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Published Online: 2025 October 12 **Systematic Review**

Human Resources for Health in the Eastern Mediterranean: A Systematic Review of the WHO Workforce 2030 Strategy

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Abstract

Context: Human resources for health (HRH) are a cornerstone of effective health systems. However, many lower-middle-income countries (LMICs) in the Eastern Mediterranean Region (EMRO) face persistent shortages and structural challenges.

Objectives: This review evaluates the implementation of the World Health Organization (WHO) Global Strategy for HRH: Workforce 2030 in Iran, Djibouti, Morocco, Egypt, Tunisia, Palestine, and Pakistan.

Methods: A systematic review was conducted in accordance with the preferred reporting items for systematic reviews and meta-analyses (PRISMA) guidelines. Literature published between 2015 and 2025 was retrieved from seven databases, including PubMed, SCOPUS, Web of Science, and the Cochrane Library. From 2,768 records screened, 52 peer-reviewed articles met the inclusion criteria. Methodological quality was assessed using Joanna Briggs Institute (JBI) tools.

Results: Progress toward the 2020 milestones varied across countries. Egypt demonstrated notable success in accreditation reforms, while Tunisia and Morocco faced challenges in policy implementation and workforce distribution. The role of community health workers (CHWs) was particularly effective in Iran, improving rural healthcare access and outcomes.

Conclusions: Strengthening HRH in the EMRO requires sustained investment, robust data systems, and coordinated policy efforts. Integrating HRH strategies within broader health system reforms is essential to achieving equitable service delivery. Future research should address regional disparities and support resilient workforce planning.

Keywords: Health Workforce, Health Policy, Accreditation, Global Health, Health Equity

1. Context

Health systems worldwide are increasingly challenged by the rising demand for quality healthcare services (1). The World Health Organization (WHO) identifies four key dimensions of clinical service quality: Professional performance, resource efficiency, patient satisfaction, and risk management (2). Human resources represent a major cost in hospitals (3), and in sanctioned countries, consequences such as migration, brain drain, and economic collapse further strain health systems (4). Human resources for health (HRH) are a core component of effective health systems (5), essential for achieving universal health coverage (UHC) and the sustainable development goals (SDG) (6). In some countries, HRH training consumes over a quarter of the public budget (7). Yet, many lower-middle-income countries (LMICs) in the Eastern Mediterranean Region (EMRO) face persistent HRH shortages, leading to inequities and poor service quality (8), a problem intensified during the coronavirus disease 2019 (COVID-19) pandemic (9). To address these gaps, WHO launched the Global Strategy on HRH: Workforce 2030 (10), supported by regional frameworks like EMRO's Action Plan (11).

Despite these efforts, EMRO countries still face severe workforce deficits (12), especially in conflict zones like Yemen and Afghanistan (13), with healthcare worker (HCW)-to-population ratios below WHO standards (14) and physician-to-nurse imbalances (15). In 2018, EMRO

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nations committed to UHC2030, emphasizing equitable and resilient systems (16). Achieving UHC requires sufficient, well-distributed, and skilled health workers (17). The WHO estimates a global shortfall of over 17 million HCWs by 2030, especially in rural areas (18). Ongoing conflicts in EMRO further destabilize fragile health infrastructures (19).

2. Objectives

This systematic review evaluates the implementation of the WHO Global Strategy for HRH: Workforce 2030 in LMICs within the EMRO. Specifically, it assesses progress toward the 2020 milestones in countries including Iran, Djibouti, Morocco, Egypt, Tunisia, Palestine, and Pakistan, and examines the effectiveness of interventions aimed at strengthening health workforce development (Table 1).

3. Methods

3.1. Study Design

This systematic review evaluated interventions supporting the implementation of the WHO Global Strategy for HRH: Workforce 2030 in seven EMRO countries classified as low- or middle-income by the World Bank: Djibouti, Egypt, Iran, Morocco, Pakistan, Palestine, and Tunisia. The review followed preferred reporting items for systematic reviews and meta-analyses (PRISMA) guidelines and applied a structured approach to synthesize relevant literature. Country selection was based on three criteria: Policy performance in implementing the global strategy, shared socioeconomic and health system challenges, and contextual diversity enabling comparative analysis.

