COVID-19 Vulnerabilities, Actions, and Perceptions of Urban and Rural Communities of Rawalpindi, Pakistan

By

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DEDICATION

To my beloved parents, spouse, siblings, and my respected teachers!

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(Iqra Kamil)

ABSTRACT

COVID-19 has become one of the most challenging global pandemics since December 2019 and since then it has become a Public Health Emergency (PHEIC) as declared by WHO. COVID-19 has spread in urban and rural areas, and its impacts vary among urban and rural communities. Hence it is significant to recognize the underlying factors that exacerbate the risks of Covid-19 in urban and rural communities. The research aims to assess the multidimensional pandemic vulnerability of urban and rural communities, measure socio-economic impacts, identify risk perception between urban and rural communities and suggest suitable strategies for effective pandemic risk reduction. It is based on a structured questionnaire survey at the household level with 500 samples, 250 for urban and 250 for rural communities of Rawalpindi District. The sampling technique is random/convenient sampling. The questionnaire was designed based on selected indicators extracted from a literature review of published research works. Index-based approach, statistical tests, descriptive statistics, and mapping techniques have been used for data analysis and to depict the results. This study has found that significant difference exists in all the three dimensions of vulnerability, social-economic and infrastructural, among urban and rural communities. However, no significant variation is found in the overall vulnerability of both communities. There was a significant difference in all four dimensions of COVID-19 risk perception between urban and rural communities. The overall risk perception of urban communities is higher than rural communities. The study highlights various dimensions of vulnerability and risk perception in urban and rural communities, a better understanding of underlying factors affecting vulnerability and risk perception and their relationship will assist decision-makers, health authorities, and disaster managers in developing efficient programs/policies and mitigation/preparedness measures to address pandemics in a better way.

Contents

Chapter 1: INTRODUCTION

Covid-19 has affected communities worldwide, and its effects are socially stratified. To prepare for future pandemic events and cope with the current crisis, it's important to assess multi-dimensional public health vulnerabilities and capacities in the wake of COVID-19 & identify its socio-economic impacts. Social vulnerability affects the resilience of the community and it is based on various factors such as social, economic, demographic etc. Individuals belonging to poor socio-economic backgrounds, underprivileged and deprived areas are likely to suffer more. This is because of the fact that COVID-19 functions in such a way that it exploits the inequalities within the communities as supported by emerging evidence. (Mikolai et al., 2020).

A very important and essential component of emergency health response and preparedness is Risk Communication and Community Engagement (RCCE). Perceptions of health risks inform decisions about protective behaviors, but COVID-19 was an unknown risk as it began to spread (Bruine de Bruin & Bennett, 2020). Assessment of risk perception can pave the way for suitable strategies for pandemic risk reduction in the future. Since the data and information is evolving rapidly, the main focus should be given to effective risk communication particularly during pandemics to avoid misinformation and infodemics (Abrams & Greenhawt, 2020).Risk communication deals with information which directly effects how people perceive risk and take actions as a result based on their risk perception. It is a significant part of Disaster Risk Management as it ultimately influences disaster mitigation/preparedness and response (Shaw et al., 2013). Emerging evidence supports the decision to invest in preparedness measures in past pandemics. In wake of health emergencies such as severe acute respiratory syndrome SARS and Ebola, those countries that remained vigilant and prioritized investing in mitigation and preparedness measures are well versed to fight future pandemics and are better equipped to prevent and control the COVID-19 pandemic challenging the world (WHO, 2020c).

1.1 Problem Statement

There is little research carried out in Pakistan on pandemic vulnerability assessment, socio-economic impacts, and risk perception in the wake of COVID-19. Few relevant studies include (GOP, 2020; Mukhtar, 2020; Qazi et al., 2020). At the world level, much research has been carried out on the proposed topic; however research gap still exists. Health is a very important component

in vulnerability and disaster risk assessment. However in the existing literature comprising of vulnerability indicators the main focus remains on social and economic vulnerability. The problem is further exacerbated when significant underlying health risks such as non-communicable diseases are not given due emphasis in measuring vulnerability (Chan et al., 2019).

The physical world remained a prime focus in disaster management until the recent decades. The risk assessments were mostly related to the natural hazard threats as well as the anthropogenic hazards to the surrounding environment. A multi-dimensional and complete risk assessment must include the social, economic and demographic factors emphasizing on the inclusion of the concept of social vulnerability for adequate risk assessment and overall disaster management (Flanagan et al., 2018). Since COVID-19 is evolving and emerging rapidly, there is scarcity of objective risk information. The data and information is further considered uncertain and at the same time constantly changing. It is unclear how people perceive the risks or whether their initial risk perceptions inform their decisions about protective actions (Bruine de Bruin & Bennett, 2020).

An ongoing pandemic of Novel Coronavirus (COVID-19) in Pakistan was first notified on 26 February 2020. As of 14 April 2020, over 5,719 cases with 96 deaths (CFR 1.68%) had been reported. The pandemic has spread to all provinces in Pakistan, with over 115 districts affected, largely in Punjab and Sindh. Pakistan needs to be prepared for public health emergencies, particularly COVID-19 owing to the unknown nature of its transmission, unavailability of vaccines, and socio-economic circumstances of the country.

The situation is further worsened by a lack of coordination between governing authorities, a weak & fragmented disease surveillance system, challenges of confirmation of COVID-19 cases, poor isolation and quarantine facilities, etc. (GOP, 2020). Hence there's a dire need to conduct research in terms of vulnerability assessment, socio-economic impacts, risk perception, and preparedness in the local context.

1.2 Justification of Study

Due to its novel nature, much research is required to fight this pandemic. The research will help carry out a comprehensive Covid-19 pandemic vulnerability & capacity assessment to develop a local public health index. Furthermore, it will also identify socio-economic impacts & suggest suitable strategies/coping mechanisms. Risk perception indicators can measure the effectiveness

of risk communication/awareness campaigns by the Pakistani government. Public health measures play a very important role in controlling associated risk particularly in case of pandemics and outbreaks as supported by International Health Regulations. These measure comprises of prevention, detection and response to the outbreak/pandemic (Kandel et al., 2020).

The World Health Organization's Director-General has classified COVID-19, an illness that shares similarities with previous coronavirus infections like MERS, SARS, and influenza, to be a public health emergency of international concern. The unknown and novel nature of the disease and uncertainty lead to panic and fear. Hence, in such a scenario, effective risk communication becomes a significant contribution toward adequate public response in terms of preparedness and mitigation measures.

1.3 Research Questions

The research questions are as follow:

a. How to develop a comprehensive pandemic vulnerability index
b. What are the key indicators to measure Covid-19 vulnerability, risk perception, and protective behaviors
c. How's Covid-19 affecting the communities, and how to assess the impacts
d. How pandemic preparedness and capacities can be improved within the community

1.4 Objectives

The objectives of the research are as follows:

a. To assess multidimensional pandemic/public health vulnerability (social, economic & infrastructural) of urban and rural communities in the wake of COVID-19.
b. To identify COVID-19 risk perception between urban & rural communities.
c. To assess actions, beliefs, and perceptions during COVID-19 lockdown between urban and rural communities.
d. To suggest remedial measures for effective pandemic risk reduction.

Chapter 2: PANDEMIC RISK REDUCTION

2.1 Disaster Risk Reduction (DRR)

Disaster risk reduction (DRR) is a systemic technique for recognizing, evaluating, and minimizing disaster risks that helps reduce a society's or community's susceptibility. (Tuladhar et al., 2015)**.** It plays a very significant role in ensuring sustainable development and reducing the overall impact of the disaster on communities. The concept evolved from the Second World Conference on Disaster Reduction held in Japan in January 2005. In light of this, the countries adopted the Hyogo Framework for Action (HFA) 2005-2015: Building the Resilience of Nations and Communities to Disaster (Tuladhar et al. 2015). Improving the overall legal framework and ensuring the implementation of rules and regulations is the key initiative for strengthening governance for disaster risk reduction (DRR) (WHO, 2022a).

In order to minimize the chances of hazards ultimately turning into disasters, it's important to strengthen community resilience and mitigate risks. In this situation, developing resilience might be based on laws and regulations which promote an enabling environment to prevent new risks and create safer communities. This importance of legal framework was recognized when 168 UN member states adopted the Hyogo Framework for Action, Building the Resilience of Nations and Communities to Disasters 2005 – 2015 (HFA). A decade later, it was given greater affirmation in the Sendai Framework for Disaster Risk Reduction 2015-2030." Strengthening disaster risk governance to manage disaster risk' is one of the four priorities of the Sendai Framework."(WHO, 2022a)

It has given a common platform and opportunity to all the countries to collaborate systematically and strategically to address vulnerabilities and mitigate risks. The HFA advises that disaster impact can be considerably lessened if communities remain well well-versed and adopt necessary preventive/protective measures to reduce vulnerabilities. It promotes the concept of innovation and education to enhance the culture of safety and resilience within the communities at various levels. (Tuladhar et al., 2015). Social equity in development planning can enhance resilience and DRR. However, in this regard, the significance of risk awareness and community understanding (predisposition) towards local hazards can't be underestimated in DRR (Odiase et al., 2020).

2.2 COVID-19

In December 2019, a new coronavirus (2019-nCOV) was discovered in Wuhan, China, that sent shockwaves worldwide due to its novel nature. On 30 January 2020, the coronavirus (COVID-19) outbreak was declared a Public Health Emergency (PHEIC) by WHO requiring International Concern(Dryhurst et al., 2020; WHO, 2020b). It spread worldwide in months and was later declared a "pandemic" on 11 March 2020(Iqbal & Chaudhuri, 2020). The zoonotic origin of this virus is SARS-CoV-2, being the third most major coronavirus, followed by (SARS-CoV) 2003 and the Middle East Respiratory Syndrome (MERS-CoV) 2012 (Zhang et al., 2020). In order to quickly advance scientific understanding of this unique virus and provide timely recommendations on protecting people's health and halting the outbreak, WHO is working with worldwide scientists, governments, and partners(WHO, 2020a). As of 23 June 2022, there were 539,119,771 confirmed cases of COVID-19 worldwide, including 6,322,311 fatalities. 11,912,594,538 vaccination doses have been given as of June 21st, 2022.(WHO, 2022b)

2.3 Vulnerability Assessment

COVID-19 has spread in urban and rural areas, and its impacts vary among urban and rural communities. Hence it is imperative to ascertain the underlying factors which exacerbate the risks of Covid-19 in urban and rural communities. Lower population density may have reduced COVID-19 infection risk in rural locations, but that is not the case which can be attributed to a false sense of security and lack of precautions(OECD, 2021). In terms of various underlying risk factors, life expectancy, medical care and health treatment, there exist health disparities between urban and rural communities (Huang et al., 2021).

The characteristics of the pandemic include i) rapid spread, ii) aged and low immune people being more vulnerable, and iii) differential recovery rate(R. Chatterjee et al., 2020)**.** The main symptoms of the virus include but are not limited to fever, cough, shortness of breath, and fatigue. However, many affected individuals can be asymptomatic (Harper et al., 2020). Standard recommendations for preventing the spread of COVID-19 includes frequently washing hands with soap and water or an alcohol-based hand wash, covering the nose and mouth with a bent elbow or a disposable tissue when coughing, sneezing, or wearing masks, and social distancing which means avoiding close contact with people who have a fever and a cough(Shiina et al., 2020; WHO, 2020a).

Increased global travel and integration, urbanization, and changes in land use that greatly influence nature and society interaction have all increased the likelihood of pandemics during the past century(Prieto et al., 2021; WHO, 2018). Epidemics disproportionally impact vulnerable groups (Macharia et al., 2020), particularly COVID-19, which possesses significant potential to influence all individuals in heterogeneous ways (Campos et al., 2021) hence vulnerability assessment is crucial, and its fundamental principles seek to identify those who are disproportionately exposed to the risk of infection or severity of disease (Macharia et al., 2020). The dynamic concept of vulnerability in the COVID-19 demands the knowledge & understanding of the various type of vulnerabilities/identification of vulnerable groups to manage the COVID-19 pandemic(Acharya & Porwal, 2020; Lancet, 2020). The consequence of a pandemic will be more devastating if vulnerable groups aren't identified(Lancet, 2020).

On February 26, 2020, COVID-19 was notifies in Pakistan. As of April 14, 2020, there has been over 5,719 cases reported, with 96 deaths (CFR 1.68 percent). The situation is worsened by a lack of coordination between governing authorities, a weak & fragmented disease surveillance system, the challenge of confirmation of COVID-19 cases, poor isolation and quarantine facilities, etc. (GOP, 2020). There is some research carried out in Pakistan on pandemic vulnerability assessment in the wake of COVID-19(GOP, 2020; Mukhtar, 2020; Qazi et al., 2020). However, a comprehensive multi-dimensional index to measure Covid-19 vulnerability needs to be developed locally. The study proposes a methodology to assess multi-dimensional pandemic/public health vulnerability of rural and urban communities in the wake of COVID-19.

2.3.1 Covid-19 Vulnerability Assessment

Vulnerability assessment explains methods employed to systematically study the interaction between humans and their surroundings (physical, social, economic, environmental, and institutional).(Birkmann, 2007; Hahn et al., 2009; Ram et al., 2019) It aims at quantifying multi-dimensional issues by using indicators and developing composite indexes to integrate variables. It is a significant part of disaster risk reduction, which aims to identify, assess, and decrease the likelihood of disasters, as well as minimizing the vulnerability of a society(Birkmann, 2007; Tuladhar et al., 2015). The term vulnerability is multi-dimensional (Jhan et al., 2020; Ram et al., 2019; Rana & Routray, 2018) and is used widely in the literature; however, its usage/and definition vary considerably. Due to the persuasive work of Sen (1981, 1989), Chambers (1989), and Jodha

(1988), numerous attempts have been made to describe multi-dimensional vulnerability and poverty (Ahmed & Gassmann, 2010). A common methodology to measure and identify risk and vulnerabilities still needs sufficient development (Birkmann, 2007)**.**

Biological threats, such as the COVID-19 pandemic, are highlighted as significant risk and danger for the 21st century in the Sendai Framework for Disaster Risk Reduction (UNDRR, 2020). Beyond their evident effects on human health, disasters, pandemics and public health emergencies are increasingly being recognized as a threat to the livelihoods of people and global health security (Macharia et al., 2020; Talisuna et al., 2020). Due to globalization, health risks have become borderless, and health emergencies require a collaborative effort. Disaster risk indexes lack in terms of describing vulnerability, particularly health risks (Chan et al., 2019).

Vulnerability assessment is a challenging, multi-dimensional, and complex task(Ahmed & Gassmann, 2010; Jhan et al., 2020), and various approaches have been used to define and measure it. However, three main cautions are highlighted by Birkmaan (2006) and Wisner (2003).

One-size-fits-all approaches might not accurately capture the specifics and peculiarities of various contexts. Establishing how vulnerability relates to other variables is necessary when measuring vulnerability so that cause and effect can be distinctly identified. Finally, vulnerability measurements must be realistic to use in empirical research (Ahmed & Gassmann, 2010). Vulnerability assessment determines the capability of a community to respond to hazards and/or secure their livelihood. (Suryanto & Rahman, 2019). Researchers have carried out vulnerability assessments in various dimensions, such as Health vulnerability (Amram et al., 2020; Confalonieri et al., 2009; Houghton & English, 2014; Lane et al., 2013; Mikolai et al., 2020; Oliveira et al., 2019)livelihood vulnerability (Hahn et al., 2009; Suryanto & Rahman, 2019) economic(Davradakis et al., 2020; Guillaumont, 2009), physical(Feindouno et al., 2020; Papathoma-Köhle et al., 2019)social vulnerability(Cutter et al., 2012; Flanagan et al., 2011; Flanagan et al., 2018; Spielman et al., 2020). These dimensions have been integrated into a single multi-dimensional vulnerability index (Ahmed & Gassmann, 2010; Gerlitz et al., 2016; Ram et al., 2019).

2.4 Risk Perception

2.4.1 Actions, Beliefs, and Perceptions of Urban & Rural Communities during Lockdown

The World Health Organization (WHO) declared a Public Health Emergency (PHEIC) of International Concern for the novel coronavirus (COVID-19), which emerged in China in December 2019 (Dryhurst et al., 2020; WHO, 2020a). Risk perception is determining factor that guides the decision/ response adopted for preventive and protective measures (Ranit Chatterjee et al., 2020; Karasneh et al., 2021; Roy et al., 2020; Wise et al., 2020). The restrictions posed by the pandemic have affected mental as well as physical well-being, socioeconomic factors, and community resilience. People's knowledge/attitude about COVID-19, and socioeconomic background are important factors that govern their risk perception. For effective risk communication, it is essential to comprehend how the general public views risk. Central to pandemic preparedness and planning is knowing which risk perceptions affect a multi-faceted and complex phenomenon affected by rapidly changing (societal, cultural, psychological) factors (Lohiniva et al., 2020).

In the lockdown stage, coronavirus information is scarce, constantly changing, and characterized by uncertainty (Bruine de Bruin & Bennett, 2020). As the disease is spreading globally, its emergence is causing panic and anxiety and fear in the society, which can be characterized as rational and irrational. Hence, it is significant to understand how people perceive the risk of COVID-19 in varying environments, i.e., urban and rural. Sufficient awareness and knowledge of the pandemic and the underlying factors shaping risk perception are of utmost importance to control the pandemic. Risk perception particularly affects psychological/ mental health and overall well-being, requiring proactive interventions.

The lockdown, which can be characterized as domestic and international, has far-reaching effects on all facets of life. It has led to an imminent global economic recession, a rapid decrease in social interaction, a burden on healthcare systems, the constant fear of "unknown," and a rapidly changing status quo. (Onyeaka et al., 2021). Measuring the social, economic, and psychological effects of lockdown is challenging. Recent evidence suggests that during COVID-19 generally, and particularly those who are kept in isolation and quarantine, experience significant distress in the form of anxiety, anger, confusion, and post-traumatic stress symptoms (Brooks et al., 2020; Roy et al., 2020; Simon et al., 2021).

Various social groups are affected differently by COVID-19 protective and preventive measures depending on their gender, race, and degree of education. The factor of uncertainty associated with the disease has further complicated the scenario. It can lead to both healthy and vulnerable individuals adopting protective measures. (Jose et al., 2021). Overall the long-lasting pandemic and restrictions, particularly lockdown/quarantine, has produced persistent unfavorable situations and negative consequences for earnings, physical-mental well-being, and work patterns (Soiné et al., 2021).

Beliefs and perceptions are usually subjective and vary from person to person. Numerous studies have already been conducted to evaluate COVID-19 risk perception and actions/behavior in different domains (Bruine de Bruin & Bennett, 2020; Cori et al., 2020; Dryhurst et al., 2020; Geldsetzer, 2020; Jose et al., 2021; Lohiniva et al., 2020; Motta Zanin et al., 2020; Olapegba et al., 2020; Roy et al., 2020; Shiina et al., 2020; Wise et al., 2020).

2.4.2 The difference in risk Perception between Urban and Rural Communities

As coronavirus began to spread worldwide, people faced a rapidly changing pandemic threat affecting their lifestyles and behaviors. Risk perception plays a significant role in influencing such behaviors. It acts as a prerequisite and a major guiding/motivating factor in adopting protective, preventive, and precautionary measures by the general public (Ranit Chatterjee et al., 2020; Contreras-Yáñez et al., 2019; Karasneh et al., 2021; Roy et al., 2020; Wise et al., 2020; Zhong et al., 2021). Similarly, it plays a significant role in public health and risk management (Zhang & Fan, 2013). It is central to the idea of protective health behaviors and preparedness through interventions (R. A. Ferrer & W. M. Klein, 2015; Loewenstein et al., 2001; Slovic, 1964). In health risk, perception of a threat is based on the perceived characteristics of that threat (threat-specific) which may include mortality, morbidity, controllability, etc. (Contreras-Yáñez et al., 2019; R. A. Ferrer & W. M. Klein, 2015). The accuracy and inaccuracy of risk perception have significant health outcomes (R. A. Ferrer & W. M. Klein, 2015). Several studies concluded that affective attitudes significantly predict health behaviors (Conner et al., 2015; Lawton et al., 2009). Evidence suggests that compliance with health measures suggested by public health organizations can considerably influence the trajectory of an outbreak. Thus, it is important to understand the recent COVID-19 risk perception for launching risk communication and awareness campaigns. It is

imperative to develop an accurate insight and understanding of risk perception for effective disaster risk reduction and management (Aerts & Mysiak, 2016; Odiase et al., 2020). A better comprehension and assessment of these factors will help determine how risk perception should be addressed when managing pandemics.

2.4.2.1 COVID Risk Perception

Risk perception is a multi-dimensional construct (Wilson et al., 2019). There is a difference in the risk perception approach between experts and laypeople. There are two ways humans perceive risk and act as a result. One is based on feeling (built on emotions and instincts that develops risk judgment from affective attitude), and the other is "risk as analysis" (logical and statistical reasoning) (Savadori & Lauriola, 2022). Risk can be considered objective (physical facts) (Hutchins, 2018) (Hansson, 2010; Schmälzle et al., 2017) as well as subjective (social construction) (Bourque et al., 2013; Loewenstein et al., 2001; Paul & Bhuiyan, 2010; Xu et al., 2016). Risk perception acts as a stimulus for prioritization, adequate resource allocation, preparedness, and prevention (Ardaya et al., 2017). Hence it is important to identify the underlying social, economic, and cultural factors that control public health risk perception during COVID-19 and its health consequences.

Studies have been conducted during epidemics, including SARs (Brug et al., 2004; De Zwart et al., 2009; RDJS, 2006), MERS (Kim & Kim, 2018), and Avian Influenza (Ibuka et al., 2010). In terms of COVID-19 risk perception/beliefs, public attitude/actions, and knowledge, various studies have been carried out in different domains (Attema et al., 2021; Bruine de Bruin & Bennett, 2020; Cori et al., 2020; Dryhurst et al., 2020; Erchick et al., 2022; Geldsetzer, 2020; Gerhold, 2020; Jose et al., 2021; Lohiniva et al., 2020; Malik et al., 2020; Motta Zanin et al., 2020; Olapegba et al., 2020; Rana et al., 2021; Roy et al., 2020; Shiina et al., 2020; Wise et al., 2020; Zhong et al., 2021). Health risk perception during an epidemic is affected by various factors such as perception/beliefs, knowledge & information sources, etc. (Zhong et al., 2021). Several studies have adopted the model in which risk perception is a function of perceived likelihood, perceived severity, and perceived susceptibility (Brewer et al., 2007; Ng, 2022; Shreve et al., 2016). These include controllability, voluntariness, catastrophic potential, and degree of outcome uncertainty. Risk perception directly affects risk mitigation measures (Martin et al., 2009). Some contextual factors also play a significant part in health behaviors. A positive relationship has been found

between disease information and risk perception (Kim & Choi, 2016; Zhong et al., 2021). As a distant threat becomes immediate, the risk becomes pessimistic. When the public perceives the threat as uncontrollable, risk perception becomes higher. Affective contextual factors and general effects also influence public risk perception (R. Ferrer & W. M. Klein, 2015). Studies have shown that adopting precautionary measures is significantly associated with socioeconomic status, severity/susceptibility, self-efficacy, and trust in government (Park et al., 2021). The elements that affect risk perception include voluntariness, knowledge, visibility, and trust (Cori et al., 2020). Another study confirms the use of mass media, knowledge, acceptance of mitigation measures and perceived feelings, and fake news/information as significant factors of COVID-19 risk perception (Motta Zanin et al., 2020). The only predictor of positive behaviour change (better hygiene, social distancing) was fear of COVID-19 (Harper et al., 2021). Survey tools and guidance by WHO provide several domains for behavioral insights and studies of COVID-19 (WHO, 2020e). Another study used catastrophic potential, probability of death, the reason for exposure, belief in controllability, and trust in authorities as main domains of risk perception (Lohiniva et al., 2020). One of the studies characterized perceptions of infection likelihood and severity (Wise et al., 2020). A study used five items (wearing a facemask, handwashing, avoiding going out, washing mouth with salty water & taking vitamin C) to assess risk perception of COVID-19 in China (Qian et al., 2020). The COVID-19 pandemic has also been investigated in terms of risk perception, knowledge, information sources, and preventative health behaviours (Olapegba et al., 2020). One of the studies used a health belief model approach to evaluate COVID-19 risk perception and preparedness (Jose et al., 2021). Another study assesses the relationship between initial COVID-19 risk perception and protective health behaviors (Bruine de Bruin & Bennett, 2020).

Various studies have assessed the urban-rural disparities in terms of COVID-19. The COVID-19 intervention effectiveness and public compliance vary between urban and rural areas. The significant difference in behavioral responses signifies the need to ascertain the underlying factor affecting these responses. The overall reduction in relative mobility was comparatively greater in urban areas than the rural area in WPRs. In contrast, both the areas had the same scale of social distancing measures (Park et al., 2021). Another study assessed the risk perception in the United States (urban, rural, and suburban areas). Rural respondents were found to be less concerned, with only a few people supporting staying home and closing businesses. Only half of them were

concerned about severe health impacts (Chauhan et al., 2021). Similarly, the mask-wearing rates were higher in urban areas compared to rural areas and more in females than males (Hsu et al., 2021). Rural populations are also significantly less likely to adopt and participate in COVID-19 preventive health behaviors (Callaghan et al., 2021). The predicted probability of wearing a mask decreased significantly as the level of rurality increased (Pro et al., 2021). In another study conducted in Alabama on adults of urban and rural areas, no significant difference was found between the perceived susceptibility to COVID-19 in both of the communities (Scarinci et al., 2021).

Chapter 3: METHODOLOGY

Research methodology is used to specifically identify the steps taken throughout a period to achieve the answers to all the research questions and ultimately propose recommendations and solutions against the set objectives. The underlying assumption in selecting a defined methodology is centered on variety of elements, the nature and type of research questions and objectives being the most significant. The type of methodology adopted has a direct implication on the acquired results. It may be considered an overall plan that emerges from the research objectives.

The research methodology adopted comprises of both quantitative and qualitative data. To achieve the results, a combination of research approaches and techniques are used. To validate the research and achieve the purpose of the study, both primary and secondary data are used. Primary data is obtained through field surveys based on a structured questionnaire. Secondary data is obtained through journal articles, books, dissertation, reports, etc. The study populations are the residents of urban and rural areas of Rawalpindi.

3.1 Research design

Formulation of the research question is a crucial and important step in the research process. The interest of the researcher determines the research questions. Any assertion that needs to be investigated/challenged can serve as the foundation of the research. The research is cross-sectional in nature based on the time dimension. The description of various steps to achieve the final results is provided in the preceding headings.

- Preliminary Studies (Research Gap)
- Selection of Topic
- Research Questions
- Literature review (Primary & Secondary Data)
- Selection of Study Area/Population
- Sampling
- Sample Size
- Field Surveys
- Data Analysis (Descriptive Stats, Indices, Statistical Modeling)
- Ethical Consideration

- Limitations
- Results & Discussions

3.2 Data Sources/Data Collection

Data is gathered on various pre-defined aspects from both primary and secondary sources. The study opted for a literature review and structured questionnaire survey as its main data collection methods. The secondary data served as the basic foundation of the questionnaire tool for primary data collection. Initially, secondary data was collected, followed by primary data. The questionnaires were filled out by either the household head or any other representative. An extensive literature review was carried out to search for relevant indicators via sources such as research papers, dissertations, reports, books, policy papers, etc. The articles were shortlisted based on their relevance to the proposed topic and date of publication.

