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Review

Health and Population Challenges in Punjab, Pakistan: A Narrative Review and Gap Analysis

Muhammad Imran [1,*] and Mehwish Baloch [2]

[1] Department of Emergency Medicine and Trauma, DHQ Hospital, Layyah 31200, Punjab, Pakistan
[2] Department of Ophthalmology, Shalamar Medical and Dental College, Lahore 54840, Punjab, Pakistan
* Correspondence: imranmerani247@gmail.com

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Abstract: **Background:** Punjab, Pakistan's most populous province, faces burdens of communicable and non-communicable diseases (NCDs), rapid population growth, and inequitable healthcare access. Despite healthcare investments, challenges remain in achieving Universal Health Coverage (UHC) and Sustainable Development Goals (SDGs), highlighting the need for comprehensive health and population sector assessment. The objective of this study was to assess the current status of health and population services in Punjab, Pakistan, identify key system gaps using the World Health Organization (WHO) Health System Building Blocks Framework, and propose evidence-based recommendations for health system strengthening. **Methods:** A narrative review and policy analysis were conducted using a PRISMA-informed search of PubMed, Scopus, Web of Science, and Google Scholar, and reports from WHO, UNICEF, UNFPA, the World Bank, and the Government of Punjab. Publications (2020–2025) were screened, with 87 eligible studies included. The findings were synthesized using the WHO Health System Building Blocks Framework to identify key gaps and policy priorities. **Results:** The review found improvements in healthcare infrastructure, maternal and child health, immunization, and digital health. However, persistent gaps include inequitable access, workforce shortages, fragmented information systems, limited access to essential medicines, inadequate primary healthcare (PHC) investment, and weak governance. High maternal and child mortality, childhood stunting, rising NCDs, unmet family planning needs, and rapid population growth continue to strain Punjab's health system. **Conclusions:** Despite notable progress, persistent health system gaps continue to impede UHC and SDG achievement in Punjab. Strengthening PHC, governance, workforce capacity, and preventive services is essential for sustainable health outcomes.

Keywords: family planning; health system; health workforce; population welfare; primary healthcare; Universal Health Coverage

1. Introduction

Health systems play a critical role in improving population health, reducing inequalities, and achieving Universal Health Coverage (UHC). The World Health Organization (WHO) defines a well-functioning health system as one that delivers quality services, develops an adequate workforce, ensures access to essential medicines and technologies, generates reliable health information, secures sustainable financing, and provides effective leadership and governance [1]. Strengthening these components has become increasingly important in low- and middle-income countries (LMICs), where rapid population growth, epidemiological transition, and resource constraints continue to challenge health system performance.

Punjab, the largest and most populous province of Pakistan, is home to more than 127 million people and accounts for over half of the country's population [2]. The province has witnessed substantial improvements in healthcare infrastructure, immunization coverage, maternal and child health services, and disease surveillance systems during the past decade. Government-led initiatives such as the expansion of PHC facilities, implementation of the District Health Information System (DHIS-2), and strengthening of public health programs have contributed to improvements in healthcare utilization and service coverage [3]. Despite these achievements, Punjab continues to face significant health and population challenges that threaten progress toward UHC and Sustainable Development Goal (SDG) targets.

The province is undergoing a demographic and epidemiological transition characterized by rapid urbanization, population growth, changing disease patterns, and increasing healthcare demands. According to the Punjab Multiple Indicator Cluster Survey (MICS) 2024, approximately one-third of children under five years remain stunted, reflecting persistent nutritional and socioeconomic disparities [4]. Maternal and child health indicators have improved over time; however, maternal and neonatal mortality and under-five mortality remain higher than desired levels, particularly in underserved districts. Furthermore, the United Nations Population Fund (UNFPA) reported that unmet need for family planning remains a major challenge despite gradual improvements in contraceptive prevalence, contributing to continued population growth and increased pressure on healthcare resources [5].

In addition to communicable diseases and reproductive health challenges, Punjab is facing a rapidly increasing burden of non-communicable diseases (NCDs). The WHO NCDs Country Profile 2024 reported that cardiovascular diseases, diabetes, cancers, and chronic respiratory diseases account for nearly two-thirds of all deaths in Pakistan [6]. Similar findings from the Global Burden of Disease Study 2021 indicate that NCDs have become the dominant contributors to morbidity and mortality, requiring health systems to shift from predominantly acute care models toward long-term preventive and chronic disease management approaches [7].

