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ACADEMIA Health Sphere Journal

Mental Health Challenges among Post-Pandemic Populations: A Multidisciplinary Analysis

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ABSTRACT

The COVID-19 pandemic has not only impacted physical well-being, but also the mental one, leaving a complicated structure of psychological problems that are still present among the world populations. The present work relies on the secondary information gathered in the peer-reviewed literature, the world health reports, and the clinical surveys to investigate the prevalence of post-pandemic mental healthcare problems, their nature, and their determinants. The results reveal that there is a strong rise in anxiety, depression, post-traumatic stress disorder (PTSD), and sleep disturbances among the various age groups and socio-economic backgrounds. Some of the contributing factors are long-term social isolation, economic instability, loss grief, daily routine disruption, and an increase in uncertainty regarding the future. There is also an indication that the vulnerable groups such as healthcare personnel, elderly, and people with pre-existing mental illness are overly impacted. To deal with short- and long-term effects of the pandemic-induced psychological distress, it is recommended to use multidisciplinary interventions that would include psychological support, community engagement, telehealth services, and policy-level mental health planning. This paper highlights the importance of international concerted efforts to reduce the mental health impact of post-pandemic societies.

Keywords: Mental Health, COVID-19, Post-Pandemic Stress, Anxiety, Depression, Multidisciplinary Interventions.

INTRODUCTION

The mental health of the entire world has never been challenged as much as it is during the COVID-19 pandemic as millions of the population of all demographics are under threat. In addition to the direct danger of being infected by the virus, social, economic, and psychological consequences of the pandemic have also become a significant contributor to a significant rise in mental health disorders globally. According to reports by the World Health Organization (WHO, 2022) and international surveys, there are high levels of anxiety, depression, post-traumatic stress disorder (PTSD), and sleeping problems in the general population. The lockdowns, quarantine, and physical distancing as a significant factor in the increased challenges of mental health management as they disrupt the normal social processes and undermine the social support systems that are critical in the face of emotional resilience (Brooks et al., 2020). Moreover, insecurity in the economy and losing jobs and financial difficulties faced during the pandemic have increased stress and psychological pressure, especially against low-income and marginalized groups (United Nations, 2020).

Healthcare personnel has been one of the most severely impacted and experienced elevated burnout, emotional fatigue, and moral distress as a result of a long time working in high-risk areas and heavy workloads (Lai et al., 2020). Likewise, the elderly, people with underlying psychiatric issues, and solo

residents have been affected disproportionately, and the literature of the deterioration of depression, cognitive ability, and increased loneliness was reported (Armitage and Nellums, 2020). These challenges were exacerbated by the interference with normal healthcare including mental health services, leaving most people without proper care. According to secondary data of clinical and population-based research, these psychological effects are most likely to continue during the post-pandemic phase, which may impose a long-term burden on the overall health of the population (Vindegaard and Benros, 2020).

Besides the individual factors, society- and structure-based determinants have been very critical in determining the mental health outcomes. Resilience and coping strategies at a population level have been affected by public health messaging, confidence in government response, and telehealth services and community support systems (Galea et al., 2020). The mental health outcome differences have been noted between the high-income and the low- and middle-income nations that are characterized by disparity in healthcare infrastructure, social safety netting, and cultural approaches toward mental illness. As a result, future efforts to deal with post-pandemic mental health must use a multidisciplinary approach that incorporates clinical psychology, psychiatry, public health, social policy, and community interventions.

This research is aimed at synthesizing secondary data on mental health problems that arise in the post-pandemic era, examining the factors and risk, and outlining how multidisciplinary interventions can help reduce the prevalence of psychological distress. This study will give recommendations to policymakers, caregivers and community agencies in developing successful mental health initiatives by looking at the various trends around the world and the disproportionate effects on vulnerable groups. This study has the importance of informing the strategies that encourage psychological resilience, decrease mental disorder burden in the long run, and support the general well-being of populations that have to overcome the post-pandemic world.

LITERATURE REVIEW

The psychological toll of the COVID-19 has been generally acknowledged as one of the most acute challenges of the 21 st century in terms of public health. There has always been an evidence of high degree of anxiety, depression, post-traumatic stress disorders (PTSD) and sleeping problems in many segments of the population as studies that have been carried out in different countries have always demonstrated. According to Rajkumar (2020), the psychological burden does not only apply to the individuals who were infected with the virus, but it also applies to the general population who are exposed to extended social isolation, economic uncertainty and media news of morbidity and mortality levels. It has been shown that social isolation under lockdowns and quarantine conditions derailed the regular social support networks, which are key to psychological resilience, contributing to the worsening of loneliness, hopelessness, and emotional distress (Brooks et al., 2020). Longitudinal studies also provide secondary data that indicate that those who have undergone prolonged periods of confinement do not recover mentally in the long-run, which points to the long-term nature of psychological implications of the pandemic (Xiong et al., 2020).

Unemployment and economic instability have been also cited as one of the significant causes of psychological distress in the pandemic. According to reports provided by United Nations (2020), there was a large-scale loss of jobs and reduction of income that over burdened the low-and-middle-income households leading to increased stress and symptoms of depression. Not only did financial strain elevate anxiety in the face of the immediate survival needs but it also led to an even greater feeling of insecurity about the future, which led to heightened vulnerability in the mental health. As literature shows, socio-economically disadvantaged populations were more vulnerable to poor psychological outcomes, and structural inequalities complicated the fact that the pandemic led to mental health issues (Banks and Xu, 2020). Additionally, the financial instability, combined with other stressors, including the caregiving burden and homeschooling during lockdowns, only contributed to the stresses and burnouts of families and women reported higher levels of stress and burnout than men (Fegert et al., 2020).

The healthcare workers became one of the most vulnerable populations of the pandemic. Medical professionals were exposed to high rates of burnout, anxiety, depression, and PTSD due to high levels of occupational stress, fear of infection, moral dilemmas, and patient suffering (Lai et al., 2020). According to secondary studies, frontline workers, especially those working in intensive care units, had experienced chronic stress because of the long working hours, the lack of personal protective equipment (PPE), and the emotional burden due to death of patients. Also, healthcare professionals were sharing higher levels of insomnia and somatic complaints and that undermined their psychological health and effective performance (Pappa et al., 2020). The use of institutional support, counseling services, and peer support programs was observed to alleviate the effects of psychological distress to a certain degree, yet the lack of resources and personnel in the system hampered the overall application (Chen et al., 2020). The psychological toll of healthcare workers highlights a necessity to plan and develop occupational mental health initiatives, which can support workforce resilience during international health emergencies, on the policy level.

Elderly and people with a pre-existing mental health condition have been determined to be especially vulnerable to the psychological impacts of the pandemic. Older populations were disproportionately impacted by social isolation, routine disturbance, and decreased access to healthcare services, which resulted in greater levels of depression, cognitive impairment, and anxiety (Armitage and Nellums, 2020). Similarly, patients who had previous psychiatric diagnoses of anxiety disorders, depression, or schizophrenia were found to have their symptoms worsened by the lack of continuity of the treatment process and the inability to receive in-person treatment (Gonzalez-Blanco et al., 2020). The important intervention was telehealth services, which ensured continuity of care delivery among such populations, and the studies revealed moderate effectiveness in decreasing the severity of symptoms and enhancing treatment adherence (Wind et al., 2020). Nevertheless, not all older adults and low-income individuals could receive mental health services due to the inequalities in digital access and technological literacy, which are also indicators of inequity.

Scarce challenges also confronted adolescents and children in the pandemic. School suspensions, social isolation, and lack of opportunities to have fun broke developmental patterns, which precipitated stress, irritability, and depressive symptoms (Loades et al., 2020). According to secondary sources, the long-range online schooling was linked to increased anxiety and lower social competence, because young people had difficulties in keeping their social lives and academic activity at a distance (Golberstein et al., 2020). Moreover, children living in vulnerable families were exposed to the increased level of stressors in the family (parental conflict and financial strain), which adversely impacted their emotional and behavioral outcomes (Patrick et al., 2020). The literature points to the fact that early interventions, such as school-based counseling, family support programs and organized social engagement opportunities are necessary to counteract the long-term psychological impacts on younger communities.

The topic of the role of media and information dissemination in the pandemic has also been actively studied. The ongoing news reports and misinformation about the pandemic led to the development of anxiety, fear, and uncertainty in the general population (Garfin et al., 2020). Secondary sources demonstrate that an abundance of negative news cycles and conflicting information may worsen psychological distress and that correct, clear, and constant communication by health authorities may enhance coping strategies and preventive behavior among the population (Cuan-Baltazar et al., 2020). The role of mental health literacy campaigns to educate populations on stress management, coping measures, and the need to seek professional assistance also has been mentioned in literature as effective interventions to reduce the prevalence of pandemic-related psychological distress (Singh et al., 2020).

Mental health is also affected by social and structural factors, which exacerbate the effect of the pandemic. The population-level mental health outcomes are a result of disparities in healthcare access, socio-economic disparities, and structural vulnerabilities (Galea et al., 2020). As an example, the uniformly stressed communities were forced to endure more stress because of the lack of access to testing, healthcare services, and social safety nets, leading to an increased prevalence of depression,

anxiety, and post-traumatic stress (Horesh & Brown, 2020). According to cross-national research, it was observed that the national results in terms of psychological outcomes in the population during the pandemic were comparatively better in countries that had more developed social support systems, universal healthcare coverage, and indexed proactive mental health policies (OECD, 2021). The results highlight how a multidisciplinary intervention involving the provision of mental health, social policy, economic support, and planning of health services is needed to manage the psychological problems of the post-pandemic period.

A number of evidence-based approaches to addressing post-pandemic mental health issues have been found in the literature. Cognitive-behavioral therapy (CBT), mindfulness-based stress reduction, and tele-counseling are among the psychological interventions that have proven to be effective in decreasing anxiety symptoms and depression symptoms (Ho et al., 2020). Community-based initiatives, peer support networks, and social engagement programs are found to foster resilience and social connectedness particularly in those groups that are isolated, vulnerable, and connected (Wind et al., 2020). Increased funding to mental health services, inclusion of mental health into primary healthcare, and public awareness campaigns are policy-level interventions that are critical in ensuring mental health support is maintained at the population level (Pfefferbaum & North, 2020). This is supported by literature that indicates that an individual therapy, community involvement, technological advancements, and policy changes need to be integrated into a structured multidisciplinary and multilevel intervention to address the issues of mental health challenges in both the short- and long-term effects of the pandemic.

Conclusively, the literature underlines that mental health issues that follow the pandemic are widespread, multifactorial, and are probably not to end with the immediate crisis. At risk groups such as healthcare providers, elderly individuals, children and patients with an underlying mental illness are overrepresented. Psychological distress is further aggravated by socio-economic differences, social alienation, broken routines and media-induced fear. The most effective strategy to curb these challenges is the multidisciplinary interventions combining clinical, social, and policy interventions. This review highlights the importance of mental health planning proactively, coordinated, and evidence based in post-pandemic societies by compiling secondary research on the topic across the world.

METHODOLOGY

The proposed study assumes a secondary research method, which means that it will be based on literature sources, governmental reports, and peer-reviewed articles to explore the issue of mental health problems among post-pandemic populations. The adoption of secondary data was informed by the high presence of global and regional research on psychological outcomes and the prevalence of mental health disorders and the effectiveness of interventions in and after the COVID-19 pandemic. The secondary sources were epidemiological surveys, clinical research, meta-analyses, systematic reviews and reports of international organizations like the World Health Organization (WHO), Centers of Disease Control and Prevention (CDC) and the United Nations (UN). This methodology allowed performing a thorough study of mental health dynamics in various groups, making it a global approach and revealing susceptible groups and critical factors of psychological suffering (Rajkumar, 2020; Pfefferbaum and North, 2020).

Databases like PubMed, Scopus, Web of Science, and Google Scholar were also used to collect the necessary data by using such keywords as post-pandemic mental health, COVID-19 anxiety, depression, PTSD, telehealth interventions, and psychological resilience. Inclusion criteria selected studies published in 202023 to focus on the studies occurring within the context of the post-pandemic environment, whereas the seminal works on psychological impact of pandemics were also reviewed to supply the historical background. Non-empirical studies, non-peer-reviewed studies, or studies that had no direct link to the outcomes of mental health during pandemics were filtered out to retain analytical rigor. Also, WHO, CDC, and UN reports of grey literature were included to complement the results of peer review and offer insights of policy relevance.

Thematic synthesis and qualitative content analysis were used to analyze the data. The most important patterns, trends, and common themes concerning the issue of mental health difficulties were found in the literature. Themes were prevalence of anxiety, depression, PTSD, sleep problems, occupational stress among health care workers, effects of social isolation, economic pressures and age, gender and socio-economic group disparities. Evidence-based interventions and multidisciplinary interventions suggested in the literature were also analyzed and incorporated into the results of clinical psychology, psychiatry, social work, community programs, and public health. In such a manner, the study was able to generalize the variety of evidence into a consistent account that reveals the causes, effects, and possible remedies to the mental health issues that might arise after the pandemic (Vindegaard and Benros, 2020; Galea et al., 2020).

Although a secondary research provides a comprehensive analysis range, some shortcomings are admitted. The research is based on the data gathered previously which can be different in terms of methodology, sample size, and cultural background, which can be a factor of comparability. Moreover, the quality of research studies in different areas is uneven, and low- and middle-income nations are frequently underrepresented in mental health research, which restricts the extrapolation of the results. Such limitations notwithstanding, secondary research is a reputable and viable strategy of exploring the world mental health patterns, vulnerable groups, and informing evidence-based interventions and policy suggestions.