3.2. Search Strategy

A comprehensive search was conducted across seven databases — PubMed, Scopus, Web of Science, Global Health, Health Systems Evidence (Beta), Eastern Mediterranean Health Journal, and Cochrane Library — from January 15 to February 15, 2023, with an update extending to August 2025 (21). The search targeted peer-reviewed and grey literature published in English between January 2015 and August 2025. Boolean search strings were developed using three keyword categories: Workforce, strategy milestones, and country names (Appendices 1 and 2 in Supplementary File).

3.3. Inclusion and Exclusion Criteria

Studies were included if they evaluated HRH interventions aligned with the WHO Global Strategy in EMRO LMICs. Eligible articles were peer-reviewed, published in English, and focused on programs, policies, or initiatives aimed at strengthening HRH. Exclusion criteria encompassed studies from high-income countries, regions outside EMRO, non-peer-reviewed sources, and those lacking direct relevance to Workforce 2030. Data extraction captured authorship, publication year, study design, intervention scope, target groups, outcomes, and alignment with strategic milestones. Reviewer responsibilities included screening, full-text evaluation, data extraction, synthesis, quality appraisal, and transparent documentation (Appendix 3 in Supplementary File).

3.4. Quality Assessment

Methodological quality was assessed using Joanna Briggs Institute (JBI) appraisal tools (22). While randomized trials showed strong internal validity, cross-sectional designs and lack of control groups limited causal inference. Common biases included convenience sampling, inadequate blinding, and subjective reporting. The grading of recommendations, assessment, development and evaluation (GRADE) framework was applied to evaluate evidence certainty (Appendices 4 and 5 in Supplementary File):

- High certainty: Accreditation mechanisms improved educational outcomes.

- Moderate certainty: Policy development showed promise in Tunisia and Morocco.

- Low certainty: Cross-sectional studies lacked causal clarity.

- Very low certainty: Self-reported data were prone to bias.

The findings underscore the need for more rigorous, methodologically sound studies to inform HRH policy-making in the region.

3.5. Protocol Registration

This review was not registered due to its limited scope, absence of institutional funding, and its focus on synthesizing regional policy literature. At the time of study initiation, registration was not mandated for reviews addressing health workforce governance in LMICs.

4. Results

This systematic review examined the implementation of the WHO Global Strategy for HRH:

Table 1. Objectives and Milestones by 2020 of Global Strategy on Human Resources for Health: Workforce 2030 (20)

Objectives	Milestones by 2020
Objective 1: Optimizing performance, quality, and impact of the health workforce through evidence-informed policies on HRH, contributing to healthy lives and well-being, effective UHC, resilience, and strengthened health systems at all levels	1.1. All countries will have established accreditation mechanisms for health training institutions.
Objective 3: Building the capacity of institutions at subnational, national, regional, and global levels for effective public policy stewardship, leadership, and governance of actions on HRH	3.1. All countries will have inclusive institutional mechanisms in place to coordinate an intersectoral health workforce agenda.
	3.2. All countries will have an HRH unit with responsibility to develop and monitor policies and plans.
	3.3. All countries will have regulatory mechanisms to promote patient safety and adequate oversight of the private sector
Objective 4: Strengthening data on HRH to enhance monitoring and accountability of national and regional strategies, as well as the global strategy	4.1. All countries will have made progress in establishing registries to track health workforce stock, education, distribution, flows, demand, capacity, and remuneration
	4.3. All countries will have made progress in sharing HRH data through national health workforce accounts and submitting core indicators to the WHO Secretariat annually
	4.4. All bilateral and multilateral agencies will have strengthened health workforce assessment and information exchange

Abbreviations: HRH, human resources for health; UHC, universal health coverage; WHO, World Health Organization.

Workforce 2030 in seven EMRO countries: Iran, Djibouti, Morocco, Egypt, Tunisia, Palestine, and Pakistan. From 2,768 records identified, 2,076 were screened after removing duplicates. A total of 52 studies were included for final analysis. The PRISMA flow diagram (Figure 1) and Appendix 7 in Supplementary File detail the selection process.

4.1. Overview of Findings

The review identified key interventions contributing to health workforce development (Table 2 Appendix 6 in Supplementary File), including educational reforms, policy initiatives, and international collaborations. These efforts have led to measurable improvements in workforce capacity, competencies, and governance structures (Table 3).

4.2. Effectiveness of Interventions

- Educational reforms: Updated curricula and practical training approaches increased the number and readiness of healthcare professionals.

- Policy development: Inclusive policy-making strengthened system responsiveness, particularly where stakeholder engagement was prioritized.