Despite having one of the largest healthcare delivery networks in South Asia, inequities in healthcare access and quality remain substantial. Previous studies have identified shortages and maldistribution of healthcare professionals, weaknesses in PHC services, fragmented referral systems, and inadequate financing as major barriers to health system performance in Pakistan [8,9]. Moreover, fragmentation between the Health Department and Population Welfare Department often limits coordination of maternal health, reproductive health, and family planning services, reducing the efficiency of service delivery.

Although several provincial reports describe individual health indicators and program performance, few studies have comprehensively evaluated Punjab's health and population systems within a unified health systems framework. Existing evidence remains fragmented across disease programs, maternal health, family planning, and health-service delivery. Therefore, this review provides a comprehensive synthesis using the WHO Health System Building Blocks Framework to identify cross-cutting systemic gaps and generate integrated policy recommendations relevant to Punjab. By examining interactions among health system components, this study offers insights beyond routine descriptive reports and supports evidence-informed policy development.

2. Material and Methods

2.1. Study Design

This study employed a narrative review and policy analysis to evaluate the current status of health and population services in Punjab, Pakistan, identify key gaps within the Health and Population Department, and propose strategic recommendations for health system strengthening. A PRISMA flow diagram is shown in Figure 1.

2.2. Literature Search Strategy

A comprehensive literature search was conducted using PubMed, Scopus, Web of Science, and Google Scholar, and reports from the WHO, UNFPA, United Nations Children's Fund (UNICEF), World Bank, and Government of Punjab. Search terms included "Punjab Pakistan," "health system," "population welfare," "family planning," "maternal health," "primary healthcare," "health workforce," "health information systems," and "Universal Health Coverage." Publications published between January 2020 and December 2025 were considered. In addition, gray literature, including government publications, policy documents, technical reports, and reports from international organizations, was searched to identify relevant evidence not indexed in bibliographic databases.

2.3. Eligibility Criteria and Study Selection

Eligible sources included peer-reviewed articles, government reports, policy documents, and technical reports relevant to health and population services in Punjab. Editorials, opinion papers, duplicate records, and studies not directly related to Punjab were excluded. Following the PRISMA 2020 framework, records were screened through title, abstract, and full-text review. A total of 480 records were identified, of which 85 duplicates were removed. After screening 395 remaining records, 150 full-text documents were assessed for eligibility, and 87 studies and reports were included in the final narrative review and gap analysis.

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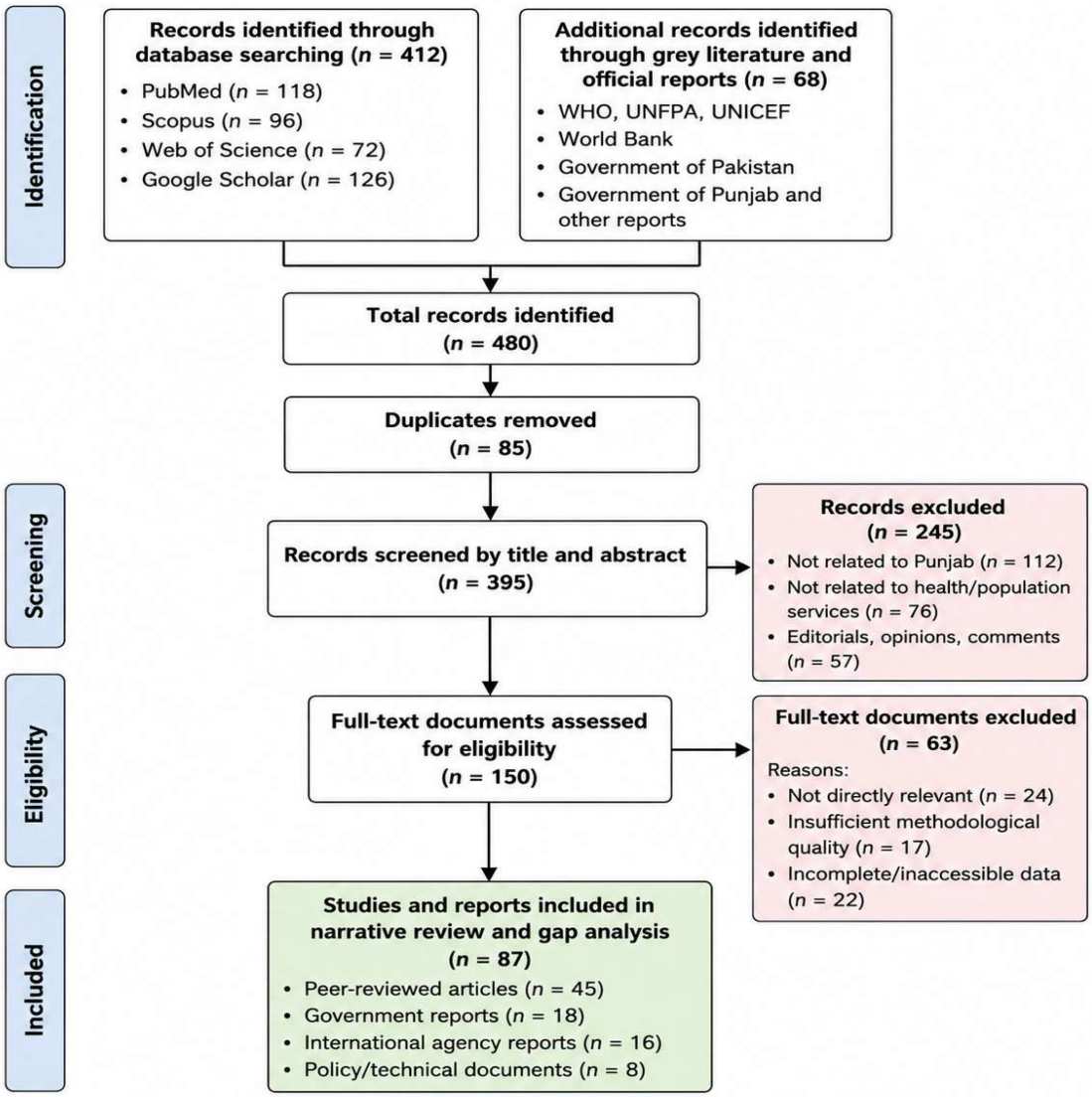