3.2.1 Questionnaire Design

One of the most significant aspects of a research project is the research instrument used for data collection. Questionnaires are a widely used technique for systematic data collection. For each objective, all questions were formulated and derived from indicators. The questionnaire was designed based on selected indicators extracted from a literature review of published research works. Firstly, all the important indicators regarding the pandemic COVID-19 were extracted, and then they were short-listed based on their significance and relevance to the objectives of this research study.

The questionnaire comprises of two parts/sections to meet the objectives of the research. Section one pertains to all the questions related to vulnerability derived from indicators based on the literature review. In the same way, Section 2 includes all the questions related to risk perception derived from indicators based on a literature review. The socio-economic impacts also form a part of the questionnaire. Most questions related to vulnerability are close-ended, comprising of "Yes" and "No" options. Questions related to risk perception are developed based on Likert scale.

3.2.2 Survey Method

The structured questionnaire survey was conducted at the household level. A household is a very significant unit of analysis as it can clearly understand how risk perception of Covid-19 varies at the household level in urban and rural communities. The participants were the residents of

Rawalpindi urban and rural areas at household level. The identity of the participants has been kept confidential. Before conducting the questionnaire survey, the participants were informed that the information provided would be used so that their identity would not be disclosed.

3.3 Sampling

The sampling method was employed since the study area population was large, covering both rural and urban areas. For sample size calculation, Yamane's formula was used (Eq. 1.). Here, "n" shows the sample size or total number of respondents, and "N" represents the "total population" of the case study area, i.e., Rawalpindi, and "e" is the margin of error. With a confidence level of 95% and margin error of 0.05, a minimum of 400 samples were required.

$$n = \frac{N}{1 + Ne^2} \qquad Eq.1$$

The actual sample size taken was 250 for Rawalpindi urban area and 250 for Rawalpindi rural area. The method/technique used for acquiring the sample for collecting the data is random sampling. The survey was administered from 1 July 21 to 25 Aug 21. The questionnaire gathered 250 responses from urban and 250 responses from rural areas. A bilingual questionnaire comprising English and Urdu versions were administered for urban and rural areas, respectively, to acquire a greater response rate and eliminate the language barrier. The urban area of Rawalpindi for conducting the survey included Rawal Town, DHA 2, Chaklala scheme 2 and 3, Westridge, Qasim Market, Old Airport, and the PWD area *Fig. 3*. The rural area included Chak Baile khan, Jatli, Karai, Mohra Sharif, Gujar khan, and Rawat town *Fig. 4*. Dhudial, Mona, Syed Kisran, Bangali sharif, Fim Kasar, Siral, Dhok Wadan, Mangwal, Hattar, Bharpur, and Mulhal Mughlan (Chakwal) *Fig. 5*.

3.4 Selection of study area (maps)

The study area selected is Rawalpindi District, part of Punjab Province, with a total population of 5,402,380 with 3,005,708 urban and 2,396,672 rural populations(PBS, 2017). Rawalpindi city is the capital of the district. The district has an area of 5,285 km^2(PBS, 2017). It is situated on the southern slopes of the north-western extremities Himalayas. It is traversed by mountains and rivers along with rich valleys. The major rivers include the Indus and Jhelum. The climate is characterized as mild with abundant rainfall.
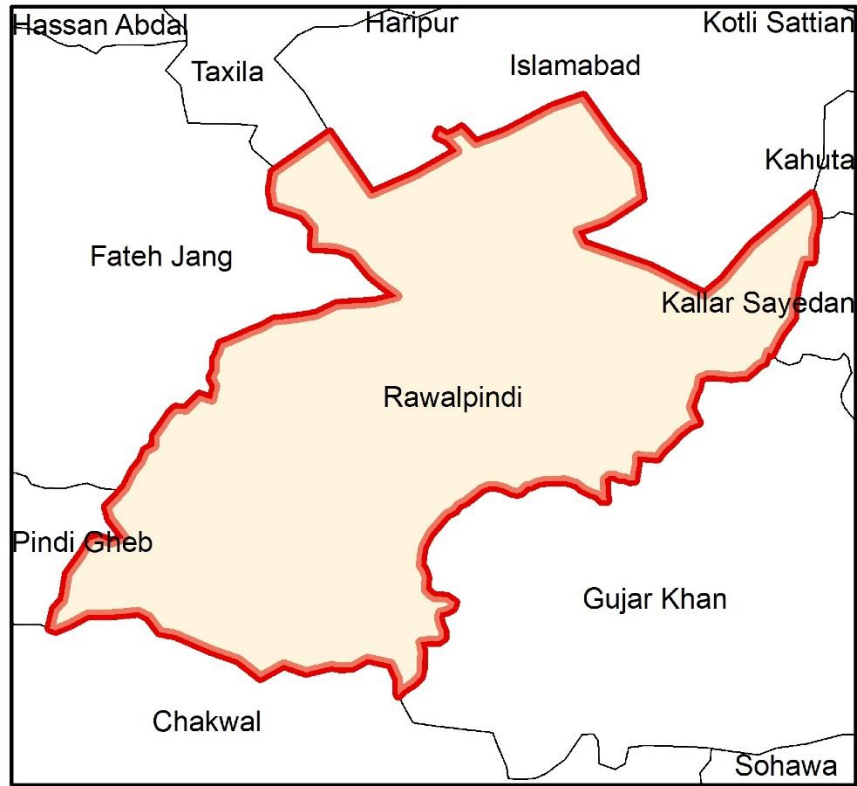
Fig. 1 Study area map showing selected urban and rural areas of Rawalpindi District

Fig. 2 Study area map showing selected rural areas of Chakwal
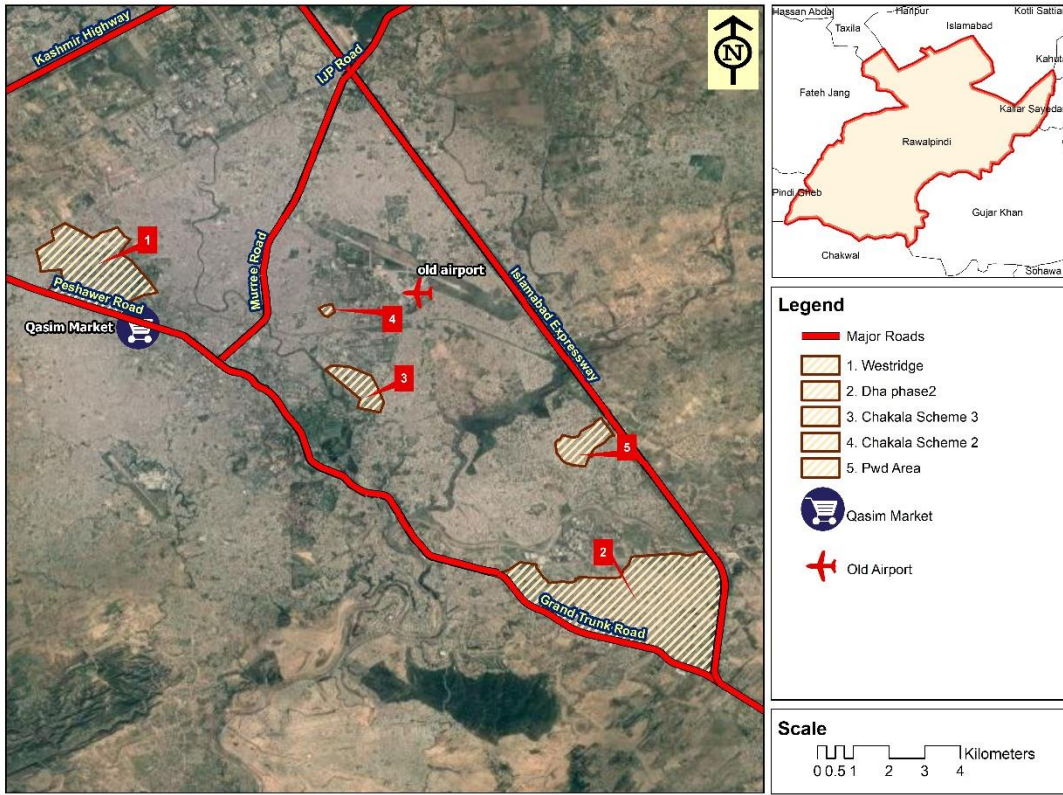
Fig. 3 Study area map showing selected urban areas of Rawalpindi District
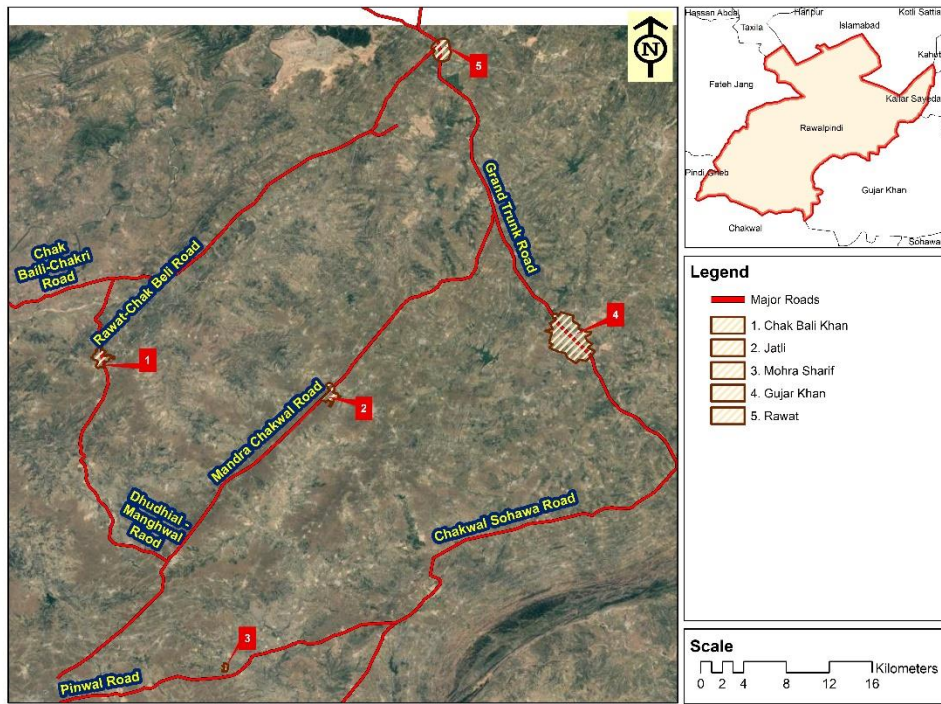
Fig. 4 Study area map showing selected rural areas of Rawalpindi District
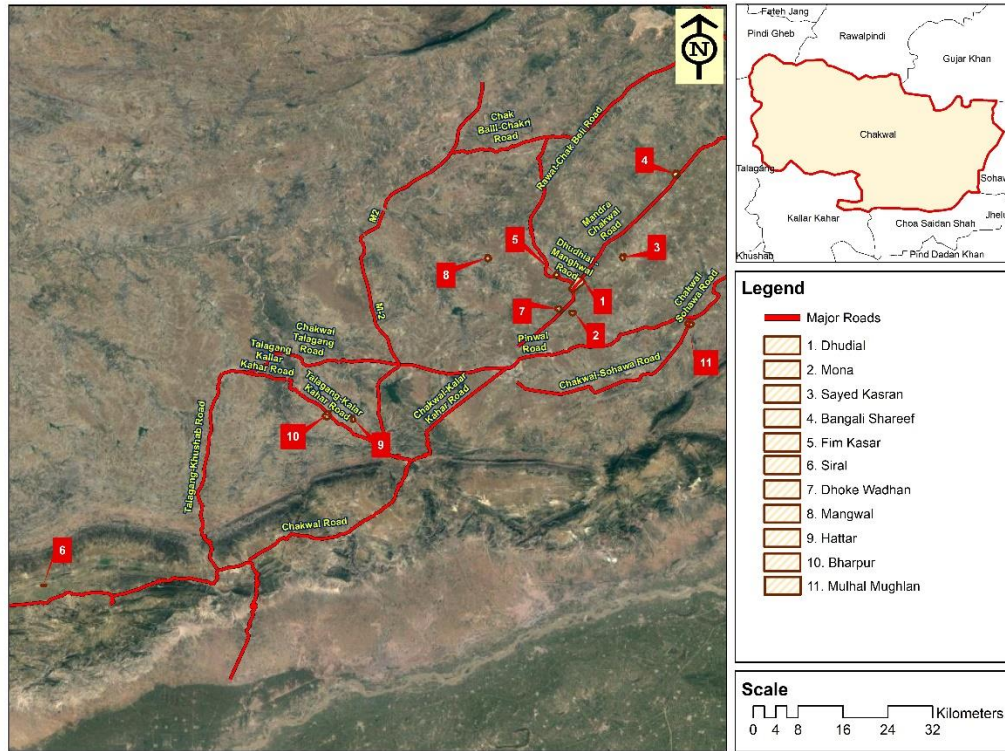
Fig. 5 Study area map showing location of selected rural areas of Chakwal

3.5 Data Analytical Method

Data Analysis and its adequate interpretation directly affect the reliability of research. Data analysis has been carried out for both quantitative as well as qualitative indicators. The data collected through a structured questionnaire was analyzed using IBM-SPSS 23 and MS Office. The methods for data interpretation include Indexes as well as Descriptive Stats. ArcGIS has been utilized to generate a map of the study area of Rawalpindi District for urban and rural communities. Data Analysis is the most important step of the research, which produces the results for which the research is conducted. Once the data is collected, the next step in the research is to analyze and interpret the data. The data collected was organized and tabulated, and entered into software like SPSS and MS Excel for interpretation to be done.

3.5.1 Indices

Vulnerability and risk perception indicators were assigned weights based on their direct or indirect relation. Based on the sum of the weighted score, indexes are prepared, which give a clear assessment of vulnerability and risk perception in urban and rural communities. Chi square/t tests are performed to assess the relationship between indicators.

3.5.2 Descriptive Stats

Descriptive stats were used to assess the responses in frequency tables, percentages, and means. Suitable graphs (Stacked bar charts & pie charts) have been made to indicate the responses. Frequency tables were generated in SPSS for each indicator for urban and rural communities so risk perception between urban and rural communities can be compared. Descriptive statistics were used to assess the responses using frequency tables, percentages, and means.

Chapter 4: COVID-19 VULNERABILITY ASSESSMENT

4.1 Introduction

For the purpose of developing a multi-dimensional vulnerability index for Covid-19, the unit of analysis selected is household. Since vulnerability assessment is a complex study and involves various factors, the methodology adopted must be comprehensive. This chapter aims to develop a multi-dimensional index by quantifying vulnerability in terms of social, economic, and infrastructural dimensions. The proposed methodology is applied in Rawalpindi District urban and rural communities.

The chapter aims to assess whether vulnerability (social, economic, infrastructural) varies between urban and rural communities of Rawalpindi District. The method for data interpretation is an index-based approach and statistical tests. The social, economic, and infrastructure vulnerability indices are based on a total of 68 indicators, with 44 indicators in the social vulnerability index, eight in the economic vulnerability index, and 18 in the infrastructure vulnerability index. The Chi-square test assesses vulnerability differences within each indicator for both communities. The t-test assesses vulnerability differences within each dimension and overall vulnerability differences between urban and rural communities.

4.2 Socio-economic Profile

The study participants were asked various questions related to socioeconomic characteristics, as shown in the socio-economic profile **Error! Reference source not found.**. These comprised genders, age, education, income, household size, deaths related to Covid-19 in relatives, and employment nature. For some indicators, while some socioeconomic traits were found to be similar among urban and rural communities, others showed a significant difference.

No significant variation ($\chi 2$=6.44, p value=0.16) is found among age of respondents in both of the communities. In the urban community, the highest frequency of respondents (47.6%) fell in the (30-39) age bracket, followed by 28% in the (40-49) age bracket, 19.6% (20-29) in the age bracket, and 4.8% in (>49) age bracket. No respondents fell in the category of <=19 age. In rural community the highest frequency of respondent(42.4%) fell in (30-39) age bracket followed by

28% in (20-29) in age bracket, 26% (40-49) in age bracket 3.2% in (>49) age bracket and 0.4% in <=19 age bracket. Elderly people are more vulnerable to Covid-19, which is greater in the urban area (4.8%) compared to rural areas (3.2%).

A significant variation (χ^2=56.258, p value=0.000) is found among gender of respondents in both the communities. In urban communities majority of the respondents (70.4%) were male, and 29.6% were female. In rural communities majority of the respondents (95.6%) were male, who were 25.2% greater than the rural community, and only 11% were female.

No significant variation (χ^2=4.578, p value=0.101) is found among the education level of respondents both the communities. In urban communities, the highest frequency of respondents (42%) was observed in the school category, followed by 38.4% in college and 18.4% in university. In rural communities, the highest frequency of respondents (50%) was observed in the school category, followed by 29.6% in college and 18.4% in university. The lack of higher education in both urban and rural communities increases their vulnerability. Furthermore, they will not easily comprehend the Covid-19 situation and will lack awareness/essential knowledge to take adequate action in light of SOPs.

No significant variation (χ^2=6.886, p value=0.142) is observed among the income level of respondents in urban and rural communities. In urban communities, the highest frequency of respondents 44% was observed in (25001-40000) category, followed by 34.4% in (40001-55000) category, 14% in 10001-25000 category, 4.8% in >55000 and 4.8% in <10000 category. In rural communities, the highest frequency of respondents 47.2% was observed in (25001-40000) category, followed by 26.4% in (40001-55000) category, 16.8% in (10001-25000) category, and 6% in <10000 category 3.6% in >55000. Lower-income shows higher vulnerability. Since covid-19 has impacted people economically, those who were hard hit might have lost their jobs/downgraded or curtailed their spending. The vulnerable groups cannot meet their daily needs in the same way, increasing their vulnerability. Those with higher income are better equipped to avail socio-economic facilities hence decreasing their vulnerability.

A significant variation (χ^2=12.986, p value=0.011) is found among household size of respondents in both the communities. In urban communities majority of the respondents, 46.4%, have household sizes 4-5, followed by 29.6% with 6-7 members, 13.6% with <=3 members, 8.8% with 8-9 members, and 1.6% with >9 members. In rural communities majority of the respondents,

34.8%, have household sizes 4-5, followed by 28 % with 6-7 members, 22% with <=3 members, 10.8% with 8-9 members, and 4.4% with >9 members. The larger the household size, the more the vulnerability. Smaller Household size means more appropriate space for quarantine, less crowdedness, and hence less vulnerability.

A significant variation (χ^2=514.275, p value=0.000) is found among deaths of relatives due to Covid-19 in both the communities. In urban communities majority of the respondents, 67.2%, replied "No" to the question. Those who replied "Yes" were 32.8%. In rural communities majority of the respondents, 51.2%, replied "No" to the question. Those who replied "Yes" were 48.8%. It can be observed that the deaths in rural communities are more as compared to urban communities. It shows more vulnerability, particularly in terms of deaths due to Covid-19. It can be attributed to various reasons such as lack of awareness & education, poor SOPs compliance, lack of access to socio-economic facilities, particularly health facilities, etc.

A significant variation (χ^2 = 513.26, p value=0.000) is observed among the employment nature of respondents in both the communities. In urban communities majority of the respondents, 44%, are working in government sector, followed by 30.8% in agriculture, 14% as a daily wage earner, and 11.2 % in trade and commerce. In rural communities majority of the respondents, 54.4%, are working in the Government sector, followed by 17.6 in trade & commerce, 16.4% as daily wage earners, and only 11.6% in agriculture. The high percentage of employment in the Government sector in rural areas is 54.4% as compared to urban areas. 44% suggests less economic vulnerability in rural areas. Government jobs are more stable and remained little affected despite the lockdown. The high percentage of daily wage earners in rural areas is 16.4% compared to urban areas. 14% suggests more economic vulnerability in rural areas. This is because daily wage earners don't have a constant stream of earnings and have to travel consistently owing to the nature of their job. Despite a common perception of agriculture being the most significant source of income in rural areas, its percentage of 11.6% is less than urban areas of 30.8%. The summary of the results is provided in Fig. 6.
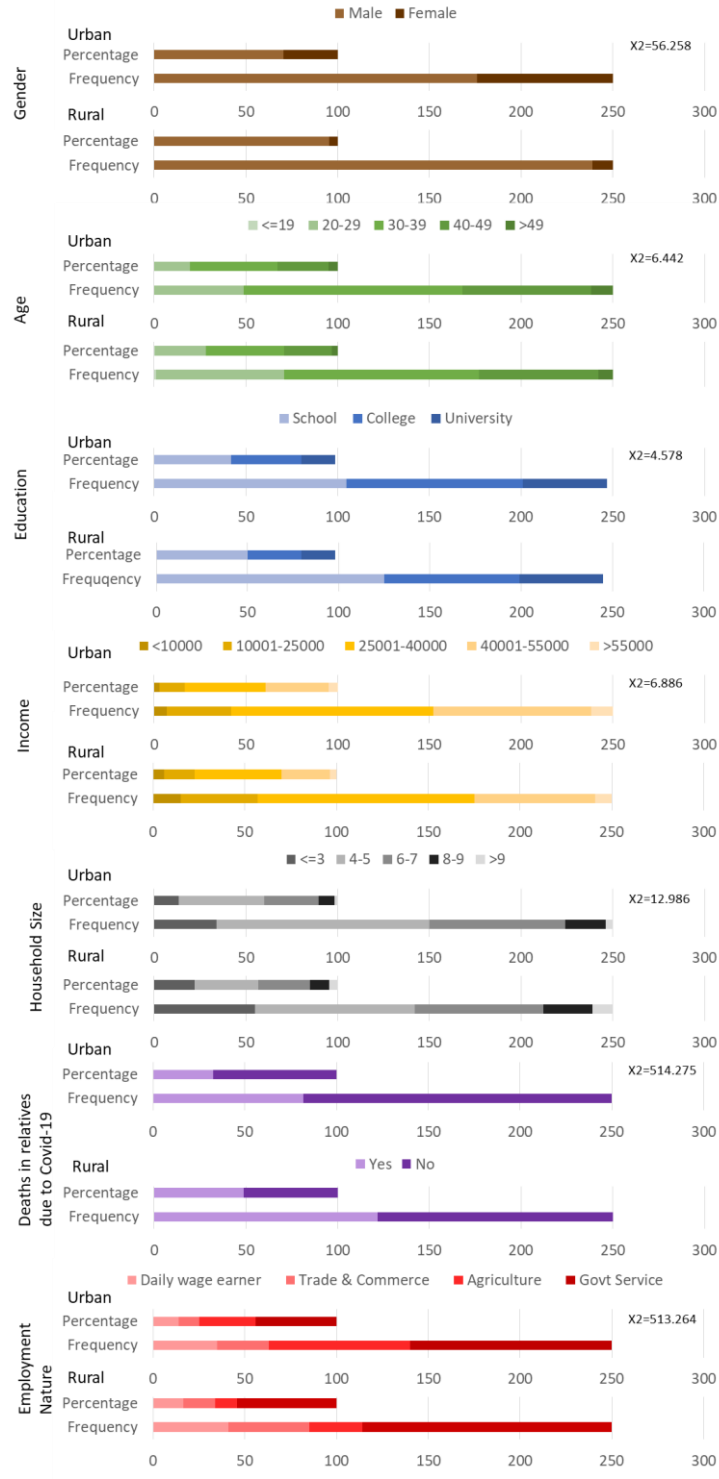
Fig. 6 Socio-economic characteristics of respondents of urban and rural communities

4.3 Indicator selection

Various studies have aimed at Covid-19 vulnerability assessment by adopting different approaches. Urban Vulnerability Assessment (Prieto et al., 2021)**,** Composite Index based on 15 indicators & five dimensions(Acharya & Porwal, 2020), Three vulnerability indices were created using geospatial indicators (Macharia et al., 2020), vulnerability assessment based on Multi-Criteria Decision Analysis (MCDA),(Campos et al., 2021). Estimates of the population and YLD were taken from GBD 2017 for 45 European nations (Wyper et al., 2020), the Vulnerability Index was based on five domains, and vulnerability scores were computed for various geographical areas(BritishRedCross, 2021). This study employs an index-based approach to develop a multi-dimensional Covid-19 vulnerability index in urban and rural communities of Pakistan. The summary of indicators is provided in Table 1.