- International collaboration: Cross-border partnerships facilitated knowledge exchange and adoption of best practices.

4.3. Impact on Workforce Development

- Growth: Recruitment and training expanded workforce numbers, though rural shortages persist.

- Competency enhancement: Training programs improved clinical skills and service delivery.

- Challenges: Retention, uneven distribution, and limited continuing education remain barriers.

4.4. Strategic Objectives Assessed

Progress was evaluated across four strategic domains:

- Accreditation: Efforts to improve education quality in training institutions.

- Policy implementation: Varying success in developing and executing HRH policies.

- Institutional governance: Establishment of HRH units for workforce oversight.

- Data systems: Advances in registry development, though data sharing remains limited.

4.5. Country-Specific Highlights

- Iran: Workforce distribution challenges persist.

- Djibouti: The HRH gaps evident during health emergencies.

- Morocco: Training programs improved service delivery.

- Egypt: Distribution issues hindered access to care.

- Tunisia: The HRH central to UHC advancement.

- Palestine: Conflict-related barriers to HRH management.

- Pakistan: Mental health concerns among HCWs noted.

5. Discussion

Table 3. Analysis of Health Workforce Development: Achievements, Challenges, and Key Interventions

Countries	Challenges	Key Interventions	Achievements	Milestones	SDGs
Djibouti	Limited healthcare infrastructure and workforce shortages	HRH response protocols and training initiatives	Improved healthcare access and emergency response	Milestone 1.1: Enhanced healthcare response systems	Goal 3: Good health and well-being
Iran	Disparities in workforce distribution and mental health resources	Data-driven workforce planning and mental health training	Better resource distribution and mental health services	Milestones 3.1, 3.2, and 3.3: Enhanced HRH training	-
Egypt	Challenges in service delivery and workforce morale	Training programs and policy reforms for HRH improvement	Increased workforce morale and service delivery	Milestones 3.1, 3.2, and 3.3: Improved HRH policies	-
Morocco	Inequities in rural healthcare access	Community health programs to boost HCW presence	Enhanced rural healthcare access and service quality	Milestones 3.1, 3.2, and 3.3: Rural health initiatives	-
Tunisia	Need for better coordination in health services	Emergency management protocols and multi-sector collaboration	Improved coordination and emergency preparedness	Milestones 3.1, 3.2, and 3.3: Enhanced stakeholder coordination	-
Palestine	Challenges in HRH management	Tailored training for midwives and CHWs	Strengthened HRH capabilities and training	Milestones 4.1 and 4.2: Enhanced training programs	-
Pakistan	Barriers to healthcare delivery, stigma, and misinformation	Awareness campaigns and mental health training for providers	Increased mental health awareness and service provision	Milestones 3.1, 3.2, and 3.3: Improved mental health training	-

Abbreviations: SDGs, sustainable development goals; HRH, human resources for health; HCW, healthcare worker; CHWs, community health workers.

This systematic review analyzed 52 studies (2015 - 2025) to evaluate HRH interventions in EMRO LMICs, focusing on workforce availability, training, policy implementation, and the role of community health workers (CHWs). Quantitative data revealed disparities in workforce distribution, while qualitative findings provided stakeholder perspectives on implementation challenges and opportunities. Significant progress was observed in accreditation mechanisms, particularly in Egypt and Jordan, aligning with WHO milestone 1.1 (20, 75). Egypt's robust systems improved training quality and workforce readiness, with similar efforts reported in Morocco (76) and sub-Saharan Africa (77). These reforms underscore the importance of investing in education to build a competent health workforce capable of meeting evolving health needs (78).

The CHWs emerged as key contributors to service delivery, especially in rural areas. Iran's integration of CHWs demonstrated improved access and outcomes (79-81), supporting WHO milestone 3.1. Evidence from other regions confirmed their impact on maternal and child health, primary care, and mortality reduction (82-84). Empowering CHWs is essential for advancing UHC and promoting equity, particularly where formal infrastructure is limited.

Despite these gains, workforce distribution and retention remain critical challenges. Countries like Djibouti and Pakistan face shortages in underserved areas (85, 86), with urban preference among professionals exacerbating disparities (9, 85-87). Studies from Ethiopia further highlight resource constraints and high turnover in rural settings (88). Addressing these gaps is vital for fulfilling UHC2030 and SDG 10 commitments.