DATA ANALYSIS AND FINDINGS

The secondary data analysis using peer-reviewed publications, global human health reports, and population surveys shows that the levels of psychological distress among post-pandemic populations are significantly high. The situation caused by the COVID-19 pandemic affected social, economic, and healthcare systems all over the world, providing the environment favorable to anxiety, depression, post-traumatic stress disorder (PTSD), and sleep disturbances (Rajkumar, 2020; Pfefferbaum and North, 2020). The information gathered as the results of various cross-sectional studies indicates that between 20% and 35% of the general population had anxiety, with the rates reported as even higher in countries with longer lockdowns and higher rates of infections (Xiong et al., 2020). The same was true of depression as prevalence estimates of between 18% and 32% depict the prevalent impacts of social isolation, uncertainty, and grief. It is worth noting that young adults and adolescents had been more anxious and depressed, probably because of interrupted education schedules, social isolation, and a future-oriented uncertainty (Loades et al., 2020; Golberstein et al., 2020).

One of the most impacted categories was the medical workers, who struggle with serious psychological difficulties as they are exposed to high-risk healthcare settings over an extended period, higher workloads, and patient deaths. According to studies, about 25-40% of medical workers complained of anxiety and depression-like symptoms, and 10-20% of them had PTSD-like symptoms (Lai et al., 2020; Pappa et al., 2020). Frontline workers in the intensive care units and emergency departments experienced burnout and occupational stress to a very high degree, worsened by the lack of personal protective equipment (PPE), moral dilemma, and fear of infecting the family members. It has been shown that institutional interventions, including counseling services, peer support networks, and structured working schedules, minimally decreased the level of distress, yet the systemic issues like the shortage of staff and high patient loads minimalized their effectiveness (Chen et al., 2020).

Elderly people and those who had mental health issues were disproportionately affected psychologically. The alteration of routine, social isolation, and limited access to healthcare services were factors that increased depressive symptoms, cognitive impairment, and anxiety among the older groups of people (Armitage and Nellums, 2020). Patients with previous psychiatric diagnoses also complained that their symptoms deteriorated, which justifies the continuity of care by using telehealth services. Telemedicine turned out to be a vital remedy to address the shortage of services, and its moderate efficiency was associated with symptom control, but the lack of digital literacy and the internet posed challenges to other

vulnerable groups (Wind et al., 2020). School closures, social isolation, and low recreational activities also caused high levels of stress and irritability among children and adolescents. According to secondary sources, such disturbances had adverse effects on emotional growth and social competence and were especially apparent in socioeconomically disadvantaged families (Patrick et al., 2020).

Another important role of socio-economic and environmental determinants in the determination of mental health outcomes is also identified in the analysis. People with low-income families, minority groups, or nations with inadequate health facilities had greater levels of anxiety, depression, and PTSD (Horesh and Brown, 2020; Galea et al., 2020). Economic stressors, such as the loss of a job and financial insecurity, were closely related to greater psychological distress, especially in young adults and caregivers (Banks and Xu, 2020; Fegert et al., 2020). In addition, the news and misinformation related to the pandemic added to the level of anxiety and fear, indicating the importance of accurate, transparent, and consistent communications by the authorities in the field of public health (Garfin et al., 2020; Cuan-Baltazar et al., 2020).

The interventions, as indicated in the literature, are evidence-based, which focuses on a multidisciplinary approach that involves the use of individual, community, and systemic approaches. Psychological treatment, especially cognitive-behavioral therapy (CBT), mindfulness-based stress reduction, tele-counseling intervention showed considerable improvement in anxiety, depression, as well as sleep disturbances (Ho et al., 2020). The community engagement schemes, peer support networks, and family based intervention programs served to reduce social isolation, foster resilience and offer emotional support to vulnerable communities. System-wide policy interventions, like incorporating mental health in primary healthcare, allocating more resources to mental health services, and educating the population, became very important in terms of maintaining mental health at the population level (Pfefferbaum & North, 2020).

Table 1 is used to summarize the outcomes, the groups that were affected, and the prevalence estimates of mental health conditions in post-pandemic populations in order to obtain a clear picture of a specific subject.

Table 1: Mental Health Challenges in Post-Pandemic Populations (2020–2023)

Population Group	**Primary Mental Health Outcomes**	**Estimated Prevalence (%)**	**Key Contributing Factors**	**Evidence Source**
General Population	Anxiety, Depression, Sleep Disturbances	Anxiety: 20–35, Depression: 18–32	Social isolation, lockdowns, uncertainty, grief	Rajkumar (2020); Xiong et al. (2020)
Healthcare Workers	Anxiety, Depression, PTSD, Burnout	Anxiety/Depression: 25–40, PTSD: 10–20	High-risk exposure, workload, moral distress	Lai et al. (2020); Pappa et al. (2020)
Older Adults	Depression, Cognitive Decline, Anxiety	Depression: 15–25, Anxiety: 10–20	Social isolation, disrupted routines, limited care	Armitage & Nellums (2020)
Children & Adolescents	Anxiety, Depression, Stress, Irritability	Anxiety: 20–30, Depression: 15–25	School closures, social isolation, disrupted routines	Loades et al. (2020); Patrick et al. (2020)

Individuals with Pre-existing Disorders	Worsening of symptoms, Anxiety, Depression	30–50	Treatment disruption, stress, social isolation	Gonzalez-Blanco et al. (2020)
Marginalized & Low-Income Populations	Anxiety, Depression, PTSD	25–45	Economic insecurity, limited healthcare access	Horesh & Brown (2020); Banks & Xu (2020)

The table analysis indicates that mental health issues touch upon all population groups and are disproportionally impactful in relation to healthcare workers, older adults, children, and socio-economically disadvantaged groups. The most widespread consequences were anxiety and depression, PTSD was also noteworthy in the context of healthcare workers and people who had to deal with severe illness or loss. The factors that contribute are multifactorial and include individual, social, and structural factors and therefore interventions that are multidisciplinary are required.

Synthesis of secondary data also reveals that proactive measures like tele counseling, community based support, community awareness and inclusion of mental health into primary care systems is effective in minimizing psychological distress. Nonetheless, access and digital inequality and policy-based interventions do not reach everyone, particularly low- and middle-income countries. On the whole, the evidence supports the idea that the issue of post-pandemic mental health is a difficult, prolonged, and multi-level phenomenon that will need the efforts of individuals, communities, and systems to foster resiliency, alleviate distress, and provide care equitably.

CONCLUSION

The pandemic of COVID-19 has brought extensive implications on the mental health of the different populations across the world. Secondary data analysis shows that the rates of anxiety, depression, PTSD, and sleep disorders have become more widespread during the post-pandemic period. The healthcare workers, the aged, children, adolescents, and other individuals with pre-existing mental conditions have processed disproportionate psychological impacts. The factors of mental health outcomes include individual, social, and structural determinants, which are influenced by the effects of prolonged social isolation, economic insecurity, disruption of routines, occupational stress, and pandemic-related news (Rajkumar, 2020; Pfefferbaum and North, 2020). Such results demonstrate the critical necessity of both immediate and policy-level planning and intervention to overcome short-term and long-term mental health challenges.

The results provided in the literature may underpin that multidisciplinary interventions are essential to the enhancement of psychological resilience and reduction of the distress. Cognitive-behavioral therapy, tele-counseling, community engagement programs, peer support networks, and integration of mental health into primary healthcare are some of the strategies that have proven to be effective in the alleviation of anxiety, depression, and stress symptoms (Ho et al., 2020; Wind et al., 2020). Moreover, it is imperative that policy programs that guarantee equitable care access, improve mental health literacy, and offer social and economic assistance could assure sustainable changes in population well-being. In general, an integrated strategy at the personal, community, and systemic levels should be used to address post-pandemic mental health issues, alleviate inequalities, and support resilience among the groups of individuals who face the long-term psychological effects of the pandemic.

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ACADEMIA Health Sphere Journal

Telemedicine Adoption and The Implications On Patient Care in Rural and Underserved Areas

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ABSTRACT

Telemedicine has come out as a revolution in the provision of healthcare especially in rural and underserved areas where there is still limited access to medical services because of geographical, socioeconomic, and infrastructural factors. This paper discusses telemedicine adoption and how it has affected patient care outcomes, accessibility of health care, and efficiency of health service delivery. The results obtained in terms of secondary data and the existing literature demonstrate that telemedicine is beneficial in terms of access to healthcare, a decrease in the burden of travel, the opportunity to diagnose a disease early, and the ability to monitor a patient. Nevertheless, telemedicine still experiences a number of challenges that include digital illiteracy, poor internet access, technological resistance, and data privacy issues. It is highlighted in the study that it is necessary to invest in digital infrastructure, training and supportive policy frameworks to guarantee the integration of telemedicine in healthcare systems in a sustainable manner. The findings reveal that telemedicine has the potential to curb health disparities and help in the equitable distribution of healthcare when well adopted.

Keywords

Telemedicine; Rural Healthcare; Health Access; Digital Health; Patient Care; Medical Technology; Healthcare Equity; Remote Consultation.

INTRODUCTION

Costly healthcare has been a worldwide issue especially in rural and underserved areas whereby there usually is a deficiency of medical facilities, medical personnel, and special care units. People who reside in remote locations often encounter significant obstacles to accessing prompt medical attention, such as the long distances to the healthcare facilities, high transportation prices, and lack of healthcare professionals (World Health Organization, 2021). Such restrictions add to the higher levels of untreated diseases, complications that can be avoided, and mortality. Telemedicine has become an urgent innovation to solve such imbalances by allowing remote consultations, diagnosing, monitoring, and treating using digital communication technology (Dorsey & Topol, 2020). Telemedicine has transformed the conventional healthcare delivery paradigm and increased access to medical care among geographically dispersed populations by connecting the patients with health care providers without necessarily having them meet in person.

The recent growth of telecommunication infrastructure, as well as the application of smartphones and other tools that allow access to the internet, has made the growth of telemedicine systems more common in the last decade (Kruse et al., 2018). This adoption has been greatly accelerated by the COVID-19 pandemic since most healthcare systems were forced to transition towards remote care delivery following lockdowns and the risk of infection (Keesara, Jonas, & Schulman, 2020). Telemedicine in under-serviced and rural areas became a substitute and in most instances the sole source of healthcare delivery. This demonstrated its possible enhancement of continuity of care in conditions when there is no crisis and supported the necessity of its eventual incorporation into health service infrastructure (Monaghesh and Hajizadeh, 2020).

Although the telemedicine has transformative potential, the adoption of telemedicine in rural areas is still a problem with structural and socioeconomic barriers. One of the major constraints is still limited technological infrastructure, especially in low-income areas where the broadband connection is not stable or even present (Smith et al., 2022). Digital literacy is also a factor, since healthcare providers (as well as patients) in the rural areas might not be familiar (or confident) with the telehealth platforms (Carter, Anderson, and Moss, 2021). In addition, the attitude to telemedicine is also shaped by culture; some patients are unwilling to use telemedicine, as they do not want to miss the physical examination, whereas other healthcare workers are afraid that telemedicine will adversely affect the accuracy of diagnoses (Gajarawala & Pelkowski, 2021). These issues demonstrate that it is essential to offer technical training, design culturally sensitive communication plans, and make the telehealth platforms usable.

However, there is a strong evidence that telemedicine enhances healthcare access and outcomes among the remote populations. It saves time and costs on traveling, particularly among the elderly patients, people with disabilities, and those residing in geographically remote areas, such as mountains and rural areas (Bashshur, Shannon, and Grigsby, 2016). Also, telemedicine provides chronic disease management via constant remote control monitoring, which enables early intervention and minimizes emergency hospitalization (Flodgren et al., 2015). With the help of telemedicine services, patients can receive more frequent contact with the healthcare environment, which increases adherence to treatment and the quality of life in general (Totten et al., 2019).

The telemedicine also helps in solving severe shortages in the health care workforce. Most rural areas do not have specialists, which leads to imbalances in the choice of treatment and diagnostic accuracy. Teleconsultation allows the local providers to engage the specialists in the urban medical facilities, enhancing the decision-making process and patient outcomes and decreasing the inappropriate referrals (Serper & Volk, 2018). This model of collaborative care reinforces the local healthcare capacity and adds to the healthcare equity. Also, telemedicine contributes to the development of professionals since mentoring and knowledge can be shared in real-time, which may help to prevent burnout and enhance retention of rural health professionals (Greenhalgh et al., 2020).

To ensure that telemedicine is able to revolutionize the delivery of healthcare in underserved areas, special policy assistance and a commitment in infrastructures are necessary. Governments and health sectors are urged to focus on the development of internet connectivity, subsidize telehealth, and develop training programs that would prepare health practitioners and patients with the required digital skills (World Bank, 2022). It is also important to develop the regulatory frameworks related to patient confidentiality, medical liability, reimbursement policies, and data protection to guarantee the ethical and safe telemedicine practice (Sharma and Clarke, 2019). Outreach and community awareness can also make the users more accepting through misconceptions about remote care.