Table 1 COVID-19 vulnerability indicators and transformed values in urban & rural communities of Pakistan

Dimension	Indicator	Classes	Weights	Relationship with Indicator	Source
SOCIAL					
SVI	Age	<=19	0.2		(BritishRedCross, 2021; Cutter et al., 2012; Davradakis et al., 2020; Esteve et al., 2020; Flanagan et al., 2011; Lane et al., 2013; Rygel et al., 2006; Segnon et al., 2020)
		20-29	0.4		
		30-39	0.6	Elderly people are more vulnerable to Covid-19	
		40-49	0.8		
		>49	1		
SV2	Gender	Female	1	Females are considered more vulnerable in general.	(Fatemi et al., 2017; Rygel et al., 2006) Marina et al 2020
		Male	0.5		
SV3	Education	School	1		(Ahmed & Gassmann, 2010; Alkire & Santos, 2010; Gerlitz et al., 2016; Jhan et al., 2020; Macharia et al., 2020; Segnon et al., 2020; St Bernard, 2007; Tewari & Bhowmick, 2014; UNDP&OPHI, 2020)
		College	0.666		
				It affects awareness of COVID-19. The more the education level, the lesser the vulnerability	
		University	0.333		
SV4	Income	<10000	1	Since covid-19 has impacted people economically, those who were hard hit might have lost their jobs/downgraded or curtailed their spending. Those with higher income are better equipped to avail socio-economic facilities hence decreasing their vulnerability. The vulnerable groups cannot meet their daily needs in the	(Ahmed & Gassmann, 2010; Amram et al., 2020; Flanagan et al., 2011; Huong et al., 2019; Jhan et al., 2020; Justin Ram, 2019; Lane et al., 2013; Macharia et al., 2020; Mikolai et al., 2020; UNDP&OPHI, 2020)
		10001-25000	0.8		
		25001-40000	0.6		
		40001-55000	0.4		
		>55000	0.2		

				same way, increasing their vulnerability.	
SV5	Household Size	<=3 4-5 6-7 8-9 >9	0.2 0.4 0.6 0.8 1	Smaller Household size means more appropriate space for quarantine, less crowdedness, and less vulnerability.	(Amram et al., 2020; Flanagan et al., 2011; Huong et al., 2019; Jhan et al., 2020; Mikolai et al., 2020)
SV6	Children with Incomplete Schooling	0 1 2 3 >3	0.2 0.4 0.6 0.8 1	Family members who have incomplete schooling will not easily comprehend the covid-19 situation and will lack awareness and essential knowledge to take adequate action in light of SOPs. Ignorance/Lack of education directly affects vulnerability	(Alkire et al., 2020; Alkire & Santos, 2010; UNDP&OPHI, 2020)
SV7	Education Affected by Covid-19	Yes No	1 0	Households where education is adversely affected by Covid-19, would be more vulnerable than those not affected.	(Alkire et al., 2020; Schleicher, 2020; UNDP&OPHI, 2020)
SV8	No of Elderly People	0 1 2 3 >3	0 0.25 0.5 0.75 1	The greater the number of elderly members greater the vulnerability.	(BritishRedCross, 2021; Davradakis et al., 2020; Flanagan et al., 2011; Lane et al., 2013; Segnon et al., 2020)
SV9	No of Children	0 1-2 3-4 >4	0.25 0.5 0.75 1	Children don't perceive the seriousness/severity of the situation the same way as elders; hence are more vulnerable. They play outside	(Lane et al., 2013)

				and have frequent social interactions with other children.	
SV10	No Disabled Family Member	0	0	They may have difficulty conforming to SOPs. Dependent disabled individuals, if COVID +ve, will become even more vulnerable if isolated/quarantined.	(Segnon et al., 2020)
		1	0.33		
		2	0.66		
		>2	1		
SV11	Women with Special Needs	Yes	1	Women with special needs are more vulnerable	(Tewari & Bhowmick, 2014; UNDP&OPHI, 2020)
		No	0		
SV12	Membership Status in Community Organization	Yes	0	Individuals having membership in community organizations will be equipped with essential skills to cope with the pandemic. They can help the individuals around and also their families.	(Ahmed & Gassmann, 2010; Huong et al., 2019; Narayan et al., 2000)
		No	1		
SV13	Cordial relations with the neighbor community	Yes	0	A good relationship with neighbors means the individuals will help each other socially, financially, and economically.	(Ahmed & Gassmann, 2010; Huong et al., 2019)
		No	1		
SV14	Faced any disaster in the last 5 years	Yes	1	Those who have faced disaster in the last five years will be more prepared to deal with the pandemic.	(Hahn et al., 2009; Huong et al., 2019; Tewari & Bhowmick, 2014)
		No	0		
SV15	Deaths in relatives due to Covid-19	Yes	1	Individuals whose relatives died due to Covid will be more cautious and follow preventive measures more owing to the death experience.	(Amram et al., 2020; BritishRedCross, 2021)
		No	0		
SV16	Immunized against viral diseases	Yes	0		(Tewari & Bhowmick, 2014; UNDP&OPHI, 2020)

		No	1	Immunization against other diseases means less vulnerability.	
SV17	Ever diagnosed with mental illness	Yes	1	Will be more vulnerable to poor mental health during covid-19 isolation/quarantine and lockdown	(BritishRedCross, 2021; Lane et al., 2013)
		No	0		
SV18	Suffering from poor physical health	Yes	1	Individuals with poor health will not be able to follow the SOPs adequately and may be dependent on other individuals as well	(BritishRedCross, 2021; Chan et al., 2019; Mikolai et al., 2020; Segnon et al., 2020)
		No	0		
SV19	Number of Obese Adults in Family	0	0	Greater the number of obese adults greater the vulnerability	(BritishRedCross, 2021) British Red Cross Covid-19 Vulnerability Index
		1-2	0.33		
		3-4	0.66		
		>4	1		
SV20	Family members with limiting long-term Illness	0	0	Individuals with limiting long-term Illness will not be able to follow the SOPs adequately and may be dependent on other individuals as well	(BritishRedCross, 2021)
		1	0.33		
		2	0.66		
		>2	1		
SV21	Day-to-day activities are limited a lot due to a particular disease	Yes	1	Individuals with disabling Illnesses will not be able to follow the SOPs adequately, and may be dependent on other individuals as well	(BritishRedCross, 2021)
		No	0		
SV22	Do you have a compromised immune system	Yes	1	The immune system already compromised will be more vulnerable	(BritishRedCross, 2021; Flanagan et al., 2011)
		No	0		

SV23	You/Family Member recently diagnosed with Asthma	Yes	1	Individuals with the indicated disease will be more vulnerable	(BritishRedCross, 2021; Chan et al., 2019; Mikolai et al., 2020; Segnon et al., 2020)
		No	0		
SV24	You/Family Member recently diagnosed with a Stroke	Yes	1	Individuals with the indicated disease will be more vulnerable	(BritishRedCross, 2021; Chan et al., 2019; Mikolai et al., 2020)
		No	0		
SV25	You/Family Member recently diagnosed with Diabetes	Yes	1	Individuals with the indicated disease will be more vulnerable	(BritishRedCross, 2021; Chan et al., 2019; Mikolai et al., 2020; Segnon et al., 2020)
		No	0		
SV26	You/Family Member recently diagnosed with Emphysema	Yes	1	Individuals with the indicated disease will be more vulnerable	(BritishRedCross, 2021; Chan et al., 2019; Mikolai et al., 2020; Segnon et al., 2020)
		No	0		
SV27	You/Family Member recently diagnosed with High Blood Pressure	Yes	1	Individuals with the indicated disease will be more vulnerable	(BritishRedCross, 2021; Chan et al., 2019; Mikolai et al., 2020; Segnon et al., 2020)
		No	0		
SV28	You/Family Member recently diagnosed with Angina	Yes	1	Individuals with the indicated disease will be more vulnerable	(BritishRedCross, 2021; Chan et al., 2019; Mikolai et al., 2020; Segnon et al., 2020)
		No	0		
SV29	You/Family Member recently diagnosed with Congestive heart failure	Yes	1	Individuals with the indicated disease will be more vulnerable	(BritishRedCross, 2021; Chan et al., 2019; Mikolai et al., 2020; Segnon et al., 2020)
		No	0		
SV30	You/Family Member recently diagnosed with a Liver condition	Yes	1	Individuals with the indicated disease will be more vulnerable	(BritishRedCross, 2021; Chan et al., 2019; Mikolai et al., 2020; Segnon et al., 2020)

		No	0		
SV31	You/Family Member recently diagnosed with Coronary heart disease	Yes	1	Individuals with the indicated disease will be more vulnerable	(BritishRedCross, 2021; Chan et al., 2019; Mikolai et al., 2020; Segnon et al., 2020)
		No	0		
SV32	You/Family Member recently diagnosed with Learning disabilities	Yes	1	Individuals with the indicated disease will be more vulnerable	(BritishRedCross, 2021; Chan et al., 2019; Mikolai et al., 2020; Segnon et al., 2020)
		No	0		
SV33	You/Family Member recently diagnosed with a Heart Attack	Yes	1	Individuals with the indicated disease will be more vulnerable	(BritishRedCross, 2021; Chan et al., 2019; Mikolai et al., 2020; Segnon et al., 2020)
		No	0		
SV34	You/Family Member recently diagnosed with Dementia	Yes	1	Individuals with the indicated disease will be more vulnerable	(BritishRedCross, 2021)
		No	0		
SV35	You/Family Member recently diagnosed with Myocardial Infection	Yes	1	Individuals with the indicated disease will be more vulnerable	(BritishRedCross, 2021; Chan et al., 2019; Mikolai et al., 2020; Segnon et al., 2020)
		No	0		
SV36	You/Family Member recently diagnosed with Peripheral Arterial Disease	Yes	1	Individuals with the indicated disease will be more vulnerable	(BritishRedCross, 2021; Chan et al., 2019; Mikolai et al., 2020; Segnon et al., 2020)
		No	0		
SV37	You/Family Member recently diagnosed with Cancer	Yes	1	Individuals with the indicated disease will be more vulnerable	(BritishRedCross, 2021; Chan et al., 2019; Mikolai et al., 2020; Segnon et al., 2020)
		No	0		

SV38	You/Family Member recently diagnosed with Cardiovascular disease	Yes	1	Individuals with the indicated disease will be more vulnerable	(BritishRedCross, 2021)
		No	0		
SV39	You/Family Member recently diagnosed with Artial Fibrillation	Yes	1	Individuals with the indicated disease will be more vulnerable	(BritishRedCross, 2021)
		No	0		
SV40	You/Family Member recently diagnosed with Hypertension	Yes	1	Individuals with the indicated disease will be more vulnerable	(BritishRedCross, 2021; Chan et al., 2019; Mikolai et al., 2020; Segnon et al., 2020)
		No	0		
SV41	You/Family Member recently diagnosed with Chronic Bronchitis	Yes	1	Individuals with the indicated disease will be more vulnerable	(BritishRedCross, 2021; Chan et al., 2019; Mikolai et al., 2020; Segnon et al., 2020)
		No	0		
SV42	You/Family Member recently diagnosed with COPD	Yes	1	Individuals with the indicated disease will be more vulnerable	(BritishRedCross, 2021)
		No	0		
SV43	You/Family Member recently diagnosed with Myocardial infarction	Yes	1	Individuals with the indicated disease will be more vulnerable	(BritishRedCross, 2021; Chan et al., 2019; Mikolai et al., 2020; Segnon et al., 2020)
		No	0		
SV44	You/Family Member recently diagnosed with CKD	Yes	1	Individuals with the indicated disease will be more vulnerable	(BritishRedCross, 2021)
		No	0		
ECONOMIC					

EV1	Employment Nature	Daily wage earner	1	Government jobs are more stable and remained little affected despite the lockdown. The most vulnerable community are the daily wage earners, followed by business and agriculture.	(BritishRedCross, 2021; Mazumdar & Paul, 2016; Tewari & Bhowmick, 2014)
		Trade & Commerce	0.75		
		Agriculture	0.5		
		Govt Service	0.25		
EV2	Multiple sources of income	Yes	0.5	Multiple sources of income mean less economic vulnerability.	(Ahmed & Gassmann, 2010; Flanagan et al., 2011)
		No	1		
EV3	HH receiving pension	0	1	Households receiving pensions are less vulnerable than those not receiving any pension.	(BritishRedCross, 2021; Huong et al., 2019)
		1	0.666		
		>1	0.333		
EV4	Insurance possession	Yes	0	Insurance (health, life, etc.) can cover uncertainties	(Lane et al., 2013)
		No	1		
EV5	Taken any loan	Yes	1	Households that have taken loans are less financially stable and more vulnerable.	(Ahmed & Gassmann, 2010; Hahn et al., 2009; Tewari & Bhowmick, 2014)
		No	0		
EV6	HH Members formal/informal skills	0	1	Households with formal/informal skills can earn by alternative means if they lose their job during the pandemic.	(Ahmed & Gassmann, 2010; Hahn et al., 2009; Tewari & Bhowmick, 2014)
		1-2	0.8		
		3-4	0.6		
		5-6	0.4		
		>6	0.2		
EV7	Dependency Ratio/Earning Members of Household	0.08	1	The higher the dependency ratio, the lesser the vulnerability	(Gerlitz et al., 2016; Hahn et al., 2009; Huong et al., 2019; Jhan et al., 2020; Naudé et al., 2009; Segnon et al., 2020; Tavares & Betti, 2021) (Ahmed & Gassmann, 2010; Amram et al., 2020; BritishRedCross, 2021; Flanagan et al., 2011; Mikolai et al., 2020; Ram et al., 2019)
		0.09-0.31	0.8		
		0.32-0.54	0.6		
		0.55-0.77	0.4		
		>0.77	0.2		

EV8	No Affordable Meals/day	Hardly Any	1	Since covid-19 has impacted people financially, those who were hard hit might have curtailed their spending and meal intake. The vulnerable groups cannot afford meals the same way as before the pandemic.	(Alkire et al., 2020; UNDP&OPHI, 2020)
		One Meal	0.8		
		Two Meal	0.6		
		Three Meal	0.4		
		Greater than three meals	0.2		

INFRASTRUCTURAL

IV1	Poor Housing Condition	Yes	1	Lack of quarantine possibilities, individuals may be more severely affected socially/economically (being already deprived of adequate living space/mentally dissatisfied)	(Ahmed & Gassmann, 2010; Alkire et al., 2020; BritishRedCross, 2021; Huong et al., 2019; Lane et al., 2013; Tavares & Betti, 2021; UNDP&OPHI, 2020)
		No	0		
IV2	Small/Overcrowded Housing	Yes	1	Lack of quarantine possibilities, individuals may be more severely affected socially/economically (being already deprived of adequate living space/mentally dissatisfied)	(BritishRedCross, 2021; Mikolai et al., 2020; Tavares & Betti, 2021; UNDP&OPHI, 2020)
		No	0		
IV3	Shared Housing	Yes	1	In shared housing, two or more families may use common facilities and share some common space. Different families have different perspectives/reactions regarding the following covid-19 SOPs. If a family member is exposed to covid-19, they may put other family members at risk.	(Jhan et al., 2020; Mikolai et al., 2020)
		No	0		

IV4	Mode of Transportation for traveling	Public	0.666	Public transport has the highest exposure, followed by no access to transport and traveling on foot, and the least exposed is one's transport	(Ahmed & Gassmann, 2010; Alkire et al., 2020; UNDP&OPHI, 2020)
		Private	0.333		
		No access to transport	1		
IV5	Communication Assets Owned	Yes	0	The greater the number of assets owned, the lesser the vulnerability. Communication via mobile phones is faster, easy, and more accessible rather than telephone and radio	(Ahmed & Gassmann, 2010; Alkire et al., 2020; UNDP&OPHI, 2020)
		No	1		
IV6	Average Travel time to a health facility	0.06	0.166	The greater the time taken to reach the health facility, the more the vulnerability. An individual showing symptoms of Covid-19 may be unable to make it to the hospital on time. Also, greater travel time means more chances of getting exposure	(Segnon et al., 2020)
		0.07-1.06	0.332		
		1.06-2.06	0.498		
		2.07-3.06	0.664		
		3.07-4.06	0.830		
		>4.06	1		
IV7	The hospital in my area has poor health facilities	Yes	1	Covid patients may not be able to get adequate treatment and may also put other individuals at risk. Individuals with Covid-19 symptoms may not be diagnosed hence more vulnerability.	(Davradakis et al., 2020; Flanagan et al., 2011; Hahn et al., 2009; Huong et al., 2019; Macharia et al., 2020; Segnon et al., 2020)
		No	0		
IV8	The hospital in my area doesn't have enough health professionals	Yes	1	Covid patients may not be able to get adequate treatment and may also put other individuals at risk. Individuals with Covid-19 symptoms may not be	(Davradakis et al., 2020; Flanagan et al., 2011; Hahn et al., 2009; Huong et al., 2019; Macharia et al., 2020; Segnon et al., 2020)
		No	0		

				diagnosed hence more vulnerability.	
IV9	Household having access to electricity	Yes	0	Access to basic facilities means less vulnerability	(Alkire et al., 2020; Tavares & Betti, 2021; UNDP&OPHI, 2020)
		No	1		
IV10	Household having access to Gas	Yes	0	Access to basic facilities means less vulnerability	(UNDP&OPHI, 2020)
		No	1		
IV11	Household having availability of Drinking Water	Yes	0	Access to basic facilities means less vulnerability	(Alkire et al., 2020; Gerlitz et al., 2016; Segnon et al., 2020; Tavares & Betti, 2021; UNDP&OPHI, 2020)
		No	1		
IV12	Household having access to Sanitation	Yes	0	Access to basic facilities means less vulnerability	(Ahmed & Gassmann, 2010; Alkire et al., 2020; Macharia et al., 2020; Segnon et al., 2020; Tavares & Betti, 2021; UNDP&OPHI, 2020)
		No	1		
IV13	Places for hand washing in the vicinity	Yes	0	Individuals will be able to wash their hands more frequently	(BritishRedCross, 2021)
		No	1		
IV14	Availability of adequate infrastructure in the locality	Yes	0	Infrastructure, i.e., availability of roads to reach nearby places to buy daily essentials/medical items/groceries during lockdown	(Ahmed & Gassmann, 2010)
		No	1		
IV15	Physical access to nearby facilities within 1km	Yes	0	Infrastructure, i.e., availability of roads to reach nearby places to buy daily essentials/medical items/groceries during lockdown	(BritishRedCross, 2021; Segnon et al., 2020)
		No	1		
IV16	Multiple/Diversity of water sources	Yes	0	For maintaining basic hygiene/frequent hand washing	(Segnon et al., 2020)
		No	1		

IV17	Struggle to get sufficient water	Yes	1	For maintaining basic hygiene/frequent hand washing. Those struggling to get water may be more exposed to using common facilities for the collection of water	(Segnon et al., 2020)
		No	0		
IV18	Keep/Have access to livestock	Yes	0	Stable source of income/sustenance hence less vulnerability	(Ahmed & Gassmann, 2010)
		No	1		

4.4 Vulnerability index construction

The social, economic, and infrastructure vulnerability indices are derived from a total of 68 vulnerability indicators categorized as social (SVI, 44), economic (EVI, 8), and infrastructure (IVI, 18). To develop indices, all of the indicators were standardized by giving them weights ranging from 0-1, with higher values near 1 indicating a higher level of vulnerability and lower values near 0 indicating a lower level of vulnerability. The indicators were further checked and amended to match local conditions and context. In order to create the multi-dimensional index, an average score for each of the three dimensions was calculated. The variables were further divided into various classes, i.e., two, three, four, and five. The classes were made based on the dispersion of data and the range of responses. To develop composite Index, weights were assigned to each class based on the relationship of the indicator with vulnerability. Variables with responses based on 2 classes were assigned weights as 1 and 0 or 1 and 0.5(where vulnerability can't be considered 0) , 3 classes were assigned weights as (0.3,0.6,1), 4 classes were assigned weights as (0.25,0.5,0.75,1) and 5 classes were assigned weights as (0.2,0.4,0.6,0.8,1). Initially, the average weights are summed up separately for social (0.276) minimum, economic (0.653) maximum, and infrastructure (0.424) medium vulnerability indices. The total summed-up score (0.451) gives the overall vulnerability of the community. A summary of indicators with weights, classes, and the source is given in Table 1. The following formulae were used for the standardization of the selected indicators:

$$CI = W_1 + W_2 + W_3 \ldots . W_n/n \qquad 2$$

$$\sum_{i=1}^{n} Wi/n \qquad 3$$

CI is the composite index, the number of indicators used to calculate the composite index is n, and the transformed values W1 to Wn are assigned to each indicator. The Social Vulnerability Index (SVI), Economic Vulnerability Index (EVI), and Infrastructural Vulnerability Index are all based on this general principle (IVI). (MVI) was calculated for each household in the study area using Eq. 2.

Social Vulnerability Index SVI

$$SVI = \sum_{i=1}^{44} SWi \,/n \qquad\qquad (n = 44) \qquad 4$$

Economic Vulnerability Index

$$EVI = \sum_{i=1}^{8} EWi/n \qquad\qquad (n = 8) \qquad 5$$

Infrastructural Vulnerability

$$IVI = \sum_{i=1}^{18} IVi/n \qquad\qquad (n = 18) \qquad 6$$

Multi-Dimensional Vulnerability Index (MVI)

MVI=SVI+EVI+IVI/3   7

4.5 Results and discussion

Separate indices are calculated for SVI, EVI, and IVI using the same methodology for each dimension. Initially, the average weights are summed up separately for social (0.276) minimum, economic (0.653) maximum, and infrastructure (0.424) medium vulnerability indices. The total summed-up score (0.451) gives the overall vulnerability of the community. The result of each dimension is described, followed by the multi-dimensional vulnerability.

4.6 VULNERABILITY ASSESSMENT

4.6.1 Social vulnerability assessment

The social vulnerability index at the household level was calculated for both urban and rural areas to draw a comparison. The range of social vulnerability index varies from <=0.243- >0.36 in an urban area. The range is classified as very low, low, moderate, and high. The highest percentage of household (38.4%) is observed in 0.24-0.30 (Low) SVI category followed by (29.6%) in 0.30-0.36 (Moderate) class, (16.4%) in >0.36(High) class and (15.6%) in <=0.243 (very Low) class. The range of the social vulnerability index varies from <=0.19->0.31 in a rural areas. The highest percentage of household (36%) is observed in 0.19-0.25 (Low) SVI category followed by 0.25-

0.31(29.6%) in (Moderate) class, (18%) in <=0.19(Very Low) class and (16.4%) in >0.31(High) class. The average values for SVI are 0.30 and 0.25 for urban and rural areas, respectively. The t-test value T=8.501 shows that the social vulnerability of urban communities is greater than that of rural communities, and p=0.000 shows significant variation between the social vulnerability of both communities. Highly vulnerable households made up 16.4% of both urban and rural communities. Higher social vulnerability can be attributed to 68 social vulnerability indicators.
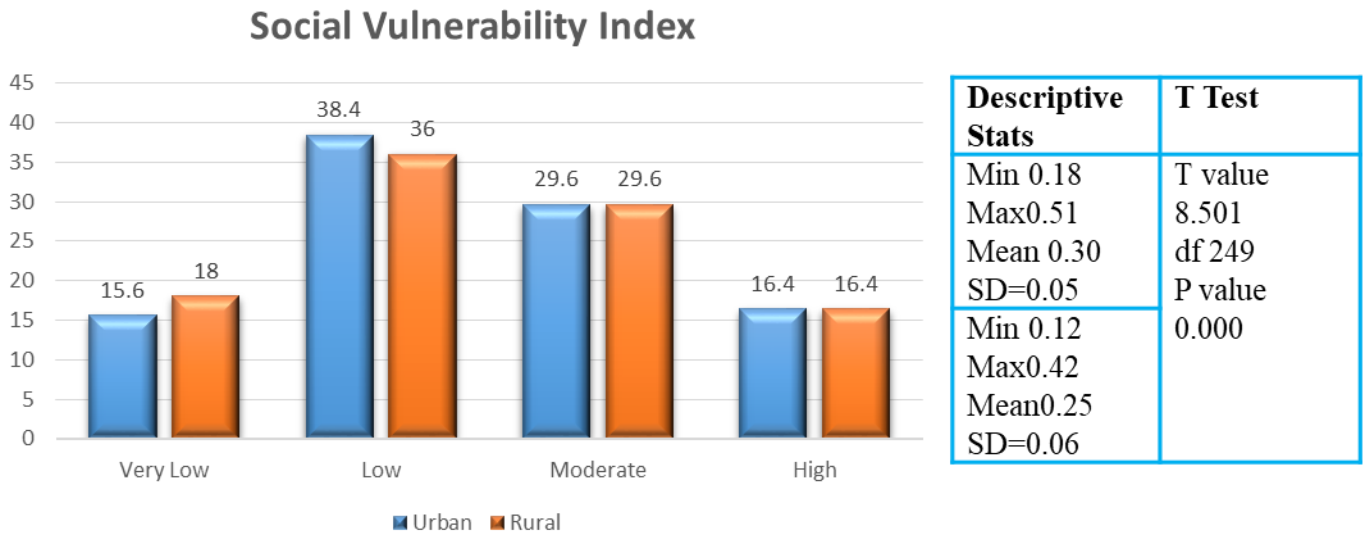

Social Vulnerability Index

Descriptive Stats	T Test
Min 0.18	T value
Max0.51	8.501
Mean 0.30	df 249
SD=0.05	P value
Min 0.12	0.000
Max0.42	
Mean0.25	
SD=0.06	

Fig. 7 Social vulnerability to COVID-19 of urban and rural communities in Rawalpindi District, Punjab Province Pakistan (HH=Households; n=500)

4.6.2 Economic vulnerability assessment

The economic vulnerability index at the household level was calculated for both of the urban and rural communities in the same manner as SVI. The range of the economic vulnerability index varies from 0.47- 0.86 in urban and rural areas. The range is classified as very low, low, moderate, and high. The highest percentage of household (38.8%) is observed in 0.562-0.65 (Low) SVI category followed by (31.6%) in 0.65-0.74 (Moderate) class, (15.2%) in <=0.561(very low) class and (14.4%) in >0.74 (High) class. The range of the economic vulnerability index varies from 0.42-0.92 in rural areas. The highest percentage of household (38.4%) is observed in 0.562-0.65 (Low) SVI category followed 0.65-0.74 (30.8%) in (Moderate) class, (17.2%) in >0.74(High) class and (13.6%) in <=0.561(Very Low) class. The average values for SVI are 0.65 and 0.67 for urban and rural areas, respectively. The T-test value T=22.093 shows that the economic vulnerability of

urban communities is greater than that of rural communities, and p=0.000 shows significant variation between the economic vulnerability of both communities. 14.4% and 17.2% of the households were highly vulnerable in urban and rural communities, respectively. Eight economic indicators are attributing towards the higher level of economic vulnerability.
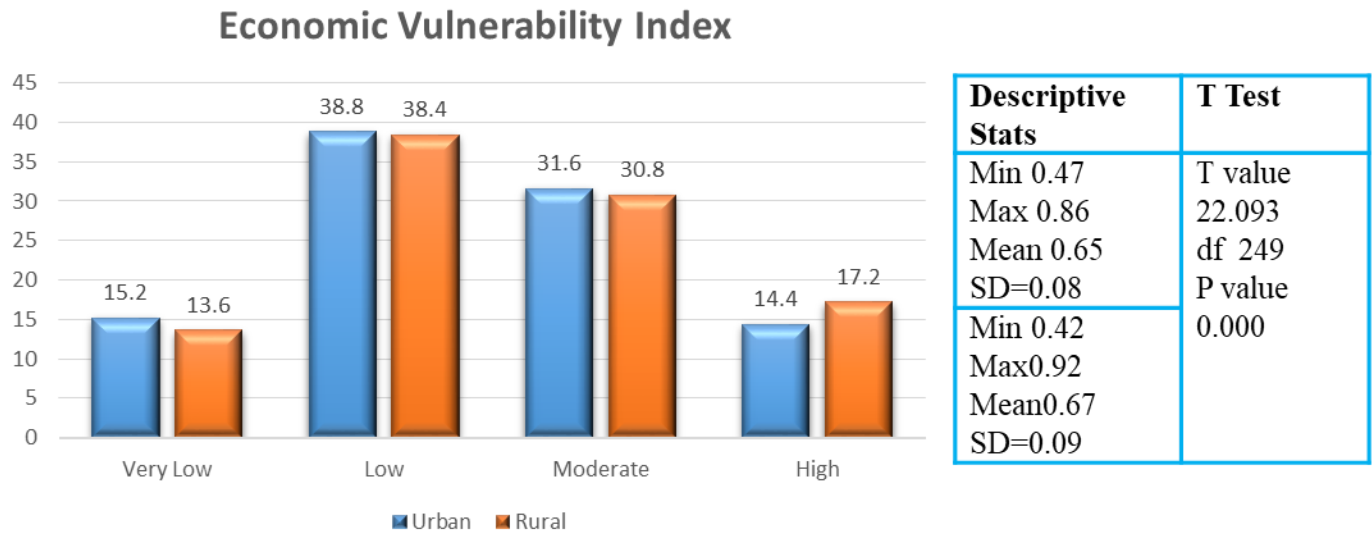
Economic Vulnerability Index

Descriptive Stats	T Test
Min 0.47 Max 0.86 Mean 0.65 SD=0.08	T value 22.093 df 249 P value 0.000
Min 0.42 Max0.92 Mean0.67 SD=0.09	

Fig. 8 Economic vulnerability to Covid-19of urban and rural communities in Rawalpindi District, Punjab Province Pakistan (HH=Households; n=500)

