

AVAILABILITY AND QUALITY OF HEALTHCARE SERVICES FOR NCD PATIENTS IN UNDERSERVED AREAS

Original Research

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ABSTRACT

Background: Non-communicable diseases (NCDs) such as diabetes, hypertension, and cardiovascular disorders represent a growing public health challenge, particularly in underserved regions. In areas like Sindh, Pakistan, barriers such as insufficient infrastructure, lack of trained personnel, and limited financial resources hinder the effective management of chronic conditions. Strengthening primary healthcare services is essential to address the rising burden of NCDs and reduce long-term health disparities in rural and resource-constrained settings.

Objective: To assess the availability of healthcare services and evaluate the quality of care provided to NCD patients in primary health facilities located in underserved areas of Sindh, Pakistan.

Methods: A cross-sectional quantitative study was conducted across 12 public-sector primary healthcare facilities, including Basic Health Units (BHUs), Rural Health Centers (RHCs), and Mother and Child Health Centers (MCHCs). A standardized facility audit checklist was used to evaluate the availability of diagnostic tools, essential medicines, trained staff, and referral systems. Additionally, structured interviews were conducted with 300 randomly selected NCD patients aged ≥ 30 years to assess patient-reported outcomes related to access, affordability, satisfaction, follow-up care, health literacy, and treatment adherence. Descriptive statistics, including means and proportions, were calculated using SPSS version 26.

Results: Only 40% of facilities had basic diagnostic tools, and 35% had healthcare professionals trained in NCD management. Availability of essential medications was reported in 42% of centers, while functional referral systems were present in just 30%. Among patients, 62% reported long waiting times, 50% found care unaffordable, 58% expressed treatment satisfaction, 45% received adequate follow-up, 55% had poor health literacy, and only 47% adhered to treatment plans.

Conclusion: Substantial gaps were identified in both the availability and quality of healthcare services for NCD patients in Sindh's underserved areas. Targeted interventions including improved infrastructure, workforce training, and enhanced patient education are critical to improving chronic disease outcomes in these settings.

Keywords: Cardiovascular Diseases, Diabetes Mellitus, Health Literacy, Hypertension, Pakistan, Primary Health Care, Rural Health Services.

INTRODUCTION

Non-communicable diseases (NCDs), including cardiovascular diseases, diabetes, chronic respiratory diseases, and cancer, have emerged as the leading causes of mortality globally, accounting for over 70% of deaths each year (1). Once considered diseases of affluence, NCDs now disproportionately affect low- and middle-income countries (LMICs), with approximately 80% of NCD-related deaths occurring in these regions (2). Among LMICs, underserved populations—particularly those in rural and economically disadvantaged areas—face a significantly higher burden of disease due to systemic healthcare inequalities and socio-economic barriers (2,3). These communities often experience limited access to quality healthcare services, resulting in delayed diagnoses, inadequate management, and poor health outcomes (4,5). Numerous structural challenges impede the effective management of chronic diseases in underserved regions. Health systems in these areas frequently lack the essential infrastructure, such as specialized clinics, diagnostic tools, and consistent medication supplies (6,7). In many cases, even basic tools necessary for early diagnosis of hypertension or diabetes—like sphygmomanometers or glucose testing kits—are unavailable at primary care facilities (7). Furthermore, a severe shortage of trained healthcare professionals remains a persistent obstacle, with rural areas struggling to recruit and retain skilled personnel capable of managing the complexities of NCDs (8,9). Even when healthcare services are physically present, the quality of care may be compromised due to outdated treatment protocols, limited follow-up systems, and insufficient professional training (10).

