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Barriers and opportunities in hepatitis C elimination: perspectives of healthcare workers in Saudi Arabia

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Abstract

Background

Saudi Arabia's National Hepatitis C Virus (HCV) Elimination Programme aims to meet WHO's 2030 targets through mass screening, decentralised treatment, and public awareness. Healthcare workers (HCWs) are central to this effort, yet their perspectives on system-level challenges remain understudied.

Aims

This study explores HCWs' experiences with the national HCV programme to evaluate operational performance, identify systemic barriers, and highlight opportunities to improve care pathways.

Methods

A qualitative design using semi-structured interviews was conducted with 21 HCWs (including physicians, nurses, lab staff, and administrators) across 15 treatment centres in five Saudi regions. Data were analysed inductively using thematic analysis.

Results

While HCWs expressed strong commitment, they reported that programme delivery relies heavily on individual initiative rather than structured institutional support. Screening intensity has declined due to rapid-test shortages and limited public awareness. Centralised PCR testing caused diagnostic delays, contributing to patient disengagement, while treatment capacity remains underutilised due to weak linkage to care. Key systemic barriers include supply chain instability, inconsistent administrative communication, limited formal training, and patient stigma. HCWs recommended decentralising diagnostics, stabilizing supply chains, and enhancing community engagement.

Conclusion

Saudi Arabia's HCV elimination goals are supported by a motivated workforce but constrained by operational inefficiencies. Strengthening logistics, inter-level coordination, and community outreach is essential to achieve sustainable national elimination.

I. Introduction

Hepatitis C virus (HCV) remains a major global public health challenge, contributing to substantial morbidity and mortality through progression to liver cirrhosis, hepatocellular carcinoma, and liver failure

if untreated. An estimated 58 million people are chronically infected worldwide, with approximately 1.5 million new infections each year (WHO, 2021c). The burden is disproportionately concentrated in low- and middle-income settings, where access to diagnosis and treatment remains limited (Blach et al., 2017). In response, the World Health Organization (WHO) has set ambitious targets to eliminate viral hepatitis as a public health threat by 2030, including diagnosing 90% of infections and treating 80% of eligible individuals (WHO, 2016).

Saudi Arabia has aligned with these global targets through the implementation of a National HCV Elimination Programme in 2018, which combines mass screening, decentralised treatment using direct-acting antivirals, and public awareness initiatives. While the programme represents a significant advancement in national health policy, its effectiveness depends on how it is operationalised within diverse healthcare settings.

Healthcare workers play a central role in translating policy into practice, acting as the primary interface between health systems and patients. Evidence from HCV elimination programmes indicates that their engagement is critical for improving service delivery, enhancing patient trust, and addressing barriers such as stigma, misinformation, and access constraints (Gamkrelidze et al., 2021; Lazarus et al., 2022; Cunningham et al., 2022). However, their perspectives are often underrepresented in programme evaluations, limiting understanding of implementation challenges and system performance.

In Saudi Arabia, variations in infrastructure, service delivery models, and regional contexts further shape programme implementation. Despite the national scale of the HCV initiative, limited empirical evidence exists on how frontline healthcare workers experience and navigate these complexities in practice.

This study addresses this gap by exploring healthcare workers' perspectives on the implementation of the HCV elimination programme across multiple regions in Saudi Arabia. Using qualitative semi-structured interviews, the study examines programme performance, identifies system-level challenges, and highlights opportunities for improvement. By focusing on frontline experiences, it aims to provide contextually grounded insights to inform more effective, equitable, and sustainable HCV elimination strategies.

II. Methods

This study employed a qualitative design using semi-structured interviews to explore healthcare workers' experiences of implementing the National Hepatitis C Virus (HCV) Elimination Programme in Saudi Arabia. A qualitative approach was selected to generate in-depth, contextually grounded insights into programme delivery, including operational processes, workforce roles, and system-level challenges that are not readily captured through quantitative methods (Guest et al., 2006; Sandelowski, 2000).

The study was conducted across 15 treatment centres located in five administrative regions of Saudi Arabia (Central, Eastern, Western, Southern and Northern). Centres were purposively selected to ensure variation in geographic location, population density, and programme activity, allowing representation of

both urban and rural service delivery contexts (Patton, 2002). Participants were healthcare professionals directly involved in the screening or treatment components of the HCV elimination programme, including physicians, nurses, laboratory staff, public health specialists and administrative personnel.