Figure 1. PRISMA flow diagram showing the process used to identify and select studies and reports for the review. The diagram shows the number of records identified, duplicates removed, records screened, full-text articles assessed, and sources finally included in the review. In total, 87 eligible publications, government reports, policy documents, and technical reports were included in the final analysis.

2.4. Data Quality Assessment

To enhance the credibility of the evidence synthesis, peer-reviewed studies were preferentially included whenever available. Government reports and international agency publications were included because of their relevance to provincial policy and health system performance. Evidence from multiple sources was triangulated to minimize bias and improve consistency of findings.

2.5. Data Extraction and Evidence Synthesis

Data extraction included study characteristics, health system domain, principal findings, reported challenges, and policy recommendations. Evidence was synthesized narratively through thematic analysis. Similar findings across studies were grouped according to the WHO Health System Building Blocks Framework. Areas with consistent findings across multiple evidence sources were considered priority health system gaps, whereas conflicting findings were critically examined and interpreted within the Punjab context.

2.6. Administrative and Geographic Definitions

A province is the highest subnational administrative unit of Pakistan; Punjab is one of the country's four provinces. A district is a major administrative subdivision within a province and generally serves as an important unit for local government, health-service administration, planning, and monitoring. A tehsil (also referred to as *taluka* in some parts of Pakistan) is a sub-district administrative unit located within a district. Tehsils are further divided into local administrative

areas and serve as important units for the organization and delivery of public services. In the health system, facilities and service indicators may therefore be reported at provincial, district, or tehsil level depending on the data source.

2.7. Gap Analysis Framework

The gap analysis was conducted using the WHO Health System Building Blocks Framework. This framework assesses health system performance across six domains: (1) service delivery, (2) health workforce, (3) health information systems, (4) access to essential medicines and technologies, (5) health financing, and (6) leadership and governance. Population welfare and family planning services were evaluated as a cross-cutting domain due to their central role in addressing demographic and reproductive health challenges in Punjab.

The current status of health and population services was compared against national health priorities, UHC targets, SDG indicators, and international best practices. Gaps were identified and categorized according to the framework domains, enabling a systematic assessment of health system performance and informing evidence-based strategic recommendations.

2.8. Ethical Considerations

As this study utilized publicly available literature, reports, and policy documents, ethical approval and informed consent were not required.

3. Results

A total of 87 studies, policy documents, government reports, and technical publications were included in the narrative review. Findings were synthesized according to the WHO Health System Building Blocks Framework, with Population Welfare and Family Planning assessed as a cross-cutting domain. Overall, the analysis demonstrated substantial progress in healthcare infrastructure and service expansion in Punjab; however, persistent deficiencies in service delivery, workforce capacity, financing, governance, information systems, and population management continue to hinder progress toward UHC and SDG targets (Table 1).

Table 1. Gap analysis of Punjab health system using the WHO Health System Building Blocks Framework.