4.6.3 Infrastructure vulnerability assessment

The infrastructural vulnerability index at the household level was calculated for urban and rural areas. The range of infrastructural vulnerability index varies from 0.11- 0.88 in the urban area and in. The range is classified as very low, low, moderate, and high. The highest percentage of household (44%) is observed in 0.27-0.38(Low) IVI category followed by (25.6%) in 0.39-0.51 (Moderate) class, (17.6%) in >0.51(High) class and (13.2%) in<0.27(Very Low) class. The range of infrastructural vulnerability index varies from 0.22-0.88 in rural areas. The highest percentage of household (40.4%) is observed in 0.34-0.45 (Low) SVI category followed by 0.45-0.57 (29.2%) in (Moderate) class, (14%) in >0.57(High) class and (16.4%) in <=0.33(Very Low) class. The average values for IVI are 0.39 and 0.45for urban and rural areas, respectively. The T-test value T=-6.004 shows that the infrastructural vulnerability of urban communities is less than that of rural communities, and p=0.000 shows significant variation between the infrastructural vulnerability of both communities. 17.6% and 14% of the households were highly vulnerable in urban and rural

communities, respectively. Eighteen infrastructural indicators are attributing towards the higher level of infrastructural vulnerability.
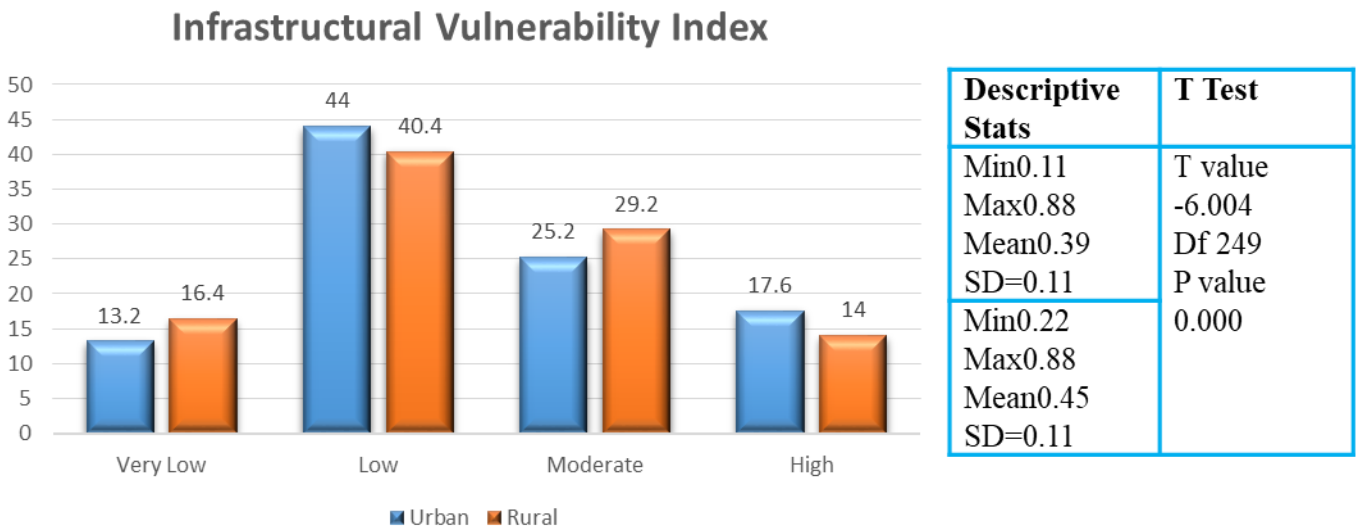

Infrastructural Vulnerability Index

Descriptive Stats	T Test
Min0.11 Max0.88 Mean0.39 SD=0.11	T value -6.004 Df 249 P value
Min0.22 Max0.88 Mean0.45 SD=0.11	0.000

Fig. 9 Infrastructural vulnerability to Covid-19 of urban and rural communities in Rawalpindi District, Punjab Province Pakistan (HH=Households; n=500)

4.6.4 Multi-dimensional vulnerability index

Paired sample T-test was used to calculate the multi-dimensional vulnerability Index for urban and rural communities. MVI is based on social, economic, and infrastructural dimensions of vulnerability for both communities. It is based on the results of the previous section, which separately emphasizes the three dimensions of vulnerability. The varying results of each dimension are affected by the numerous underlying vulnerability indicators used for each dimension. Despite significant variation in each dimension among urban and rural communities, no significant difference (T= -1.040, p=0.29) is observed in the overall vulnerability among urban and rural communities. However, the overall vulnerability of urban areas is greater than that of rural areas. The average overall multi-dimensional vulnerability values were almost the same 0.44 and 0.45 for urban and rural communities, respectively. In urban communities, 18% of the households were highly vulnerable and 12.4% were highly vulnerable in rural communities. Overall, 15.2% of households were deemed highly vulnerable. The social and economic vulnerability of urban communities is greater than rural communities. The infrastructural vulnerability of rural communities is greater than urban communities.
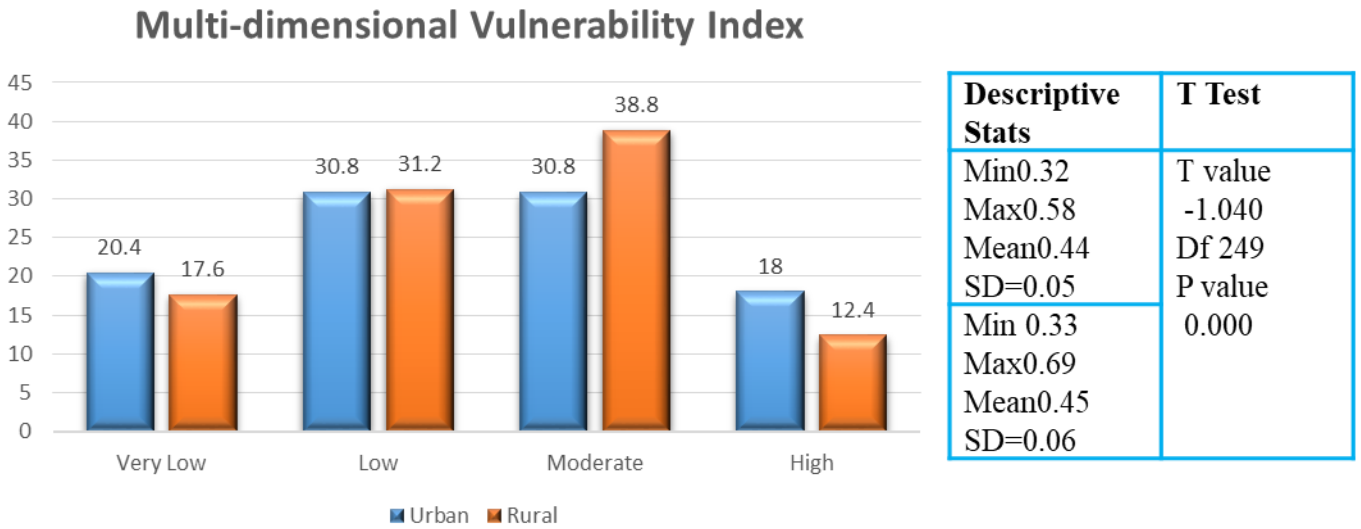
Fig. 10 Multi-dimensional vulnerability to Covid-19 of urban and rural communities in Rawalpindi District, Punjab Province Pakistan (HH=Households; n=500)

4.7 Summary of Chapter

The t-test value for social vulnerability (t=8.501, p=0.000) shows that the social vulnerability of urban communities is greater than that of rural communities. Significant differences exist in the social vulnerability of both communities. 16.4% of households in both urban and rural areas were highly vulnerable. The t-test value for economic vulnerability (t=22.093, p=0.000) shows that the economic vulnerability of urban communities is greater than that of rural communities, and a significant difference exists between the economic vulnerability of both communities.14.4% and 17.2% of the households were highly vulnerable in urban and rural communities, respectively. The t-test value for infrastructural vulnerability (t= -6.004, p=0.000) shows that the infrastructural vulnerability of urban communities is less than that of rural communities, and significant difference exists between the infrastructural vulnerability of both communities.17.6% and 14% of surveyed households were highly vulnerable in urban and rural communities, respectively. Despite significant variation in each dimension among urban and rural communities, no significant difference (t= -1.040, p=0.29) is observed in the overall vulnerability among urban and rural communities. However, the overall vulnerability of urban areas is greater than that of rural areas.

Chapter 5: COVID-19 RISK PERCEPTION ASSESSMENT

5.1 Introduction

Risk perception is a significant factor in determining preparedness and mitigation measures adopted by the community. Since several underlying factors affect public risk perception, its assessment is a challenging and multi-dimensional task. The situation is further aggravated owing to the unknown, novel, and uncertain nature of the COVID-19 pandemic. Public risk perception can play a significant role in adopting preventive and protective measures.

The chapter aims to assess how public risk perception varies between urban and rural communities based on key indicators and dimensions. The findings can help local administrations, public health experts, and emergency managers reduce future pandemic risks. Understanding urban-rural differences in COVID-19 risk perception is also imperative so governments can take relevant courses of action. Therefore, this chapter aims to understand COVID fear, likelihood, awareness, and trust differences between urban and rural communities.

5.2 Indicator selection

The selected indicators/questions have been categorized into various dimensions to assess the risk perception of urban and rural communities. The four dimensions of indicators are fear and likelihood (9 indicators), awareness (10 indicators), preventive measures (5 indicators), and trust (3) indicators, as shown in Table 2.

Table 2 COVID-19 Risk Perception indicator for urban and rural communities

Sr No	Indicator	Classes	Weights	Explanation	Source
Fear and likelihood					
FL1	Anxiety of not knowing when the outbreak would end	Highly anxious	1	Highly anxious individuals have a higher risk perception as compared to others.	(Shreve et al., 2014; WHO, 2020e)
		Anxious	0.8		
		Neither anxious nor calm	0.6		
		Calm	0.4		
		Very much at peace	0.2		
FL2	How worried are you about being infected with COVID-19/health financial situation?	Very worried	1	Very worried individuals have a higher risk perception and are more vulnerable to mental health issues.	(Abir et al., 2020; Yubin Ding et al., 2020; Krok & Zarzycka, 2020; Soiné et al., 2021; Wilson et
		Worried	0.8		
		Neither worried nor calm	0.6		
		Calm	0.4		
		Very Calm	0.2		

FL3	Most patients recover from the infection due to early treatment	Strongly Disagree Disagree Neither agree nor disagree Agree Strongly agree	0.2 0.4 0.6 0.8 1	Individuals who strongly agree with the statement have a lower-risk perception due to inadequate information/awareness.	(Yani Ding et al., 2020)
FL4	Only elderly, chronic patients, and obese are likely to be severe cases	Strongly Disagree Disagree Neither agree nor disagree Agree Strongly agree	1 0.8 0.6 0.4 0.2	Individuals strongly agree with the statement have higher-risk perceptions due to adequate information/ awareness.	(Yani Ding et al., 2020)
FL5	On contracting the virus, how likely do you think you will pass it on to someone else?	Very Likely Likely Neither likely nor unlikely Unlikely Very unlikely	1 0.8 0.6 0.4 0.2	Individuals who responded very likely are lesser vulnerable and have higher-risk perception due to adequate information/ awareness/knowledge They will adopt preventive measures/will be well prepared and avoid social contact on contracting the virus.	(Wise et al., 2020)
FL6	If someone contacts virus from you, how badly do you think they would be affected	Very Likely Likely Neither likely nor unlikely Unlikely Very unlikely	1 0.8 0.6 0.4 0.2	Individuals who responded very likely have higher-risk perceptions and are lesser vulnerable due to adequate information/awareness/knowledge. They will adopt preventive measures/will be well prepared and avoid social contact on contracting the virus.	(Wise et al., 2020)
FL7	Your chances of personal risk of infection with COVID-19 for each of the following Risk of becoming infected	Very High High Neither High nor low Low Very Low	1 0.8 0.6 0.4 0.2	Those who believe the chances of being infected with COVID-19 are very high would take more preventive/precautionary measures and be more prepared than others. They may also be more affected mentally by the pandemic and have a higher risk perception.	(Abir et al., 2020)
FL8	Your chances of personal risk of infection with COVID-19 for each of the following Risk of becoming severely infected	Very High High Neither High nor low Low Very Low	1 0.8 0.6 0.4 0.2	Those who believe that the chances of being infected severely with COVID-19 are very high would take more preventive/precautionary measures and be more prepared than others. They may also be more affected mentally by the pandemic	(Abir et al., 2020)

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				and have a higher risk perception.	
FL9	How likely do you think that a loved one will become infected?	Very Likely	1	Individuals who replied very likely have a higher risk perception.	(Yani Ding et al., 2020)
		Likely	0.8		
		Neither likely nor unlikely	0.6		
		Unlikely	0.4		
		Very unlikely	0.2		
Awareness					
AW1	Chance of dying if a person gets infected with COVID-19	Very High	1	Those who believe that the chances of dying from COVID-19 are very high would take more preventive/precautionary measures and be more prepared than others. They have a higher risk perception as compared to others.	(Abir et al., 2020; Bruine de Bruin & Bennett, 2020; Yani Ding et al., 2020; Kaulu et al., 2020; Svahn, 2013)
		High	0.8		
		Normal	0.6		
		Low	0.4		
		Very Low	0.2		
AW2	Well prepared (self-efficacy) to protect yourself against COVID-19	Yes	1	Well-prepared individuals will have a higher risk perception.	(Bruine de Bruin & Bennett, 2020; WHO, 2020e)
		No	0		
AW3	Intentionally avoided protective measures and voluntarily put yourself in a risky situation concerning COVID-19	Strongly Disagree	1	Individuals who strongly disagree with the statement have a higher risk perception.	(Svahn, 2013)
		Disagree	0.8		
		Neither agree nor disagree	0.6		
		Agree	0.4		
		Strongly agree	0.2		
AW4	Isolation of people infected with the COVID-19 virus is effective in reducing its spread	Strongly Disagree	0.2	Individuals who strongly agree with the statement have higher risk perception and are lesser vulnerable	(Abir et al., 2020; Bruine de Bruin & Bennett, 2020; Yani Ding et al., 2020; Shreve et al., 2014)
		Disagree	0.4		
		Neither agree nor disagree	0.6		
		Agree	0.8		
		Strongly agree	1		
AW5	I am interested in receiving more information about COVID-19 in my locality	Strongly Disagree	0.2	Individuals who strongly agree with the statement have higher risk perception and are lesser vulnerable	(Wilson et al., 2019)
		Disagree	0.4		
		Neither agree nor disagree	0.6		
		Agree	0.8		
		Strongly agree	1		
AW6	I think that COVID-19 is a myth/conspiracy, and the news regarding it is fake	Strongly Disagree	1	Individuals who strongly disagree with the statement have higher risk perception	(T. L. D. Huynh, 2020; WHO, 2020e)
		Disagree	0.8		
		Neither agree nor disagree	0.6		
		Agree	0.4		
		Strongly agree	0.2		
AW7	When a fever is not present, a person with COVID-19 cannot infect others	Strongly Disagree	1	Individuals who strongly disagree with the statement have higher risk perception due to adequate information/awareness/knowledge	(Abir et al., 2020; Yani Ding et al., 2020)
		Disagree	0.8		
		Neither agree nor disagree	0.6		
		Agree	0.4		
		Strongly agree	0.2		
AW8		Strongly Disagree	0.2	Individuals who strongly agree with the statement	(Yani Ding et al., 2020)
		Disagree	0.4		

	COVID-19 spreads via respiratory droplets of infected individuals	Neither agree nor disagree	0.6	have higher risk perception due to adequate information/awareness/know ledge	
		Agree	0.8		
		Strongly agree	1		
AW9	Children and young adults do not require preventive measures	Strongly Disagree	1	Individuals who strongly disagree with the statement have higher risk perception due to adequate information/awareness/know ledge	(Abir et al., 2020; Yani Ding et al., 2020)
		Disagree	0.8		
		Neither agree nor disagree	0.6		
		Agree	0.4		
		Strongly agree	0.2		
AW10	Because I/family members are in good health, we have a low chance of being infected by COVID-19	Strongly Disagree	1	Individuals who strongly disagree with the statement have higher risk perception due to adequate information/awareness /knowledge	(Yubin Ding et al., 2020)
		Disagree	0.8		
		Neither agree nor disagree	0.6		
		Agree	0.4		
		Strongly agree	0.2		
Preventive measures					
P1	Practicing hand hygiene and wearing masks can prevent the spread of COVID-19	Strongly Disagree	0.2	One of the most significant SOP to be followed for COVID-19 infection. Those who strongly disagree must be unaware, have lower risk perception, and are more vulnerable	(Abir et al., 2020; Bruine de Bruin & Bennett, 2020; Wise et al., 2020)
		Disagree	0.4		
		Neither agree nor disagree	0.6		
		Agree	0.8		
		Strongly agree	1		
P2	I will no longer attend crowded events due to the fear of COVID-19	Strongly Disagree	0.2	The individuals who agree are conscious/aware that COVID-19 spreads at crowded places/events /gatherings and would follow the SOPs. They have a higher risk perception.	(Abir et al., 2020; Bruine de Bruin & Bennett, 2020; Yani Ding et al., 2020; WHO, 2020e)
		Disagree	0.4		
		Neither agree nor disagree	0.6		
		Agree	0.8		
		Strongly agree	1		
P3	I am avoiding in-person social interaction	Strongly Disagree	0.2	Individuals who strongly agree with the statement will have a higher risk perception	(Yani Ding et al., 2020; Wise et al., 2020)
		Disagree	0.4		
		Neither agree nor disagree	0.6		
		Agree	0.8		
		Strongly agree	0.1		
P4	I am traveling less than I normally would	Strongly Disagree	0.2	Individuals who strongly agree with the statement will have a higher risk perception	(Bruine de Bruin & Bennett, 2020; Wise et al., 2020)
		Disagree	0.4		
		Neither agree nor disagree	0.6		
		Agree	0.8		
		Strongly agree	1		
P5	This year I will rather look for holiday possibilities within my own country	Strongly Disagree	0.2	Individuals who strongly agree with the statement will have a higher risk perception	(Bruine de Bruin & Bennett, 2020; Yani Ding et al., 2020)
		Disagree	0.4		
		Neither agree nor disagree	0.6		
		Agree	0.8		
		Strongly agree	1		
Trust					
T1	Trust in COVID-19 cure	Most Trust	1	Individuals with the most trust are lesser vulnerable/have higher risk perception. They would	(Kaulu et al., 2020)
		More Trust	0.8		
		Neutral	0.6		
		Less Trust	0.4		

		Least Trust	0.2	follow the rules/SOPs in letter and spirit, owing to the level of trust	
T2	Trust in Health Authorities	Most Trust	1	Individuals with the most trust are lesser vulnerable/have higher risk perception. They would follow the rules/SOPs in letter and spirit, owing to the level of trust	(WHO, 2020e)
		More Trust	0.8		
		Neutral	0.6		
		Less Trust	0.4		
		Least Trust	0.2		
T3	Trust in Government institutions	Most Trust	1	Individuals with the most trust are lesser vulnerable/have higher risk perception. They would follow the rules/SOPs in letter and spirit, owing to the level of trust	(WHO, 2020e)
		More Trust	0.8		
		Neutral	0.6		
		Less Trust	0.4		
		Least Trust	0.2		

5.3 Data analysis

The data collected through a structured questionnaire was analyzed using IBM-SPSS 23 and MS Office. An index-based approach and descriptive statistics have been used for data analysis to quantify risk perception. Statistical tests (chi-square/t-test) were performed to assess the relationship between indicators and differences in four dimensions of risk perception. Separate indices of risk perception for urban and rural communities were generated for fear and likelihood, awareness, preventive measure, and trust dimensions and compared. Based on these four dimensions, overall risk perception is assessed for both urban and rural communities. Frequency tables were generated in SPSS for each indicator for comparing urban and rural communities. Descriptive statistics were used to assess the responses in frequency tables, percentages, and means. Suitable graphs (stacked bar charts) were made to indicate the responses to the socioeconomic profile of the respondents. Furthermore, ArcGIS was used to generate a map of the study area of Rawalpindi District for urban and rural communities.

Indices are derived from a total of 27 risk perception indicators categorized as fear and likelihood (FLI, 9), awareness (AWI, 10), preventive measures (PI, 5), and trust (TI, 3). To develop indices, all the indicators were standardized by assigning weights from 0-1, with higher values close to 1 indicating a greater level of risk perception and lower values close to 0 indicating a lower level of risk perception. The indicators were further checked and amended to match local conditions and context. An average score was calculated for all four dimensions for developing the risk perception index. For the purpose of developing the risk perception index, an average score for all the four dimensions was determined. The variables were already divided into various classes based on the

Likert scale. To develop composite Index, weights were assigned to each class based on the relationship of the indicator with risk perception. Variables with responses based on 5 classes were assigned weights as (0.2, 0.4, 0.6, 0.8, and 1). Initially, the average weights are summed up separately for fear and likelihood (0.81), awareness (0.63), preventive measures (0.61), and trust (0.82) indices. The total summed-up score (0.7) gives the overall vulnerability of the community. A summary of indicators with weights, classes, and the reference is given in Table 2. The following Equations 2 and 3 were used for the standardization of the selected indicators:

$$CI = W_1 + W_2 + W_3 \dots \cdot \frac{W_n}{n} \qquad Eq.2$$

$$\sum_{i=1}^{n} Wi/n \qquad Eq.3$$

CI is the composite index, the number of indicators used to calculate the composite index is n, and the transformed values W1 to Wn are assigned to each indicator. Following this general principle, the Fear and Likelihood Index (FLI), Awareness Index (AI), Preventive measures Index (PI), and Trust Index (TI) were calculated. RPI was calculated for each household in the study area using Eqs. 4, 5, 6, 7, and 8.

Fear & Likelihood Index

$$FLI = \sum_{i=1}^{9} SWi/n \qquad (n = 9) \qquad Eq.4$$

Awareness Index

$$AWI = \sum_{i=1}^{10} EWi/n \qquad (n = 10) \qquad Eq.5$$

Preventive Measure Index

$$PI = \sum_{i=1}^{5} IVi/n \qquad (n = 5) \qquad Eq.6$$

Trust Index

$$TI = \sum_{i=1}^{3} IVi/n \qquad\qquad (n = 3) \qquad Eq.7$$

Risk Perception Index (RPI)

$$RPI = \frac{FLI + AI + PI + TI}{4} \qquad\qquad Eq.8.$$

5.4 Dimensions of risk perception
5.4.1 Fear and likelihood
In the fear and likelihood dimension, as shown in Fig. 11, in response to FL1, half of the sampled respondents from urban (52%) and rural (50.4%) households were highly anxious about COVID-19. Overall, a significant difference was found between the urban and rural population (χ2= 47.649, p value=0.000). In response to FL2, most of the sampled respondents (76.4%) from urban and rural (56.4%) were highly worried. Overall, a significant difference was found between the urban and rural populations (χ2=24.211, p value=0.000). In response to FL3, the majority of the sampled respondents from urban (56.4%) strongly agreed, while rural (77.6%) strongly disagreed. Overall, a significant difference was found between the urban and rural populations (χ2=330.274, p value=0.000). In response to FL4, most of the sampled respondents from urban (60%) disagreed, while rural (85.6%) strongly agreed. Overall, a significant difference was found between the urban and rural populations (χ2=313.167, p value=0.000). In response to FL5, the majority of the sampled respondents from urban (82%) strongly agreed, while in rural (57.2%) strongly agreed. Overall, a significant difference was found between the urban and rural populations (χ2=81.475, p value=0.000). In responses to FL6, the majority of the sampled respondents from urban (81.6%) strongly agreed, while in rural (55.2%) strongly agreed. Overall, a significant difference was found between the urban and rural populations (χ2=55.764, p value=0.000). In responses to FL7, the majority of the sampled respondents from urban (90.4%) replied very high as compared to (41.2%) in rural. Overall, a significant difference was found between the urban and rural populations (χ2=154.769, p value=0.000). In responses to FL8, the majority of the sampled respondents from urban (86%) replied very high as compared to (51.2%) in rural. Overall, a significant difference was found between the urban and rural populations (χ2=80.210, p value=0.000). In responses to

FL9, most of the sampled respondents from urban (92.4%) replied that it was very likely compared to (40.8%) in rural. Overall, a significant difference was found between the urban and rural populations ($\chi 2$=150.042, p-value = 0.000).