Overall, telemedicine is one of the potential solutions to enhancing the accessibility of healthcare and minimizing health disparities in rural and underserved areas. Although the digital infrastructure, usability, and cultural adaptation issues still persist, strategic policy interventions and long-term technological investment can contribute to the more widespread and more equal adoption of telemedicine. Telemedicine can increase patient outcomes, increase the capacity of healthcare workforce, and create more inclusive health systems, responsive to the needs of remote populations, when well implemented.

LITERATURE REVIEW

The implementation of telemedicine in rural and other underserved areas has been a popular topic of discussion in global health, with the authors showing that telemedicine has the potential to change the prospects of access to healthcare services in an area with limited medical resources. The term telemedicine is identified as the provision of healthcare services through digital communication technologies, such as video consultation, remote monitoring, and the electronic health system (Wootton, 2020). Geographical barrier, lack of adequate doctor to patient ratio, and transportation are some of the factors that continue to create delays in diagnosis and avoidable health complications in rural areas where the healthcare infrastructure is poorly built (WHO, 2021). Another model that minimizes these barriers is telemedicine, which allows conducting real-time consultations, access to specialists, and continuity of care (Kruse et al., 2018).

Researchers note that among the major factors that have led to the adoption of telemedicine is the necessity to remedy the rural gap in healthcare particularly in developing nations. Indicatively, Bashshur, Shannon, and Krupinski (2019) observed that telemedicine leads to a decrease in hospitalization and increased patient satisfaction among remote population groups when properly supported with the infrastructural support. Equally, Rai and Prasad (2022) posit that telehealth will be effective in reducing disparities in rural maternal and child health due to the frequent lack of healthcare providers. These papers indicate that telemedicine is not only a technological breakthrough but a healthcare access model.

The technological preparedness and level of digital literacy among the rural communities, however, determine the adoption of telemedicine. Studies have shown that a lack of internet connectivity, poor smartphone penetration, and lack of training on the part of patients and healthcare workers are all major obstacles (Latif et al., 2021). Culture has a very diverse acceptance and trust in digital healthcare systems even in the presence of technology infrastructure. According to Anderson and Agarwal (2020), patients in conservative or traditional rural areas tend to prefer face-to-face appointments, and they consider digital appointments less credible or impersonal. This brings out the necessity of community-based sensitization and awareness initiatives.

The other dimension that is significant relates to the quality and continuity of care provided by telemedicine. Sood et al. (2019) argue that telehealth platforms can enhance the follow-up of chronic diseases including diabetes, cardiovascular diseases, and hypertension because patients do not have to travel to health facilities to be monitored. Wearable-based remote patient monitoring has demonstrated a good response in enhancing adherence to treatment (Li et al., 2021). However, there are still concerns about data privacy, risks of misdiagnosis, and ethical standards in case of limited physical examination (Varkey, 2022). In most countries, policies and regulatory frameworks of telemedicine are still developing.

When applied to rural Pakistan, a number of studies indicate that telemedicine holds great potential but has not been effectively integrated because of the infrastructural barriers. According to Ahmad and Khan (2020), the majority of rural provinces do not have the stable broadband connection and trained medical staff that are aware of telehealth devices. Nevertheless, pilot programs, including the Sehat Kahani telehealth program, have proven that digital healthcare models can be culturally adapted and implemented successfully in case female doctors, paramedics, and community health workers work together in a hybrid model (Sehat Kahani Report, 2023).

In general, the literature reveals that the process of telemedicine implementation in rural and underserved areas is affected not merely by technological issues but also by socio-cultural acceptance, governmental support, training, and affordability. Telemedicine is a complex system that needs combined efforts to connect infrastructure, professional capacity building, patient education, and regulation framework development (Scott and Mars, 2021). Although telemedicine has a great potential in enhancing healthcare equity, its successful application should be localized based on the economic, cultural, and technological realities.

METHODOLOGY

The proposed research design is a qualitative research study that will utilize the secondary data analysis method to assess the adoption of telemedicine and its effect on patient care in rural and underserved areas. The qualitative method is suitable since the study is expected to examine trends, problems, advantages, and the contextual factors instead of quantifying the results. Secondary data enables access to already published empirical researches, policy reports and program reviews which are credible evidence sources in the context of the research.

Data Source and Selection

Peer-reviewed journal articles, government healthcare reports, WHO publications, NGO project reports, and telehealth implementation case studies published between 2018-2024 were used as a source of secondary data. The databases that have been consulted are:

- Google Scholar
- PubMed
- ScienceDirect
- WHO Global Health Observatory.
- Report by Ministry of Health and WHO Pakistan.
- The inclusion criteria were:
- Research on the use of telemedicine in rural or underserved areas.
- Studies on patient outcomes, access to care or quality of care.

Publications in English.

Full-text accessibility.

The exclusion criteria were:

Research on urban telehealth only.

Papers that were written earlier than 2018 (except those used as background ideas).

Empirically and policy irrelevant studies.

Data Analysis Technique

The thematic content analysis was used to analyse the collected literature and it included:

- Reading and being acquainted with some documents.
- Locating common themes, including access to care, patient satisfaction, technological barriers, digital literacy, and policy frameworks of telemedicine.
- Cross-regional comparison in order to learn about prevalent challenges and success factors.
- Combining the findings to provide a logical explanation of the importance of telemedicine in rural healthcare.

Ethical Considerations

There are no direct ethical threats on participants since the study is fully founded on the secondary data. Nevertheless, the ethical academic behavior was ensured by:

- All authors and studies used are adequately recognized.
- Avoidance of plagiarism.

- Credible and verified sources have been used.

Methodology Limitations.

The research lacks primary field data, thus it might not be able to adequately reflect patient or healthcare provider life experiences in rural settings. Also, the availability of secondary data across regions is not the same and this can pose a limitation to representation. The validity and completeness of the findings are however reinforced by the wide range of sources that were utilized.

Data Analysis

The secondary data obtained through the global health reports, peer-reviewed journal article sources, and national policy assessment shows an intricate yet mostly favorable effect of the telemedicine implementation in rural and underserved areas. The discussion identifies five key dimensions, including accessibility, quality of care, affordability, patient satisfaction, and systemic barriers that determine the continued use of telemedicine in disadvantaged regions.

Among the most important discoveries is that telemedicine has increased access to healthcare. There are traditionally high physical, financial, and social barriers to healthcare services among rural populations. WHO (2022) states that more than two hours of distance to the nearest secondary-care facility is the situation of over 45 percent of rural inhabitants in most of the low-and-middle-income countries. Telemedicine helps to close this divide by allowing remote consultations either using mobile phones, community health centers or telehealth hubs. As an example, a massive telehealth project in Pakistan saved patients almost 70 percent of the expenses of traveling, as well as waiting time during specialist appointments (Chaudhry and Ali, 2022). Equally, in Nepal, teleconsultations increased access to maternal and neonatal care in mountainous areas that were not accessible during the winter months (Nuwan & Khanal, 2021). These examples prove that telemedicine is not a supplement to healthcare, it is a key to access to healthcare in distant areas.

The enhancement of accessibility however depends on technological infrastructure. They are in regions where power supply is not reliable, mobile networks are inadequate, and people do not own smartphones, so they cannot access telemedicine services regularly. According to the estimates provided by the World Bank (2021), the proportion of rural households with reliable internet connectivity in South Asia is only 41%. Moreover, in an environment where there is connectivity, digital literacy is a major obstacle. Older patients, women in conservative areas, and patients with low education levels tend to have difficulties in using telehealth software. The medical staff of such areas also states that they require special training to be sure of using remote diagnostics, tele-consult platforms, and data recording systems (Habib & Soomro, 2021). These aspects imply that telemedicine is structurally in a position to enhance access, but its practical effectiveness requires the solution of the digital divide.

The quality of care and patient health outcomes is also another significant theme in the data. Regular follow-up consultations and patient monitoring have been found to enhance continuity of care as telemedicine is proven to be effective in this regard. Several chronic disease management initiatives that have implemented the use of remote patient monitoring devices have recorded considerable emergency hospitalization reductions. As an illustration, a tele-cardiology project in Bangladesh demonstrated an improvement in the control of hypertension and diabetes among patients who were remotely monitored relative to patients who only received traditional clinic-based care (Islam & Hossain, 2021). Similarly, Indian telepsychiatry initiatives lowered the occurrence of treatment dropout and decreased the levels of stigma related to traditional mental health care visits (Bhatt & Sharma, 2020). These results indicate that telemedicine improves preventive and long-term care, which is usually ineffective in rural health systems.

However, telemedicine is not as effective in all medical conditions. Physical check-ups, lab diagnosis, and examinations that involve touching are restrictive to remote medical interaction. Doctors complain that it is more challenging to make some diagnoses without personal observation or clinical devices. Moreover, other patients state that they feel uncomfortable with the virtual communication because they believe that

it does not provide the emotional support that they would receive during regular visits (Zhang and Yang, 2020). These observations indicate that telemedicine is most effective in the form of a hybrid system, which is remote consultation with periodic face-to-face evaluation

Table 1. Comparative Analysis of Telemedicine Impact (Secondary Data)

Impact Dimension	Positive Outcomes	Persistent Challenges	Overall Assessment
Accessibility	Reduced distance, reduced travel cost, increased specialist access	Internet and digital literacy gaps	Positive but uneven
Quality of Care	Better disease monitoring, timely follow-ups	Limited physical diagnostic capacity	Effective for chronic and preventive care
Cost Efficiency	Lower patient expenses, reduced hospital congestion	High initial setup costs for systems	Cost-effective long-term
Patient Satisfaction	Convenience, reduced anxiety and travel fatigue	Trust issues and cultural perceptions	Improves with familiarity
System Integration	Supports rural clinicians and decentralizes care	Regulatory and funding limitations	Requires structured national policy

Another theme that is repeated in the analyzed literature is economic efficiency. Telemedicine will lead to a decrease in indirect healthcare expenses in terms of transportation, lost wages, and accommodation of rural patients who used to travel long distances to seek medical treatment. Telemedicine also minimized the burden on the system during the COVID-19 pandemic because it decreased overcrowding in the hospitals (Koonin et al., 2020). There are however initial set-up costs such as equipments, connection infrastructure, and training which are still high especially in low-income areas. Many pilot telemedicine projects will be abandoned after the external funding has subsided unless the government and the long-term funding are provided (Gogia & Maeder, 2019). Sustainability therefore, requires institutional commitment, and is not based on short-term project-deployments.

Lastly, cultural and social acceptance is also important to telemedicine adoption. Face-to-face interaction in most conservative or community based societies is linked to trust and medical legitimacy. Research indicates that acceptance is elevated when telemedicine services are delivered by local health workers, and not by alien external physicians (Mishra and Singh, 2022). This implies that the human factor will continue to be the focus of the technology-mediated care: technology is not sufficient to enhance healthcare; it needs a social background.

CONCLUSION

The results of this discussion show that telemedicine has a significant potential to enhance access to health care, its continuity, affordability and patient outcomes in the rural and underserved areas. Telemedicine can help to alleviate structural disparities in health systems, especially in countries where medical resources are centralized in urban areas by linking patients with qualified medical professionals despite the geographic barriers. The evidence indicates that telemedicine is especially useful in the chronic disease management, maternal and mental health services and post-treatment follow-ups, in which frequent communication is essential.

Nevertheless, the ultimate achievement of the advantages of telemedicine relies on the resolution of major obstacles that concern digital infrastructure, literacy, socio-cultural acceptance, stability of funding, and legal frameworks. Telemedicine cannot be considered as an alternative to traditional healthcare but as a supplemental system which is part of the national health strategies. The provision of digital infrastructure, training of healthcare providers, subsidizing of Internet access in rural populations, and the development of trust-building community-based telehealth models are all necessary actions to ensure the implementation of telemedicine becomes sustainable. Through a strategic approach, telemedicine will be a revolution in healthcare equity and long-term community health.

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Impact of Community Health Workers (CHWs) on Childhood Immunization Coverage in Rural Punjab, Pakistan

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ABSTRACT

The research paper is based on Community Health Workers (CHWs) role on coverage of immunization among children in rural districts of Punjab, Pakistan. CHWs are quite significant in linking the communities to the formal healthcare sector because they facilitate outreachs to vaccination, health and follow-up services. The level of childhood immunization regardless of the national immunization programs in Pakistan is not desired particularly in the rural areas (UNICEF, 2021). The research design applied in this study is quantitative research design, which involved the use of structured questionnaires and health records on 150 households spread across the chosen rural districts. The correlation and regression analyses were completed to evaluate the relationship between CHW engagement and immunization outcomes using descriptive statistics. The results show that when CHWs are actively involved, the immunization rates have been significantly higher and the greater the coverage in the household is the higher the home visits, counseling, and reminders by CHWs. The paper highlights the importance of CHWs in addressing the barriers, particularly lack of awareness, distance to health facilities and vaccine hesitancy. Strategies to be recommended to achieve equity in access to childhood immunization in rural Punjab are; strengthening CHW programs, continuous training and enhancing community engagement strategies.

Keywords Childhood Immunization, Rural Health, Punjab, Pakistan, Community Health Workers (CHWs), Vaccination Coverage.

INTRODUCTION

It has been well established that the most economically effective and crucial public health activity is childhood immunization which is used to prevent morbidity and mortality caused by vaccine-preventable disease, including measles, polio, diphtheria, and hepatitis B (WHO, 2020). Vaccination programs have helped Worldwide to lower child mortality significantly, but the coverage is still uneven and has been especially low in low- and middle-income nations and rural regions (Ozawa et al., 2016). However, in Pakistan, the pace at which childhood immunization is achieved in rural areas falls short of the aimed levels despite years of efforts to address the issue through national immunization programs because of structural,

social, cultural risks (Bhutta et al., 2019). The distance to the health facilities, absence of awareness, vaccine hesitancy, and low education of caregivers contribute to the delay in receiving vaccines among rural Punjabi kids (Siddiqui, Rizvi, and Ahmed, 2019).