Building Block	Key Indicators	Current Status	Identified Gap
Service Delivery	Healthcare facilities, MCH services, NCD care	151 hospitals, 2,461 BHUs, 293 RHCs, 188 MCH centers	Rural–urban disparities, weak referral systems, inadequate NCD integration
Health Workforce	Availability and distribution of health professionals	Expanded training institutions and workforce deployment	Shortages and maldistribution of physicians, allied health professionals, nurses, and midwives
Health Information Systems	DHIS-2, surveillance, digital health	Electronic reporting systems established	Data quality issues, poor interoperability, limited use of data in decision-making
Essential Medicines and Technologies	Availability of medicines and diagnostics	Improved access in urban facilities	Supply chain interruptions and limited diagnostic capacity in rural areas
Health Financing	Public health expenditure and resource allocation	Increasing provincial investment	Underfunding of PHC, preventive care, and family planning services
Leadership and Governance	Policy implementation and coordination	Multiple health reforms underway	Weak accountability and fragmented coordination mechanisms
Population Welfare and Family Planning	CPR and unmet need	CPR 40.1%; unmet need 16.7%	Persistent barriers to contraceptive uptake and service integration

3.1. Service Delivery

Punjab possesses the largest healthcare delivery network in Pakistan, serving a population exceeding 127 million through approximately 151 public hospitals, 293 Rural Health Centers (RHCs), 188 Maternal and Child Health Centers (MCHCs) and 2461 Basic Health Units (BHUs) (Figure 2A–D). The coverage of antenatal care exceeds 90%, while skilled birth attendance is estimated at approximately 85% (Figure 2E). Despite these achievements, important inequities remain across districts. Childhood stunting affects approximately 31–34% of children under five years, maternal mortality remains between 150 and 180 deaths per 100,000 live births, and under-five mortality is estimated at 60–65 per 1000 live

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births. Furthermore, referral systems remain weak and PHC services are inadequately equipped to manage the growing burden of chronic diseases. These findings indicate substantial gaps in service quality, accessibility, continuity of care, and integration of preventive and curative services.

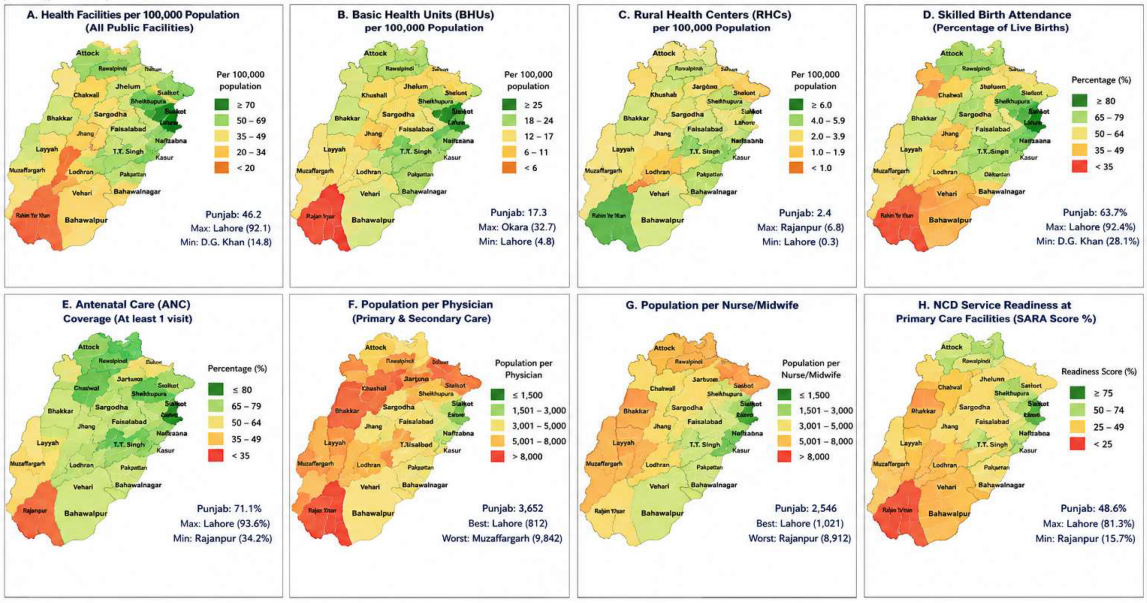


Figure 2. District-level variation in health-service delivery indicators across Punjab, Pakistan. (**A**) Health facilities per 100,000 populations. (**B**) BHUs per 100,000 population. (**C**) RHCs per 100,000 population. (**D**) Skilled birth attendance as percentage of live births. (**E**) Antenatal care coverage as at least one visit. (**F**) Population per primary or secondary physician. (**G**) Population per nurse or midwife. H. NCDs service readiness (%) at primary care facilities.