A high level of anxiousness and worry was prevalent in sampled urban and rural respondents. This may be due to various factors, such as the novel nature of the disease, quarantine/isolation, lack of social interaction, uncertainty, lack of awareness, and infodemic. It also highlights the importance of promoting mental health interventions/measures during a COVID-19 pandemic. In a rural community, most people were unaware that early treatment plays a significant role in the recovery of a patient, which can be attributed to a lack of awareness regarding how to deal with a patient who has been diagnosed with COVID-19. In a rural community, the majority believed that only elderly, obese, and chronic patients were likely to be severe cases. Rural communities had better risk perception in this regard as compared to the urban community. Both communities were very much aware of the highly contagious nature of the disease and had a high risk perception in this regard.
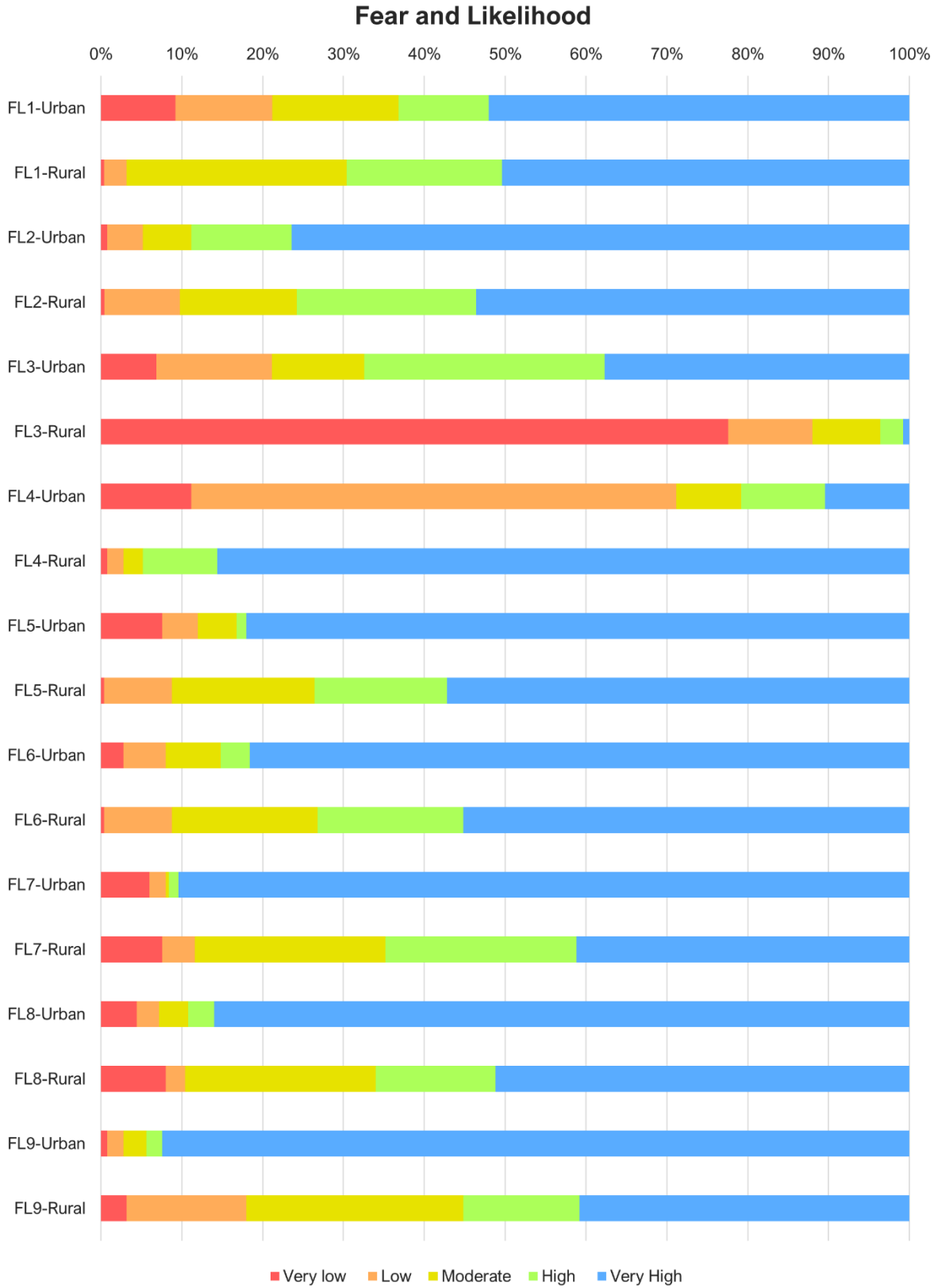
Fig. 11 Level of fear and likelihood

5.4.2 Awareness

In the awareness dimension, as shown in Fig. 12, in response to AW1, half of the sampled respondents from urban (57.6%) responded with very low, and rural (24.4%) responded with very low, followed by (22.2%) who replied moderate. Overall, a significant difference was found between the urban and rural populations ($\chi2$=108.834 p value=0.000). In response to AW2, most of the sampled respondents (92%) from urban and rural (95.6%) believed they were well prepared against COVID-19. In response to AW3, most of the sampled respondents from urban (39.6%) strongly disagreed, while rural (66%) strongly agreed. Overall, a significant difference was found between the urban and rural populations ($\chi2$=228.593, p value=0.000). In response to AW4, the majority of the sampled respondents from urban (58.8%) strongly agreed, while rural (71.2%) strongly disagreed. Overall, a significant difference was found between the urban and rural populations ($\chi2$=281.093 p value=0.000). In response to AW5, the majority of the sampled respondents from urban (56.5%) strongly agreed, while rural (58.4%) strongly disagreed. Overall, a significant difference was found between the urban and rural populations ($\chi2$=229.354, p value=0.000). In responses to AW6, the majority of the sampled respondents from urban (37.2%) strongly disagreed, while in rural (35.6%) strongly agreed. Overall, a significant difference was found between the urban and rural populations ($\chi2$=95.141, p value=0.000). In responses to AW7, the majority of the sampled respondents from urban (65.6%) disagreed as compared to (71.6%) in rural who strongly agreed. Overall, a significant difference was found between the urban and rural populations ($\chi2$=283.258, p value=0.000). In responses to AW8, the majority of the sampled respondents from urban (42.4%) strongly disagreed as compared to (73.2%) in rural. Overall, a significant difference was found between the urban and rural populations ($\chi2$=86.517, p value=0.000). In responses to AW9, the majority of the sampled respondents from urban (40.4%) strongly agreed as compared to (73.2%) in rural. Overall, a significant difference was found between the urban and rural populations ($\chi2$=94.227, p value=0.000). In responses to AW10, most of the sampled respondents from urban (38.4%) strongly agreed as compared to (21.2%) in rural who strongly disagreed. Overall, a significant difference was found between the urban and rural populations ($\chi2$=122.392, p value=0.000).

In urban communities, the majority believed that the chance of dying on catching COVID-19 is very low, which shows that they have a low-risk perception in terms of COVID-19 death as compared to the rural community. It might be because most respondents did not experience cases

of COVID-19 deaths in family and relatives, and there was a general lack of awareness regarding its mortality and morbidity statistics. Both the communities believed they were well prepared to fight against the COVID-19 pandemic showing a lower risk perception. In rural communities, the majority disagreed with protective measures and agreed that they voluntarily avoided them. The lack of seriousness may be attributed to a lack of awareness, considering COVID-19 a myth, socioeconomic background, and non-serious attitude. In urban communities, the majority disagreed that COVID-19 is a fake/myth/conspiracy. However, a great percentage still believed it was fake/myth/conspiracy. While in rural communities, the majority agreed that COVID-19 was a fake/myth/conspiracy. It may be attributed to non-credible sources and an overall lack of knowledge and information. Both the communities disagreed that COVID-19 spread due to respiratory droplets of infected individuals. Poor knowledge regarding the transmission of disease directly affects the preventive behaviors adopted.
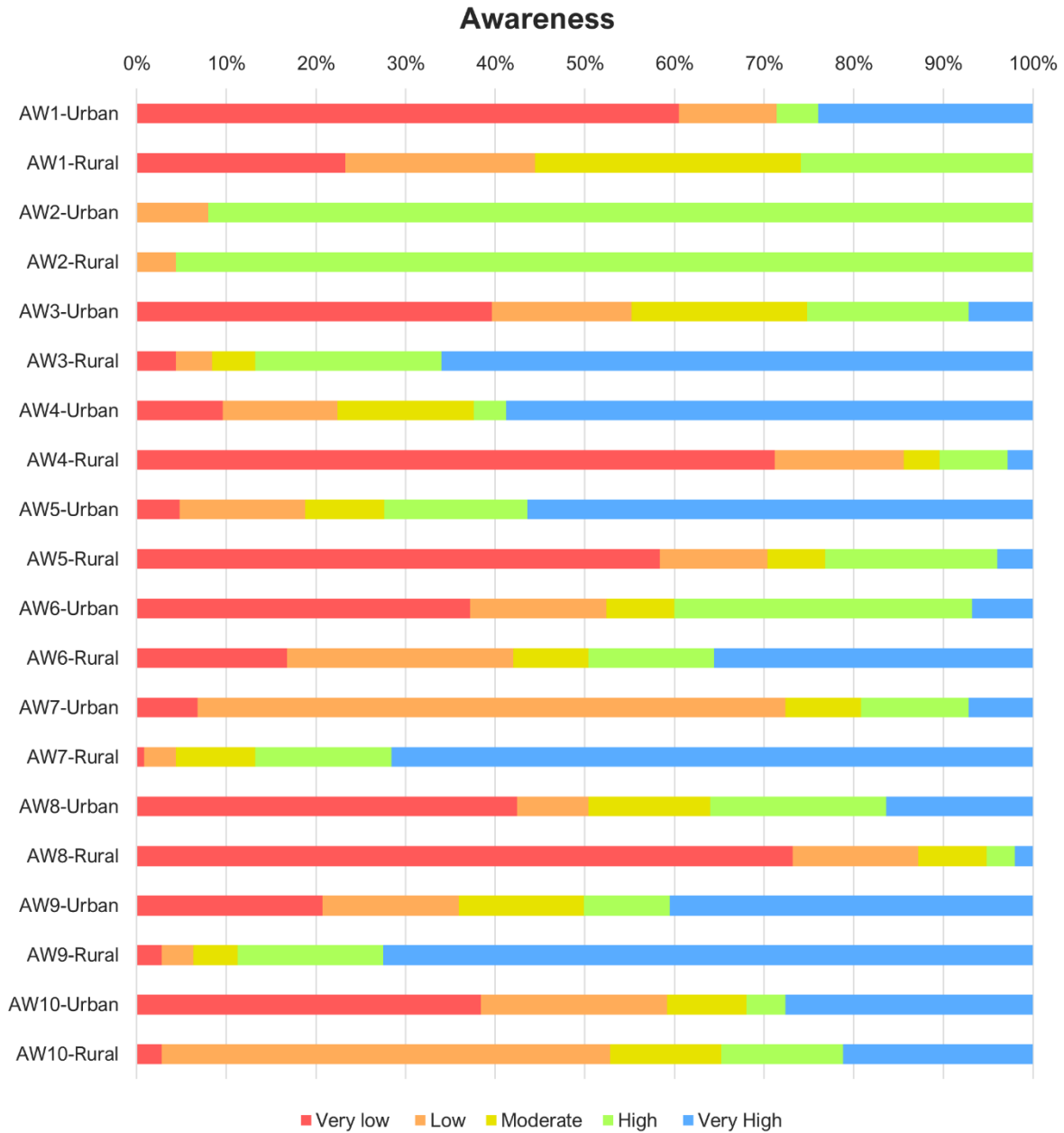
Fig. 12 Level of awareness

5.4.3 Preventive

In the preventive measure dimension, as shown in Fig. 13, in response to P1, the majority of the sampled respondents from urban (46.8%) strongly agreed, and rural (63%) strongly disagreed. Overall, a significant difference was found between the urban and rural populations ($\chi2$=199.402 p value=0.000). In response to P2, the majority of the sampled respondents (44%) from urban strongly agreed, and rural (67.2%) strongly disagreed. Overall, a significant difference was found between the urban and rural populations ($\chi2$=247.524, p value=0.000). In response to P3, most of

the sampled respondents from urban (41.2%) strongly agreed, while rural (56.4%) strongly disagreed. Overall, a significant difference was found between the urban and rural populations ($\chi2$=213.399, p value=0.000). In response to P4, the majority of the sampled respondents from urban (57.6%) strongly agreed, while rural (44%) strongly disagreed. Overall, a significant difference was found between the urban and rural populations ($\chi2$=100.034 p value=0.000). In response to P5, the majority of the sampled respondents from urban (53.2%) strongly agreed, while rural (33.6%) strongly disagreed. A significant difference was found between the urban and rural populations ($\chi2$=93.425, p-value = 0.000).

The rural community did not consider most of the preventive and protective measures important to control the spread of COVID-19 compared to the urban community. Low-risk perception in this regard would greatly affect the adoption of precautionary measures by the rural communities. It requires necessary intervention in rural communities to signify the importance of preventive and protective measures. In rural populations, the community and neighborhood systems are very strong, which may explain why the individuals are not avoiding social interaction. People from rural areas travel to urban areas for employment opportunities which might be one of the reasons why they are not restricting their traveling practices.

Preventive measures
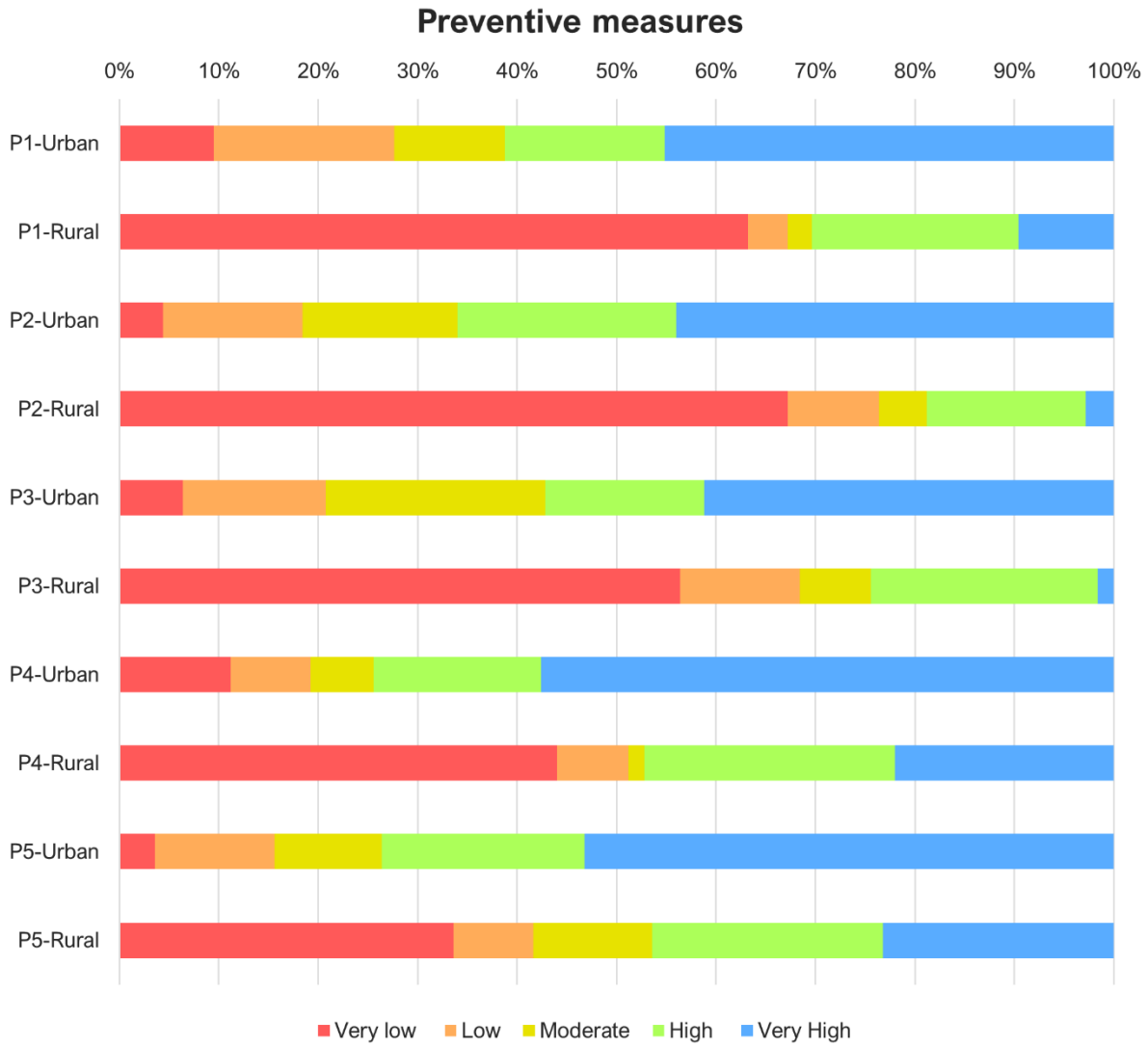
Fig. 13 Level of preventive measures

5.4.4 Trust

In the trust dimension, as shown in Fig. 14, in response to T1, most of the sampled respondents from urban (58.4%) had a high trust, and rural (75.6%) had very high trust in COVID-19 cure. Overall, a significant difference was found between the urban and rural populations ($\chi 2$=196.369, p value=0.000). In response to T2, the majority of the sampled respondents (46%) from urban had high trust, and rural (70.8%) had very high trust. Overall, a significant difference was found between the urban and rural populations ($\chi 2$=158.369, p value=0.000). In response to T3, the majority of the sampled respondents from urban (46.8%) had high trust in health authorities, while

rural (71.2%) had very high trust. Overall, a significant difference was found between the urban and rural populations ($\chi2=59.312$, p value=0.000).

Trust is an important factor in the formation of risk perception. In both communities, the high level of trust in COVID-19 cure, government institutions, and health authorities is an encouraging factor. The guidance provided by the health authorities, in the form of SOPs and precautionary measures, may be adopted by the communities due to higher trust. There may be several factors attributed to this, i.e., past experiences, the performance of government/health institutions, credible/authentic/reliable information, family/friends, and relatives getting vaccinated, etc. Another possible explanation might be that it may be their only way out when COVID-19 was evolving, and there was total uncertainty, panic, and limited sources of information.
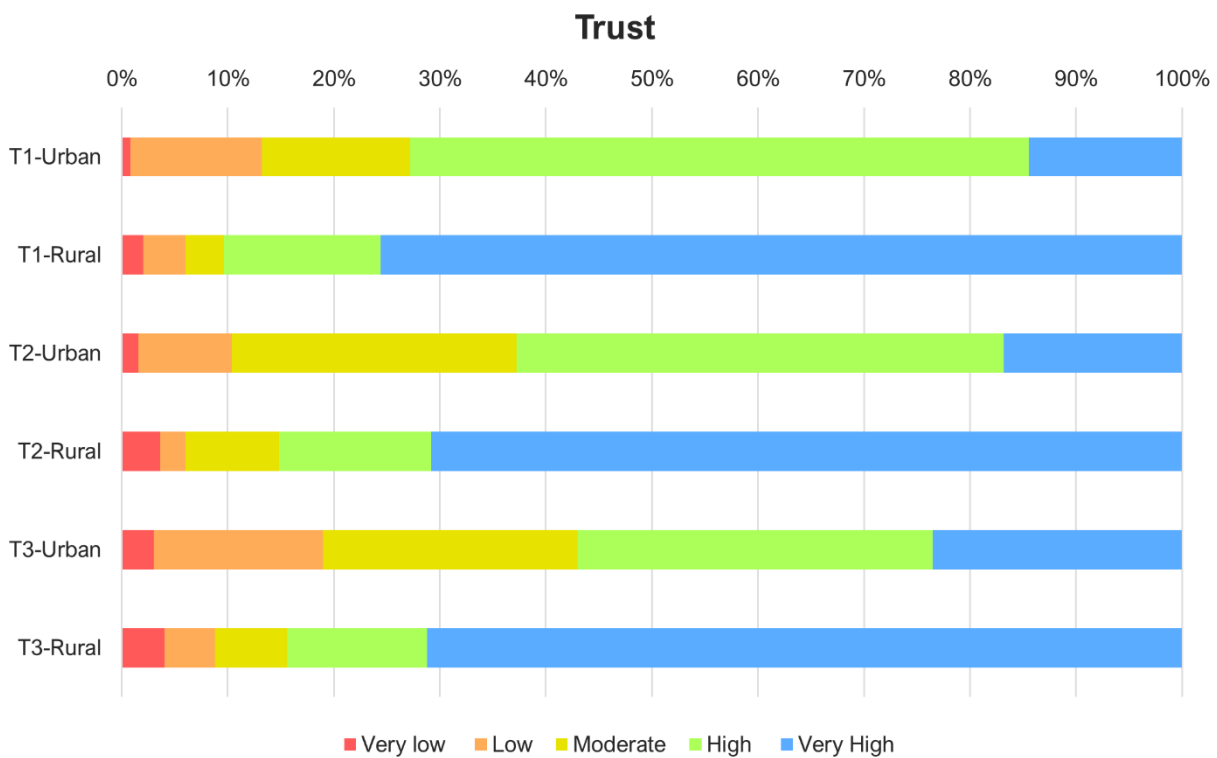
Fig. 14 Level of trust

5.4.5 Overall covid risk perception
Combining the values for all the four dimensions, the results for risk perception in each dimension for both urban and rural communities have been estimated, as shown in Fig. 15. In the fear and likelihood dimension, the majority of the sampled respondents from urban (46%) and rural (47.6%)

had a moderate level of risk perception. Overall, a significant difference was found between the urban and rural population ($\chi2$=90.077 p value=0.000). In the awareness dimension, the majority of the sampled respondents (40%) from urban had low-risk perceptions, and rural (43.6%) had moderate risk perceptions. Overall, a significant difference was found between the urban and rural populations ($\chi2$=33.651, p value=0.00). In the preventive measure dimension, the majority of the sampled respondents from urban (42.8%) had high-risk perceptions, while rural (56.4%) had low-risk perceptions. Overall, a significant difference was found between the urban and rural populations ($\chi2$=229.959, p value=0.000). In the trust dimension, the majority of the sampled respondents from urban (53.6%) had low-risk perceptions, while rural (60.8%) had high-risk perceptions. Overall, a significant difference was found between the urban and rural populations ($\chi2$=175.794, p value=0.000). In terms of overall RPI, the majority of the sampled respondents from urban (38.8%) had moderate risk perception, while rural (37.2%) had low-risk perception. Overall, a significant difference was found between the urban and rural populations in terms of overall risk perception ($\chi2$=61.330, p value=0.000).

Risk perception and its dimensions
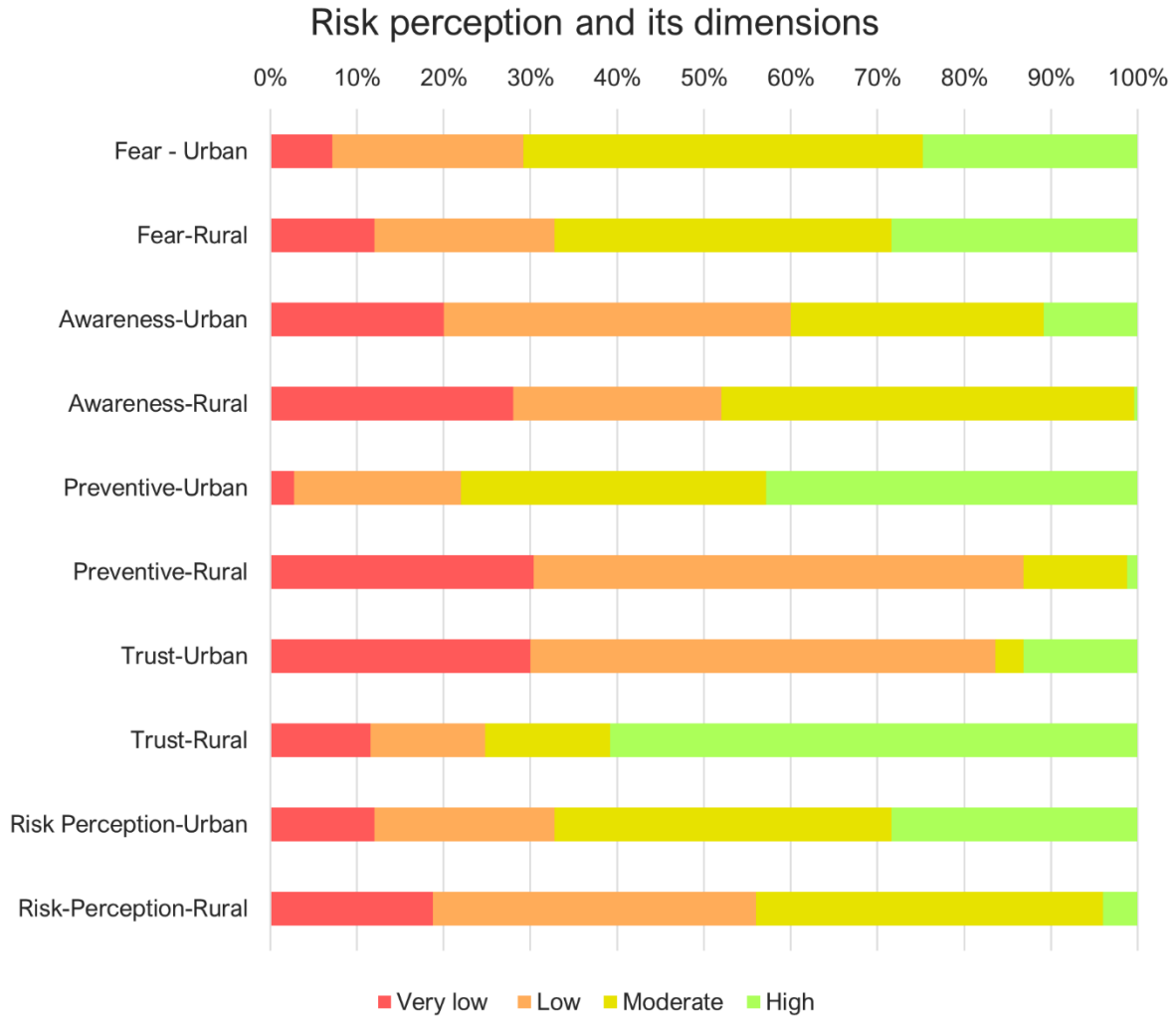
Fig. 15 Level of overall risk perception

The t-test value for the four dimensions shows a significant difference in all the four dimensions, as shown in Table 3. In terms of fear and likelihood, the t value (8.322) shows that the risk perception of urban communities is higher compared to rural communities. In terms of awareness, the t value (-5.460) shows that the risk perception of rural communities is higher than urban communities. Regarding the preventive measure dimension, the t value (20.208) shows that the risk perception of urban communities is higher than rural communities. Regarding the trust dimension, the t value (-12.359) shows that the risk perception of rural communities is higher

compared to urban communities. Regarding overall risk perception, the t value (8.016) shows that the overall risk perception of urban communities is higher than rural communities.

Table 3 Urban-rural difference in risk perception and its dimensions

Dimension	Urban		Rural		t-test	p-value
	Mean	SD	Mean	SD		
Fear & Likelihood	2.88	0.863	2.20	0.856	8.322	0.000
Awareness	2.31	0.912	2.74	0.817	-5.460	0.000
Preventive Measures	3.18	0.838	1.84	0.669	20.208	0.000
Trust	2.00	0.929	3.24	1.072	-12.359	0.000
Overall RPI	2.84	0.974	2.29	0.816	8.016	0.000

5.5 Summary of Chapter

According to the survey findings, there was a significant difference in all four dimensions of COVID-19 risk perception between urban and rural communities. The overall risk perception of urban communities was greater than rural communities. In the fear and likelihood and preventive measure dimensions, the risk perception of urban communities was greater than rural communities. However, the risk perception of rural communities was higher in the awareness and trust dimensions. Both communities had a high level of anxiousness and worry due to the pandemic. In rural communities, most people were unaware that early treatment plays an important role in the recovery of patients, and a majority believed that only elderly, obese, and chronic patients were likely to be severe cases. Both communities were very aware of the highly contagious nature of disease transmission but believed that the chance of dying due to COVID-19 was very low. Both the communities believed they were well prepared to fight against the COVID-19 pandemic. In rural communities, the majority were not in favor of protective measures and agreed that they voluntarily avoided such measures. Many respondents still believed it was a fake/myth/conspiracy. The rural community did not consider most of the preventive and protective measures important to control the spread of COVID-19 compared to the urban community. In both communities, the high level of trust in COVID-19 cure, government institutions, and health authorities is an encouraging factor.

Chapter 6: ACTIONS, BELIEFS, AND PERCEPTIONS IN LOCKDOWN

6.1 Introduction

The COVID-19 outbreak has affected both urban and rural communities. Assessment of people's attitudes, beliefs, and risk perception is a challenging and multidimensional phenomenon. Beliefs and perceptions are usually subjective and vary from person to person. This chapter analyzes the beliefs, perceptions, and responses to COVID-19 during the lockdown in urban and rural communities. It aims to identify whether different environments (social, economic, cultural) lead to different levels of public risk perceptions and actions. Based on public perceptions/attitudes, it can address knowledge gaps between decision-makers and urban/rural communities.

For assessment of public action, belief, and perceptions during lockdown 13 qualitative indicators have been selected. A quantitative approach is used for data analysis. Initially, frequency tables were generated in SPSS for each indicator for both urban and rural communities so risk perception during lockdown between urban and rural communities can be compared. Descriptive stats were used to assess the responses in the form of frequency tables, percentages, and means. Suitable graphs (Stacked bar charts & pie charts) have been made to indicate the responses clearly.