Social determinants of health—such as poverty, limited education, and low health literacy—further compound the difficulties in NCD prevention and management (11). Individuals may be unaware of the importance of lifestyle changes or regular screening and often face financial constraints that hinder their ability to access or continue treatment. In addition, indirect costs such as transportation or wage loss due to clinic visits can discourage care-seeking behavior in already vulnerable populations (12). These compounded barriers contribute to the failure to achieve early detection, sustained treatment adherence, and favorable long-term outcomes. The growing incidence of NCDs in countries like India and across sub-Saharan Africa illustrates a broader epidemiological shift, with chronic diseases surpassing infectious diseases as the primary cause of mortality in some regions (12,13). Despite this rising burden, national health systems remain under-resourced and ill-equipped to respond, especially in rural and remote areas (14,15). This misalignment between disease burden and healthcare capacity demands urgent and targeted interventions that prioritize equity, accessibility, and sustainability in healthcare delivery systems (16). Given this context, there is a critical need to investigate the availability and quality of healthcare services for NCD patients in underserved areas. This study aims to assess how healthcare systems in these regions respond to the growing demand for chronic disease management and identify key structural and socioeconomic barriers that affect access and treatment quality. The objectives of this research are twofold: to evaluate the availability of healthcare services for NCD patients in underserved areas and to assess the quality of care provided, with particular emphasis on accessibility, affordability, and treatment outcomes.

METHODS

This study employed a cross-sectional quantitative research design to evaluate the availability and quality of healthcare services provided to patients with non-communicable diseases (NCDs) in underserved regions. Data collection was carried out in rural and remote areas of Sindh, Pakistan, where healthcare infrastructure is limited, and the burden of NCDs is significantly high. The study population comprised two levels: healthcare facilities and patients. A total of 12 primary care health facilities were randomly selected using a stratified sampling approach to ensure representation across different levels of primary healthcare service delivery. These included Basic Health Units (BHUs), Rural Health Centers (RHCs), and Mother and Child Health Centers (MCHCs), which function as the first point of healthcare contact in rural communities. Facility audits were conducted in each selected health center to assess the availability of essential services required for effective NCD management. These audits evaluated key elements such as infrastructure, diagnostic equipment (e.g., blood pressure monitors, glucometers), availability of essential medications for hypertension and diabetes, and the presence of trained medical staff. A structured audit checklist was developed in accordance with internationally recognized guidelines for NCD care, including WHO PEN protocols and local Ministry of Health standards, ensuring that the assessment reflected accepted benchmarks for service provision.

In parallel, the quality of healthcare services was assessed by surveying a randomly selected sample of 300 patients diagnosed with one or more NCDs and attending the participating facilities during the study period. Inclusion criteria included adults aged 30 years or older with a documented diagnosis of hypertension, diabetes, chronic respiratory disease, or cardiovascular disease. Patients with acute medical conditions or cognitive impairments that hindered their ability to complete the survey were excluded. The structured survey instrument included questions covering multiple domains of care, such as service accessibility, affordability of treatment, patient satisfaction, quality of interaction with providers, and health literacy. The instrument was pre-tested in a similar population to ensure clarity and reliability. Ethical approval for the study was obtained from the Institutional Review Board (IRB) and formal permission was also secured from local health authorities. Informed written consent was obtained from all participants prior to data collection, and all responses were anonymized to ensure confidentiality. Data were analyzed using SPSS Version 26. Descriptive statistics were employed to summarize the availability of resources in health facilities and patient-reported experiences. Measures of central tendency, including mean and standard deviation, were calculated for continuous variables, while categorical variables were reported as frequencies and percentages. This methodological framework enabled a comprehensive assessment of service availability and patient-perceived quality of care, helping to identify critical gaps in chronic disease management across underserved areas in Sindh.