Community Health Workers (CHWs) have become very important players in the gap between healthcare services and underserved populations. They are community based workers who are trained in such a way that they can provide culturally sensitive health education, access to healthcare and assistance in preventive actions like vaccination (Lehmann and Sanders, 2007). In rural Punjab, CHWs have significantly contributed to the creation of awareness on immunization, home visits, reminding the caregivers of the vaccination schedule, and following up on the vaccination process of the children (Pakistan Ministry of Health, 2018). With the help of their local experience, speaking their native language, and understanding cultural traditions, CHWs are able to build faith among families, eliminate misunderstandings concerning vaccines, and encourage families to follow the immunization schedules (Hill et al., 2014).

In various researches, CHWs are reported to have been efficient in ensuring the immunization coverage. It has already proven that when actively involved in routine vaccination work, as well as in outreach activities, CHWs will make a significant contribution to coverage, especially in remote and marginalized communities (Perry, Zulliger, and Rogers, 2014). CHWs also offer logistical assistance besides behavior change through counseling, education, and reassurance to the caregivers, an aspect that directly influences the vaccination cover of the children (Glenton et al., 2013). They have been associated with a higher adherence to the vaccination program, reduced school dropout rates, and overall health of rural children (Ali, Khan, and Fatima, 2021).

Despite the above documented benefits, there are hiccups. Supervision, resources, and program structure may limit the scope of immunization due to the influence of CHW training (Khan, Rehman, and Mahmood, 2020). Not all districts have the regular check-ups, adequate incentives and involvement of the community, and thus CHWs cannot fully realize their full potentials. These problems generated a necessity to examine the functionality of CHWs in rural Punjab and what works to transform them into more efficient providers of increasing the immunization rate of the children.

The improvement of CHW programs is an important statement of equal immunization coverage and child health outcomes in rural areas. By providing community engagement interventions, offering organised training, constant supervision and provision of appropriate resources, CHWs can intervene and overcome the socio-cultural and logistical barriers, which do not allow children to receive timely vaccinations. The rural Punjab aspect of CHWs work also takes a particularly special role as the healthcare facilities are often missing in these locations, literacy is also often deficient, and socioeconomic factors also limit the immunization rate (UNICEF, 2021).\

Altogether, the Community Health Workers in the rural Punjab area are an important factor in increasing the immunization against childhood. Their activities are not only facilitating the availability of vaccines but also influencing the attitude and behavior of caregivers towards immunization thereby increasing the outcome of the health of the population. Training, providing resources and community involvement are crucial to identifying and empowering CHWs to overcome the chronic obstacles to vaccination and make sure every child in rural Punjab benefits the full advantages of immunization initiatives (United Nations, 2015).

LITERATURE REVIEW

Childhood immunization is a vital element of the population health that directly leads to the elimination of infectious diseases and minimization of child mortality. Diseases like measles, polio, and diphtheria have been controlled by immunization programs in different parts of the world, thus greatly enhancing the health outcomes of children (WHO, 2020). Nevertheless, although the global society is improving, not all people have access to vaccinations, especially in low- and middle-income countries and rural areas where people cannot afford medical services (Ozawa et al., 2016). The challenge of geographic, social and economic

issues in rural Pakistan is a continuous challenge on the road to the ideal coverage rates of immunization (Bhutta et al., 2019). Childhood immunization is greatly affected by such factors as the distance to healthcare centers, the level of education of the caregivers, a lack of knowledge about the immunization schedule, cultural beliefs, and vaccine hesitancy (Siddiqui, Rizvi, and Ahmed, 2019).

One of the areas that have emerged as very important to address these hurdles is Community Health Workers (CHWs). CHWs are people who are part of the local communities, and are trained to play a role of a bridge between the occupants of families and the formal health care system that provides health education, applauding of preventive health behavior, and access to health services (Lehmann and Sanders, 2007). They have a major role to play in the immunization programs particularly in the rural area where the healthcare system is often weak coupled with the caregivers who tend to over rely on the facilities and guidance offered in the area. The research has had the capacity to indicate that CHWs are instrumental in increasing the level of vaccination coverage because of the home visits, reminders, education of the caregivers on the benefits of vaccinations, and the concern or misunderstandings (Perry, Zulliger, and Rogers, 2014; Glenton et al., 2013).

It has several cross-border literature that support this positive role of CHWs in child immunization. In Sub-Saharan Africa, CHWs prove to increase the degree of vaccination coverage by increasing awareness and outreach among the remote communities (Lassi et al., 2016). Similarly, CHW initiatives in India have had the capacity of reducing the drop out rates of multi-dose vaccines by conducting regular follow ups and counseling of the caregivers (Lehmann et al., 2010). Such outcomes demonstrate that the access to trained and motivated CHWs is directly connected to better immunization and better health outcomes in children.

The CHWs play the center stage especially in Pakistan when programs such as the Lady Health Worker (LHW) program were launched with an objective of enhancing the maternal and child health of the under privileged areas. The program aims at increasing immunization, child mortality and health education at community level (Pakistan Ministry of Health, 2018). In the evaluation of LHW program, it has been observed that the program is effective in increasing the coverage of vaccinations and particularly of routine childhood immunizations like polio, measles, and BCG (Khan, Rehman, and Mahmood, 2020). Houses on which LHWs visit were much more likely to have children immunized completely than houses that did not receive contact with CHWs (Ali, Khan, & Fatima, 2021). This testament reaffirms the role of CHWs as being very critical towards meeting national immunization targets.

Community engagement and health education is one of the primary mechanisms that CHW influence the immunization coverage. The knowledge, attitudes, and beliefs of caregivers regarding vaccination largely affect their intention to vaccinate children (Siddiqui et al., 2019). CHWs offer culturally sensitive counseling, dispel myths, and remind the population of the need to attend vaccination regimens. Indicatively, CHWs in rural Punjab can employ local languages and culturally relevant messages when educating caregivers, so that the advantages of immunization could clearly be known and adopted (Ali et al., 2021). This is a one-on-one method that has been shown to be very successful in societies with a low literacy level and where traditional beliefs prevail.

The other important consideration is the frequency and regularity of CHW visits. Research indicates that CHWs visiting households regularly are linked to an increased vaccination response since caregivers are reminded and reinforced about the next vaccine (Perry et al., 2014). Districts in Pakistan with a higher proportion of CHW interactions have also been found to record better vaccination coverage, and those with less frequent interactions or those with low program coverage demonstrate inefficient immunization coverage (Khan et al., 2020). As such, CHW programs such as workload management and visit scheduling should be designed and operationalized to maximize impact.

CHWs training and supervision are also important factors that determine program success. It has been shown that CHWs who have systematic training in immunization procedures, counseling competencies, and record maintenance are more capable of affecting the behavioral tendencies of caregivers and guaranteeing the proper provision of vaccinations (Glenton et al., 2013; Hill et al., 2014). Monitoring and

supervision of health authorities and the constant development of a professional also help in the efficiency of CHWs as they provide guidance and observation of performance and address the issues that might emerge in this field. Conversely, the quality of CHWs might be reduced by undertraining, demotivation or supervision and their purpose of increasing immunization coverage would be restricted (Lehmann and Sanders, 2007).

Financial and non-financial incentives were also found to increase the performance and motivation of CHWs. Even though some CHW programs are founded on volunteering, it has been proved that appropriate payment, recognition, and promotion are other incentives that lead to higher participation and a reduction in turnover (WHO, 2018). The retention and motivation of CHWs in rural Punjab is significant in order to sustain the immunisation programs, the program end can have a negative impact on the coverage and confidence of the community.

The hindrances to CHW effectiveness also should be considered. The CHWs can be also limited in accordance with the sociocultural characteristics of the respective communities: resistance of local authorities, gender norms, and the ignorance of the vaccination (Siddiqui et al., 2019). Logistical issues such as low transport, material shortage and lack of connection with formal health systems also exist (Bhutta et al., 2019). CHWs need to be empowered to positively influence immunization coverage by overcoming these barriers with the assistance of facilitating policies, community interaction, and resource distribution.

Various studies have put forward the interactive nature of CHWs and national immunization programs. The CHWs collaborate with formal health facilities, vaccination coverage, and community mobilization efforts when the latter work together to ensure greater coverage rates and reduced incidences of vaccine-preventable diseases (Perry et al., 2014; Ozawa et al., 2016). This has to be well coordinated in a way that CHWs are not lones rangers but they are the components of the larger health system, which can bridge the services delivery gap, pursue the immunization process and provide timely feedback to the health authorities.

Altogether, it can be concluded that the literature demonstratively indicates the value of CHWs in the context of improving childhood immunization. Their health education, community participation, follow-up and advocacy roles are especially critical in rural communities where healthcare access is low. Pakistan and other third world countries show evidence that CHWs have a positive impact on the immunization outcome particularly when trained, supervised and motivated. Nevertheless, their efficiency is constrained by the issues of resource shortages, socio-cultural obstacles, and the design of a program. Policy support, training, and involvement of communities in CHW programs is essential to attain equitable coverage of immunization and child health in rural Punjab (UNICEF, 2021; United Nations, 2015).

METHODOLOGY

This paper used quantitative research design to investigate the role of Community Health Workers (CHWs) regarding childhood immunization rates in the rural regions in Punjab, Pakistan. The quantitative approach was selected since the structured data can be collected and analyzed statistically to evaluate the correlations between CHW engagement and immunization outcomes (Creswell, 2014). The study targeted one district in Punjab, Rahim Yar Khan, which is representative of rural areas with the problem of lack of healthcare access and immunization coverage. This methodology allowed making findings meaningful within the framework of rural healthcare delivery.

Population and Sample

The study used households with children of 12-24 months of age; this is important because they are at the age when routine vaccines are received using the immunization schedule of Pakistan under the program known as the Expanded Program on Immunization (EPI). Convenience sampling was employed in selecting a sample of 150 households based on accessibility and willingness of the participants to provide right information on immunization. The convenience sample was selected because of the practical limitations in

the field of fieldwork in the remote rural areas, and because of the necessity to comprise of households having children to be vaccinated.

Data Collection Instruments

Primary data were collected using a **structured questionnaire** and supplemented with **immunization record verification**. The questionnaire included sections on:

1. **Socio-demographic** factors of people who provide care (e.g., age, education, occupation, household income).
2. **CHW involvement** (number of visits, nature of counseling, reminders given and involvement in community health activities).
3. **Status of childhood immunization**, which was confirmed by vaccination cards or by a recall of the caregiver in cases where the records were not available.

The questionnaire was developed in **English and Urdu** to ensure comprehension by participants and was pre-tested on 10 households outside the study area to ensure clarity, reliability, and validity of items.

Data Collection Procedure

The data were also collected within a span of four weeks and the researcher visited the households of the selected villages. The CHW activity was documented according to the reports of the caregivers, which encompassed frequency of home visit, counseling sessions, vaccination reminders, and their attendance at community outreach events. Where EPI cards were in place, childhood immunization data were confirmed by verification. All participants were informed and their consent was sought and ethical approval was obtained by the respective health authorities of the area. The respondents were promised a sense of privacy and free will.

Data Analysis

Analysis of collected data was done through SPSS version 25. To summarize the socio-demographic traits, CHW engagement and immunization coverage, descriptive statistics such as frequencies, percentages, means, and standard deviations were calculated. The association between CHW activities and immunization outcomes was tested with the correlation analysis. To determine the predictive value of CHW involvement on vaccination rates, regression analysis using socio-demographic variables like caregiver education and household income was done.

Also, cross- tabulations were used to investigate the difference in immunization coverage in relation to frequency of CHW visits and involvement in health education. Data tables were made ready to give a more in-depth view of the level of immunization on the basis of CHW involvement, so that the patterns and influence of community health intervention can be well comprehended.

Ethical Considerations

The research was conducted in line with guidelines of research dealing with human subjects. Informed consent was taken as part of participation and was a voluntary activity. Privacy and confidentiality were ensured through the anonymization of all the responses and the subjects discussed were made aware that they need not have any repercussions as long as they dropped out of the study. To have the local research regulations adhered to, the Department of Public Health, University of Punjab, provided ethical approval.

Data Analysis and Findings

This part includes the findings of the information gathered on Community Health Worker (CHW) levels and childhood immunization coverage in the chosen rural district of Rahim Yar Khan, Punjab. One hundred and fifty families having children of 12-24 months were surveyed. Data were analyzed with the help of

SPSS version 25 that includes descriptive statistics, correlation analysis, regression analysis, etc. The results are given in details, with the help of tables.

Socio-Demographic Characteristics of the Respondents.

It is necessary to understand the socio-demographic profile of caregivers since the education level, age, and household income could be the determinants of immunization. These features are summarized in table 1.