6.2 Indicator Selection

The qualitative indicator for assessing risk perceptions is mentioned in Table 4.

Table 4 Indicators

Sr No	Indicator	Classes	
1.	My opinion regarding quarantine is	I am bored by the quarantine I am frustrated because of quarantine I am angry about the quarantine I am nervous about quarantine I am worried/anxious/alarmed and frightened by the quarantine I consider the quarantine as necessary and reasonable	(Abir et al., 2020; Shreve et al., 2014)
2.	Preventive behaviors adopted in the last seven days for safety against COVID-19	Washed hands with soap/used sanitizer several times per day Avoided public spaces, gatherings, or crowds Avoided contact with people who could be high risk Canceled or postponed air travel for work/pleasure	(Abir et al., 2020; Bruine de Bruin & Bennett, 2020; Yani Ding et al., 2020; Kaulu et al., 2020; Shreve et al., 2014; WHO, 2020e; Wise et al., 2020)

		Wore face masks when going outside	
3.	Channels you use to acquire official info about COVID-19(channels/sources)	Administrative (government) agencies	(He et al., 2021; T. L. Huynh, 2020; Karasneh et al., 2021; Olapegba et al., 2020; Shiina et al., 2020; Tandi et al., 2018; WHO, 2020e; Wilson et al., 2019)
		Professional groups (such as universities) Digital/Print Media Social Media Health personnel Friends/relatives	
4.	To what extent do you think that the media has hyped up the issue	Media is solely responsible for hyping the issue	(Jose et al., 2021; Svahn, 2013)
		Media has hyped the issue up to some extent So-so Media has a little role in hyping up the issue Media has no role in hyping up the issue	
5.	What rumors have you heard regarding COVID-19	Open-ended Question	(Abir et al., 2020; Yani Ding et al., 2020; WHO, 2020e)
6.	Trust in Covid-19 interventions by the government	Most Trust	,(Yani Ding et al., 2020; Tandi et al., 2018; WHO, 2020e)
		More Trust Neutral Less Trust Least Trust	
7.	When you think about COVID-19 for a moment, what do you feel	Fearful	(Abir et al., 2020; Yubin Ding et al., 2020; Krok & Zarzycka, 2020; Shreve et al., 2014; Soiné et al., 2021; Svahn, 2013; Tandi et al., 2018; WHO, 2020e; Yan et al., 2020)
		Anxious Worried Dissatisfied with consequences Angry about consequences	
8.	What measures should be taken by the government to control the spread of COVID-19 infection	Seal the city	(Yubin Ding et al., 2020; WHO, 2020e)
		Road closure Close business/entertainment venues close management of community Send staff to each household for temperature testing Monitor the temperature of passengers at stations and ports	
9.	Do you think Public Health Authorities in Pakistan are doing enough to control the COVID-19 outbreak	Yes	(Abir et al., 2020)
		No	
10.	Trust on Media	Most trust More trust Neutral Less trust Least trust	(WHO, 2020e)

11.	How much do you know about the effects of COVID-19	Great knowledge	(Tandi et al., 2018; WHO, 2020e)
		Enough knowledge but not about all the effects	
		Neither great nor little knowledge	
		Little Knowledge	
		Hardly any knowledge	
12.	To what extent the risk from COVID-19 can be managed (i.e. avoided or prevented)	Can be completely avoided in all cases	(Tandi et al., 2018)
		Can be avoided only in some cases	
		Neutral	
		Can't be avoided only in some cases	
		Can't be avoided at all	
13.	Timely communication of COVID-19 info by official organizations	Yes	(T. L. Huynh, 2020)
		No	

6.2.1 Data analytical methods

Data Analysis and its adequate interpretation directly affect the reliability of research. The data collected through a questionnaire was analyzed using IBM-SPSS 23 and MS Office. Initially, frequency tables were generated in SPSS for each indicator for both urban and rural communities so risk perception between urban and rural communities can be compared. Descriptive stats were used to assess the responses in the form of frequency tables, percentages, and means. Suitable graphs (Stacked bar charts & pie charts) have been made to indicate the responses clearly. Furthermore, ArcGIS has been utilized to generate a map of the study area of Rawalpindi District for urban and rural communities.

6.2.2 Results

6.2.2.1   Opinion regarding quarantine

The respondents were asked about their opinion of quarantine and lockdown in urban and rural communities. There is a marked difference between the responses of individuals from both communities. According to Fig. 16, in urban communities, the highest percentage of respondents (55.6%) were bored by quarantine, followed by those who considered quarantine as necessary (8%). About 8.8% were angry because of the quarantine, and 7.6% responded that they were frustrated by it. In rural communities, the highest percentage (46.8%) were frustrated by quarantine, followed by those who were bored by quarantine (30.8%), angry because of quarantine (13.2%), and only 9.2% considered the quarantine necessary.
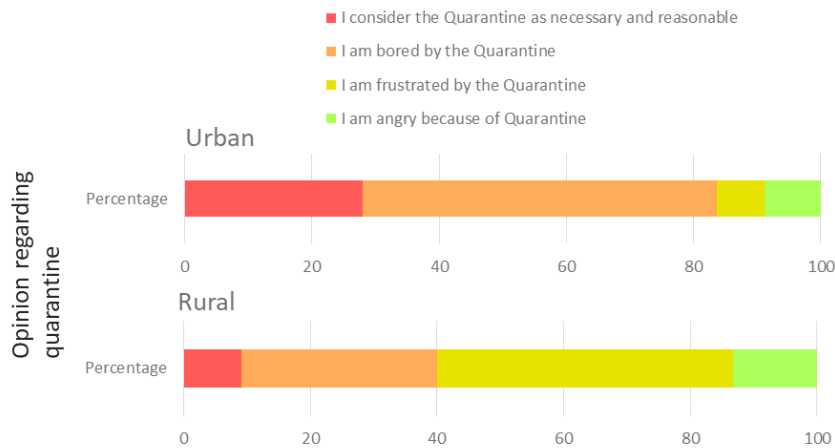
Fig. 16 Public opinion regarding quarantine

6.2.2.2   Preventive behaviors adopted in the last seven days

The respondents were asked about the preventive behaviors they had adopted in the last seven days, as shown in Fig. 17. In urban communities, the respondents (77.2%) said that they washed hands with soap and used sanitizer, avoided public spaces/gatherings (7.6%), avoided contact with people who could be high risk (7.6%), canceled air travel (4.4%), and wore face masks while going outside (3.2%). In rural communities, 72.4% washed their hands with soap and used sanitizers, 18.8% wore face masks, 3.2% avoided public spaces/gatherings, and 2.8% avoided contact with people who could be high risk.
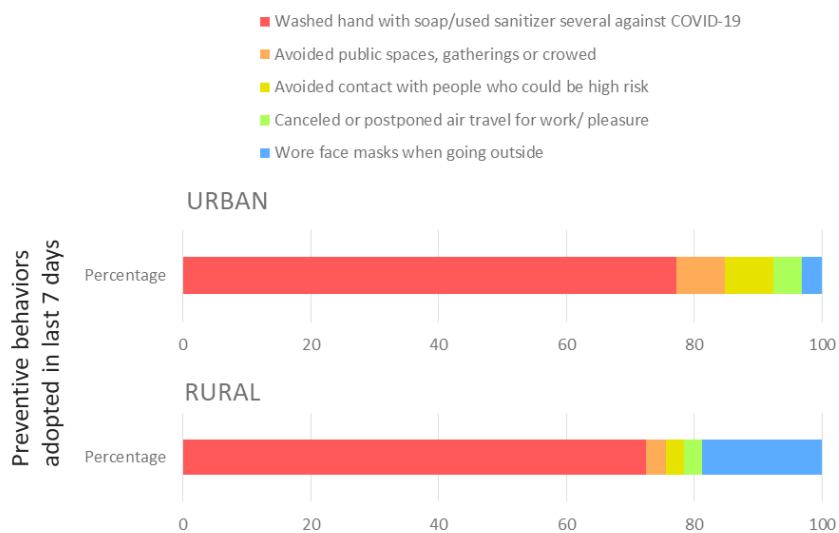
Fig. 17 Preventive behaviors adopted in the last seven days

6.2.2.3 Channels to acquire info about COVID-19

The respondents were asked about the channels/sources they used to acquire information about COVID-19. In urban communities, about 55.6% of respondents relied on administrations (government agencies), and none relied on friends/relatives. In rural communities, about 54% responded that they used administrative (government) channels to acquire information on COVID-19, and only 3.2% relied on friends/relatives. Both communities placed the highest level of trust in government agencies as the main source of information, as shown in Fig. 18**.**
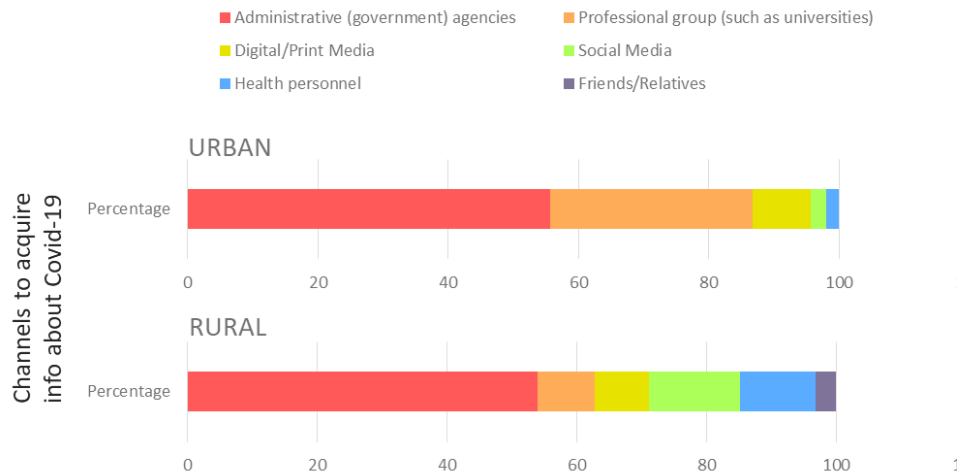
Fig. 18 Channels to acquire official information about COVID-19

6.2.2.4 Extent to which media has hyped up the issue

The respondents were asked to what extent the media has hyped up the issue. In urban communities, the highest percentage of respondents remained neutral (37.2%), and 3.6% replied that the media has no role in hyping up the issue, as shown in Fig. 19. On the other hand, most respondents (62%) from rural communities asserted that the media is solely responsible for hyping up the issue. Interestingly, none of the respondents believed that the media has no role in COVID-19.
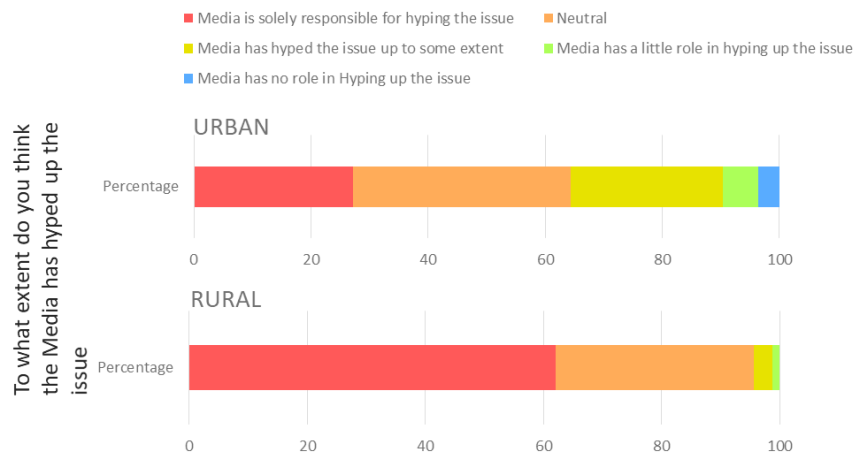
Fig. 19 Role of media in hyping up the issue

6.2.2.5 Rumors regarding COVID-19

The respondents were asked about the rumors they had heard in the context of COVID-19, as shown in Fig. 20. In urban communities, the respondents stated that the government/doctors are intentionally killing people (33.2%), COVID-19 is a myth/fake/conspiracy (30.8%), and future expected vaccination would kill individuals die within two years (26.4%). In rural communities, 36% of the respondents believed that it is a myth/fake/conspiracy, 31.2% believed there is no COVID-19 present in the rural areas, and 14.8% stated that the government is intentionally killing people (2.8%) responded that it is intentionally planted to control humankind. The remaining (2%) responded that the vaccinated individuals would die within two years.
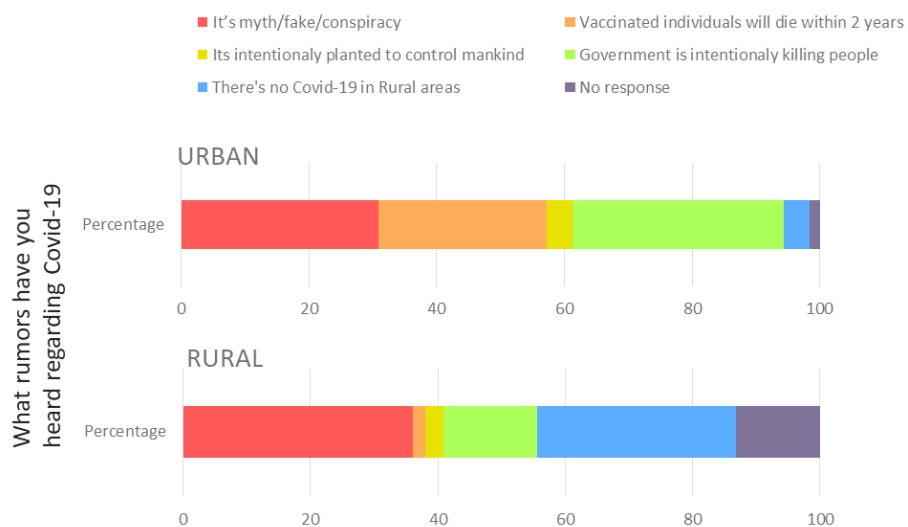
Fig. 20 Rumors about COVID-19

6.2.2.6 Trust Level of COVID-19 interventions by government

The respondents were asked about the trust level of COVID-19 interventions by government, as shown in Fig. 21. In urban communities, the majority responded with trust in government (70.8%), and only (2.4%) responded with less trust. In rural communities, the majority (46%) responded with complete trust, and only (1.6%) had the least trust. It can be assessed that most of the respondents from an urban area considered the programs/policies and protective and preventive measures taken by the government trustworthy and placed high reliance on their credibility. However, in the rural area, those with the most trust was only 16.8%, followed by 46% with more trust. It can be deduced that the rural population has less conviction regarding the government action than the urban population. The less confidence can be attributed to various factors, i.e., lack of awareness, perception of the public regarding government actions, rumors such as government is intentionally killing people/COVID-19 does not exist, level of government intervention in rural areas, unofficial sources of information, past performance of the government, etc.
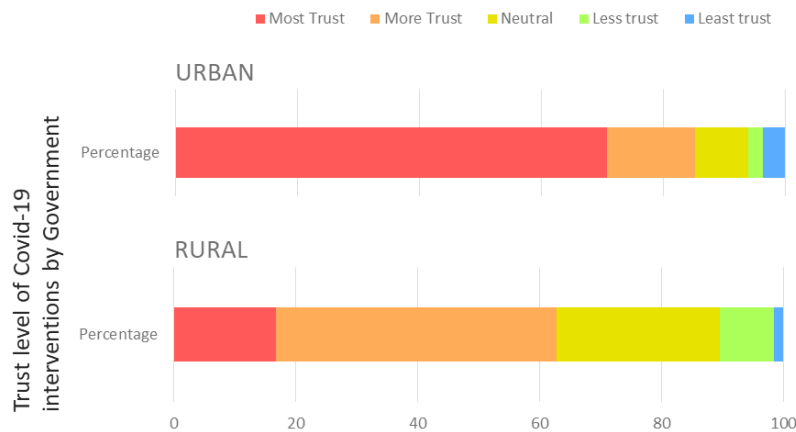

Fig. 21 Trust level of COVID-19 interventions by the government

6.2.2.7 What do you feel about COVID-19?

The respondents were asked about how they felt when they thought about COVID-19. Most respondents from the urban areas responded that they felt fearful (46%), felt anxious (25%), worried (10%), dissatisfied with consequences (10%), and angry about it (9%). In rural areas, about 69% felt worried, 18% felt fearful, 5% were angry, and 4% felt anxious and dissatisfied with the consequences (Fig. 22). Fear is a common phenomenon surrounding pandemics. The mental health effects of COVID-19 are intense and widespread. In urban & rural areas, several factors may be responsible for why most people were fearful and worried, respectively, i.e.,

isolation/quarantine, uncertainty, death, lack of control, non-availability of cure, poor socioeconomic status, etc.
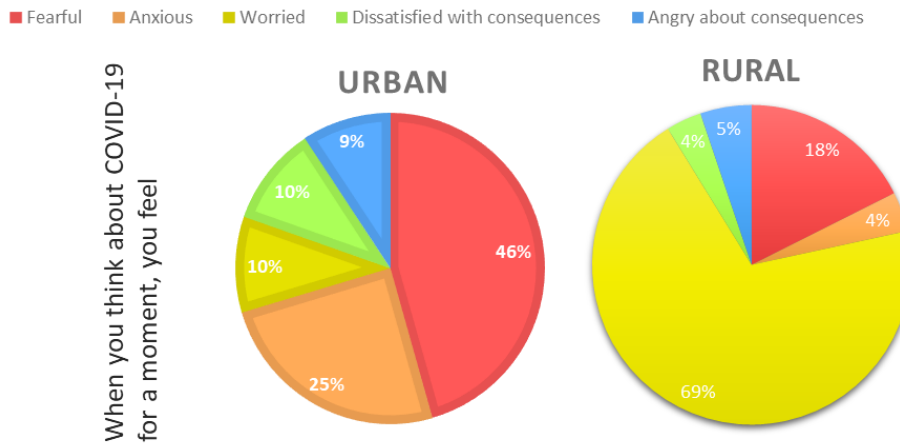

Fig. 22 How do you feel when you think about COVID-19

6.2.2.8 Measures by government to control the spread of COVID-19
The respondents were asked what measures must be taken by the government to control the spread of COVID-19. In urban communities, the majority responded to closing business/entertainment venues (31.6%), leaving management to the community (28.4%), sealing the city 26.4%, closing transportation routes (6.8%), monitoring the temperature of passengers (6.4%), and remaining send staff to each household for temperature testing (0.4%). In rural communities, the highest percentage favored leaving management to the community (41.2%), and 4% favored of sending staff to each household for temperature testing.
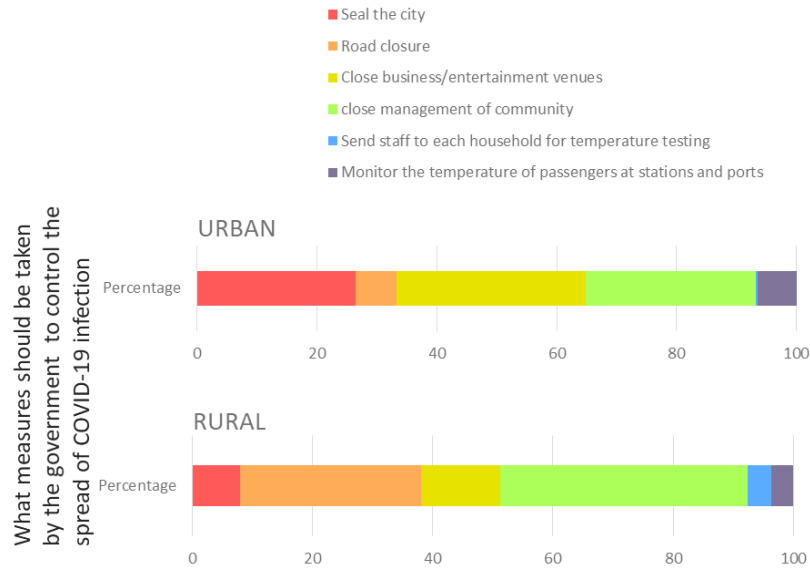
Fig. 23 Measures by the government to control the spread of COVID-19

6.2.2.9   Public health authorities in Pakistan

The respondents were asked whether they think the Public Health Authorities in Pakistan is doing enough to control the COVID-19 outbreak, as shown in Fig. 24. In urban communities, most respondents responded yes (63%). While in rural communities, the majority responded No (92%). This shows a vast difference in perception and belief about the measures taken by public health authorities in urban and rural communities. The sampled rural population was dissatisfied with the actions taken by the health authorities to control the pandemic. This can be attributed to poor social, economic, and health facilities in rural areas. Since the pandemic was evolving, no substantial/tangible measures by the authorities other than those in policy/program domains may also be a contributing factor.
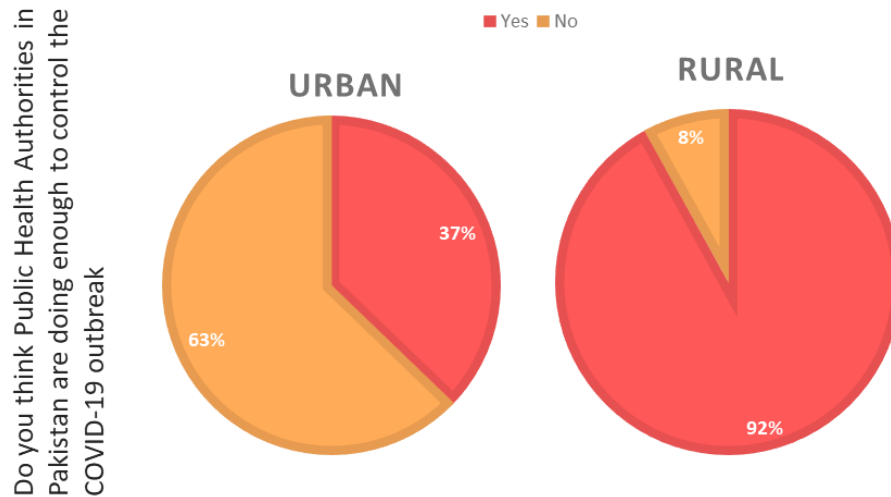
Fig. 24 Role of Public Health Authorities in controlling the outbreak

6.2.2.10 Trust in media

The respondents were asked about their trust level in media for receiving information on COVID-19. As shown in Fig. 25, the results highlight almost the same trend concerning the majority having the least trust in both communities. In the urban communities, most respondents stated that they had the least confidence in media as a source of information (38.4%), while some trusted, and the rest remained neutral. In rural communities, most respondents stated that they had the least trust in media (49.6%), followed by the most trust (37.2%), and remained neutral at 3.6%. However, a higher percentage of the sampled population in rural communities had the most trust in media compared to urban communities.
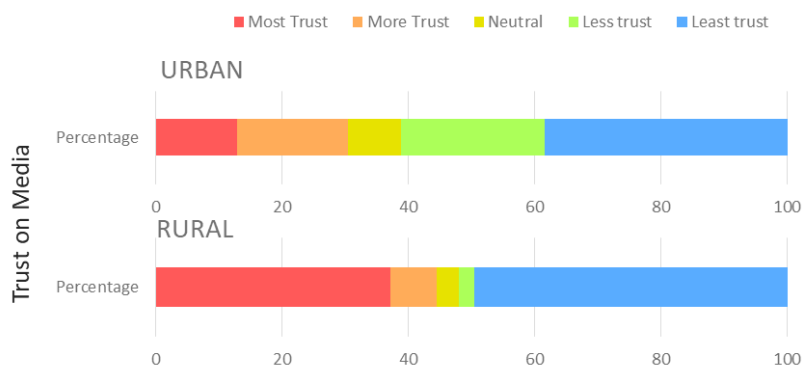

Fig. 25 Trust Level on media for COVID-19 information

6.2.2.11 Knowledge about effects of COVID-19

The sampled population was asked about their knowledge of the effects of COVID-19. In urban communities, 47.2% stated they had knowledge, and 38% replied that they hardly have any knowledge. In rural communities, the majority replied that they had knowledge about the effects of COVID-19 (56.4%), while 28.4% stated that they had enough knowledge but not about all the effects. There was a difference between the perceived knowledge of COVID-19 in urban and rural communities, as shown in Fig. 26. Usually, it is believed that urban communities are more abreast with the updated information, as they have access to better sources/channels of information.
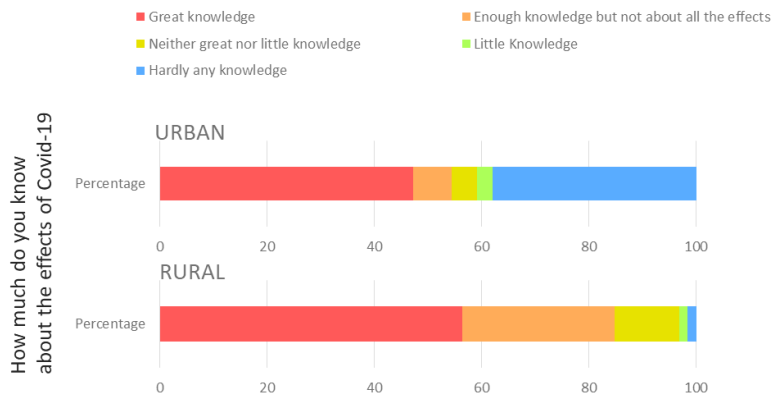

Fig. 26 Knowledge about effects of COVID-19

6.2.2.12 To what extent the risks of COVID-19 can be managed

The urban and rural communities were asked to which extent the risks of COVID-19 can be managed, i.e., avoided or prevented. In urban communities, respondents said it could be completely avoided in all cases (76.8%), it could be avoided in some cases only (8.8%), it cannot be avoided at all (5.6%), it cannot be avoided only in some cases (4.8%), and were neutral (4%). In rural communities, the majority believed that it could be completely avoided in all cases (61.6%), could be avoided only in some cases (20%), remained neutral (10.8%), it could not be avoided only in some cases (6.4%), and it cannot be avoided at all (1.2%). No significant difference exists between the viewpoint of urban and rural communities regarding the extent to which COVID-19 risks can be managed, as shown in Fig. 27.
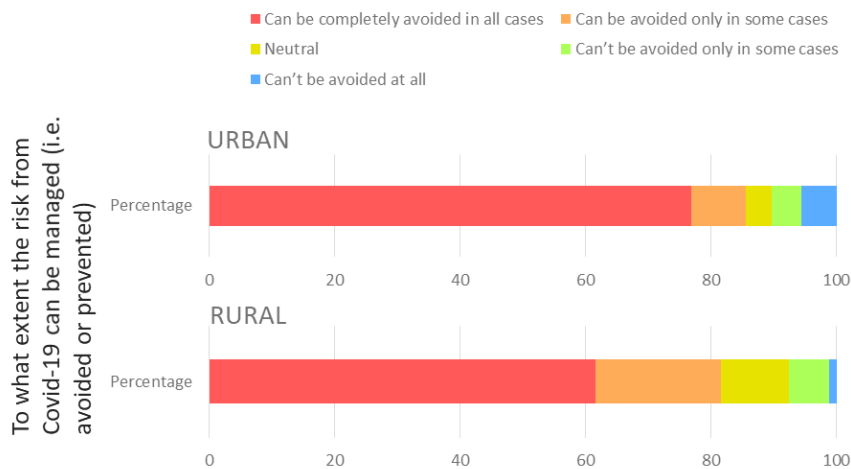
Fig. 27 Extent to which risk from COVID-19 can be managed

6.2.2.13 Timely communication of COVID-19 information

The respondents were asked their opinion on the timely communication of COVID-19 information by official organizations. As per the survey findings shown in Fig. 28, most respondents from urban communities (80%) believed that the organization timely communicated the information, while only (20%) believed otherwise. In rural communities, about 78% believed that the official organizations timely communicated the information, and 22% stated otherwise. There was no significant difference in the opinion on timely information communication between the urban and rural communities. This may be attributed to the fact that all major sources of information have now become available in rural areas and their bridging of the gap between the rural-urban divide.
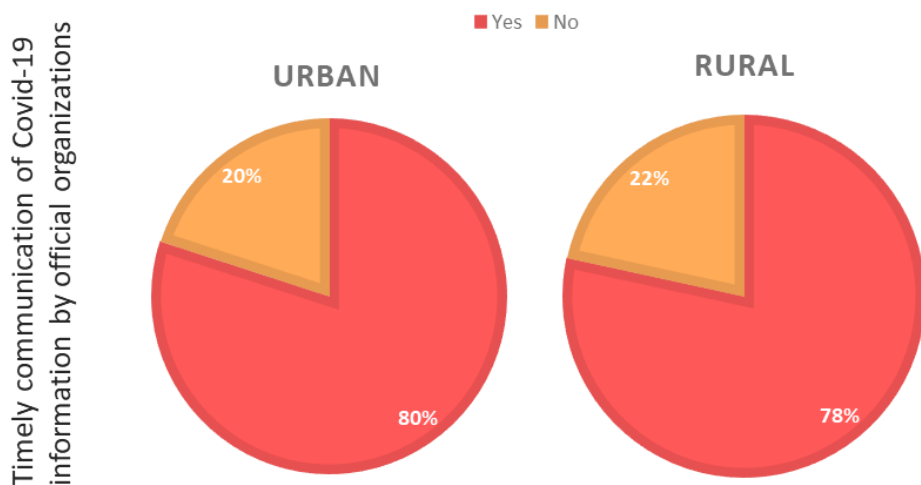

Fig. 28 Timely communication of COVID-19 information by official organizations

6.2.3 Discussion

Attitude toward COVID-19 has been assessed in various studies. In one such study, most respondents (96%) agreed to quarantine/ isolate themselves if they had a fever and cough (Roy et al., 2020). There was a significant difference in risk perception of COVID-19 between urban and rural communities. In the urban communities, when asked about their opinion regarding quarantine, the majority stated that they were bored, while in rural the majority were frustrated due to quarantine. A significant finding indicates that only 9.2% of people in rural communities perceived quarantine as necessary. This suggests a lack of awareness of COVID-19 in rural communities compared to urban communities. It requires essential intervention to signify the importance of quarantine and lockdown measures.