RESULTS

The study assessed data obtained from 12 primary healthcare facilities and 300 non-communicable disease (NCD) patients residing in underserved areas of Sindh. The demographic analysis revealed an equal distribution of gender among participants, with 150 males (50%) and 150 females (50%). A majority of the respondents were aged between 40 and 59 years (58%), while 42% were aged 60 years or above. Geographical representation indicated that 70% of patients belonged to rural areas, and the remaining 30% were from peri-urban settings. Socioeconomic analysis showed that 60% of patients reported a monthly household income below 20,000 PKR, reflecting a low-income status. Educational attainment was found to be limited, with 30% having no formal education, 40% having only primary-level schooling, and 30% achieving secondary or higher education. Findings from facility audits highlighted several critical deficiencies in the availability of healthcare resources. Only 40% of the centers were equipped with essential diagnostic tools such as blood pressure monitors and glucometers. Similarly, only 42% of facilities had a regular supply of essential medications for chronic conditions, including insulin and antihypertensive drugs. Merely 35% of the health centers had healthcare professionals specifically trained in NCD management. Specialized services such as cardiology or endocrinology were notably scarce, available in only 25% of the assessed facilities. A functional referral system was present in just 30% of the centers, limiting the continuity and escalation of care for patients with complex medical needs. Additionally, health education materials were available in only 45% of the facilities, indicating limited support for patient self-management and awareness.

Patient-reported data regarding healthcare quality underscored several systemic barriers. Long waiting times were a common issue, with only 38% of patients expressing satisfaction with appointment wait times. Healthcare affordability was a challenge, as 50% of patients reported that cost remained a barrier to accessing regular care. Satisfaction with treatment quality was moderate, with 58% of respondents reporting satisfactory care. However, only 45% of patients confirmed receiving consistent follow-up care. Regarding health literacy, 55% of patients had limited understanding of their condition, and just 47% reported adhering consistently to their prescribed treatment regimen. Stratified analysis of patient-reported outcomes based on gender, age, and income level revealed notable disparities in the quality of healthcare services for NCD management. Male patients reported slightly higher satisfaction with treatment (60%) compared to female patients (56%), and better follow-up care (48% vs. 42%). Patients aged 40–59 years expressed greater satisfaction (61%) and follow-up care access (50%) compared to those aged 60 and above (53% and 38%, respectively), indicating potential age-related access barriers. Income level significantly influenced care perceptions: individuals from medium-to-high income groups reported higher satisfaction with treatment (67%), affordability of care (67%), and follow-up care (58%), in contrast to those from lower-income households, who reported only 52%, 38%, and 37%, respectively. Health literacy and treatment adherence followed similar trends, with lower percentages consistently observed among the lower-income and older cohorts. These findings highlight the compounding effects of socioeconomic and demographic factors on care accessibility and effectiveness.

Table 1: Demographic Characteristics of Surveyed Participants

Demographic Variable	Category	Frequency (n = 300)	Percentage (%)
Gender	Male	150	50
	Female	150	50
Age	40-59 years	174	58
	60 years and above	126	42
Location	Rural	210	70
	Peri-urban	90	30
Income Level	Low (< 20,000 PKR)	180	60
	Medium/High (> 20,000 PKR)	120	40
Education	No formal education	90	30
	Primary school	120	40
	Secondary or higher	90	30

Table 2: Availability of Healthcare Services in Primary Healthcare Facilities

Service/Resource	Available (%)	Not Available (%)
Diagnostic Equipment	40	60
Essential Medications	42	58
Trained Healthcare Professionals (NCD Care)	35	65
Specialized Services (Cardiology, Endocrinology)	25	75
Referral System	30	70
Health Education Materials	45	55

Table 3: Quality of Healthcare Services for Ncd Patients

Quality Measure	Satisfied (%)	Not Satisfied (%)
Waiting Time	38	62
Affordability of Care	50	50
Satisfaction with Treatment	58	42
Follow-up Care	45	55
Health Literacy (Knowledge about NCDs)	45	55
Adherence to Treatment	47	53

Table 4: Stratified Analysis of Quality Outcomes by Demographics

Demographic Variable	Satisfied with Treatment (%)	Follow-up Care (%)	Affordability of Care (%)	Health Literacy (%)	Adherence to Treatment (%)
Male	60	48	52	47	49
Female	56	42	48	43	45
40–59 years	61	50	55	48	50
60+ years	53	38	42	41	42
Low Income	52	37	38	40	43
Medium/High Income	67	58	67	56	53