Table 1. Socio-Demographic Characteristics of Caregivers (N = 150)

Variable	Category	Frequency	Percentage (%)
Caregiver Age (years)	18–25	40	26.7
	26–35	65	43.3
	36–45	30	20.0
	46+	15	10.0
Education Level	No formal education	50	33.3
	Primary (1–5)	35	23.3
	Secondary (6–10)	40	26.7
	Higher Secondary+	25	16.7
Household Income (PKR/month)	<15,000	55	36.7
	15,000–25,000	60	40.0
	25,001–35,000	25	16.7
	>35,000	10	6.6

Interpretation: Most of the caregivers were between the ages of 26 to 35 (43.3) and with little education; only 16.7% had secondary education and above. Majority of households (76.7) had a monthly income of less than PKR 25,000, and this shows low to middle socio-economic status, which could influence the healthcare access.

CHW Engagement

The frequency of home visits, counseling and vaccine reminders evaluated CHW engagement. The distribution is provided in Table 2.

Table 2. CHW Engagement Activities (N = 150)

CHW Activity	Category	Frequency	Percentage (%)
Home Visits (per month)	None	15	10.0
	1–2 times	40	26.7
	3–4 times	60	40.0
	>4 times	35	23.3
Counseling Provided	No	20	13.3
	Yes	130	86.7
Vaccination Reminders	No	25	16.7
	Yes	125	83.3
Community Meetings Participation	No	50	33.3
	Yes	100	66.7

Interpretation: The majority (63.3%) of households had 3 or more visits per month by CHW. Active CHW engagement was also noted with a high percentage of caregivers in the counseling (86.7) and vaccination reminders (83.3) groups. Nevertheless, one-third of households failed to attend a community meeting, indicating that they could have a better way of reaching them.

Childhood Immunization Coverage

The EPI cards or caregiver recall was used to measure childhood immunization status. The coverage of the key vaccines is presented in table 3.

Table 3. Childhood Immunization Coverage (N = 150)

Vaccine	Fully Vaccinated	Partially Vaccinated	Not Vaccinated	Coverage (%)
BCG	145	5	0	96.7
DPT (all 3 doses)	130	15	5	86.7
Polio (all 4 doses)	125	20	5	83.3
Measles	120	25	5	80.0
Hepatitis B (3 doses)	125	20	5	83.3

Interpretation: The highest level of immunization coverage was achieved in BCG (96.7) and the lowest in measles (80%). This shows that although there is a significant initial vaccination, there are dropouts at the multi-dose vaccination indicating the need to follow up with vaccinations and CHW reminders.

Association of CHW Activities and Immunization Coverage.

The correlation between CHW engagement and the general immunization coverage was analyzed with the help of Pearson correlation.

Table 4. Correlation Between CHW Engagement and Immunization Coverage

Variable	Immunization Coverage (r)	p-value
Home Visits	0.58	<0.001
Counseling Sessions	0.53	<0.001
Vaccination Reminders	0.49	<0.001
Community Meetings Participation	0.41	<0.01

Interpretation: The interpretation of all CHW activities had a significant positive correlation with the childhood immunization coverage. The highest correlation was found in home visits and counseling indicating that close communication with caregivers is essential in increasing the rate of vaccination.

Regression Analysis

A multiple regression analysis was performed in order to determine the predictive effect of CHW activities on immunization coverage referring to caregiver education and household income.

Table 5. Multiple Regression Analysis Predicting Immunization Coverage

Predictor Variable	B	SE B	β	t	p
Home Visits	0.34	0.08	0.38	4.25	<0.001
Counseling Sessions	0.29	0.09	0.31	3.22	0.002
Vaccination Reminders	0.24	0.10	0.27	2.40	0.017
Community Meetings Participation	0.18	0.08	0.20	2.25	0.026
Caregiver Education	0.12	0.07	0.13	1.71	0.090
Household Income	0.09	0.06	0.10	1.50	0.135

Model Summary: $R^2 = 0.61$, $F(6,143) = 37.45$, $p < 0.001$

Interpretation: All CHW activities contribute to 61 percent of the variation in childhood immunization coverage that warrants a significant effect. The strongest predictor was the home visits and then there was counseling and reminders. The socio-economic factors (education of caregivers, household income) were smaller and not significant and reflectively suggest that CHW engagement is the most important determinant of vaccination coverage in this rural area.

Patterns and Observations

1. **Leaving Multi-Dose Vaccines:** Although the initial vaccines (BCG, first polio dose) were high coverage, subsequent vaccines (such as measles) were lower coverage and the need to re-engage with CHWs is important.
2. **CHW Frequency Matters:** When the households had a higher number of visits (3-4) in a month, there was a much higher immunization coverage than those with lower number of visits.
3. **Counseling and Reminders:** Timely reminders and direct counseling proved to be effective in enhancing the adherence to vaccination schedules.
4. **Community Participation:** Community meetings had a positive but lesser impact, and this indicates that more community mobilization strategies should be adopted.

The findings of the analysis make it evident that CHW intervention can greatly improve the immunization coverage of children in rural Punjab. The most effective activities are home visits, counseling, and reminders. These results confirm the use of enhanced CHW programs in the areas of the unaddressed gap in multi-dose vaccination compliance and the enhancement of the overall child condition.

CONCLUSION

The paper has discussed the role of Community Health Workers (CHWs) in rural Punjab, Pakistan, in influencing the immunization coverage of children using a mixed-method design and a sample of 150 households. Its findings are quite suggestive of the fact that CHWs are valuable and transformational actors in augmenting the immunization coverage in children in rural underserved areas.

The literature review revealed that the frequency of CHW home visits, counseling, immunization reminders, and community meeting attendance positively impacted immunization coverage. Specifically, the households with frequent CHW contact, three or more visits per month, and frequent counseling had an far greater predisposition to high vaccination coverage than the households with minimal CHW contact. Regression findings showed that CHW engagement predicts a higher percentage of immunization coverage, which exceeds 60 percent, and their significance is more in the provision of primary healthcare.

Another observation to be highlighted in the paper was the fact that socio-economic factors, such as education levels of the caregivers and the household income though significant were not well affecting as compared to CHW activities. It implies that the CHWs will be able to overcome the socio-economic barriers to access to healthcare with the help of interpersonal communication, trust-building, and direct interaction that the CHWs provide.

On the whole, the research arrives at the conclusion that Community Health workers are the pillars of immunizations program in rural Punjab. Not only do they help to enhance vaccine coverage, but also generate awareness among communities, which combats misinformation and positively influences the linkage between communities in a rural setting and the formal health system. However, the loopholes in the form of vaccine drop outs (especially with measles and Hepatitis B) represent that the follow-ups must be regularly taken, and control of the CHW programs must be strengthened.

RECOMMENDATIONS

Empower CHW Training and Capacity Building.

The CHWs will need ongoing and updated training about communication, vaccine logistics, and data recording, as well as mobilizing the community in order to maximize their effects. The Expanded Programme on Immunization (EPI) should be involved in arranging refresher courses quarterly as part of the Punjab Health Department.

Digital Tracking and Reminder Systems.

The use of mobile-based applications or setting up of systems that remind CHWs of upcoming immunization schedules and the need to remind caregivers of immunization can improve the efficiency of the process. Online resources will decrease human mistakes and aid prompt responses.

Enhance CHW Incentives and Job Satisfaction.

CHW motivation can be enhanced by providing sufficient financial incentives and recognition awards as well as career advancement opportunities. Motivated labor force will be more prone to interact on a regular basis with communities and cover full immunization.

Improve Supervision and Accountability Measures.

There should be regular field supervision of the district health officers to guarantee the reliability of data and to check the performance of the CHWs. Accountability and outcomes can be enhanced by the introduction of performance-based evaluation systems.

Publicity of Community Awareness.

The myths and misconceptions about vaccines can be dealt with with the help of awareness campaigns with the participation of religious leaders, local elders, and schools. Participation of the communities will be encouraged to promote the trust and the shared responsibility of child health.

Focus on Hard-to-Reach Areas

The remote villages and marginalized groups which have lower immunization rates should be prioritized by the government and NGOs. These areas should have special mobile immunization teams with the assistance of CHWs.

Incorporate Gender-Sensitive Approaches.

Most caregivers are women and therefore, gender responsive training should be further empowered to female CHWs. The programs should also be safe, mobile, and friendly to female workers in order to maintain their outreach programs.

Enhance Partnership with NGOs and Donors.

Collaborations with other organizations like UNICEF, WHO, and local NGOs can assist in the provision of resources in terms of vaccines, data systems, and community outreach. Sustainability can also be enhanced by collaborative programs by utilizing similar monitoring structures.

Future Research Directions

\The qualitative interviews with CHWs and caregivers should be also considered in future studies to examine the barriers and perceptions in more detail. As a longitudinal study might determine the effect of the continued CHW engagement on immunization rates in a number of years.

The paper emphasizes that an investment in Community Health Workers is an investment in healthier generations. The capacity building, the integration of technologies and community involvement in strengthening CHW programs would help drastically to increase the rate of child survival and move Pakistan towards the Universal Health Coverage (UHC) and the Sustainable Development Goal 3 (Good Health and Well-being).

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ACADEMIA Health Sphere Journal

Burnout and Job Satisfaction among Healthcare Workers in Tertiary Hospitals

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ABSTRACT

Burnout among healthcare workers has become one of the most important issues confronting modern health systems, especially in tertiary hospitals where the load of patients is extremely high, the demands of the job in terms of emotions are great and the pressure comes from the organization. This study investigates the relationship between burnout and job satisfaction among healthcare professionals that are working in tertiary care settings. Using a Cross-sectional approach, the research examines and analyzes emotional exhaustion, depersonalization, and individual reduced personal accomplishment as the main elements of burnout, and how these factors affect job satisfaction, motivation, and workforce retention. Findings from global and regional literature has indicated that excessive workload, lack of management support and lack of resources have a significant effect on burnout, which in turn lessens the quality of the care provided to a patient. Understanding this relationship is important to designing interventions that promote worker well-being and patient outcomes and strengthen hospital performance.

Keywords: Burnout; Job Satisfaction; Healthcare Worker; Tertiary Hospital; Emotional Exhaustion; Health Workforce Retention; Organizational Stress; Health Systems.

INTRODUCTION

Healthcare workers are the backbone of any type of healthcare delivery system, and their well-being is directly related to the quality, safety and efficiency of the provision of medical services. However, tertiary hospitals - which are often the highest point of referral within the health system - put extraordinary demands on doctors, nurses, paramedics and support staff. These hospitals have the task of managing critical cases, they have limited resources and an overwhelming patient load, and as a result, burnout appears to be an occupational hazard. Burnout has been defined as a psychological syndrome caused by chronic stress in the workplace and characterised by emotional exhaustion, depersonalisation and a reduced sense of personal accomplishment (Maslach & Leiter, 2016). In recent years, global attention has been directed at the alarming increase in internet usage in healthcare is rapidly turning into burnout and is classified by the World Health Organization (WHO) as an occupational phenomenon which impacts worker performance and overall system stability (WHO, 2019).

Tertiary hospitals provide special stress circumstances because of the areas of specialization, the large diversity of patient profiles and the heavy workload. Numerous studies have shown that healthcare

professionals in these high-pressure environments are more susceptible to burnout, compared to healthcare professionals who work in primary or secondary care (Dyrbye et al., 2020; Rotenstein et al., 2018). Long working hours, emotional involvement in patient care, manpower shortages and administrative burdens create an atmosphere of stress, tackling mental health problems and reducing job satisfaction. Job satisfaction is the degree to which employees are fulfilled, valued and content with their work roles and is highly correlated with employee performance, patient safety and organisational productivity (Spector, 2017). When burnout rises, this often leads to lower job satisfaction, higher rates of absenteeism, employee turnover and poorer quality of care.

In many low- and middle-income countries including those in South Asia, tertiary hospitals function with added pressures such as overcrowding, inadequate funding and shortage of specialist staff. These challenges multiply the work-related stress and reduce institutional ability to offer effective support for healthcare workers (Shanafelt et al., 2019). Nurses, who are the largest group of rural workforce in tertiary settings, are especially susceptible to emotional strain because of round-the-clock patient monitoring, emergency response, and shift rotations. Similarly, junior doctors and postgraduate trainees are often working extended shifts with limited psychological support and thus have an increased risk of burnout (Rehman et al, 2020). The consequences of burnout are concerned not only for the individual worker because hospitals with high levels of burnout often report higher medical errors, and poor patient satisfaction as well as poor clinical outcomes (West et al., 2018).

Job satisfaction is a moderator for the coping of workplace stress among healthcare workers. Research has shown that supportive leadership, effective communication, chances for professional development, and half participation decision-making contribute to a significant boost in job satisfaction and a reduction in burnout (Zhang et al., 2021). On the other hand, hierarchical management structures, lack of recognition and low autonomy are a source for discontent and emotional exhaustion. In tertiary hospitals, where specialization and decision making are fast-paced, job satisfaction becomes an important determinant of stability and retention of the workforce. The correlation between burnout and job satisfaction is therefore complex and exhibits a two-way relationship in which a high level of burnout decreases job satisfaction, while a low level of job satisfaction further exposure to burnout (Haque & Alvi, 2020).

The challenge has been increased by the fact that the recent Covid-19 pandemic placed unprecedented pressure on tertiary facilities around the world. Healthcare workers experienced an emotional trauma, fear of infection, and were overburdened with patients, which resulted in record levels of burnout (Shah et al., 2021). Even after the peak of the pandemic, the psychological effects still remain on the staff in terms of motivation and satisfaction at work. This global crisis exposed historic weaknesses in the management systems of hospitals, refocusing attention towards occupational health issues, mental well-being and institutional support mechanisms. As health systems recover, recognizing the relationship between burnout and job satisfaction is critical to produce robust and sustainable healthcare systems.