Stakeholder engagement proved pivotal in successful HRH policy implementation. Collaborative approaches involving governments, academic institutions, and communities enhanced program relevance and sustainability. Community involvement in CHW deployment fostered trust and utilization (81), while participatory planning in Egypt improved long-term outcomes (85). Strengthening such partnerships is crucial for responsive and adaptable health systems.

5.1. Conclusions

This review assessed the implementation of the WHO Global Strategy for HRH: Workforce 2030 in selected EMRO LMICs. While progress in accreditation and education is evident, persistent challenges in workforce distribution and retention hinder equitable service delivery. Advancing SDG 3 and UHC requires targeted investment, improved monitoring, and coordinated policy action. Continued research and stakeholder collaboration are essential to strengthen HRH systems across the region.

5.2. Policy Implications

Standardized accreditation and regional coordination can elevate health education across EMRO. Policies supporting CHW training, deployment, and retention — backed by financial and social incentives — are essential. To attract professionals to underserved areas, strategies must include career development, infrastructure investment, and supportive work

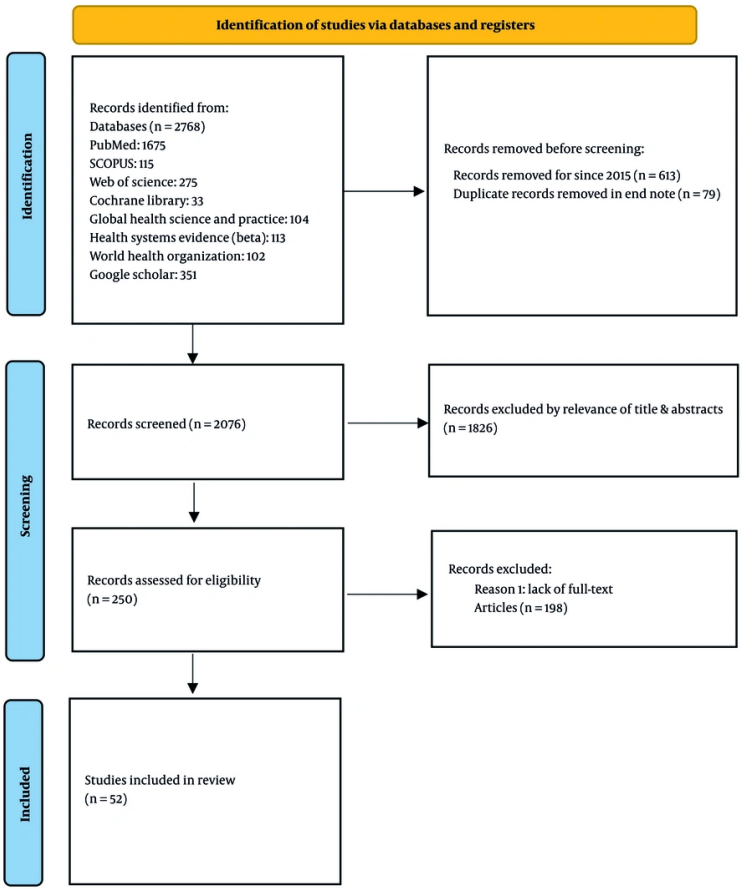

Figure 1. Search strategy flow chart preferred reporting items for systematic reviews and meta-analyses (PRISMA): Consider, if feasible, reporting the number of records identified from each database or register searched (rather than the total number across all databases/registers). If automation tools were used, indicate how many records were excluded by a human and how many were excluded by automation tools (74).

environments. Public-private partnerships and community engagement frameworks should be prioritized. Aligning HRH policies with SDG targets on equity and access remains fundamental.

5.3. Study Limitations

- Design limitations: The predominance of cross-sectional studies limits causal inference.

- Publication bias: Positive findings may overrepresent intervention success.

- Regional specificity: The EMRO-focused data may not be generalizable.

- Data variability: Inconsistent definitions and collection methods hinder synthesis.

- Temporal scope: Post-COVID-19 trends may be underrepresented.

- Stakeholder bias: Limited patient perspectives due to reliance on provider-reported data.

- Implementation gaps: Barriers to strategy execution were insufficiently explored.

- Language restriction: Exclusion of non-english studies may omit relevant evidence.

Supplementary Material

Supplementary material(s) is available here [To read supplementary materials, please refer to the journal website and open PDF/HTML].

Footnotes

Authors' Contribution: Study concept and design: M. N. and L. R.; Analysis and interpretation of data: M. M. and A. M.; Drafting of the manuscript: M. N. and L. R.; Critical revision of the manuscript for important intellectual content: M. M. and A. M.; Statistical analysis: M. N.