Eligible participants were identified through centre-level administrative lists and approached in person. Sampling aimed to achieve diversity in professional roles, experience and regional context. A total of 21 healthcare workers participated. Data collection continued until thematic saturation was reached, defined as the point at which no new themes emerged from the data (Guest et al., 2006; Morse, 2000).

Data were collected through face-to-face semi-structured interviews conducted in private settings within participants' workplaces. An interview guide was used to ensure consistency while allowing participants to elaborate on issues they considered important (King et al., 2019). Interviews covered experiences related to both screening and treatment components of the programme, including service delivery processes, resource availability, patient engagement, and perceived barriers and facilitators to implementation. All interviews were audio-recorded with consent, transcribed verbatim, and translated into English where necessary. Transcripts were anonymised prior to analysis.

Ethical approval

was obtained from the Saudi Ministry of Health and University College London. Participants were informed of the study purpose and provided verbal consent prior to participation. Confidentiality and anonymity were ensured throughout data collection and analysis. Data were securely stored on encrypted institutional servers and accessed only by the researcher.

2.1 Data analysis

Data were analysed using thematic analysis following Braun and Clarke's six-phase framework (Braun & Clarke, 2006). An inductive, data-driven approach was adopted to allow themes to emerge from participants' accounts rather than being predefined, which is appropriate for exploratory health systems research (Patton, 2002; Thomas, 2006).

Analysis focused primarily on semantic themes, capturing explicit meanings in participants' accounts, while also allowing limited interpretive insights into underlying system-level dynamics (Braun & Clarke, 2019). Transcripts were read repeatedly and coded line-by-line. Codes were iteratively refined, compared across interviews, and grouped into broader categories through a constant comparative process, enhancing analytical rigour (Nowell et al., 2017).

Two overarching themes were generated through the inductive analysis, reflecting both the organisation of programme delivery and the conditions shaping its implementation. The first, programme performance across screening and treatment pathways, captures how intended service processes were enacted in practice and where variations in delivery emerged. The second, system-level challenges and opportunities for improvement, reflects the structural and organisational factors influencing these

patterns, indicating that observed performance is closely linked to broader system constraints rather than isolated operational issues.

NVivo software supported coding and data management. Analytical credibility was strengthened through iterative comparison across roles, regions, and levels of programme involvement (Lincoln & Guba, 1985).

III. Results

Twenty-one healthcare workers participated in the study, representing a range of professional roles, including physicians, nurses, laboratory staff, public health specialists and administrative personnel, across both urban and rural settings in five regions of Saudi Arabia. Participants were involved in both the screening and treatment components of the HCV elimination programme (see Appendix Table A1).

The findings provide insight into how the programme is implemented in practice and highlight key operational strengths, systemic challenges and opportunities for improvement from a frontline perspective.

3.1 Performance of the screening and treatment components

Participants consistently demonstrated a strong sense of professional responsibility towards the HCV elimination programme, viewing their involvement as an integral part of their clinical role and contribution to national health priorities. However, this commitment appeared to operate largely in the absence of structured institutional support. Several participants reported limited formal training and reliance on experiential learning, suggesting that programme delivery is sustained more by individual initiative than by standardised implementation processes.

“I was not given formal training, but I learned through practice.” (Participant 6)

A key finding was the decline in screening intensity over time, reflecting a shift from an initially proactive, community-based model to a more constrained and facility-based approach. Early efforts characterised by outreach and active case finding were not sustained, largely due to resource limitations and reduced operational support. This transition has important implications for programme effectiveness, particularly in identifying asymptomatic individuals and high-risk populations.

“Screening was very active in the beginning… but not anymore due to the short supply of rapid tests.” (Participant 11)

In parallel, limited awareness of HCV among both the public and healthcare workers emerged as a persistent barrier. This was particularly evident in rural settings, where stigma and misinformation continued to influence health-seeking behaviour. The findings suggest that awareness strategies have not been consistently embedded within programme delivery, thereby weakening the interface between service provision and community engagement.