3.2. Health Workforce

The health workforce remains a major constraint to health system performance (Figure 2F,G). Although Punjab has expanded medical, nursing, and allied health training institutions, shortages and inequitable distribution of healthcare professionals continue to affect service delivery, particularly in rural and underserved districts. Many RHCs and BHUs operate with vacant positions for physicians, allied health professionals, nurses, pharmacists, midwives, and laboratory personnel. In addition, limited continuing professional development opportunities, insufficient incentives for rural deployment, and workforce retention challenges adversely affect healthcare quality and efficiency. Consequently, workforce capacity remains inadequate to meet the increasing demand generated by rapid population growth and the rising burden of NCDs (Figure 2H).

3.3. Health Information Systems

Punjab has made notable progress in digital health transformation through the implementation of the DHIS-2, electronic disease surveillance systems, telemedicine services, and hospital management information systems. These initiatives have strengthened routine reporting and monitoring capacities across the province. Nevertheless, challenges persist regarding data completeness, quality assurance, interoperability between databases, and real-time reporting. Fragmentation between health and population information systems limits integrated planning and evidence-based decision-making. Furthermore, limited analytical capacity at district and facility levels restricts effective utilization of routinely collected data for performance improvement and policy formulation.

3.4. Access to Essential Medicines and Technologies

The availability of essential medicines and healthcare technologies has improved considerably in tertiary and urban healthcare facilities. However, significant disparities persist in rural and remote areas, where interruptions in medicine supplies, inadequate laboratory services, and shortages of diagnostic equipment remain common (Figure 3A–F). Access to advanced diagnostic technologies, telemedicine platforms, and specialized treatment services is concentrated in urban centers, contributing to inequities in healthcare utilization and outcomes. These deficiencies affect timely diagnosis, continuity of treatment, and overall quality of care.

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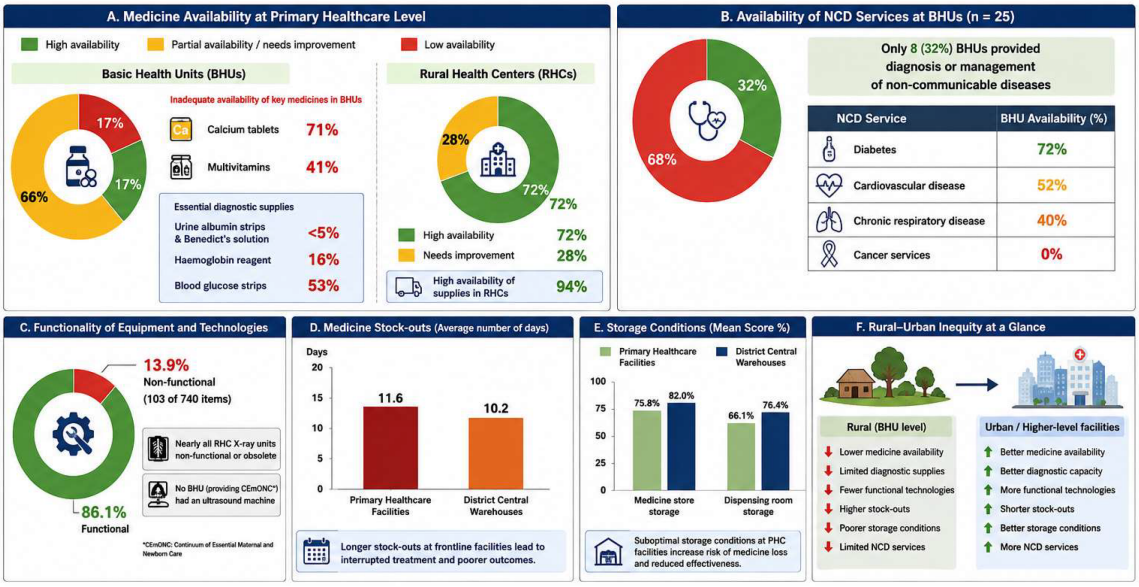


Figure 3. Inequity in access to essential medicines and technologies across Punjab, Pakistan. (**A**) Medicine availability at PHC level. (**B**) Availability of NCDs services at BHUs. (**C**) Functionality of equipment and technologies. (**D**) Medicine stock-outs as average number of days. (**E**) Storage conditions availability (%). (**F**) Rural-urban inequity at glance.