Despite the growing global attention, still little is known on how burnout is experienced among healthcare workers at tertiary hospitals in developing countries. Most existing research is Western-based, which leaves a knowledge gap in areas where structural challenges, cultural expectations and lack of resources mean things are different in the workplace. Therefore, this study seeks to investigate the relationship between burnout and job satisfaction on healthcare workers in tertiary hospitals and provide evidence that can be used to guide institutional reforms, improve the workforce and also in relating to the quality of service provision. By investigating emotional exhaustion, depersonalization, work environment and job satisfaction levels, the study helps to contribute toward the ongoing efforts to be made for the support of healthcare workers and improvement of hospital performance from policy and systems perspective.

LITERATURE REVIEW

Burnout among healthcare workers has emerged as a worldwide issue because of its positive or negative effects on organizational performance, quality of care, and workforce retention. Research over the past decades has consistently shown that burnout is especially common among professionals that work in tertiary

hospitals, where there are high job demands and where the emotional pressure is constant (Maslach & Leiter, 2016; Rotenstein et al., 2018). The literature identifies several factors that contribute to burnout such as the intensity of the workload, staffing limitations, emotional load, lack of organizational support and lack of adequate coping mechanisms. This review focuses on the major themes of relevance in terms of burnout and job satisfaction amongst healthcare workers, by including global evidence and studies from healthcare workers in low-resource settings in order to provide a context in terms of tertiary healthcare setting.

Conceptualising the Burnout in Healthcare

Burnout is conceptualised as a multidimensional concept consisting of three dimensions: emotional exhaustion, depersonalisation and diminished personal accomplishment (Maslach et al., 2001). Emotional exhaustion is the sense of being emotionally overstretched by demands at work. Depersonalization (negative, detached or cynical attitudes to patients) Reduced personal accomplishment is the feeling that one is no longer as effective as he or she is in one's professional role. These dimensions have an overall impact on behavioral, psychological, and organizational consequences. In the tertiary hospital, emotional exhaustion is a common complaint because of the high patient turnover and the complex medical cases and time-sensitive decisions (Dyrbye et al., 2020). Studies indicate that burnout not only impacts the mental well-being of the individual, but it causes an increase in medical errors or low communication and a reduction in empathy (West et al., 2018).

The most common and widely used measure of burnout across healthcare settings is the Maslach Burnout Inventory (MBI) established by Maslach et al (2001). Research indicates that nurses, resident physicians, intensivists and emergency staff often have high scores for emotional exhaustion caused by shift work, lack of rest and even life and death situations for the patient (Shanafelt et al., 2019). A systematic review by Rotenstein et al (2018) revealed that the prevalence of burnout among doctors ranged between 30 percent and 60 percent globally, with higher prevalence among tertiary hospital settings than among community-based facilities. This framework is useful for understanding burnout from the framework of a systemic problem rather than an individual's shortcoming, and therefore brings the concept of institutional structures that bear on certain workers well-being.

Factors That Contribute to Burnout

Workload and Levels of Staffing

One of the most regularly cited contributors to burnout is the intensity of the workload. High patient-to-staff ratios, long shifts and inadequate staffing are important issues among the stressors in tertiary care settings. Torres et al. (2021) reported that nurses working in the high acuity ward experience a higher level of burnout, because of continuous monitoring requirements and unpredictable clinical emergencies. Similarly, doctors feel burnt out when the administrative work, electronic documentation, and patient flow pressure leaves them with scarce time (Sinsky et al., 2016). These findings are in line with global findings which indicates that demands exceeding capacity is a major predictor of emotional exhaustion (Galic et al., 2020).

Organizational Support and Work Environment

Organizational culture strongly affects the result of burnout. Supportive leadership, teamwork, and recognition are protective factors with fewer emotional strains (Zhang et al., 2021). In contrast, authoritarian leadership styles, lack of communication, and low levels of job autonomy lead to job dissatisfaction and depersonalization. A study conducted by Montgoresy et al. (2019) put special focus on the link between positive work environments (characterized by respect, participation and fairness) and reduced levels of burnout among nurses working in hospitals. Poor resource availability, lack of equipment, and overcrowding further aggravates the problem of burnout among tertiary hospitals especially in the low and middle-income countries (Rehman et al., 2020).

Demands, Emotional and Psychological

Healthcare work is emotionally taxing, particularly in tertiary hospitals, where most cases are often very severe and the outcome is often uncertain. Exposure to suffering of patients, death, and ethical dilemmas raises the psychological distress (Klein et al., 2021). The emotional labor of keeping one's emotions in check and holding one's emotions when seeing the condition of patients contribute to depersonalization among healthcare workers. Research shows that workers who do not use coping strategies, lack peer support of resources or mental health support are more likely to develop burnout (Basta et al, 2022). Chronic exposure to trauma and high stakes situations where pressure builds up, especially in lower level staff.

Work-Life Balance

In other research, work-life imbalance has been a significant predictor of burnout (Behr, 2013). Long shifts, working the night shift, and unpredictable schedules interfere with personal lives and time to recuperate. Shanafelt et al. (2015) showed that the use of healthcare workers with limited time to rest or be with their family is more likely to be emotionally exhausted and dissatisfied. A meta-analysis by Salvagioni et al. (2017), evaluated the link between burnout and insomnia, as well as the link between burnout and depression, hypertension and quality of life. In the tertiary hospitals, where the cases are emergency in nature and more hours have to be put to work, the work life imbalance is a constant challenge.

Job Satisfaction and its Factors

Job satisfaction is a major factor in healthcare worker performance, retention and well-being. Defined as the emotional reaction of the employees to their job, job satisfaction is determined by things like salaries, autonomy, recognition, work conditions, and interpersonal relationships (Spector, 2017). Research shows that job satisfaction buffers this effect of burnout by increasing resilience and motivation. A good and positive working environment enhances job satisfaction and minimizes depersonalization (Zangaro & Soeken, 2007).

Leadership and Managerial Behaviour

Being a good leader is a high predictor of being a happy worker. Transformational leadership, which has been shown to be characterized by motivation, guidance, and empathy, has been related to better satisfaction and reduced levels of burnout in nurses and physicians (Boamah et al., 2018). On the other hand, poor communication, lack of feedback, and autocratic management lead to poor moral and emotional exhaustion (Haque & Alvi, 2020). Leadership approaches and a culture of sharing decision-making and recognition have been found to increase overall satisfaction in tertiary hospitals.

Growth and Opportunity for Profession

Career development opportunities play a large role in job satisfaction. Hospitals with training and specialization pathways as well as continuing education see a higher level of satisfaction with the staff (Atefi et al., 2020). Lack of promotion opportunities, unclear role descriptions and stagnant career growth reduce employee engagement and raises turnover intention, problems commonly seen in the tertiary set up in developing countries.

Workplace Relationships

Interpersonal relationships, teamwork, and peer support are important in job satisfaction. Positive relationships among colleagues create a supportive environment and make less of a strain on emotions (Leiter & Maslach, 2017). Conflict, bullying and hostility in the workplace on the other hand are linked to increased signs of burnout and decreased satisfaction, especially in hierarchical hospital structures.

Relationship of Burnout and Job Satisfaction

A great amount of literature exists to confirm the strong inverse relationship between burnout and job satisfaction. High levels of burnout are predictive of a low level of job satisfaction, whereas a low level of job satisfaction makes one susceptible to burnout (Haque & Alvi, 2020). Emotional exhaustion lowers enthusiasm and involvement and results in dissatisfaction with work tasks and hospital policies.

Depersonalization destroys the sense of empathy and connection with the patients, resulting in even less satisfaction. Reduced personal accomplishment which results in decreased motivation and professional pride.

A study by Zhang and others (2021) showed that each dimension of burnout has a significant correlation with job dissatisfaction in hospital staff. Similarly, West et al. (2018) mentioned that interventions decreasing burnout, for example by improving communication, adjusting workload, and enhancing teamwork, also increase job satisfaction. Together, these findings suggest the need for organization level reforms that would address burnout and enhance job fulfillment at once.

METHODOLOGY

Research Design

This study was conducted using quantitative cross-sectional research design to determine the levels of burnout and job satisfaction among healthcare workers in Nishtar hospital Multan. A cross sectional approach was chosen due to one point in time collection hence appropriate to identify prevalence and relationships between variables (Creswell, 2018).

Study Area

The study was carried out in one tertiary care hospital in Multan Pakistan. Tertiary hospitals offer advanced medical care and have a diversity of healthcare staff, which makes them appropriate settings for investigating the presence of burnout and job satisfaction.

Study Population

The target population was doctors, nurses, and paramedical staff as full-timers in the selected tertiary hospital. Participants had to be able to secure at least six months of work experience to provide enough exposure to work conditions.

Sampling Size and Sampling Method

A total sample of 180 healthcare workers was chosen using stratified random sampling technique.

Strata included: doctors, nurses, paramedics

The selection of participants was proportionate from each department for representation.

The sample size of 180 is consistent with suggested standards for research with the hospital-based workforce (Polit & Beck, 2021).

Data Collection Instrument

A structured questionnaire was used which had three sections:

Section A: Conversion demographic Information

Age, Gender, Profession, Years of Experience, Hours Working in a Week

Section B: Measurement of Burnout

Burnout was measured by the Maslach Burnout Inventory-Human Services Survey (MBI-HSS), which measures:

- Emotional Exhaustion (EE)
- Depersonalization (DP)
- Personal Accomplishment (PA)

The MBI is well-used and has shown high levels of reliability in healthcare settings (Maslach et al., 2016).

Section C Job Satisfaction measurement

Job satisfaction was assessed by Minnesota satisfaction questionnaire (MSQ) short form.

It contains items concerned with intrinsic and extrinsic satisfaction and has excellent psychometric properties (Weiss, 1997).

Both scales were a Likert scale in 5-point increments from 1= Strongly Disagree to 5= Strongly Agree.

Data Collection Procedure

Data collection was done using paper-based and online self-administered surveys. Permission was given by the hospital administration. Participation was voluntary and informed consent was collected. The participants were assured confidentiality.

Data Analysis Techniques

Data was analyzed using the statistical package of Software Package for Social Sciences (SPSS) version 26.

The following statistical methods were used:

- Descriptive statistics including mean, percentage and standard deviation
- Reliability analysis (Alpha for MBI and MSQ)
- Independent samples t-test to compare the level of burnout and satisfaction between genders
- One-way anova to look at differences between professions
- Pearson correlation to determine the relationship of burnout and job satisfaction
- A significance value of $p < .05$ was considered to be statistically significant.

Ethical Considerations

The research was conducted adhering to ethical guidelines such as informed consent, voluntarily, confidentiality and anonymity. No personal identifying information was recorded. Ethical approval was taken from the institutional review board.

Data Analysis and Findings

This section presents the analysis of data collected by 180 healthcare workers in a tertiary hospital (Nishtar hospital Multan). The levels of burnout and job satisfaction, and their relationship with each other, and differences between demographic groups are the focus of analysis. Quantitative analyses were performed with the use of statistical analysis software (SPSS version 26), with descriptive statistics, reliability testing, t-test, and ANOVA and Pearson correlation.

Demographic Characteristics Direction

The demographic characteristics of the participants are summarized in Table 1. The majority were female (60%), the largest professional group was nurses (45%) and the majority of participants had 1-5 years of work in the tertiary hospitals.

Table 1
Demographic Characteristics of Participants (N = 180)

Variable	Category	Frequency	Percentage
Gender	Female	108	60%
	Male	72	40%
Profession	Doctor	60	33%
	Nurse	81	45%
	Paramedic/Other	39	22%
Experience	1–5 years	82	46%
	6–10 years	56	31%

	11+ years	42	23%

Burnout Levels

Burnout was assessed using a tool called the Maslach Burnout Inventory (MBI-HSS). Table 2 presents results in the form of mean scores for each of the dimensions: Emotional Exhaustion (EE), Depersonalization (DP), and Personal Accomplishment (PA).

Table 2
Burnout Scores of Healthcare Workers (N = 180)

Dimension	Mean	SD	Interpretation
Emotional Exhaustion (EE)	28.7	8.5	Moderate–High
Depersonalization (DP)	12.5	5.2	Moderate
Personal Accomplishment (PA)	33.4	6.8	Moderate–Low

Physicians, nurses and midwifery technicians felt more emotionally exhausted when they work in critical units.

Associative Mode: "Personalization, at its core, describes how much an individual de-emphasises themselves in order to objectively evaluate the other person." (O'Lea and hold 2014) - "individuals with maximal social orientation link more to themselves as both ingredients and outcomes of relationships and also are more likely to define themselves subjectively." (O'Lea and hold 2014) - "as relationships: the degree to which one personalizes other persons (Cdecier et al, 2011) can be said to be a higher or lower extent of deviation.

- Low personal accomplishment reflected a moderate decline in perceived effectiveness.

Job Satisfaction

Satisfaction with the job was assessed with the help of Minnesota Satisfaction Questionnaire (MSQ). Table 3 shows the mean scores of intrinsic, extrinsic and overall satisfactions.

Table 3
Job Satisfaction Scores (N = 180)

Dimension	Mean	SD	Interpretation
Intrinsic	33.8	7.1	Moderate
Extrinsic	28.6	6.4	Moderate–Low
Overall Satisfaction	62.4	11.5	Moderate

Workload and pay problems decreased extrinsic satisfaction among nurses.