The protective behaviors indicator has been extracted from a study to assess the relationship between Initial COVID-19 risk perceptions and protective health behaviors. The study investigated whether risk perception for COVID-19 infection and infection fatality were linked to protective behaviours (Bruine de Bruin & Bennett, 2020). Other avoidant behaviors have also been used in the study of perception & anxiety of COVID-19 (Shiina et al., 2020). One such study on changes in risk perception and protective behavior in the US also studies the relationship between risk perception and protective behaviors (Wise et al., 2020).

In rural and urban communities, the preventive measure that was given major emphasis was washing hands with soap and using sanitizer. This result coincides with a study in which most respondents (97.2%) were confident that hand washing lockdown/social distancing would be helpful in the pandemic (Jose et al., 2021). Most of the community considered washing hands/using sanitizer as the most important preventive measure. In urban communities, only (3.2%) of individuals perceived wearing a face mask as important. This shows that most urban area respondents do not have adequate knowledge regarding the significance of wearing masks when going outside. Very few respondents were willing to cancel air travel. This finding corroborates another study in which (88.7%) believed that domestic travel was safe during a pandemic (Roy et al., 2020).

Public health systems and their communication channels have been put to test by the COVID-19 outbreak. If communication is not carried out appropriately, it leads to loss of lives, socioeconomic impacts as well as loss of trust & reputation. The most significant intervention in public health response is to communicate the known, unknown and additional measures being taken to get more information (WHO, 2020d). Interestingly, respondents from urban and rural communities chose administrative (government) agencies as their preferred source/channel of information. This finding indicates that people perceive administrative agencies as the most reliable source of information on COVID-19, which is true. Due to the rapidly changing, uncertain, and novel nature of the information on COVID-19, there were several sources of incoming information without any credibility. In such circumstances blocking the non-credible sources and relying on authentic sources becomes quite significant.

Media can be a reliable source of information as it provides up-to-date facts, enhancing the knowledge and awareness of the audience. It also facilitates the communication between researchers, health experts, and the general public for an adequate response. On the other hand, its credibility is questionable since too many sources and sites can lead to misinformation and infodemics (Karasneh et al., 2021; WHO, 2020d). The findings coincide with the aforementioned facts as most individuals in both rural and urban communities had the least trust in media. A startling finding regarding knowledge of the effects of COVID-19 is observed in urban communities compared to rural communities. Comparatively, respondents from urban communities had hardly any knowledge regarding the effects of COVID-19. The lack of awareness in this regard can be attributed to numerous factors which may be further explored.

The general public's mental composure is only being exacerbated by conspiracy theories, false claims, misinformation, and disinformation, particularly those that claim that the coronavirus is unbreakable, unstoppable, and unbeatable (Mukhtar, 2020). Rumors have been asked as open-ended questions as suggested by the survey tool and guidance by WHO (WHO, 2020e). As the disease kept evolving lot of myths and fake news emerged. However, WHO has led in myth-busting and providing authentic information.

The plethora of information and unknown nature of the disease gave rise to suspicions and rumors. Most of the rumors stated by urban and rural communities were the same since the question was

asked as an open-ended question. In urban communities, most respondents replied that the government was intentionally killing people. This indicates that the community will be reluctant to follow the SOPs and other preventive guidelines laid by the government. In rural communities, the majority had heard it is a myth/fake/conspiracy. Such rumors and risk perceptions of COVID-19 make it further difficult for the government to implement measures to contain the pandemic. Proper information and adequate awareness can break the stigma and help accept facts.

Regarding the measures to be taken by the government to control the spread of COVID-19. In urban communities, most respondents favored closing business/entertainment venues. In contrast, in rural communities, the majority favored close community management. Most respondents from rural communities believed that public health authorities were not doing enough to control the COVID-19 outbreak. In contrast, most respondents from urban communities believed that public health authorities were doing enough to control the spread of the disease. The trust in government has been used as a predictor in the study of risk perception of COVID-19 around the world (Dryhurst et al., 2020)

Globally, COVID-19 is causing severe psychosocial problems and compromising mental health, being a secondary health concern worldwide (Mukhtar, 2020). According to research, fear is one of the psychological aspect of the COVID-19 pandemic. Most respondents from urban communities stated that they feel "fearful" when they think about COVID-19. Hence, such a study developed the "Fear of COVID-19 Scale" (FCV-19S). To help people overcome fear and practice preventive behaviours, it can be used to create targeted education and prevention programs (Harper et al., 2021; Pakpour & Griffiths, 2020).

The research has included only specific qualitative indicators to assess risk perception. Quantitative indicators can also be added for comprehensive analysis and understanding of the relationship between COVID-19 perception/beliefs between urban and rural communities. It can be further improved by developing risk perception indexes and statistical modeling to understand better the relationship between urban and rural communities on COVID-19 risk perception. Also, the indicators can be further sub-divided into various categories and dimensions to identify the underlying factors. Since the research was carried out prior to the development of the COVID-19 vaccine, no indicator related to vaccination has been included.

6.3 Summary of Chapter

There was a significant difference in risk perception of COVID-19 between urban and rural communities. In rural areas, few households considered quarantine as necessary. Most respondents from both areas favored washing hands with soap/using sanitizer as the most important preventive behavior. In urban communities, very few individuals perceived wearing a face mask as important. Very few respondents were willing to cancel air travel. Interestingly, respondents from urban and rural communities chose administrative (government) agencies as their preferred source/channel of information. Most individuals in both rural and urban communities had the least trust in media. A startling finding regarding knowledge of the effects of COVID-19 is observed in urban communities compared to rural communities. Comparatively, respondents from urban communities had hardly any knowledge regarding the effects of COVID-19. The study found several rumors surrounding the COVID-19 pandemic. Most of the rumors stated by urban and rural communities were the same. In urban communities, most respondents replied that the government was intentionally killing people. Most rural households believed that public health authorities were not doing enough to control the pandemic. Most respondents from urban communities stated that they feel "fearful" when they think about COVID-19.

Chapter 7: CONCLUSION

The paper presents a multi-dimensional vulnerability index to assess Covid-19 vulnerability at the household level in urban and rural communities of Pakistan. The study shows that pandemic vulnerability is a complex function of various interactive factors and its adequate assessment requires a comprehensive methodology. The methodology used is simple and flexible and can be used by researchers for Covid-19 vulnerability in various communities. It pinpoints the vulnerable communities and gives insights into the factors adding to the overall vulnerability score. Local institutions, particularly health authorities, can utilize the data to prepare emergency plans & DRR strategies and urban/rural communities' awareness campaigns based on each dimension. The heterogeneous indices can be prioritized to undertake preventive action & response (health care provision, controlling spread of disease, awareness). The multi-dimensional vulnerability index can also be made more comprehensive by adding more relevant indicators to represent the link between urban/rural pandemic vulnerability and underlying factors. It can be further improved by using statistical models to assign weights to indicators. The methodology can also be applied at different geographical scales/sample populations. Developing a Covid-19 multi-dimensional vulnerability index is one way to spatially track the vulnerable population and the exact nature and level of intervention required for disaster risk reduction. It can spot communities with disproportionate socio-economic and infrastructural facilities and provide decision support for intervention strategies.

Despite the usefulness of the methodology, it has some limitations. Several variables/indicators that were useful for the study weren't available at the household level. Vaccination was not used in the data as it was collected before the development of the Covid-19 vaccine. Secondly, during the time this research was being carried out, Covid-19 was at its initial stages. Hence limited research relevant to Covid-19 vulnerability indicators was available. An equal weighting technique to assign weights to indicators was used, which can be improved as more Covid-19 indicators and attribute to describe vulnerability become available at the household level. Since Covid-19 is rapidly evolving, more relevant indicators and weighted approaches are needed to understand better how vulnerability and associated variable relationships vary across urban and rural communities.

This study has found significant variations in all three dimensions of vulnerability, social, economic, and infrastructural, among urban and rural communities. However, no significant variation is found in the overall vulnerability of both communities. In Pakistan, lack of coordination between governing authorities, a weak & fragmented disease surveillance system & the challenge of confirmation of COVID-19 cases, and poor isolation and quarantine facilities are further adding to the challenges of fighting the pandemic. The research can serve as an important tool for local government and key stakeholders/institutions in developing policies and programs to reduce disaster risk & mitigate, prepare, respond & recover from the COVID-19 pandemic, particularly in both urban and rural communities.

The research presents the survey findings to compare COVID-19 risk perception during lockdown between urban and rural communities. Risk perception determines how people respond to a pandemic and adopt preventive behaviors. According to our results, there was a reasonable difference in risk perception of COVID-19 between urban and rural communities. In rural areas, a very less percentage considered quarantine as necessary. Most respondents in both areas favored washing hands with soap and sanitizer as the most important preventive behavior. An encouraging finding was that both communities prioritized administrative (government) agencies as their main source of information. However, the highest percentage in rural communities responded that the media is solely responsible for exaggerating the issue. Both communities highlighted the number of rumors surrounding the COVID-19 pandemic. The trust level of COVID-19 interventions by the government was higher in urban communities as compared to rural communities. In terms of measures by the government to control the pandemic, in urban communities, the majority responded close business/entertainment venues. In contrast, most rural communities favored close management of the community. Compared to urban communities, the sampled population of rural communities believed that public health authorities were not doing enough to control the COVID-19 pandemic in Pakistan.

The risk perception insights can assist decision-makers in facing future pandemics in a better way. Lack of awareness leads to a fatalistic attitude, ultimately affecting preparedness, prevention, and response. The study can be used to intensify COVID-19 awareness campaigns, particularly in rural areas, for better adoption of preventive and protective measures. Based on the survey results, local health authorities can develop effective plans and intervention strategies. For future research, the

effects of socioeconomic and cultural factors on risk perception can be incorporated for better comprehension. In addition, determining risk perception is crucial for developing a risk communication plan.

COVID-19 has become one of the most challenging global pandemics since December 2019. In this context, risk perception is the guiding/motivating factor in adopting the general public's protective, preventive, and precautionary measures. The study analyses the difference in COVID-19 risk perception between urban and rural communities in Pakistan. Risk perception has been quantified by using already defined and established methodologies. Statistical tests have confirmed a significant difference in all four dimensions: fear and likelihood, awareness, preventive measure, and trust between urban and rural communities. The study also concludes that the overall risk perception of urban communities is higher than rural communities. It further concludes that in the fear & likelihood and preventive measure dimension, the risk perception of urban communities is higher than rural communities, while it is otherwise in the awareness and trust dimension. It is a significant finding which can assist the government in developing community-specific intervention strategies and risk communication plans. In short, the study promotes the integration of urban-rural risk perception differences for improving pandemic risk reduction strategies and risk communication plans.

Quantification of risk perception is a multi-faceted and challenging task. The rural-urban divide in the sampled population varied as, in some cases, it was not clearly demarcated. Hence, there were some limitations. More innovative techniques and methodologies can be adopted to confirm another hypothesis. Furthermore, additional indicators and dimensions can be added for a more comprehensive analysis. Nevertheless, despite the limitations, the research helps understand the difference in COVID-19 risk perception between urban and rural communities. Communities play an effective role in risk mitigation which greatly depends upon their risk perception and preparedness. In order to assist the decision-makers in developing effective risk communication plans customized to urban/rural needs, it is vital to understand the difference in risk perception between urban and rural communities. The study highlights various dimensions of risk perception in urban and rural communities, a better understanding of underlying factors affecting risk perception and their relationship will assist decision-makers, health authorities, and disaster

managers in developing efficient programs/policies and mitigation/preparedness measures to address pandemics in a better way.

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QUESTIONNAIRE

Questionnaire Sr. No: _____Date: _____Area: (Rural/Urban)

The purpose of this study is to make "COVID-19 Vulnerability and Impact Assessment of Urban and Rural Areas in Rawalpindi." This study is being conducted at National University of Science and Technology (NUST) Islamabad. The information provided will be kept confidential.

1. Age: _____
2. Average/Monthly Household Income: _____
3. Education: _____
4. Education Level of Household Head_____
5. Gender: Male [ ]   Female [ ]
6. Number of males _____
7. Number of females _____
8. Number of family members who haven't completed six years of schooling_____
9. School/Education attendance affected by COVID-19   a)Yes   b)No
10. Household size _____
11. Status of Employment   a)Employed   b)Unemployed
12. Nature of Employment a)Govt service   b)Trade & Commerce   c)Agriculture e)Daily wage earner
13. Number of earning members of Household _____
14. Multiple sources of income   a)Yes   b)No
15. No of household members receiving pension _____
16. In possession of any type of Insurance   a)Yes   b)No
17. Taken any loan in last 10-20 years   a)Yes   b)No
18. Poor housing condition '   a)Yes   b)No
19. Small and over crowded house   a)Yes   b)No
20. Shared house & using shared facilities   a)Yes   b)No
21. Number of elderly people & their age _____
22. Number of children (specify ages) _____
23. Number of disabled members in family_____
24. Number of household members with formal/informal skills _____
25. Number of dependent and independent family members_____
26. Women in your household with special needs   a)Yes   b)No
27. No of meals you can afford per day   a)Hardly any b)One meal c) Two meals d)Three meals e)Greater than three meals
28. Mode of transportation for travelling (multiple modes can be chosen)

a) Own car b) Public transport c) Cycle/ Motorcycle d) No access to transport

29. Communication assets owned (multiple assets can be chosen)

    a) Radio b)Telephone c)Mobile d)Television e)All of the above

30. Type of assets owned by household_____

31. Do you or any of your family members hold membership in any community organization?   a) Yes   b) No

32. Cordial relations with your neighbours and community   a)Yes   b)No

33. Faced any disaster in last 5 years   a)Yes   b) No

34. Deaths related to Covid-19 in family and close relatives   a)Yes   b)No

35. Immunized against viral diseases   a)Yes   b)No

36. Average time required to reach nearby health facility_____

37. Hospital in my area is not easily accessible   a)Yes   b)No

38. Hospital in my area has poor health sys capacity/facilities   a)Yes   b)No

39. Hospital in my area doesn't have enough health professional a)Yes   b)No

40. Household having access to Electricity   a)Yes   b)No

41. Household having access to Gas(Cooking fuel)   a)Yes   b)No

42. Household having access to Drinking Water   a)Yes   b)No

43. Household having access to Sanitation   a)Yes   b)No

44. Places for hand washing in vicinity   a)Yes   b)No

45. Availability of adequate infrastructure in locality   a)Yes   b)No

46. Physical access to nearby facilities   a)Yes   b)No

47. Multiple sources/diversity of water sources   a)Yes   b)No

48. Struggle to get sufficient water   a)Yes   b)No

49. Do you keep or have access to livestock   a)Yes   b)No

50. Ever diagnosed with mental illness   a)Yes   b)No

51. Suffering from poor physical health? (18 +)   a)Yes   b)No

52. Number of obese adults in family _____

53. Number of family members with limiting long term illness (16-24)_____

54. Number of family members with limiting long term illness (65+)_____

55. Day to day activities limited a lot due to particular disease   a)Yes   b)No

56. Number of members over age of 65 with bad health   a)Yes   b)No

57. Do you have immune compromised system   a)Yes   b)No

58. Any family member recently diagnosed/ suffering from any one of the following diseases (multiple diseases can be chosen)

Sr No	Disease	Diagnosed	Sr No	Disease	Diagnosed
1.	Asthma	☐	2.	Stroke	☐
3.	Diabetes	☐	4.	Emphysema	☐

5.	High Blood Pressure	☐	6.	Angina	☐
7.	Congestive Heart Failure	☐	8.	Liver Condition	☐
9.	Coronary Heart disease	☐	10.	Learning disabilities	☐
11.	Heart attack	☐	12.	Dementia	☐
13.	Myocardial infection	☐	14.	Peripheral Arterial Disease	☐
15.	Cancer (Any type)	☐	16.	Cardiovascular disease	☐
17.	Atrial Fibrillation	☐	18.	Hypertension	☐
19.	Chronic Bronchitis	☐	20.	COPD (Emergency Hospital Admission)	☐
21.	Myocardial Infarction (Emergency Hospital Admission)	☐	22.	Chronic Kidney disease	☐

59. Has a doctor diagnosed you with COVID-19　　　　　a)Yes　　　　b)No

60. Do you think you have been infected with COVID-19　　a)Yes　　　　b)No

61. Living with family members (the elderly, chronic disease patients, the pregnant, the puerperant and children　　　　　　　　　　　　a)Yes　　　　b)No

62. Chance of dying if a person gets infected with COVID-19
    a) Very High　　　b)High　　　c)Normal　　d)Low　　　f)Very Low

63. Preventive behaviors adopted in the last seven days for safety against COVID-19
    a) Washed hands with soap/used sanitizer several times per day
    b) Avoided public spaces, gatherings or crowds
    c) Avoided contact with people who could be high risk
    d) Canceled or postponed air travel for work/pleasure
    e) Wore face masks when going outside

64. Well prepared (self-efficacy) to protect yourself against COVID-19 a)Yes　　b)No

65. Practicing hand hygiene and wearing masks can prevent the spread of COVID-19
    a) Strongly Disagree b)Disagree c)Neither agree nor disagree d)Agree e)Strongly agree

66. In the future I will no longer attend crowded events due to the fear of COVID-19
    a) Strongly Disagree b)Disagree c)Neither agree nor disagree d)Agree e)Strongly agree

67. I am avoiding in person social interaction
    a) Strongly Disagree b)Disagree c)Neither agree nor disagree d)Agree e)Strongly agree

68. Intentionally avoided protective measures and voluntarily put yourself in risky situation concerning COVID-19
    a) Strongly Disagree b)Disagree c)Neither agree nor disagree d)Agree e)Strongly agree

69. Isolation of people infected with the COVID-19 virus is effective to reduce its spread
    a) Strongly Disagree b)Disagree c)Neither agree nor disagree d)Agree e)Strongly agree

70. My opinion regarding quarantine is
    a) I am worried/anxious/alarmed and frightened by the quarantine
    a) I consider the quarantine as necessary and reasonable
    b) I am nervous about quarantine

c) I am bored by the quarantine

d) I am frustrated by the quarantine

e) I am angry because of quarantine

71. I am travelling less than I normally would

   a) Strongly Disagree b)Disagree c)Neither agree nor disagree d)Agree e)Strongly agree

72. I will have no problem using public transport as they will be safe again soon

   a) Strongly Disagree b)Disagree c)Neither agree nor disagree d)Agree e)Strongly agree

73. This year I will rather look for holiday possibilities within my own country

   a) Strongly Disagree b)Disagree c)Neither agree nor disagree d)Agree e)Strongly agree

74. Channels you use to acquire official info about COVID-19(channels/sources)

   a) Administrative (government) agencies b)Professional groups (such as universities)
   c)Digital/Print Media d)Social Media e)Health personnel f)Friends/relatives

75. I am interested in receiving more information about COVID-19 in my locality

   a) Strongly Disagree b)Disagree c)Neither agree nor disagree d)Agree e)Strongly agree

76. I think that COVID-19 is a myth/conspiracy and the news regarding it is fake

   a) Strongly Disagree b)Disagree c)Neither agree nor disagree d)Agree e)Strongly agree

77. What rumours have you heard regarding COVID-19

_____

78. To what extent do you think that the media has hyped up the issue?

   a) Media is solely responsible for hyping the issue

   b) Media has hyped the issue upto some extent

   c) So-so

   d) Media has a little role in hyping up the issue

   e) Media has no role in hyping up the issue

79. Timely communication of COVID-19 info by official organizations a)Yes   b)No

80. Can Pakistan win the battle against COVID-19   a)Yes b)No c)Unsure

81. Do you Trust the following :

Trust Level	**More Trust**	**to**		**Less Trust**	
Indicators	**1**	**2**	**3**	**4**	**5**
WHO COVID-19 interventions					
COVID-19 cure					
COVID-19 interventions by Govt					
Health authorities					
Government institutions					
Media					

82. Are you willing to take COVID vaccine?   a)Yes   b)No

83. Are you willing to pay for the COVID vaccine?   a)Yes   b)No

If yes, how much in PKR. _____

84. How many times did you actively seek information on COVID-19

   a) Many times b)Sometimes c)Neither some not few d)Few times e)Hardly any

85. Are there any specific medicines to treat COVID-19 a)Yes b)No c)Unsure
86. There has been extensive research on COVID-19 a)Yes b)No c)Unsure
87. How has COVID-19 affected you
    a) Socially b)Financially c)Medically d)All of the above
88. COVID-19 is extremely dangerous to one's health
    a) Strongly Disagree b)Disagree c)Neither agree nor disagree d)Agree e)Strongly agree
89. Average hours per day for physical activity during COVID-19
    a) 150 min/week (Recommended) b)<150 min/week c)>150 min/week
90. Impact on diet during COVID-19
    a) High impact b)Some impact c)Average impact c)Minimal impact d)No Impact al all
91. Hours of sleep each day on average
    b) <=6 h b)6 – 8 h c)>8 h
92. Main clinical symptoms of COVID-19 are
    a) Fever b)Dry cough c)Tiredness d)Other e)Strongly agree
93. Early treatments help most patients recover from the infection
    a) Strongly Disagree b)Disagree c)Neither agree nor disagree d)Agree e)Strongly agree
94. Only elderly, chronic patients, and obese are likely to be severe cases
    a) Strongly Disagree b)Disagree c)Neither agree nor disagree d)Agree e)Strongly agree
95. Eating or contacts with wild animals causes COVID-19 infection
    a) Strongly Disagree b)Disagree c)Neither agree nor disagree d)Agree e)Strongly agree
96. When a fever is not present, person with COVID-19 can't infect others
    a) Strongly Disagree b)Disagree c)Neither agree nor disagree d)Agree e)Strongly agree
97. COVID-19 spreads via respiratory droplets of infected individuals
    a) Strongly Disagree b)Disagree c)Neither agree nor disagree d)Agree e)Strongly agree
98. Children and young adults don't require preventive measures
    a) Strongly Disagree b)Disagree c)Neither agree nor disagree d)Agree e)Strongly agree
99. On contracting the virus, how likely do you think it is that you will pass it on to someone else?
    a) Very Likely b)Likely c)Neither likely nor unlikely d)Unlikely e)Very unlikely
100.   If someone contacts virus from you, how badly do you think they would be affected
    a) Very Likely b)Likely c)Neither likely nor unlikely d)Unlikely e)Very unlikely
101.   To what extent the risks of COVID-19 are known to science
    a) Completely Known b)Known c)Neither Known nor unknown d)Unknown
       e) Completely Unknown
102. To what extent the risk from COVID-19 can be managed (i.e. avoided or prevented)
    a) Can be completely avoided in all cases
    b) Can be avoided only in some cases
    c) So-so
    d) Can't be avoided only in some cases
    e) Can't be avoided at all

103. How much do you know about the effects of COVID-19
    a) Great knowledge about COVID-19 effects
    b) Enough knowledge but not about all the effects
    c) Neither great nor little knowledge
    d) Little Knowledge about COVID-19 effects
    e) Hardly any knowledge about COVID-19 effects
104. Your chances of personal risk of infection with COVID-19 for each of the following
    a) Risk of becoming infected
        i. Very High ii)High iii)Neither High nor low iv)Low v)Very Low
    b) Risk of becoming severely infected
        ii. Very High ii)High iii)Neither High nor low iv)Low v)Very Low
105. People have learned to live with COVID-19 calmly
    a) Strongly Disagree b)Disagree c)Neither agree nor disagree d)Agree e)Strongly agree
106. Anxiety of not knowing when the outbreak would end
    a) Highly anxious b)Anxious c)Neither anxious nor calm d)Calm e)Very much at peace
107. How worried are you about being infected with COVID-19/health financial situation
    a) Very worried b)Worried c)Neither worried nor calm d)Calm e)Very calm
108. When you think about COVID-19 for a moment, you feel
    a) Fearful b)Anxious c)Worried d)Dissatisfied with consequences e)Angry about
       consequences
109. I'm afraid that there are
    a) Confirmed patients of COVID-19 in my city
    b) Confirmed patients of COVID-19 in my county
    c) Confirmed patients of COVID-19 in my county (district)
    d) Confirmed patients of COVID-19 in my town (street)
    e) Diagnosed patients of COVID-19 in my community(villages)
    f) My neighborhood has a confirmed patient of COVID-19
110. How likely do you think that a loved one will become infected?
    a) Very likely b)Likely c)Neither likely nor unlikely d)Unlikely e)Very unlikely
111. Because I/family members pay great attention to the epidemic, we have a low chance of
    being infected by COVID-19
    a) Strongly Disagree b)Disagree c)Neither agree nor disagree d)Agree e)Strongly agree
112. Because I/family members know professional protection knowledge, we have a low chance
    of being infected by COVID-19
    a) Strongly Disagree b)Disagree c)Neither agree nor disagree d)Agree e)Strongly agree
113. Because I/family members are in good health, we have a low chance of being infected by
    COVID-19
    a) Strongly Disagree b)Disagree c)Neither agree nor disagree d)Agree e)Strongly agree
114. What measures should be taken by the govt to control the spread of COVID-19 infection

b) Seal the city b)Road closure c)Close business/entertainment venues d)close management of community e)Send staff to each household for temperature testing f)Monitor the temperature of passengers at stations and ports