3.5. Health Financing and Private-Sector Expenditure

Provincial investment in health has increased over recent years; however, available resources remain insufficient relative to the healthcare needs of a rapidly growing population (Figure 4A–E). Resource allocation continues to favor secondary and tertiary healthcare facilities, while PHC, preventive services, nutrition programs, and family planning interventions receive comparatively less funding. Financial barriers associated with transportation, diagnostics, and medications continue to affect healthcare utilization among low-income populations. Consequently, financing constraints limit the expansion of essential public health interventions and contribute to persistent inequities in service access.

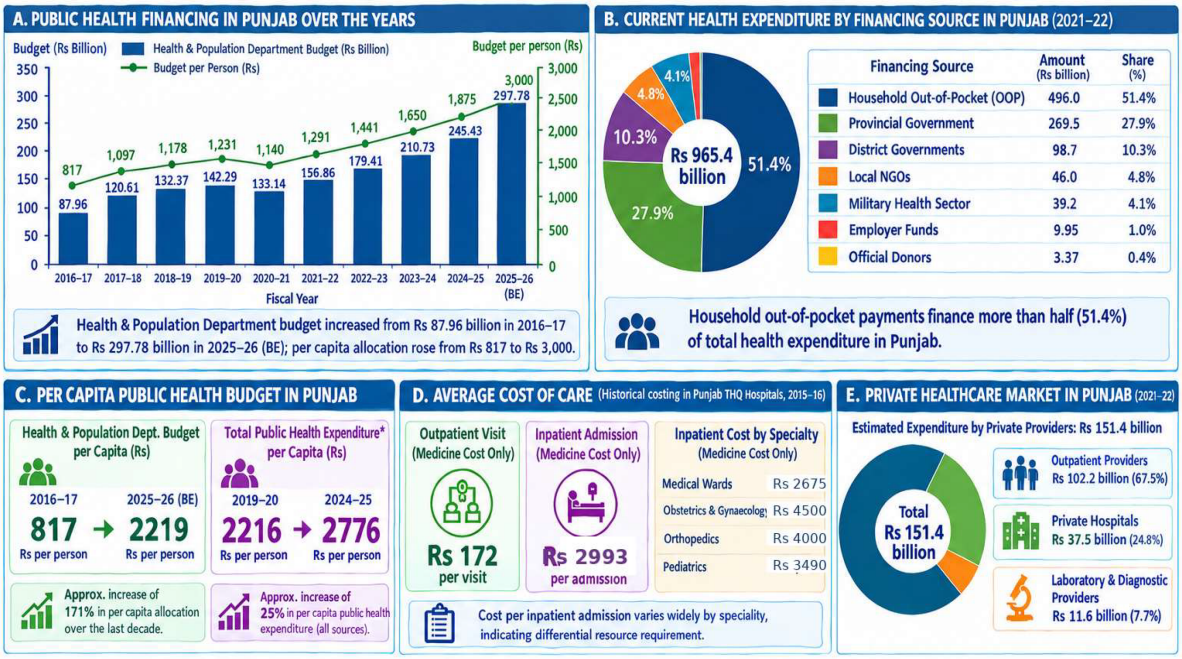


Figure 4. Health financing and healthcare expenditure in Punjab, Pakistan. (**A**) Public health financing in Punjab over the years. (**B**) Current health expenditure by financing source in Punjab. (**C**) Public health budget per capita in Punjab. (**D**) Average cost of healthcare cost in Punjab in public settings. (**E**) Private healthcare market in Punjab.

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3.6. Leadership and Governance

Punjab has implemented multiple health sector reforms aimed at strengthening healthcare delivery, improving digital health systems, and integrating health and population priorities. Despite these efforts, governance challenges continue to affect system performance. Fragmented accountability mechanisms, procurement delays, administrative inefficiencies, and insufficient coordination between health and population welfare sectors hinder effective implementation of policies and programs. Moreover, limited institutional integration reduces opportunities for coordinated service delivery and efficient utilization of available resources.

3.7. Population Welfare and Family Planning

Population growth remains a critical challenge for sustainable development in Punjab (Figure 5A). Recent estimates indicate that the contraceptive prevalence rate has increased to approximately 40.1%, while the unmet need for family planning remains around 16.7% (Figure 5B).