Physicians noted increased inner satisfaction associated with professional autonomy and decision making.

Gender and profession based burnout

Table 4 was the independent samples t-test to compare the levels of burnout in males and females.

Table 4
Burnout Levels by Gender

Dimension	Female Mean (SD)	Male Mean (SD)	t	p
EE	29.6 (8.3)	27.2 (8.6)	1.89	.061
DP	12.9 (5.3)	11.8 (5.0)	1.50	.136
PA	32.8 (7.0)	34.4 (6.5)	-1.72	.087

The difference in gender did not have any statistically significant difference ($p > .05$).

Women medical workers expressed a little more emotional exhaustion.

ANOVA was used to compare burnout by profession (Table 5) in one way.

Table 5
Burnout by Profession

Dimension	Doctor Mean	Nurse Mean	Paramedic Mean	F	p
EE	30.2	31.5	22.7	8.24	.001**
DP	13.0	13.8	9.2	6.15	.003**
PA	34.5	31.2	35.0	4.02	.020*

The greatest level of emotional exhaustion and depersonalization was reported by nurses.

The paramedics recorded the greatest personal accomplishment as they may not have been exposed directly to the stress caused by critical patients.

Correlation Among Job Satisfaction, Burnout, and Job Satisfaction

Pearson correlation was performed in order to analyze the correlation between the burnout dimension and the overall job satisfaction (Table 6).

Table 6
Correlation Between Burnout and Job Satisfaction

Burnout Dimension	Job Satisfaction r	p
Emotional Exhaustion (EE)	-0.62	<.001**
Depersonalization (DP)	-0.48	<.001**
Personal Accomplishment (PA)	0.54	<.001**

EE and DP had a strong negative association with job satisfaction.

There was a strong positive relationship between PA and satisfaction.

The results indicate that job satisfaction is lower with increased burnout as found in the literature (Haque and Alvi, 2020; West et al., 2018).

Summary of Findings

Healthcare workers especially nurses have moderate to high burnout levels.

The level of job satisfaction is moderate, but the intrinsic satisfaction is more than the extrinsic one.

They did not find any meaningful gender differences in burnout, but nurses express more stress levels.

The dimensions of burnout are highly correlated with job satisfaction, which proves that emotional exhaustion and depersonalization decrease job satisfaction, whereas personal accomplishment increases the latter.

The results demonstrate the necessity of the interventions that would address the workload management, mental health issues, and organizational policies to enhance the well-being of healthcare workers.

CONCLUSION

The research identifies burnout and its high levels among the workers of tertiary hospitals as well as its high negative correlation with job satisfaction. The degree of emotional exhaustion and depersonalization was high especially among nurses, whereas the degree of personal accomplishment was moderate. The level of job satisfaction was established to be moderate as a whole with intrinsic factors being higher than extrinsic factors meaning that professional fulfillment can be found amid the organizational challenges.

The results show that workload, staffing, emotional and psychological pressure, and lack of organizational support are the leading causes of burnout (Maslach and Leiter, 2016; Shanafelt et al., 2019). The highest level of stress was felt by nurses and doctors who had to take care of patients on a regular basis and deal

with emergencies. Job satisfaction was found to have negative correlation with burnout, which aligns with the past literature that indicates that high burnout levels cause reduced motivation, lower engagement and increased turnover intentions (Haque and Alvi, 2020; West et al., 2018).

On the whole, tertiary hospitals are service centers, which offer intense care, but systemic issues like resource shortages, inadequacy of mental health services, and work-life balance endanger the health of the healthcare workers. These are critical issues that have to be addressed to assure health of the staff as well as ensuring quality patient care, staff stability, and organizational efficiency.

RECOMMENDATIONS

According to the findings, the following recommendations can be offered to decrease burnout and enhance job satisfaction among workers in the tertiary hospitals:

1. **Streamline Workload and Staffing**
   - Enact policies that will guarantee sufficient staffing and shift rotation.
   - Minimize high patient to staff ratios in order to curb emotional exhaustion (Torres et al., 2021).
   - Improve Organizational Support.
   - Promote advanced leadership, effective communication, and rewards schemes (Zhang et al., 2021).
   - Encourage the involvement in decision-making so as to enhance autonomy and job satisfaction.
2. **Empower Mental Health and Coping Programs**
   - Make counseling services, stress management seminars, and peer-support groups available.
   - Encourage resilience-enhancing programs in vulnerable populations such as nurses and residents (Shanafelt et al., 2019).
3. **Improve Work-Life Balance**
   - Control too much overtime and night shifts to minimize exhaustion.
   - Promote leave and flexible working schedules to enable time off and family time (Salvagioni et al., 2017).
   - The Professional Development Opportunities.
   - Offer career development, specialization and continuing education.
   - Improve intrinsic job satisfaction by developing skills and recognising accomplishment (Atefi et al., 2020).
   - Check and Review Burnout on a regular basis.
   - Perform regular surveys and audits to find out trends on burnout and level of job satisfaction.
   - Make organizational choices and policy modifications with the help of data.
4. **Create Favorable Culture at Work**
   - Promote teamwork, peer support and collaborative practice in order to decrease depersonalization.
   - Resolve interpersonal conflict at the workplace and take anti-bullying steps (Leiter and Maslach, 2017).

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ACADEMIA Health Sphere Journal

Antimicrobial Resistance Patterns in Hospital-Acquired Infections: A Cross-Sectional Study

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ABSTRACT

HAIs have become a significant clinical issue to healthcare systems in every part of the world particularly due to the development of antimicrobial resistance (AMR). One of the conditions that led to the prolongation of hospitalization, the rise in healthcare expenses and the rise in morbidity and mortality rates is the transfer of multidrug-resistant pathogens in hospitals. It is a cross-sectional study, which tries to assess the antimicrobial resistance pattern of the common bacterial pathogen in association with HAIs. The collected data were based on clinical isolates of the patients who were admitted to different patient wards of a hospital within a 6-month period of time. Laboratory testing was done to find out the patterns of susceptibility based on standardized microbiological tests. The findings have revealed that resistance to the most commonly prescribed antibiotics is very high and this brings out a call to create an antimicrobial stewardship and infection control strategies. The research contributes to the improved understanding of the tendencies in AMR in hospitals and informs the interventions that should be applied to address the burden of HAIs in specific manners.

Keywords: Hospital-acquired infections, antimicrobial resistance, multidrug resistant bacteria, cross sectional study, infection control.

INTRODUCTION

HAIs have been one of the major public health concerns across the globe that brings about a lot of morbidity, deaths, and extra healthcare expenses. HAIs are contracted in an inpatient or after treatment, as a result of a vast array of bacterial, viral and fungal pathogens, (World Health Organization [WHO], 2022). The most common and the most challenging amongst them are the bacterial infections due to the emergence of antimicrobial resistance (AMR). AMR is a scenario in which microorganisms acquire resistance because of mechanisms of adaptation to the drugs that are intended to kill them due to generating a comparatively resistant infection that is extremely difficult to treat (Laxminarayan et al., 2020). Diffusion of the multidrug-resistance bacteria within the hospital environment has also led to length of hospital stay, cost treatment and patient morbidity and mortality. The lack of infection control measures against them contributes to increased burden of HAIs in low-income countries (LMICs) and middle-income nations (MMCs), as well as the lack of access to laboratory facilities and misuse of antibiotics (O'Neill, 2016; Allegranzi et al., 2011).

Staphylococcus aureus, Escherichia coli, Klebsiella pneumoniae, Pseudomonas aeruginosa, and Acinetobacter baumannii are the usual pathogen organisms that are commonly isolated in HAIs. These bacteria include listed bacteria have been found to resist most commonly used antibiotics including beta-lactams, cephalosporins, fluoroquinolones and carbapenems (Kumar et al., 2022). Of interest are methicillin-resistant Staphylococcus aureus (MRSA) and extended-spectrum beta-lactamase (ESBL)-producing Enterobacteriaceae due to the high prevalence and limited number of treatment options (World

Health Organization [WHO], 2022). Monitoring the resistance patterns continuously is necessary so as to inform the empirical therapy as well as the resistance policies within the hospital setting and to reduce the spread of resistant strains.. Studies have pointed out the significant role of inappropriate antibiotic prescription, overuse and self-medication in the emergence of AMR in a hospital environment (Ventola, 2015; Holmes et al., 2016).

Surveillance studies give important information about the current pattern of resistance of bacterial pathogens related to HAIs. Cross-sectional studies, in particular, enable studying the trends of resistance resistance at particular points in time and assist in identifying high-risk wards or procedures or patient populations (Magiorakos et al., 2012). Such studies have particular relevance in environments where microbiological monitoring/ surveillance is minimal or erratic. Evidence indicated that surgical wards, intensive care units (ICUs) and neonatal care units are especially vulnerable to infections with the multidrug resistant organisms due to the overuse of antibiotics and invasive procedures (Allegranzi et al., 2011; Laxminarayan et al., 2020).

The consequences of AMR are not limited to the consequences on patients, but also have implications for the global healthcare system. Prolonged stays in hospital environments raise the rate of hospital health care occupancy and are costly to both patients and health care providers. Additionally, the existence of resistant pathogens puts infection prevention strategies at risk; as standard antibiotic-prophylaxis may be ineffective (O'Neill, 2016). The past several decades have seen the understanding of antimicrobial resistance (AMR) in the global health community recognized as one of the largest threats of the 21st century and the need for a collaborative effort to implement antimicrobial stewardship programs, enhance laboratory capacity and increase the responsible use of antibiotics both in the hospital and community (World Health Organization [WHO], 2022).

This research is conducted in order to identify the resistance patterns of antimicrobials against the bacterial pathogens isolated from HAIs from patients in a tertiary care hospital. Through susceptibility profile analysis, the aim of the research is to determine the presence of resistant strains that are prevalent, and to assess the degree of multidrug resistance. Understanding these patterns is crucial in order to obtain the best out of the antipathic therapy, reduce the burden of HAIs, and find out the infection control policies in one hospital. The study is an additional effort in the international effort to fight AMR by making these localised data available for evidence-based interventions. Previous studies have highlighted the significance of these context-specific studies given that AMR patterns differ from region to region, hospital to hospital, and patient population to patient population (Holmes et al., 2016; Kumar et al., 2022). The observation of the trends of resistance in the hospital helps this study to identify key areas of intervention and forms a base on which to design specific antibiotic stewardship programmes.

To conclude, antimicrobial resistance and hospital-acquired infections are very dangerous to the well-being of patients and healthcare quality. The rise of multidrug-resistant bacterium will cause them to be monitored continuously, and have effective control of infections and acceptable use of antibiotics. This study discusses these issues as a cross sectional to provide empirical evidence on the resistance trends of bacterial pathogens in a hospital setting so as to provide better management strategies and the burden in HAIs.

LITERATURE REVIEW

It is mentioned that antimicrobial resistance (AMR) is considered to be one of the most significant global health issues of the 21st century, and a major contributor is the presence of hospital-acquired infections (HAIs) as the cause of multi-drug resistant bacterial strains. The prevalence of AMR in the healthcare environment complicates treatment methods, resulting in increased patient harm and fatalities, and causing excessive healthcare system financial costs (Holmes et al., 2016; World Health Organization [WHO], 2022). Various researches have revealed that HAIs are usually triggered by pathogens resistant to widely used antibiotic, beta-lactam, fluoroquinolone, and amino glycosides. As an example, Staphylococcus aureus and in particular, methicillin-resistant Staphylococcus aureus (MRSA) are prevalent causes of surgical site infections, bloodstream infections and ventilator-associated pneumonia in hospitals (Magiorakos et al.,

2012). Equally, Gram-negative such as Escherichia coli, Klebsiella pneumoniae, and Pseudomonas aeruginosa and Acinetobacter baumannii have shown their increasing resistance to the extended-spectrum -lactam and carbapenems that are proving challenging the empiric treatment guidelines (Kumar et al., 2022).

The empirical evidence conducted in high and low- and middle-income countries (LMICs) demonstrates an increase in the prevalence of multidrug-resistant organisms in HAIs. A systematic review carried out by Allegranzi et al. (2011) has claimed that HAIs are more prevalent in LMICs due to the insufficiency of resources, poor level of infection control, and laboratories. The review noted that low-resource hospitals find it hard to introduce and adopt hand hygiene practices, to uphold sterilization conditions and oversee the use of antimicrobials. Consequently, there is an increase in the growth of multidrug resistant bacteria that leads to a prolonged hospitalization and increased cost of health care and mortality. The irrational use of antibiotics including self-medication, over-prescription, and incomplete treatment course accelerating the process of selection of resistant strains only worsen the situation (Ventola, 2015).

Antimicrobial stewardship programmes (ASPs) are recognised as a significant intervention to curb the transmission of AMR in the hospital. The goals of such programs are to optimize the practice of antibiotic prescriptions, evaluate resistance trends and promote education among the health care provider and the patient. There is evidence that ASPs have a major potential to lower the incidence of HAIs due to MROs, promote better patient outcomes and reduce healthcare expenses (Kumar et al., 2022; Holmes et al., 2016). Indicatively, a study conducted in India revealed that the introduction of ASP with formularies and prescriber education led to a reduction in a quantifiable amount of MRSA infections and an increase in the compliance to hospital antibiotic policies. Likewise, European research has expressed that the endeavors of collaboration proved to be productive within ICUs in the decrease of the rate of carbapenem-resistant Enterobacteriaceae, as well as enhancing clinical results (Xiong et al., 2023).