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Data Availability: The data presented in this study are uploaded during submission as a supplementary file and are openly available for readers upon request.

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Table 2. Systematic Review Study Data

Authors	Year	Country	Method	Main Findings	Recommendations
Iqbal et al. (23)	2022	Eastern Mediterranean	Qualitative	Explored private sector engagement in health	Strengthen private sector involvement
Hameed et al. (24)	2022	Pakistan	Qualitative	Assessed mental health impact on HCWs	Enhance mental health support
Joudaki et al. (25)	2015	Iran	Data mining	Improved fraud detection in claims	Implement advanced data analytics
Hammoud et al. (26)	2022	Lebanon	Qualitative	Analyzed patient complaint systems	Establish effective complaint management
Safi-Keykaleh et al. (27)	2022	Iran	Grounded theory	Identified challenges in emergency decision-making	Train emergency medical technicians
Zeeshan et al. (28)	2018	Pakistan	Mixed methods	Identified public health education needs	Enhance public health curricula
Khosravi et al. (29)	2021	Iran	Qualitative	Assessed quality of midwifery care	Develop midwife-centered care models
Aghakhani and Baghaei (30)	2020	Iran	Quantitative	Family-centered model reduced post-dialysis fatigue	Implement family-centered care approaches
Rana et al. (31)	2020	Pakistan	Literature analysis	The HCWs face intense feelings of anxiety, fear, and helplessness in response to the COVID-19 pandemic	Create a structured model that integrates teams of Physicians, psychiatrists, psychologists, and social workers to provide early psychological interventions to HCWs and patients
Ali et al. (32)	2019	Pakistan	Qualitative	Investigated barriers to TB treatment	Address barriers to treatment adherence
Hosseini Moghaddam et al. (33)	2020	Iran	Mixed methods	Analyzed patient transfer challenges	Improve transfer protocols
Chaudhary et al. (34)	2020	Pakistan	Cross-sectional	Assessed PPE access during COVID-19	Ensure adequate PPE supply
Doshmangir et al. (35)	2020	Iran	Qualitative	Explored healthcare service tariffs	Reform pricing strategies
Zaidi et al. (36)	2020	Pakistan	Qualitative	Examined community dynamics affecting nutrition uptake	Enhance community engagement
Mumtaz (37)	2020	Pakistan	Qualitative	Evaluated midwives' role in maternal health	Strengthen support for community midwives
Javed et al. (38)	2019	Pakistan	Mixed methods	Assessed patient satisfaction across sectors	Improve service quality
Basir et al. (39)	2019	Pakistan	Quantitative	Evaluated diagnostic accuracy for TB detection	Enhance diagnostic technologies
Mumtaz et al. (40)	2015	Pakistan	Qualitative	Identified success factors for community midwives	Scale successful midwifery practices
Sheikh et al. (41)	2015	Pakistan	Qualitative	Linked trust in health services to policies	Foster transparency in management
Khalil et al. (42)	2018	Egypt	Qualitative	Assessed gaps in HIV/HCV knowledge	Develop targeted training programs
Toure et al. (43)	2021	Palestine	Mixed methods	Evaluated HRH strategies for maternal health	Focus on training midwives and community workers
Mohammadpour et al. (44)	2023	Iran	Qualitative	Identified eight themes for the paradigm shift in Iran's healthcare, including the need for enhanced electronic health infrastructure and evidence-based decision-making	Implement reforms in e-health, pandemic budgeting, and support for HCWs
Ferrinho et al. (45)	2022	Djibouti	Qualitative	The COVID-19 pandemic exposed inadequacies in HRH leadership, highlighting the need for adaptive and participatory approaches	Develop effective HRH leadership to navigate complex health labor market dynamics
Faruk et al. (46)	2021	Palestine	Mixed methods	Analyzed HRH management barriers	Develop strategies to overcome barriers
Alawode, et al. (47)	2025	Iran	Quantitative	Assessed HRH distribution impact	Improve equitable distribution of workers
G. B. D. Human Resources for Health Collaborators et al. (48)	2023	Tunisia	Qualitative	Explored HRH's role in universal coverage	Strengthen HRH policies for universal coverage
Alkhaldi, et al. (49)	2024	Palestine	Mixed methods	Revealed strengths in HRH training initiatives	Enhance training based on local needs
Zare et al. (50)	2021	Iran	Qualitative	Analyzed HRH strategies during COVID-19	Adapt HRH strategies to evolving needs
El-Jardali et al. (51)	2015	Eastern Mediterranean	Institutional	Emphasized support for health policy research	Foster research institutions for policy development