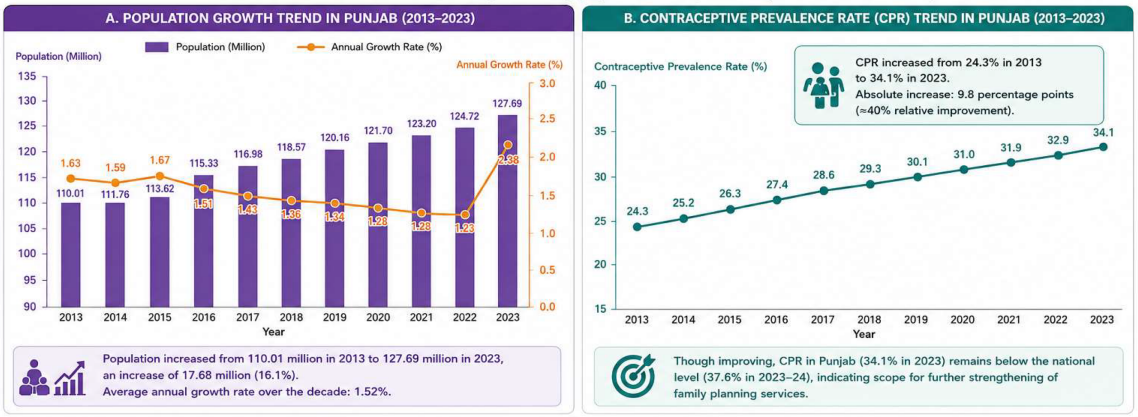


Figure 5. Population growth and contraceptive prevalence trend in Punjab, Pakistan. (**A**) Population growth trend in Punjab. (**B**) Contraceptive prevalence rate (%) trend in Punjab.

Although the awareness of reproductive health services has improved, barriers including socio-cultural norms, misconceptions regarding contraception, inadequate counseling, limited male involvement, and inconsistent availability of contraceptive commodities continue to affect uptake. The continued separation of family planning services from mainstream healthcare delivery further limits service integration and contribute to persistent fertility and population growth challenges.

Overall, three overarching patterns emerged from the synthesis (Tables 2 and 3). First, although Punjab has expanded its healthcare infrastructure and service coverage, improvements have not translated into equitable health outcomes because of persistent rural–urban disparities and limited PHC capacity. Second, weaknesses across workforce, financing, governance, and information systems were highly interconnected, suggesting that isolated interventions are unlikely to produce sustainable improvements. Third, rapid population growth continues to amplify existing system constraints by increasing demand for healthcare services while reducing the effectiveness of available resources. These findings indicate that integrated health system reforms are likely to yield greater benefits than program-specific interventions.

Table 2. Summary of priority gaps and health system implications.

Priority Gap	Potential Consequences
Inequitable healthcare access	Poor maternal, child, and population health outcomes
Workforce shortages and maldistribution	Reduced service quality and healthcare coverage
Weak health information systems	Limited evidence-based planning and monitoring
Inadequate access to medicines and technologies	Delayed diagnosis and treatment
Underfunding of PHC	Increased burden on secondary and tertiary facilities
Weak governance and coordination	Inefficient resource utilization and policy implementation
Unmet need for family planning	Continued rapid population growth and increased healthcare demand

Table 3. Cross-cutting health system challenges and policy priorities.

Health System Gap	Root Cause	System Impact	Priority Action
Rural inequity	Workforce shortage	Poor access	Incentive-based rural deployment
Weak PHC	Low financing	Hospital overcrowding	Increase PHC budget
Fragmented governance	Separate departments	Poor service integration	Integrated health–population policy
Weak health information system	Non-interoperable databases	Poor planning	Integrated digital platform
Population growth	Low contraceptive uptake	Increased demand	Family planning integration

4. Discussion

This narrative review and gap analysis, guided by the WHO Health System Building Blocks Framework, demonstrates that although Punjab has substantially expanded its healthcare infrastructure and service coverage, significant deficiencies remain across service delivery, workforce capacity, health information systems, financing, governance, and population management. Similar health system challenges have been reported at national scale in Pakistan and other LMICs, where rapid population growth, epidemiological transition, and resource constraints continue to impede progress toward UHC [10–12].

Despite having the largest public healthcare network in Pakistan, important disparities in healthcare access persist across Punjab. Rural populations continue to face challenges related to geographical accessibility, shortages of healthcare professionals, inadequate referral systems, and limited availability of specialized services. Similar findings have been reported by the World Bank and WHO, which identified inequitable distribution of health resources as a major barrier to achieving equitable health outcomes in Pakistan [11,12].

Maternal and child health indicators have improved during the last decade; however, childhood stunting, maternal mortality, and under-five mortality remain important concerns. The Punjab MICS 2024 reported that approximately one-third of children under five years remain stunted, while significant disparities continue to exist between socioeconomic groups and districts [13]. These findings are consistent with Akseer et al., who identified malnutrition, poverty, maternal education, and inadequate healthcare utilization as major determinants of poor child health outcomes in Pakistan [14]. Strengthening integrated maternal, newborn, child health, and nutrition programs therefore remains essential.