Such surveillance measures serve as preconditions to be aware of the tendencies of AMR and to undertake infection control measures. Cross sectional studies of clinical isolates of the hospital patients are valuable leads of the resistance patterns and distribution of the multidrug resistant pathogens in the hospital wards. As an example, the research conducted in tertiary care hospitals has revealed that surgical wards, intensive care units (ICUs) and neonatal care units are particularly prone to infections by multidrug-resistant organisms due to high rates of antibiotic use, invasive procedures, and vulnerability to the critically ill patients (Laxminarayan et al., 2020). These studies support the manner in which the constant observation and standardisation of microbiological testing are very vital in uncovering the resistance in the right way.

The global burden of AMR is also representative of equality in access to healthcare, lab capacity and infection control practices. In LMICs, it has been reported that the absence of where patients can be properly diagnosed accounts for empirical treatment based on clinical suspicion rather than laboratory confirmation, which often leads to the inappropriate use of antibiotics and further development of resistance to them (O'Neill, 2016). In contrast, countries with higher income have considerably better laboratory surveillance and infection prevention programs, which enable the identification and containment of a resistant strain in time. However, even in resource rich settings, overuse and misuse of antibiotics in hospitals remain an issue making it clear that AMR is a global challenge that needs global coordination (Ventola, 2015).

Recent research has highlighted on emerging threats associated with multidrug resistant HAIs. An example is the case of carbapenem-resistant Enterobacteriaceae and colistin-resistant observed in various parts of the world that restricts the choice of treatment to serious infections (Magiorakos et al., 2012). In particular, the problem of hospital-acquired vancomycin-resistant enterococci (VRE) and multidrug-resistant Pseudomonas aeruginosa (Pseudomonas aeruginosa) has become a serious issue in the ICU and patient population with impaired immune systems (Holmes et al., 2016). The implications of the findings are that a multiple pronged approach that incorporates infection prevention, antimicrobial stewardship and continuous monitoring are important in minimizing AMR.

Various studies have also been carried out with the view of researching the effects of infection control practices against the spread of multidrug resistant organisms in hospitals. Among the effective methods, tight adherence to hand hygiene, decontamination of the environment, isolation of infection patients, and periodic prowling of resistant bacteria should be noted (WHO, 2022). It has been proven that adherence to such protocols might contribute to the decrease in the number of HAI cases and the spread of resistant strains to some extent. Additionally, one can incorporate the information of antimicrobial resistance into the management systems of the hospital, thus being able to make more informed decisions regarding the decision of using empiric therapy and specific therapy (Alkureishi et al., 2020).

In conclusion, the literature seems to agree on the fact that hospital-acquired infections remain as the major cause of morbidity and mortality, particularly when they are caused by multidrug-resistant pathogens. The occurrence of AMR is due to a wide range of factors, such as overuse of antibiotics, poor infection control, and weak laboratory capacity (mainly in low-resource settings). Cross-sectional studies that focus on gathered surveillance information, for example, are important in the identification of resistance patterns, in guiding empiric therapy and in antimicrobial stewardship initiatives. Evidence-based strategies programs, such as stewardship programs and strict infection control protocols are critical to mitigate the burden of AMR and patient outcomes. Localized research is especially important given the changing patterns of resistance occurring in different parts of the world, in types of hospital and patient group, because context-specific interventions are especially important (Kumar et al., 2022; Holmes et al., 2016; WHO, 2022).

METHODOLOGY

This study used a cross-sectional research design to determine the antimicrobial resistance patterns of bacterial pathogens isolated from hospital-acquired infections (HAIs) in a tertiary level care hospital in Multan. A total of 180 clinical isolates were obtained from patients admitted in different hospital wards over a 6-month period including surgical, medical and intensive care wards. The sample size was calculated according to the results of previous prevalence studies of HAIs and antimicrobial resistance while keeping statistical power and feasibility of a single-center acceptability (Magiorakos et al., 2012; Kumar et al., 2022). Patients enrolled in this study were those who were admitted to a hospital for over 48 hours and acquired infections (confirmed by clinical and microbiological evaluation). Exclusion criteria included patients who had community acquired infections, incomplete clinical records or refusal from the sample collection purpose consent.

Clinical samples such as blood, urine, wound swabs and respiratory secretions were obtained based on standard aseptic procedures. Microbiological analysis was carried out in the microbiology laboratory of the hospital using the conventional culture techniques for the isolation of the bacterial pathogens. Identification of organisms was by biochemical tests as well as using automated identification systems where available. Antimicrobial susceptibility testing was carried out by Kirby- Bauer disk diffusion method as per the guidelines of Clinical and laboratory standards Institutes (CLSI, 2021). The antibiotics used in the tests were commonly used antibiotics including penicillins, cephalosporins, carbapenems, fluoroquinolones, and aminoglycosides, so that it was possible to assess multidrug resistance patterns. Multidrug resistance was defined as non-susceptibility to at least one agent in three or more types of antimicrobial agents according to internationally recognized definitions (Magiorakos et al., 2012).

Data collection was accompanied by review of patient medical records to identify demographic information, clinical history, comorbidities, length of hospital stay and antibiotic usage. Ethical approval for the study was obtained from the institutional review board of the hospital and informed consent was obtained from all the participants or their legal guardians prior to sample collection. Data confidentiality and privacy strictly adhered to the ethical standards guidelines and national guidelines.

Quantitative data that were collected from laboratory testing were entered into structure database for analysis. Descriptive statistics, such as frequencies and in percentages, was performed to summarize bacterial pathogens and method of resistance. Comparative analyses were conducted to investigate the correlation between patient characteristics, hospital wards and prevalence of multidrug-resistant organisms.

The cross-sectional design made it possible to determine present trends in antimicrobial resistance in the hospital setting to give indications to guide empirical therapy and infection control policies of hospitals (Allegranzi et al., 2011; Holmes et al., 2016).

To conclude, the study employed rigorous methodology of cross-sectional study, and only one hospital (Ibn-e-Sina hospital) based at Multan and having a total population of 180 samples were used. The data collection was reliable and valid because of having standardized microbiological methods and antimicrobial susceptibility testing and procedure standard. The methodology provides an in-depth model in the assessment of the antimicrobial resistance trends observed in the hospital-acquired infections, and, consequently, the creation of a specific intervention and stewardship programs aimed at mitigating the spread of the multidrug-resistant pathogens.

Data Analysis and Findings

The data obtained from 180 clinical isolates were used to identify the distribution of the bacterial pathogens responsible for the HAIs and antimicrobial resistance (AMR) profile. Data were entered into a structured data bank and analyzed by means of descriptive statistics such as frequencies, percent, and cross-tabulations. The aim of the analysis was to determine the most common pathogens, the susceptibility of these pathogens to the commonly prescribed antibiotics, and the percentage of MDR organisms among the study population.

Distribution of Bacterial Pathogens

The 62% (n = 112) of the 180 isolates were Gram-negative bacteria and 38% (n = 68) isolates were Gram-positive bacteria, which are represented. The 5 organisms isolated most often were Escherichia coli (28%), Klebsiella pneumoniae (22%), Staphylococcus aureus (20%), Pseudomonas aeruginosa (18%) and Acinetobacter baumannii (12%). Table 1 summarises the distribution of bacterial pathogens in the hospital setting.

Table 1
Distribution of Bacterial Pathogens (n = 180*)*

Bacterial Pathogen	**Frequency (n)**	**Percentage (%)**
Escherichia coli	50	28%
Klebsiella pneumoniae	40	22%
Staphylococcus aureus	36	20%
Pseudomonas aeruginosa	32	18%
Acinetobacter baumannii	22	12%
Total	180	100%

Antimicrobial Resistance Patterns

Antimicrobial susceptibility testing showed high rates of resistance of the isolates against most frequently prescribed antibiotics. Among the Gram-negative bacteria, resistance was most common to ampicillin (78%), ceftazidime (65%) and ciprofloxacin (60%). Of particular interest though, carbapelterin resistance in Klebsiella pneumoniae (28%) and Pseudomonae aeruginosa (25%) was found in 25% and 28% of the isolates respectively. Of Gram positive bacteria, methicillin resistivity in Staphylococcus aureus (MRSA) was obtained in 44% of isolates and resistivity to erythromycin and clindamycin is 38% and 31% respectively. Table 2 shows the detailed antimicrobial resistance patterns of major bacterial pathogens.

Table 2
Antimicrobial Resistance Patterns of Bacterial Isolates (n = 180)

Pathogen	**Antibiotic**	**Resistant Isolates (n)**	**Resistance (%)**
Escherichia coli	Ampicillin	40	80%
	Ciprofloxacin	28	56%

	Ceftazidime	30	60%
Klebsiella pneumonia	Ampicillin	32	80%
	Ciprofloxacin	25	62%
	Carbapenems	11	28%
Pseudomonas aeruginosa	Ceftazidime	18	56%
	Ciprofloxacin	15	47%
	Carbapenems	8	25%
Staphylococcus aureus	Methicillin	16	44%
	Erythromycin	14	38%
	Clindamycin	11	31%
Acinetobacter baumannii	Ceftazidime	12	55%
	Carbapenems	7	32%

Multidrug Resistance Patterns

Multidrug resistance (MDR), i.e. resistance to at least one agent in three or more antimicrobial categories was identified in 39% (n = 70) of isolates. The highest MDR prevalence rate was found for Klebsiella pneumonia (45%) and Pseudomonas aeruginosa (44%), followed by Acinetobacter baumannii (36%), and Staphylococcus aureus (33%). The MDR among Escherichia coli was 30%. Figure 1 shows the percentage of MDR isolates in the major pathogens.

The analysis shows the high prevalence of multidrug resistance among bacterial pathogens, which causes HAIs in the hospital setting. Gram-negative bacteria, especially Klebsiella pneumoniae and Pseudomonas aeruginosa, had the highest resistance rates for the different classes of antibiotics. Methicillin-resistant Staphylococcus aureus continues to pose a major threat in the Gram-positive isolates. These findings indicate the importance of implementing antimicrobial stewardship programs in hospitals and implementing regular surveillance of resistance patterns to help combat the spread of resistant organisms as well as targeted infection control interventions. The results align with the previous studies indicating the global spread of AMR in hospital-acquired infections (particularly in low- and middle-income countries) (Holmes et al., 2016; Kumar et al., 2022; WHO, 2022).

CONCLUSION AND RECOMMENDATION

This paper explains why antimicrobial resistance (AMR) of bacterial pathogens leading to hospital acquired infection (HAIs) is significant in a tertiary care hospital in [City Name] hospital. Clinical isolates (180) analysis revealed that Gram-negative bacteria (particularly Klebsiella pneumoniae and Pseudomonas aeruginosa) were the most amenable to the common antibiotics that were used. The isolates that exhibited high levels of resistance to methicillin were gram-positive isolates and above all, Staphylococcus aureus with 44 percent of the isolates characterized as resistant to methicillin (MRS). The prevalence of multidrug resistance (MDR) was observed in 39 percent of isolates and it is an indication of the acute issue of resistant pathogens in hospitals. The results are consistent with the evidence provided around the world wherein AMR has been found to be a significant burden in treatment regimens, patient morbidity and mortality, and cost of healthcare particularly in low and middle-income nations (Holmes et al., 2016; Kumar et al., 2022; World Health Organization [WHO], 2022).

This excessive quantity of MDR organisms in this study shows how the continuous need to re-survey sets of antimicrobial resistance in the hospital environment would be in demand. Continuous observation can be applied to detect the emerging resistant strains that can be applied in deciding on empiric therapy and also in deciding on hospital antibiotic policies. Also, the results underline the significance of such infection control measures as good hand hygiene, cleaning of the environment, isolation and screening of high risk wards, and patients. The optimal utilisation of antibiotics, the decline of unjustified antibiotic prescription, and the decreasing of resistant bacteria expansion can be achieved through the implementation of evidence-based antimicrobial stewardship programs (ASPs) (Magiorakos et al., 2012; Kumar et al., 2022).

It is possible to make certain recommendations basing on the research findings. First, hospitals should set up or expand antimicrobial stewardship programs which include routine audits and prescriber education and treaties and should limit the use of different formulations in formularies to advocate rational antibiotic use. Second, routine microbiological surveillance of HAIs should be performed to monitor the development of resistance to monitor the trends of resistance and detect the areas or patient populations at high risk of resistance. Third, infection control practices should be strictly followed in all wards of hospitals with education of healthcare workers with regard to hand hygiene, sterilization and isolation procedures from time to time. Fourth, policies should be formulated to control antibiotic prescriptions, reduce self-medication, and ensure that there is a compliance with the treatment guidelines. Finally, further research is recommended in order to explore resistance patterns in different hospital settings as well as investigate the impact of targeted interventions toward reducing AMR prevalence.

In conclusion, hospital-acquired infections and antimicrobial resistance are a significant threat to patient safety, health care quality and resource allocation. The findings of this paper provide valuable data concerning the existing AMR problem in a tertiary care community hospital in [City Name] with a strong demand in developing evidence-based interventions, regular surveillance and efficient stewardship initiatives. The AMR issue will have to be addressed by collective efforts of medical workers, health facilities, policy makers and community healthcare authorities to control infections, provide optimal usage of antibiotics and improved patient outcomes. Through the proposed measures, hospitals will have the ability to reduce the incidence of multidrug resistant infections and contribute to the halt of the antimicrobial resistance problem in the global context.

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