Zhang (52)	2015	Egypt	Mixed methods	Assessed HRH challenges in Egypt	Develop targeted HRH improvement interventions
Charfi et al. (53)	2023	Tunisia	Cross-sectional	Increased human resources development of child psychiatry improved treatment access	Enhance training for non-specialists incentivize psychiatrists in underserved areas increase accessibility to services strengthen community-based services promote public awareness and stigma reduction
Habib et al.(54)	2020	Lebanon	Cross-sectional study	Poor self-rated health poor mental health chronic illness musculoskeletal pain	Improve working conditions address job satisfaction support for chronic illness and mental health job security initiatives policy advocacy community engagement
Al Hassani et al. (55)	2024	Morocco	Quantitative	Assessed HRH challenges in rural healthcare	Strengthen rural HRH initiatives
Kasemy et al. (56)	2020	Egypt	Qualitative	Prevalence of workaholism mental health outcomes quality of life critical specialty HCWs predictors of burnout	Address personal characteristics supportive work environment regular health assessments mental health resources promote team collaboration training on time management awareness campaigns encourage breaks and downtime
Najjar et al. (57)	2022	Palestine	Mixed methods	Analyzed HRH policies' impact on accessibility	Revise HRH policies for equitable healthcare
Zhila et al. (58)	2022	Iran	Quantitative	Assessed HRH workforce planning in health needs	Implement dynamic workforce planning models
Mir et al. (59)	2015	Pakistan	Cross-sectional study	Willingness to leave service geographical factors dissatisfaction with performance evaluation dissatisfaction with salary influence of local politicians	Public healthcare system can improve staff retention, enhance job satisfaction, and ultimately provide better healthcare services to the population
Norris et al. (60)	2022	Various	Qualitative	Evaluated the African Health Initiative's role	Promote embedded implementation research
Akhlaq et al. (61)	2020	International	Qualitative	Identified barriers to health information exchange	Address barriers to improve information exchange
Alikhani and Damari (62)	2017	Iran	Qualitative	Proposed a partnership model for health screening	Implement partnership strategies for screening
Al-Mandhari et al. (63)	2019	Eastern Mediterranean	Qualitative	Explored multi-sectoral action on health for SDGs	Foster collaboration across sectors
Moucheraud et al. (64)	2016	Pakistan	Qualitative	Identified barriers to maternal and child health	Address community perceptions to improve access
Irfan et al. (65)	2015	Pakistan	Qualitative	Analyzed public sector provider challenges	Improve working conditions for healthcare staff
Mumtaz et al. (66)	2015	Pakistan	Qualitative	Identified gaps in the community midwife program	Strengthen midwife training and support
Rafique et al. (67)	2015	Pakistan	Survey	Assessed dengue knowledge among providers	Enhance training on dengue management
Shah et al. (68)	2021	Pakistan	Cost-effectiveness	Analyzed cost-effectiveness of rotavirus vaccination	Promote vaccination programs
Hameed et al. (24)	2022	Pakistan	Qualitative	Documented HCWs' pandemic experiences	Provide ongoing support for HCWs

Authors	Year	Country	Method	Main Findings	Recommendations
Siebert and Souto-Galvan (69)	2024	Pakistan	Qualitative	Explored barriers to mental health service access	Increase awareness to reduce stigma
Shahbaz et al. (70)	2022	Pakistan	Qualitative	Identified obstacles to anaesthesiology practice	Improve training for anaesthesiologists
Ben Romdhane et al. (71)	2015	Tunisia	Qualitative	Examined challenges related to non-communicable diseases	Strengthen health policies for NCD management
Aly et al. (72)	2021	Egypt	Qualitative	Highlighted occupational stressors in healthcare	Address stress through supportive measures
Shaikh (73)	2015	Pakistan	Descriptive and analytical study	Growth of the private sector challenges of quality and cos lack of effective oversight consumer trust potential for collaboration need for reforms	Strengthening regulatory frameworks enhancing public-private partnerships improving quality of care increasing accessibility promoting health education investing in workforce development

Abbreviations: HCW, healthcare worker; COVID-19, coronavirus disease 2019; HRH, human resources for health; SDGs, sustainable development goals.