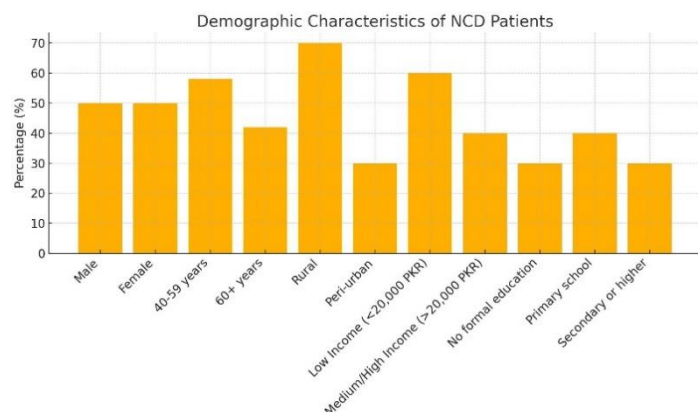


Figure 1 Demographic Characteristics of NCD Patients

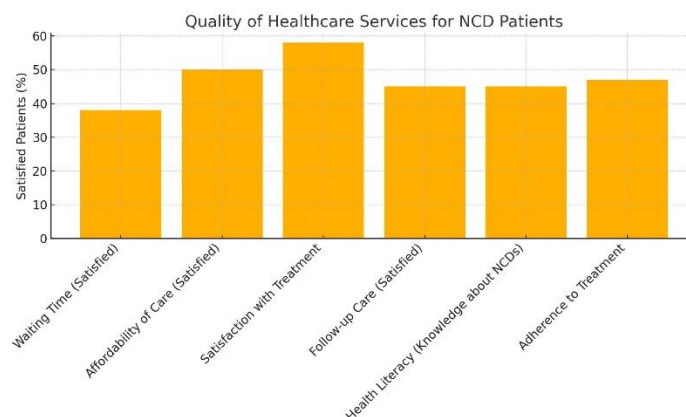


Figure 2 Quality of healthcare Services for NCD Patients

DISCUSSION

The findings of this study revealed substantial deficiencies in both the availability and quality of healthcare services for non-communicable disease (NCD) patients in underserved regions of Sindh, Pakistan, echoing global concerns regarding inequities in chronic disease management in low-resource settings (13). The limited availability of diagnostic tools and trained healthcare personnel across primary health facilities significantly undermined the timely detection and effective management of chronic conditions such as diabetes and hypertension. With only 40% of facilities equipped with basic diagnostic instruments and less than 40% staffed with healthcare professionals trained in NCD care, the study underscored the structural weaknesses that hinder clinical decision-making and disease monitoring in these communities. These findings aligned with previous research documenting the systemic resource scarcity in rural regions, which remains a major constraint on the delivery of evidence-based NCD care (14,15). The absence of a structured referral system in the majority of the facilities was another critical gap identified. With 70% of the centers lacking a functional referral pathway, patients requiring specialized services for complex chronic conditions were often left without access to necessary follow-up or secondary care. This breakdown in continuity of care is particularly detrimental for NCD patients, who benefit from integrated care pathways and regular monitoring to prevent complications. Similar structural barriers have been cited across low- and middle-income countries, where decentralization and underinvestment in health system integration compromise chronic disease outcomes (16).