The treatment component, in contrast, was not perceived as overstretched but rather as underutilised, indicating a structural imbalance within the programme. Participants reported sufficient clinical capacity to manage additional patients; however, reduced screening activity and delays in diagnostic confirmation limited patient flow into treatment pathways. This highlights a disconnection between different stages of the care continuum, where inefficiencies in earlier processes constrain downstream service utilisation.

“We can handle more patients… we need to recruit more.” (Participant 2)

Delays in PCR testing and treatment initiation were identified as critical bottlenecks, contributing to prolonged waiting times and, in some cases, patient disengagement.

“The waiting list is backlogging… it has reached a 2-month waiting point.” (Participant 9)

Notably, participants did not describe excessive workload; rather, they expressed frustration at being unable to fully utilise their capacity. This reflects inefficiencies within the system rather than limitations in workforce capability.

Overall, these findings indicate that programme performance is constrained not by clinical capacity, but by weaknesses in screening, awareness, and diagnostic processes, which collectively disrupt the continuity of care.

3.2 System-level challenges and opportunities for improvement

The second theme highlights the extent to which programme performance is shaped by system-level constraints, particularly in relation to logistics, coordination, and governance.

Logistical inefficiencies were consistently identified as major barriers. Shortages of rapid test kits, delays in PCR confirmation, and inconsistencies in medication supply were reported to disrupt both screening and treatment processes. These issues indicate underlying weaknesses in supply chain management and laboratory capacity, which limit the programme’s ability to operate as an integrated and responsive system.

“Rapid test kits are usually in short supply… sometimes we have to postpone screening.” (Participant 2)

These challenges were compounded by limited coordination between central authorities and healthcare providers, resulting in variability in implementation across centres. The absence of clear and standardised protocols suggests a gap between policy design and operational execution.

“Each centre is doing it differently.” (Participant 10)

Workforce-related constraints further illustrate this disconnect. Programme responsibilities were frequently integrated into existing clinical duties without additional staffing or protected time, particularly in smaller or rural settings. In addition, the lack of formal training contributed to variability in service delivery and reliance on informal knowledge-sharing practices.

Low patient compliance emerged as another critical barrier, closely linked to stigma, limited awareness, and delays in care. Participants reported that patients often disengaged from the programme due to fear of social stigma or frustration with prolonged diagnostic and treatment processes.

“Some patients don’t come back… they think the disease is shameful.” (Participant 20)

In addition to operational challenges, participants highlighted limited programme visibility and recognition, which influenced motivation and engagement. While financial incentives were not prioritised, the absence of institutional acknowledgement was perceived as a missed opportunity to sustain workforce commitment.

“A simple thank you letter or certificate can go a long way.” (Participant 4)

Importantly, participants demonstrated a clear understanding of system limitations and proposed practical strategies for improvement. These included strengthening supply chains, decentralising PCR testing to reduce delays, implementing structured training programmes, and enhancing community engagement through culturally appropriate approaches.

“If we could do PCR locally, we would save time and keep patients engaged.” (Participant 9)

Participants also emphasised the need for improved communication and coordination between central and local levels, including greater involvement of frontline staff in programme planning and decision-making. Addressing these challenges will require a more coordinated, resource-stable, and context-sensitive approach that strengthens both operational processes and community engagement.

3.3 Frequency analysis of NVivo data

The distribution of coded responses reveals a fundamental imbalance within the programme, characterised by strong professional engagement alongside weaker system performance. Positive responses were largely concentrated in areas related to participation and involvement, whereas negative responses clustered around awareness, programme development, and operational delivery. This pattern indicates that the programme’s apparent strengths are primarily workforce-driven, while its limitations are embedded within organisational and structural processes.

In the screening component, high levels of reported participation are not matched by equivalent gains in awareness or evidence of programme evolution. The persistence of low awareness scores, combined with limited indications of change over time, suggests that screening activities have not been supported by sustained communication strategies or adaptive programme development. The relative absence of reported challenges in some areas should therefore not be interpreted as effective performance, but rather as indicative of stabilised yet suboptimal practices, where constraints have become routine and largely unchallenged (Fig. 1A).

