authentic that may differentiate among the severity of three major predictors of COVID-19. On the other hand, every infected person passes the infection to 2.2 others (Ries, 2020) furthermore smokers are also found to be 14% more vulnerable to the disease (Barnsley & Sohal, 2020; Lewis, 2020).

Hence to gather data regarding the impact of three predictors of COVID-19in association with the habit of smoking use of public opinion is best to gather data. The purpose to use public opinion is to aid the government through thoughts, opinions and understanding of the local public (Burstein, 2003) from the city that reported the highest number of cases during the first wave ("Know About COVID-19", 2020b).

# 3. Significance

Simple architecture makes this study looks like an ordinary one although the purpose is extremely beneficial for the masses as well as policymakers. The statement made seems to be valid as the study applies to communication strategies (Anderson et al., 2020) that need to be devised by the government that may also impair the understanding of inhabitants of the city. The utmost requirement of policies is valid as in Karachi 60% population does not have access to clean water and sanitation (Karachi Urban LAB, 2020). Thus the study seems to be pervasive which will highlight perception regarding COVID-19. Thus study may aid in the formulation of early measures against the spread of the virus in South Asia & might save five million lives (Shah, 2020).

### 4. Literature Review

Adhikari et al. (2020) indicated that soon after the first four cases of COVID-19 reported in Wuhan (Lake, 2020) gradual increase in evidence of human to human transfer has also been observed as the second source for the transfer of the virus. Transfer from one human to another becomes increases significantly due to infections from Wuhan or seafood market (Adhikari et al., 2020). Hence legitimate to indicate three elements as the major predictor of COVID-19 i.e. droplet transmission; contact transmission and aerosol transmission. Study of also marked droplet transmission is the way of virus transfer by which sneeze or cough of the infected person has been inhaled by the other (Petropoulos & Makridakis, 2020).

Contrary, Contact Transmission is the form of contaminated item(s) that resulted in the transfer of virus i.e. touching sensitive body parts like the nose, eyes or mouth after touching a contaminated item. At last, Aerosol Transmission is the form of transfer where respiration in close proximity to an infected person causes the transfer (Petropoulos & Makridakis, 2020). Although initial thought didn't support tertiary and quaternary sources for virus transmission although a continuous increase of patients evident the role of tertiary and quaternary sources (Yuen et al., 2020). Hence it is obvious to restrict human to human interactions (Xiao & Torok, 2020). On the other hand heap of the literature indicated a strong probability that influenza, tuberculosis and other diseases might affect smokers more drastically (Eapen & Sohal, 2018; Wu, Patel, Booth, Zhang, Metcalf, 2011). Initial studies also failed to prove the more disastrous impact of COVID-19 on smokers (Vardavas & Nikitara, 2020). In fact, Huang et al (2020) conducted an investigation through 41 patients of COVID-19 and found that none the smoker requires intensive health care facilities. Contrary to this Liu et al (2020) found a considerable percentage of smokers i.e. 27.3% out of 78 patients is suffering from COVID-19 & the habit of smoking hinders improvement in health conditions.

- **H**<sub>1</sub>**A:** There is no relationship between droplet transmission of COVID-19 and spread of COVID-19 in Karachi
- $H_2A$ : There is no relationship between contact transmission of COVID-19 and the spread of COVID-19 in Karachi
- **H<sub>3</sub>A:** There is no relationship between the aerosol transmission of COVID-19 and the spread of COVID-19 in Karachi
- H<sub>4</sub>A: Habit of Smoking moderates the relationship between droplet transmission of COVID-19 and spread of COVID-19 in Karachi
- H<sub>5</sub>A: Habit of Smoking moderates the relationship between contact transmission of COVID-19 and spread of COVID-19 in Karachi
- **H**<sub>6</sub>**A:** Habit of Smoking moderates the relationship between the aerosol transmission of COVID-19 and the spread of COVID-19 in Karachi