115. Do you think Public Health Authorities in Pakistan are doing enough to control the COVID-19 outbreak?   a)Yes   b)No

116. Any suggestions to improve COVID-19 awareness among general public or suggestions to cope with COVD-19?

_____

_____

سوالنامہ

اس مطالعہ کا مقصد بنانا ہے "**COVID-19** راولپنڈی میں شہری اور دیہی علاقوں کا خرابی اور اثر کا اندازہ۔"یہ مطالعہ نیشنل یونیورسٹی آف سائنس اینڈ ٹیکنالوجی (نیوسٹ) اسلام آباد میں کیا جارہا ہے۔ فراہم کردہ معلومات کو خفیہ رکھا جائے گا۔

1. عمر: _____
2. اوسط / ماہانہ گھریلو آمدنی: _____
3. تعلیم: _____
4. گھریلو سربراہ کی تعلیم کی سطح
5. جنس لڑکا   عورت   ☐   ☐
6. مردوں کی تعداد _____
7. خواتین کی تعداد _____
8. کنبہ کے ممبروں کی تعداد جنہوں نے چھ سال کی تعلیم مکمل نہیں کی
9. COVID-19 سے متاثر اسکول / تعلیم کی حاضری   a) ہاں   b) نہیں
10. گھریلو ناپ _____
11. ملازمت کی حیثیت   a) ملازمت یافتہ   بی) بے روزگار
12. روزگار کی نوعیت الف) گورنمنٹ سروس ب) تجارت اور تجارت سی) زراعت ای) روزانہ اجرت حاصل کرنے والا
13. گھریلو ملازمت حاصل کرنے والے ممبروں کی تعداد _____
14. آمدنی کے متعدد ذرائع   a) ہاں   ب)نہیں
15. پنشن وصول کرنے والے گھریلو اراکین کی تعداد _____
16. کسی بھی قسم کی انشورنس کے قبضے میں   a) ہاں   b) نہیں
17. پچھلے 10-20 سالوں میں کوئی قرض لیا   a) ہاں b) نہیں
18. ناقص رہائش کی حالت '   a) ہاں b) نہیں
19. چھوٹا اور زیادہ ہجوم والا مکان   a) ہاں b) نہیں
20. مشترکہ سہولیات اور مشترکہ سہولیات کا استعمال   a) ہاں b) نہیں
21. عمر رسیدہ افراد کی عمر اور ان کی عمر _____
22. بچوں کی تعداد (عمر کی وضاحت) _____
23. خاندان میں معذور افراد کی تعداد _____
24. رسمی / غیر رسمی مہارت کے حامل گھریلو ممبروں کی تعداد _____
25. منحصر اور آزاد کنبہ کے ممبروں کی تعداد _____
26. آپ کے گھر کی خواتین خاص ضرورتوں کے ساتھ   a) ہاں   b) نہیں
27. ہر روز کھانے کے لئے آپ برداشت نہیں کرسکتے ہیں a)مشکل سے کوئی b) ایک کھانا c) دو کھانے d) تین کھانے e) تین کھانے سے زیادہ
28. سفر کے لئے نقل و حمل کا طریقہ (متعدد طریقوں کا انتخاب کیا جاسکتا ہے)
a) اپنی کار ب) پبلک ٹرانسپورٹ c) سائیکل / موٹرسائیکل d) نقل و حمل تک رسائی نہیں
29. مواصلات کے اثاثوں کی ملکیت (ایک سے زیادہ اثاثے منتخب کیے جاسکتے ہیں)
b) ریڈیو ب) ٹیلیفون سی) موبائل ڈی) ٹیلی ویژن ای) مندرجہ بالا سارے
30. گھریلو ملکیت والے اثاثوں کی قسم _____

31. کیا آپ یا آپ کے خاندانی ممبران میں سے کسی بھی کمیونٹی کی تنظیم میں رکنیت رکھتے ہیں؟
a) ہاں   b) نہیں

32. اپنے پڑوسیوں اور کمیونٹی کے ساتھ مابعدانہ تعلقات   a) ہاں   b) نہیں

33. پچھلے 5 سالوں میں کسی بھی تباہی کا سامنا کرنا پڑا   a) ہاں   b) نہیں

34. اموات سے متعلق Covid-19 کنبہ اور قریبی رشتہ داروں میں   a) ہاں   b) نہیں

35. وائرل بیماریوں کے خلاف حفاظتی ٹیکے لگائے گئے   a) ہاں   b) نہیں

36. قریبی صحت کی سہولت تک پہنچنے کے لئے اوسط وقت درکار ہے _____

37. میرے علاقے میں ہسپتال آسانی سے قابل رسائی نہیں ہے   a) ہاں   b) نہیں

38. میرے علاقے میں اسپتال میں صحت کی خراب صلاحیتوں / سہولیات کی کمی ہے   a) ہاں   b) نہیں

39. میرے علاقے میں اسپتال میں صحت کے لئے کافی پیشہ ور نہیں ہے   a) ہاں   b) نہیں

40. گھر تک بجلی تک رسائی حاصل ہے   a) ہاں   b) نہیں

41. گیس (کھانا پکانے کا ایندھن) تک رسائی حاصل کرنے والے گھریلو   a) ہاں   b) نہیں

42. گھروں کو جو پینے کے پانی تک رسائی حاصل ہے   a) ہاں   b) نہیں

43. گھروں کی صفائی ستھرائی تک رسائی   a) ہاں   b) نہیں

44. آس پاس میں ہاتھ دھونے کے مقامات   a) ہاں   b) نہیں

45. اہل علاقہ میں مناسب انفراسٹرکچر کی دستیابی   a) ہاں   b) نہیں

46. آس پاس کی سہولیات تک جسمانی رسائی   a) ہاں   b) نہیں

47. پانی کے ذرائع کے متعدد ذرائع / تنوع   a) ہاں   b) نہیں

48. کافی پانی حاصل کرنے کے لئے جدوجہد کریں   a) ہاں   b) نہیں

49. کیا آپ مویشی پالتے ہیں یا ان تک رسائی رکھتے ہیں؟   a) ہاں   b) نہیں

50. کبھی ذہنی بیماری کی تشخیص کی   a) ہاں   b) نہیں

51. خراب جسمانی صحت سے دوچار ہیں۔ (18 +)   a) ہاں   b) نہیں

52. کنبے میں موٹے موٹے بالغوں کی تعداد _____

53. طویل مدتی بیماری (16-24) تک محدود رہنے والے کنبہ کے افراد کی تعداد _____

54. طویل مدتی بیماری (65 +) تک محدود رہنے والے کنبہ کے افراد کی تعداد _____

55. روز مرہ کی سرگرمیاں خاص بیماری کی وجہ سے کافی حد تک محدود ہیں   a) ہاں   b) نہیں

56. خراب صحت کے ساتھ 65 سال سے زیادہ عمر کے ممبروں کی تعداد   a) ہاں   b) نہیں

57. کیا آپ کے پاس ہے مدافعتی سمجھوتہ کرنے والا نظام   a) ہاں   b) نہیں

58. خاندان کے کسی بھی ممبر کو حال ہی میں درج ذیل بیماریوں میں سے کسی میں سے تشخیص / تکلیف ہو رہی ہے(متعدد بیماریوں کا انتخاب کیا جاسکتا ہے)

مسٹر نمبر	بیماری	تشخیص کیا گیا	مسٹر نمبر	بیماری	تشخیص کیا گیا
23.	دمہ	☐	24.	اسٹروک	☐
25.	ذیابیطس	☐	26.	واتسفیتی	☐
27.	بلند فشار خون	☐	28.	انجائنا	☐
29.	امتلاءی قلبی ناکامی	☐	30.	جگر کی حالت	☐
31.	کورونری دل کے مرض	☐	32.	معذوری سیکھنا	☐
33.	دل کا دورہ	☐	34.	ڈیمنشیا	☐
35.	احتشاء انفیکشن	☐	36.	پیریفرل آرٹیریل بیماری	☐
37.	کینسر (کسی بھی قسم کی)	☐	38.	دل کی بیماری	☐

39.	عضلات قلب کا بے قاعدہ اور بے ہنگم انقباض	☐	40.	ہائی بلڈ پریشر	☐
41.	جان لیوا ٹی بی	☐	42.	COPD (ایمرجنسی اسپتال میں داخلہ)	☐
43.	مایوکارڈیل انفکشن (ایمرجنسی اسپتال میں داخلہ)	☐	44.	دائمی گردوں کی بیماری	☐

59. کیا کسی ڈاکٹر نے آپ کو COVID-19 کی تشخیص کی ہے؟ a) ہاں b) نہیں

60. کیا آپ کو لگتا ہے کہ آپ کوویڈ 19 میں متاثر ہوئے ہیں؟ a) ہاں b) نہیں

61. کنبہ کے افراد (بزرگ ، دائمی بیماری کے مریضوں ، حاملہ ، مرغیوں اور بچوں کے ساتھ رہنا)
a) ہاں b) نہیں

62. اگر کوئی شخص کوویڈ 19 میں متاثر ہو جاتا ہے تو مرنے کا امکان
a) بہت اونچا b) اونچا c) عمومی d) کم f) بہت کم

63. کوویڈ 19 کے خلاف حفاظت کے لئے گذشتہ سات دنوں میں بچاؤ والے روئیے
a) دن میں کئی بار صابن / استعمال شدہ سینیٹائزر سے ہاتھ دھوئے
b) عوامی مقامات ، اجتماعات یا ہجوم سے اجتناب کیا
c) ان لوگوں سے رابطے سے گریز کریں جو زیادہ خطرہ ہوسکتے ہیں
d) کام / خوشی کے لئے منسوخ یا ملتوی ہوائی سفر
e) باہر جاتے وقت چہرے کے ماسک پہنے ہوئے تھے

64. COVID-19 کے خلاف اپنے آپ کو بچانے کے لئے اچھی طرح سے تیار (خود افادیت) الف) ہاں b) نہیں

65. ہاتھ کی حفظان صحت کی مشق کرنا اور ماسک پہننا COVID-19 کے پھیلاؤ کو روک سکتا ہے
a) سخت اتفاق رائے b) متفق نہیں c) نہ ہی متفق ہوں اور نہ ہی اتفاق نہ کریں d) اتفاق کریں e) سختی سے متفق ہوں

66. مستقبل میں میں COVID-19 کے خوف کی وجہ سے اب بھیڑ کے پروگراموں میں شرکت نہیں کروں گا
a) سخت اتفاق رائے b) متفق نہیں c) نہ ہی متفق ہوں اور نہ ہی اتفاق نہ کریں d) اتفاق کریں e) سختی سے متفق ہوں

67. میں ذاتی طور پر معاشرتی رابطے سے گریز کر رہا ہوں
a) سخت اتفاق رائے b) متفق نہیں c) نہ ہی متفق ہوں اور نہ ہی اتفاق نہ کریں d) اتفاق کریں e) سختی سے متفق ہوں

68. جان بوجھ کر حفاظتی اقدامات سے گریز کریں اور رضاکارانہ طور پر اپنے آپ کو COVID-19 سے متعلق خطرناک صورتحال میں ڈالیں
a) سخت اتفاق رائے b) متفق نہیں c) نہ ہی متفق ہوں اور نہ ہی اتفاق نہ کریں d) اتفاق کریں e) سختی سے متفق ہوں

69. COVID-19 وائرس سے متاثرہ افراد کا تنہائی اس کے پھیلاؤ کو کم کرنے کے لئے موثر ہے
a) سخت اتفاق رائے b) متفق نہیں c) نہ ہی متفق ہوں اور نہ ہی اتفاق نہ کریں d) اتفاق کریں e) سختی سے متفق ہوں

70. قرنطین کے بارے میں میری رائے ہے
a) میں قرنطین سے پریشان / بے چین / گھبراہٹ اور خوفزدہ ہوں
b) میں سنگرودھ کو ضروری اور معقول سمجھتا ہوں
c) میں قرنطین سے گھبراتا ہوں
d) میں قرنطین سے بور ہوں
e) میں قرنطین سے مایوس ہوں

f) میں قرنطین کی وجہ سے ناراض ہوں

71. میں عام طور پر سفر سے کم سفر کر رہا ہوں

a) سخت اتفاق رائے b) متفق نہیں c) نہ ہی متفق ہوں اور نہ ہی اتفاق نہ کریں d) اتفاق کریں e) سختی سے متفق ہوں

72. مجھے پبلک ٹرانسپورٹ کے استعمال میں کوئی پریشانی نہیں ہوگی کیونکہ وہ جلد ہی دوبارہ محفوظ ہوجائیں گے

a) سخت اتفاق رائے b) متفق نہیں c) نہ ہی متفق ہوں اور نہ ہی اتفاق نہ کریں d) اتفاق کریں e) سختی سے متفق ہوں

73. اس سال میں اپنے ملک کے اندر چھٹی کے امکانات تلاش کروں گا

a) سخت اتفاق رائے b) متفق نہیں c) نہ ہی متفق ہوں اور نہ ہی اتفاق نہ کریں d) اتفاق کریں e) سختی سے متفق ہوں

74. COVID-19 (چینلز / ذرائع) کے بارے میں سرکاری معلومات حاصل کرنے کے لئے آپ جو چینلز استعمال کرتے ہیں

a) انتظامی (حکومت) ایجنسیوں ب) پیشہ ور گروپ (جیسا کہ یونیورسٹیاں c) ڈیجیٹل / پرنٹ میڈیا d) سوشل میڈیا ای) صحت کے اہلکار f) دوست / رشتے دار

75. میں اپنے علاقے میں COVID-19 کے بارے میں مزید معلومات حاصل کرنے میں دلچسپی رکھتا ہوں

a) سخت اتفاق رائے b) متفق نہیں c) نہ ہی متفق ہوں اور نہ ہی اتفاق نہ کریں d) اتفاق کریں e) سختی سے متفق ہوں

76. میں سمجھتا ہوں کہ کوویڈ ۔19 ایک افسانہ / سازش ہے اور اس سے متعلق خبریں جعلی ہیں

a) سخت اتفاق رائے b) متفق نہیں c) نہ ہی متفق ہوں اور نہ ہی اتفاق نہ کریں d) اتفاق کریں e) سختی سے متفق ہوں

77. کوویڈ 19 کے بارے میں آپ نے کیا افواہیں سنی ہیں؟

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78. آپ کس حد تک سوچتے ہیں کہ میڈیا نے اس معاملے کو بڑھاوا دیا ہے؟
a) میڈیا اس مسئلے کو ہائپ کرنے کے لئے مکمل طور پر ذمہ دار ہے
b) میڈیا نے کسی حد تک اس مسئلے کی روشنی ڈالی ہے
c) کچھ خاص نہیں
d) میڈیا کو اس مسئلے پر روشنی ڈالنے میں تھوڑا سا کردار ہے
e) میڈیا کو اس مسئلے پر روشنی ڈالنے میں کوئی کردار نہیں ہے

79. سرکاری تنظیموں کے ذریعہ COVID-19 کی بروقت مواصلت a) ہاں b) نہیں

80. کیا پاکستان کوویڈ 19 کے خلاف جنگ جیت سکتا ہے؟ a) ہاں b) نہیں c) غیر یقینی

81. کیا آپ مندرجہ ذیل پر اعتماد کرتے ہیں:

اعتماد کی سطح

کم اعتماد   زیادہ اعتماد

اشارے	1	2	3	4	5
ڈبلیو ایچ او 19 مداخلت					
Covid-19 شفاء					
حکومت کی طرف سے کوویڈ ۔19 مداخلت					
صحت کے حکام					
سرکاری ادارے					
میڈیا					

82. کیا آپ کوویڈ ویکسین لینے کو تیار ہیں؟ a) ہاں b) نہیں

83. کیا آپ کوویڈ ویکسین کی ادائیگی کے لئے تیار ہیں؟ a) ہاں b) نہیں

اگر ہاں تو ، پی کے آر میں کتنا ہے۔ _____

84. آپ نے CoVID-19 پر کتنی بار فعال طور پر معلومات حاصل کیں؟

a) کئی بار ب) کبھی کبھی ج) نہ کچھ نہ کچھ د) چند بار ای) شاید ہی کوئی ہو

85. کیا کوویڈ 19 کے علاج کے لئے کوئی مخصوص دوائیں ہیں؟ a) ہاں b) نہیں c) غیر یقینی

86. COVID-19 پر وسیع پیمانے پر تحقیق ہوئی ہے a) ہاں b) نہیں c) غیر یقینی

87. COVID-19 نے آپ کو کیسے متاثر کیا؟

a) سماجی طور پر b) مالی طور پر c) طبی لحاظ سے

د) مندرجہ بالا سب

88. CoVID-19 کسی کی صحت کے لئے انتہائی خطرناک ہے

a) سخت اتفاق رائے b) متفق نہیں c) نہ ہی متفق ہوں اور نہ ہی اتفاق نہ کریں d) اتفاق کریں e) سختی سے متفق ہوں

89. COVID-19 کے دوران جسمانی سرگرمی کے ل per اوسط گھنٹے

a) 150 منٹ / ہفتہ (تجویز کردہ) ب) 150< منٹ / ہفتہ c) >150 منٹ / ہفتہ

90. COVID-19 کے دوران غذا پر اثر پڑتا ہے

a) زیادہ اثر b) کچھ اثر c) اوسط اثر c) کم سے کم اثر d) کوئی اثر نہیں تمام

91. اوسطا ہر دن گھنٹے کی نیند

a) => 6 h ایچ 8 -b) 6 c)> 8 h

92. COVID-19 کی اہم طبی علامات ہیں

b) بخار ب) خشک کھانسی c) تھکاوٹ d) دوسرا e) پختہ اتفاق کرتا ہوں

93. ابتدائی علاج زیادہ تر مریضوں کو انفیکشن سے ٹھیک ہونے میں مدد کرتا ہے

a) سخت اتفاق رائے b) متفق نہیں c) نہ ہی متفق ہوں اور نہ ہی اتفاق نہ کریں d) اتفاق کریں e) سختی سے متفق ہوں

94. صرف بزرگ ، دائمی مریضوں اور موٹاپے میں ہی شدید معاملات ہونے کا امکان ہے

a) سخت اتفاق رائے b) متفق نہیں c) نہ ہی متفق ہوں اور نہ ہی اتفاق نہ کریں d) اتفاق کریں e) سختی سے متفق ہوں

95. جنگلی جانوروں کے ساتھ کھانا یا رابطے COVID-19 میں انفکشن کا سبب بنتے ہیں

a) سخت اتفاق رائے b) متفق نہیں c) نہ ہی متفق ہوں اور نہ ہی اتفاق نہ کریں d) اتفاق کریں e) سختی سے متفق ہوں

96. جب بخار موجود نہیں ہوتا ہے تو ، COVID-19 والا شخص دوسروں کو متاثر نہیں کرسکتا

a) سخت اتفاق رائے b) متفق نہیں c) نہ ہی متفق ہوں اور نہ ہی اتفاق نہ کریں d) اتفاق کریں e) سختی سے متفق ہوں

97. COVID-19 متاثرہ افراد کی سانس کی بوندوں سے پھیلتا ہے

a) سخت اتفاق رائے b) متفق نہیں c) نہ ہی متفق ہوں اور نہ ہی اتفاق نہ کریں d) اتفاق کریں e) سختی سے متفق ہوں

98. بچوں اور نوجوان بالغوں کو حفاظتی اقدامات کی ضرورت نہیں ہے

a) سخت اتفاق رائے b) متفق نہیں c) نہ ہی متفق ہوں اور نہ ہی اتفاق نہ کریں d) اتفاق کریں e) سختی سے متفق ہوں

99. وائرس سے معاہدہ کرنے پر ، آپ کو کتنا امکان ہے کہ ایسا لگتا ہے کہ آپ اسے کسی اور کے پاس بھیج دیں گے؟

a) بہت ہی ممکنہ طور پر b) ممکنہ طور پر c) نہ ہی امکان ہے اور نہ ہی امکان ہے d) غیرمعمولی ای) بہت امکان نہیں ہے

100. اگر کوئی آپ سے وائرس سے رابطہ کرتا ہے تو ، آپ کے خیال میں وہ کتنے بری طرح متاثر ہوں گے

a) بہت ہی ممکنہ طور پر b) ممکنہ طور پر c) نہ ہی امکان ہے اور نہ ہی امکان ہے d) غیرمعمولی ای) بہت امکان نہیں ہے

101. سائنس کووِڈ 19 کے خطرات کس حد تک معلوم ہیں

a) مکمل طور پر جانا جاتا ہے ب) معلوم ج) نہ تو جانا جاتا ہے اور نہ ہی نامعلوم d) نامعلوم e) مکمل طور پر نامعلوم

102. کووِڈ 19 میں سے کس حد تک خطرے کا انتظام کیا جاسکتا ہے (یعنی بچا یا بچایا گیا)

a) ہر صورت میں مکمل طور پر بچا جاسکتا ہے
b) صرف کچھ معاملات میں بچا جاسکتا ہے
c) کچھ خاص نہیں
d) صرف کچھ معاملات میں گریز نہیں کیا جاسکتا
e) بالکل بھی گریز نہیں کیا جاسکتا

103. آپ COVID-19 کے اثرات کے بارے میں کتنا جانتے ہیں

a) COVID-19 اثرات کے بارے میں زبردست علم
b) کافی معلومات لیکن تمام اثرات کے بارے میں نہیں
c) نہ تو بہت اچھا اور نہ ہی کم علم
d) COVID-19 اثرات کے بارے میں تھوڑا سا علم
e) COVID-19 اثرات کے بارے میں شاید ہی کوئی علم ہو

104. مندرجہ ذیل میں سے ہر ایک کے لئے COVID-19 کے ذریعہ انفیکشن کے ذاتی خطرہ کے امکانات

a) انفیکشن ہونے کا خطرہ

iii. بہت اعلی ii) اعلی iii) نہ تو اونچائی ہے اور نہ ہی کم iv) کم v) بہت کم

b) شدید متاثرہ ہونے کا خطرہ

iv. بہت اعلی ii) اعلی iii) نہ تو اونچائی ہے اور نہ ہی کم iv) کم v) بہت کم

105. لوگوں نے سکون کے ساتھ COVID-19 کے ساتھ رہنا سیکھا ہے

a) سخت اتفاق رائے b) متفق نہیں c) نہ ہی متفق ہوں اور نہ ہی اتفاق نہ کریں d) اتفاق کریں e) سختی سے متفق ہوں

106. نہ جانے کتنی پریشانی کہ یہ وبا کب ختم ہوگا

a) انتہائی بے چینی ب) پریشانی ج) نہ بے چین اور نہ ہی پرسکون d) پرسکون ای) بہت سکون سے

107. آپ کووِڈ -19 / صحت کی مالی صورتحال سے متاثر ہونے سے کتنے پریشان ہیں

b) بہت پریشان b) پریشان ج) نہ پریشان اور نہ ہی پرسکون d) پرسکون ای) بہت پرسکون

108. جب آپ ایک لمحہ کے لئے CoVID-19 کے بارے میں سوچتے ہیں تو ، آپ کو محسوس ہوتا ہے

a) خوفزدہ b) پریشان سی) پریشان d) نتائج سے مطمئن نہیں e) نتائج سے ناراض

109. مجھے ڈر ہے کہ وہاں ہیں

a) میرے شہر میں COVID-19 کے تصدیق شدہ مریض

b) میری کاؤنٹی میں COVID-19 کے تصدیق شدہ مریض

c) میری کاؤنٹی (ضلع) میں COVID-19 کے تصدیق شدہ مریض

d) میرے شہر (گلی) میں COVID-19 کے تصدیق شدہ مریض

e) میری کمیونٹی (دیہاتوں) میں COVID-19 کے تشخیص شدہ مریض

f) میرے پڑوس میں COVID-19 کا تصدیق شدہ مریض ہے

110. آپ کو کتنا امکان ہے کہ کسی عزیز کو انفکشن ہو جائے گا؟

c) بہت ہی امکان b) ممکنہ طور پر c) نہ ہی امکان ہے اور نہ ہی امکان ہے d) نا ممکن ہو E) بہت ہی امکان نہیں

111. چونکہ میں / کنبہ کے افراد اس وبا پر بہت زیادہ توجہ دیتے ہیں ، لہذا ہمارے پاس COVID-19 سے متاثر ہونے کا امکان بہت کم ہے

b) سخت اتفاق رائے b) متفق نہیں c) نہ ہی متفق ہوں اور نہ ہی اتفاق نہ کریں d) اتفاق کریں e) سختی سے متفق ہوں

112. چونکہ میں / کنبہ کے افراد پیشہ ورانہ تحفظ سے متعلق جانتے ہیں ، لہذا ہمارے پاس COVID-19 سے متاثر ہونے کا امکان کم ہے

b) سخت اتفاق رائے b) متفق نہیں c) نہ ہی متفق ہوں اور نہ ہی اتفاق نہ کریں d) اتفاق کریں e) سختی سے متفق ہوں

113. چونکہ میں / کنبہ کے افراد اچھی صحت میں ہیں ، ہمارے پاس COVID-19 سے متاثر ہونے کا امکان کم ہے

b) سخت اتفاق رائے b) متفق نہیں c) نہ ہی متفق ہوں اور نہ ہی اتفاق نہ کریں d) اتفاق کریں e) سختی سے متفق ہوں

114. COVID-19 انفیکشن کے پھیلاؤ کو کنٹرول کرنے کے لئے حکومت کی طرف سے کیا اقدامات اٹھائے جائیں

d) شہر پر مہر لگائیں ب) سڑک کی بندش ج) کاروباری / تفریحی مقامات کو بند کردیں د) کمیونٹی کا قریبی انتظام ای) درجہ حرارت کی جانچ کے لئے ہر گھر کو عملہ بھیجیں f) اسٹیشنوں اور بندرگاہوں پر مسافروں کے درجہ حرارت کی نگرانی کریں

115. کیا آپ کو لگتا ہے کہ پاکستان میں صحت عامہ کے حکام کوویڈ 19 کے وباء پر قابو پانے کے لئے کافی کوشش کر رہے ہیں؟ a) ہاں b) نہیں

116. عام لوگوں میں COVID-19 میں آگاہی کو بہتر بنانے کے لئے کوئی تجاویز یا COVD-19 سے نمٹنے کے لئے تجاویز؟

_____

_____