The review identified workforce shortages and maldistribution as major barriers to effective healthcare delivery. The Global Health Workforce Network reported that many LMICs continue to experience critical shortages of skilled healthcare workers, particularly in rural settings [15]. Similar challenges have been observed in Pakistan, where inequitable workforce distribution affects service quality and healthcare accessibility. Greater investment in workforce retention, continuing professional development, and rural deployment strategies is therefore required.

The growing burden of NCDs represents another major challenge. According to the WHO NCDs Country Profile 2024, NCDs account for approximately 60–65% of all deaths in Pakistan [16]. Recent evidence from the Global Burden of Disease Study 2021 similarly demonstrates increasing prevalence of cardiovascular diseases, diabetes mellitus, cancers, and chronic respiratory diseases [17]. These findings highlight the need to strengthen preventive services, routine screening programs, and long-term disease management at the PHC level.

Punjab has made important progress in digital health through the implementation of DHIS-2 and electronic disease surveillance systems. Nevertheless, challenges related to data quality, interoperability, and evidence utilization remain. Habib et al. reported that fragmented health information systems continue to limit evidence-based planning and decision-making in many LMICs, including Pakistan [18]. Strengthening digital health governance and integration of health and population databases may therefore improve health system efficiency and accountability.

Health financing remains another critical challenge. Although public investment in health has increased, healthcare financing remains insufficient relative to population needs and disease burden, with a disproportionate focus on tertiary care services [11]. Greater investment in PHC, preventive interventions, nutrition programs, and family planning services is required to improve equity and efficiency.

Population growth continues to exert substantial pressure on healthcare resources and service delivery. Recent studies indicate that contraceptive prevalence in Punjab has increased; however, the unmet need for family planning remains significant. Asif & Pervaiz reported that inadequate counseling, misconceptions regarding contraception, and limited access to reproductive health services remain major barriers to contraceptive uptake [19]. Similarly, Abdullah & Bilal demonstrated that increasing contraceptive prevalence could substantially improve maternal and child health outcomes while supporting demographic stabilization [20].

Overall, the findings suggest that Punjab has established a strong foundation for health system development; however, addressing inequities in service delivery, workforce shortages, fragmented governance structures, inadequate PHC financing, and unmet family planning needs will be critical for achieving UHC and improving population health outcomes.

Beyond summarizing existing evidence, this review demonstrates that the principal barriers to improved health outcomes in Punjab are systemic rather than disease-specific. The interaction between workforce shortages, fragmented governance, underinvestment in PHC, weak interoperability of health information systems, and inadequate integration of health and population services creates reinforcing constraints that limit progress toward UHC. The application of the WHO Health System Building Blocks Framework enables these interrelationships to be examined collectively rather than in isolation, providing a systems-level perspective that has been largely absent from previous reviews. Consequently, this review contributes not only by synthesizing current evidence but also by identifying priority leverage points for policymakers, including integrated governance, strengthened PHC, strategic workforce planning, and coordinated health–population interventions.

5. Conclusions

Punjab has made substantial progress in strengthening its health system through the expansion of its healthcare infrastructure, improvement of maternal and child health services, enhancement of disease surveillance systems, and increased access to reproductive health services. However, findings from this narrative review and gap analysis demonstrate that significant challenges continue to impede progress toward UHC and SDG targets. Persistent inequities in healthcare access, shortages and maldistribution of healthcare workers, weaknesses in health information systems, inadequate PHC financing, fragmentation between health and population services, and the growing burden of NCDs remain major concerns.

The application of the WHO Health System Building Blocks Framework highlighted important gaps across service delivery, workforce capacity, health information systems, access to essential medicines and technologies, financing, governance, and population welfare services. Rapid population growth and the continuing unmet need for family planning further increase pressure on already constrained healthcare resources. Although Punjab possesses one of the most extensive healthcare delivery systems in Pakistan, improvements in service quality, equity, integration, and efficiency are required to achieve sustainable health gains. Addressing these challenges through evidence-based and multi-sectoral interventions will be critical for strengthening health system resilience and improving population health outcomes.

Immediate priorities to be addressed in 1–3 years include: strengthening BHUs in high-burden districts, integrating Population Welfare and Health Department services, filling rural workforce vacancies, improving essential medicine supply chains, and upgrading DHIS-2 interoperability. Medium-term priorities to be addressed in 3–5 years include expanding digital health, introducing performance-based financing, strengthening NCD screening, and increasing PHC financing. Long-term priorities to be addressed in over 5 years include launch of universally integrated PHC, establishing province-wide monitoring framework, and health workforce strategic planning.

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