### 5. Research Model



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### 6. Research Methodology

#### 6.1 Research Design

The purpose of the study is to gauge the severity of various predictors of COVID-19 highlighted by Who World Health Organization through public opinion. Thus, the philosophy of study was ontology (Saunders, Lewis & Thornhill, 2015) & research stance is required to relate philosophy appropriately to answers to the research question (Žukauskas, Vveinhardt & Andriukaitiene, 2018a). Here the study stance is post-positivism which might be linked with qualitative as well as quantitative methods (Saunders et al., 2015), although majorly used for the conduction of quantitative studies with questionnaire as the research instrument (Žukauskas et al., 2018b).

The research strategy for the conduction of research surveyed as the study is based upon public opinion and the approach of the study was deductive in order to trace the major predictors for the spread of COVID-19 (Saunders et al., 2015). The study setting is non-contrived and the researcher's interference is moderate (Sekaran & Bougie, 2016) while the time horizon is cross-sectional (Saunders et al., 2015 & Sekaran & Bougie, 2016).

### 6.2 Sampling Design:

This study uses public opinion from the major districts of Karachi city to compile results regarding the major predictors of COVID-19. The strategy of public opinion has been incorporated to evaluate the importance of the three major predictors of COVID-19 provided by WHO. The strategy of public opinion is worth it as it is potent in the evaluation of those matters which are critical to the local public (Burstein, 2003). Karachi has been selected as the source of sampling as it is not only a business hub but treated important throughout the globe due to its population, geo-strategic position and location (Qureshi, 2010).

Moreover, the city has also reported the most number of cases for COVID -19 thus data has not been collected from any specific location. According to the report West reports 50 cases, South reports 111 cases, Central reports 141 cases & East reports 178 cases (Ilyas, 2020). Hence to assure the work of Kirby and Bryson (2002) during the days of Quarantine data was collected from students of higher education institutions to aid public opinion effectively. The sampling technique was non-probability, also used by Deling and Diren (2015) and Sultan Omar and Imtiaz (2019) to collect data from youth which also increases authenticity. Although to optimize the reach of research instrument indications Adu-Gyamfi (2014) was incorporated to trace youth through emails and social networking sites.

# 6.3 Questionnaire

This study uses the self-administrative questionnaire which has been developed by considering three major predictors of COVID-19. The questionnaire is developed by considering the guidelines of WHO and these guidelines are also linked with the Likert scale in order to induce proper research scaling. Although studies like Huang et al. (2020) on H1N1 etc. has been given special consideration in the formulation of the questionnaire.

This has also been done as the purpose of the study is to gauge attitudes (Likert, 1932) & Likert scaling is also applicable to different dimensions (Revilla, Saris & Krosnick, 2014) to implication through masses (Johns, 2005 & Johns, 2010).

# 7. Statistical Testing and Analysis

Christodoulou et al. (2015), highlighted that the Self-Administrative questionnaire must be impaired with pilot testing. Although for effective use of Likert scaling, Cronbach's alpha is necessary. Similar has been similarly indicated by Litwin (1995) and Sekaran and Bougie (2010) that the use of Cronbach's Alpha is best to gauge the internal consistency of data.

Table 1 indicated reliability for all elements through considering Maiyaki and Mohd Mokhtar (2011). Moreover in order to make statistical testing more effective SMART-PLS has been incorporated. This is also in line with the requirement of the theory-building approach while the statistical technique to asses' results is structural equational modelling (Hair, Risher, Sarstedt & Ringle, 2019).

Sr. No.	Description of Variable	No. of Items	Cronbach's Alpha
01	Spread of COVID-19 in Karachi	04	0.671
02	Droplet Transmission	04	0.637
03	Contact Transmission	04	0.672
04	Aerosol Transmission	04	0.689
05	Habit of Smoking	04	0.747

Table 1: Values of Cronbach's Alpha for Pilot Testing

The results of Pilot-Testing i.e. Cronbach's alpha are found to be effective enough for declaring the test successful as the values for every variable in the inventory is more than 60%. Thus following Maiyaki and Mohd Mokhtar (2011), the test is declared as successful and hence study has been impaired with SMART-PLS to gauge predictors for the spread of COVID-19. The research model is reflective in nature and hence under Hair et al (2019), there is a need to address some descriptive as well as inferential measures.