From a patient-centered perspective, prolonged waiting times and limited affordability were key barriers. Nearly two-thirds of patients reported significant delays in receiving care, while only half found healthcare services to be financially accessible. These findings illustrate the dual burden of physical and financial inaccessibility, both of which contribute to reduced care-seeking behavior and treatment discontinuation. Previous studies have linked out-of-pocket expenditures with poor adherence and delayed care in underserved populations, particularly where health insurance coverage is absent or inadequate (17,18). The burden of affordability was especially pronounced among low-income respondents, who also demonstrated poorer adherence and understanding of their conditions. Despite moderate levels of satisfaction reported by 58% of the surveyed patients, more than half lacked adequate follow-up, and 55% demonstrated limited health literacy regarding their condition and treatment. These indicators of poor self-management capacity further highlight the systemic failure to deliver comprehensive chronic care that extends beyond episodic treatment. The lack of patient education and counseling not only diminishes the effectiveness of medical interventions but also perpetuates preventable complications, increasing the long-term cost burden on both individuals and the health system (19). These results are consistent with global recommendations emphasizing the need to empower patients through health literacy as a core component of chronic disease control strategies. The stratified analysis further revealed that disparities in healthcare quality were not uniformly distributed. Patients from lower-income groups, older age brackets, and women consistently reported lower satisfaction with care, less follow-up, and poorer understanding of their condition. These variations underscore the intersection of socioeconomic, age-related, and gender-specific vulnerabilities in determining access and outcomes. Socioeconomic gradients in care quality remain a well-documented phenomenon, and the findings here reaffirm the urgent need for targeted equity-driven interventions in healthcare planning and delivery (20,21).

One of the strengths of this study lies in its dual-level assessment, combining facility-level audits with patient-reported outcomes to present a comprehensive picture of healthcare service delivery in underserved settings. The use of standardized tools based on international benchmarks for NCD care strengthened the validity of the assessments. However, the study had limitations. The cross-sectional nature of the data limited insights into trends or causal relationships, while reliance on self-reported data introduced the potential for recall and response bias. The exclusive focus on primary care centers in Sindh may also restrict the generalizability of findings to other regions or urban centers where healthcare dynamics may differ. Future research should incorporate longitudinal approaches to track changes in healthcare delivery and patient outcomes over time. Expanding the scope to include secondary and tertiary care facilities would offer a more holistic understanding of the care continuum for NCDs. Integrating clinical outcome measures, such as blood pressure control or glycemic levels, would also provide objective metrics to complement subjective patient experiences. Furthermore, evaluating the impact of health education programs and telemedicine interventions in resource-constrained settings could provide scalable solutions to bridge gaps in service delivery. These findings carry significant implications for public health planning. Improving healthcare infrastructure in rural areas, strengthening the training of healthcare workers in chronic disease management, and developing referral systems are critical first steps. Addressing financial barriers through subsidized care or expanded insurance coverage, coupled with robust health education initiatives, would enhance treatment adherence and outcomes. Holistic policy responses that address both the supply and demand sides of healthcare are essential to mitigate the growing burden of NCDs in Pakistan’s underserved populations and align care provision with global standards for chronic disease control.

CONCLUSION

This study concluded that the healthcare system in underserved areas of Sindh faces substantial limitations in delivering effective care for patients with non-communicable diseases. The availability of essential services and the quality of care remain inadequate, largely due to insufficient infrastructure, a shortage of trained healthcare personnel, and limited access to diagnostic tools and patient education. Financial constraints and the absence of structured referral systems further hinder the continuity and effectiveness of chronic disease management. These findings emphasize the urgent need for systemic improvements in healthcare delivery to bridge service gaps, reduce health inequities, and support better long-term outcomes for NCD patients in resource-limited settings.

AUTHOR CONTRIBUTION

Author	Contribution
Anzar Latif	Substantial Contribution to study design, analysis, acquisition of Data
	Manuscript Writing
	Has given Final Approval of the version to be published
Dur Muhammad Soomro	Substantial Contribution to study design, acquisition and interpretation of Data
	Critical Review and Manuscript Writing
	Has given Final Approval of the version to be published
Maria Ahsan	Substantial Contribution to acquisition and interpretation of Data
	Has given Final Approval of the version to be published
Kanchan	Contributed to Data Collection and Analysis
	Has given Final Approval of the version to be published
Abdul Razzaque Nohri*	Contributed to Data Collection and Analysis
	Has given Final Approval of the version to be published
Hina Qasim Memon	Substantial Contribution to study design and Data Analysis
	Has given Final Approval of the version to be published

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