Table 2 indicating outer loading for the entire range of elements accountable for the spread of COVID-19. Outer weights are potent when the values are near to one (Khan et al., 2019). Although in table 2 value of all the indicators are more than 0.708. Thus legitimate to declare the construct fit enough for gauging predictors of COVID-19 (Hair, Sarstedt, Ringle & Mena, 2012).

	Aerosol Trans- mission (AT)	Contact Trans- mission (CT)	Droplet Trans- mission (DT)	Habit Smoking (HoS)	Mod AT and Smoking	Mod DT and Smoking	Spread of COVID -19
AT1	0.844						
AT2	0.842						
AT3	0.876						
AT4	0.893						
AT of COVID- 19 * HoS					0.999		
CT1		0.761					
CT2		0.950					
CT3		0.952					
CT4		0.971					
DT1			0.884				
DT2			0.885				
DT3			0.909				
DT4			0.911				
DT of							
COVID-						0.995	
19 * HoS							
SCOV1							0.942
SCOV2							0.827
SCOV3							0.847
SCOV4							0.949
HoS				1.000			

Table 2: Outer Loading for the Construct of Determinates of COVID-19 in Karachi

 Table 3: Predictive Accuracy (Quality Criteria)

### **R** Square

	R Square	<b>R</b> Square Adjusted
Spread of COVID-19 in Karachi	0.663	0.641

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Table 3 reflecting predictive accuracy through R-Square to indicate the extent to which IVs predict the DV. R-Square is usually used to report goodness of fit analysis in ordinary least square which is used to highlight predictive variance in the dependent variable. Interpretation is used to provide predictive accuracy in a sample space (Benitez, Henseler, Castillo & Schuberth, 2020) & it the same as multiple regression (Andreev, Heart, Moaz & Pliskin, 2009) and the minimum required value is 0.26 (Cheah, Memon, Chuah, Ting & Ramayah, 2018). Although the value highlighted through the table is 0.663 and thus must be termed as moderate fit (Henseler Ringle & Sinkovics, 2009 & Hair Ringle & Sarstedt, 2013).



Table 4 Convergent Validity

Construct Reliability and Validity

	Cronbach's Alpha	rho_A	Composite Reliability	Average Variance Extracted (AVE)
AT	0.893	0.931	0.922	0.747
СТ	0.912	0.973	0.939	0.797
DT	0.921	0.940	0.943	0.806
HoS	1.000	1.000	1.000	1.000
Mod AT and Smoking	1.000	1.000	1.000	1.000
Mod DT and Smoking	1.000	1.000	1.000	1.000
Spread of COVID-19	0.914	0.923	0.940	0.797

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Table 4 highlighting convergent validity to highlight correlation among the variables of the same construct that is based on factor loading, Composite Reliability and (AVE) Average Variance Extracted (Ab Hamid, Sami & Sidek, 2017). However, AVE alone has the capacity to reflect convergent validity (Sijtsma, 2009a) & for validation with a minimum acceptable value of 0.5 (Ab Hamid, Sami & Sidek, 2017). Moreover, table 4 also includes some reliability measures as Cronbach's Alpha ( $\alpha$ ) & Dillon-Goldstein's rho but rho is a better measure of accuracy than Cronbach's Alpha (Ravand & Baghaei, 2016).

	AT	СТ	DT	HoS	Mod AT & HoS	Mod DT & HoS	Spread of COVID-19 in Karachi
AT							
СТ	0.205						
DT	0.089	0.382					
HoS	0.164	0.682	0.114				
Mod AT and Smoking	0.376	0.248	0.193	0.015			
Mod DT and Smoking	0.189	0.137	0.040	0.010	0.103		
Spread of COVID-19	0.098	0.503	0.318	0.368	0.191	0.048	

**Table 5:** Discriminant Validity through Heterotrait-Monotrait Ratio (HTMT)

Table 5 reflecting discriminant validity through HTMT-ratio & the purpose of discriminant validity is to indicate a lack of correlation among different variables (Cheung & Lee, 2010). Similar is the purpose of HTMT that is to highlight difference among the variables of the same construct as they are distinguished theoretically as well as numerically (Alarcon, Sanchez, Olavide, 2015 & Fornell & Larcker, 1981). Therefore, the junction of any two variables must not yield 0.90 (Hair, Hult, Ringle & Sarstedt, 2016) which has been reduced to 0.85 as the maximum value to assure HTMT by Hair Jr, Sarstedt Ringle and Gudergan (2017).



Table 6 positing numeric values regarding the perception of inhabitants of Karachi regarding three major predictors of COVI-19 in Karachi. The table is a part of the inferential statistic and indicates the path coefficient which is the most important element of the statistical portion for reflective models (Hair et a., 2019). The table is indicating t-values to show the relationship among the variable of the construct while the higher t-values indicating a better relationship (Duarte & Amaro, 2018) the minimum value of t-statistics required to indicate the relationship is 1.97 (Hair et al., 2011). Relationship is also based on p-values which must be equal to or less than 0.05 to show the relationship (Kock & Hadaya, 2018). Hence in the light of these indications and figure 2 contact Transmission and droplet transmission are the two major predictors of COVID-19 in Karachi.

Table 6: Path Coefficier
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	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics ( O/STDEV )	P Values
AT of COVID-19 -> Spread of COVID-19	0.037	0.040	0.078	0.473	0.636
CT of COVID-19 -> Spread of COVID-19	0.323	0.328	0.118	2.742	0.006

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DT of COVID-19 -> Spread of COVID-19	0.161	0.162	0.067	2.411	0.016
Habit of Smoking -> Spread of COVID-19	0.113	0.109	0.097	1.161	0.246
Mod AT and Smoking -> Spread of COVID-19	0.088	0.086	0.073	1.206	0.228
Mod DT and Smoking -> Spread of COVID-19	0.006	0.005	0.061	0.102	0.919

On the other side inhabitants of Karachi do not perceive aerosol transmission as the potent predictor of COVID-19 and the habit of smoking is also not found coherent with the outbreak of COVID-19. Similarly, the moderation of the habit of smoking with aerosol transmission and droplet transmission failed to create any impact on the outbreak of COVID-19 in Karachi.

# 8. Conclusion And Discussion

Detailed statistical analysis through SMART-PLS proved that two major predictors of COVID-19 i.e. contact transmissions and droplet transmissions are potent in spreading the virus across Karachi.

Thus, consistent with Adhikari et al. (2020) and Mertens et al. (2020) as the virus is spreading through contact transmission and droplet transmission hence secondary, tertiary & quaternary sources are termed responsible for spread. Similarly, the study is also coherent with Yuen et al, (2020) i.e. virus is also spreading from one human source to another. Though the study could not able to gauge any evidence to relate findings with Liu et al (2020) as there were no parameters to gauge health and conditions. On the other hand, the study is not in line with Barnsley and Sohal (2020) and Lewis (2020) as no association found for the habit of smoking with the more vulnerability to the COVID-19.

# 9. Area For Future Research

Collecting data from other provinces like Punjab may aid in the increase of knowledge and better policy generation regarding measures that must be opted to defeat COVID-19. Scope of future research might further be optimized by identifying any other potent moderating variable.

Similarly, if the research is based on mixed methods then linking perception from renowned physicians with quantitative tools might add significantly to the knowledge. This addition might also enable the study to answer parts that remain unclear e.g. habit of smoking as indicated by Liu et al (2020).

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