By contrast, the treatment component is characterised by a more pronounced concentration of reported drawbacks across multiple domains. The prominence of issues relating to recruitment, capacity, and service delivery reflects a system that is not constrained by clinical capability, but by inefficiencies in patient flow and coordination. In particular, the imbalance between low reported advantages and higher levels of identified challenges suggests that treatment services are operating below potential, with upstream limitations—particularly in screening and referral—restricting their utilisation (Fig. 1B).

The widespread reporting of challenges within the treatment pathway further indicates that these are not isolated operational issues, but rather symptoms of system-level fragmentation and weak integration across the care continuum. At the same time, the continued presence of suggestions and reported advantages points to localised adaptive responses, suggesting that, while the system lacks coherence, it is partially compensated for by individual and site-level efforts (for detailed information, see Appendix Table A2).

IV. Discussion

This study provides a contextually grounded analysis of healthcare workers' experiences within Saudi Arabia's National HCV Elimination Programme, highlighting a central tension between strong workforce engagement and weaker system performance. While progress has been made in expanding screening and treatment, its impact remains constrained by logistical fragility, uneven implementation, and limited system integration.

A key finding is that programme delivery is largely sustained through intrinsic motivation and professional commitment, rather than consistent institutional support. Healthcare workers described a strong sense of responsibility towards both patient care and national elimination goals, particularly among volunteers. This aligns with evidence showing that intrinsic motivation can compensate for structural limitations in resource-constrained settings (Oxholm et al., 2025; Rios-Zertuche et al., 2023; Kiwanuka et al., 2024). However, reliance on individual commitment raises concerns regarding sustainability, particularly in the absence of structured training, recognition, and supportive leadership.

The findings also indicate a decline in the intensity of screening activities over time, with a shift from proactive outreach to more limited, facility-based approaches. Participants attributed this to shortages of rapid test kits, delays in PCR confirmation, and reduced operational support. Such reductions undermine case detection and weaken programme visibility. Similar patterns have been reported in other national HCV programmes where early gains were not sustained (Handanagic et al., 2024; Burton-McKeich et al., 2025). In contrast, countries such as Egypt and Georgia have maintained progress through sustained investment in decentralised diagnostics and primary care capacity (Amer, 2018; Hiebert-Suwondo et al., 2025).

Limited awareness and persistent stigma were identified as key barriers, particularly in rural areas, pointing to a gap between service provision and community engagement. Evidence suggests that

culturally tailored outreach, including collaboration with local and religious networks, can improve uptake and reduce stigma (Grebely et al., 2023).

The treatment component, while clinically robust, was perceived as underutilised rather than overstretched. Participants reported sufficient capacity but limited patient recruitment due to inconsistent screening, delayed diagnosis, and administrative bottlenecks. This reflects a disconnect between stages of the care pathway, where inefficiencies in screening and referral constrain treatment uptake. Similar challenges have been addressed in countries such as Georgia and Australia through point-of-care diagnostics and simplified pathways, improving linkage to care (Mochales et al., 2024; Hiebert-Suwondo et al., 2025; Burton-McKeich et al., 2025).

Healthcare workers did not report excessive workload but instead described underutilised capacity, indicating inefficiencies in system design rather than workforce shortages. At the same time, limited programme visibility and lack of institutional recognition were identified as factors affecting morale. Evidence from other health systems suggests that non-financial recognition and supportive leadership can enhance engagement and retention (Yordanov et al., 2023; Owen-Boukra et al., 2025).

Participants proposed practical, system-oriented solutions, including decentralising PCR testing, strengthening supply chains, enhancing training, and appointing dedicated coordinators. These recommendations reflect a workforce that is both critically aware of system constraints and actively engaged in identifying improvements, consistent with evidence emphasising co-designed and context-sensitive interventions (Greenhalgh et al., 2018; WHO, 2022a).

Community engagement was repeatedly emphasised, with participants advocating for renewed outreach and the integration of HCV awareness into everyday community settings. This aligns with global evidence highlighting the importance of combining clinical services with community-based strategies to support adherence and long-term engagement (Grebely et al., 2023; Van Kim et al., 2024).

The need for improved communication between central authorities and frontline providers reflects broader governance challenges. Limited involvement in decision-making and weak feedback mechanisms suggest a gap between policy and practice, consistent with evidence that top-down approaches can weaken implementation and workforce morale (Sheikh et al., 2014). Strengthening feedback loops and participatory planning may therefore enhance coordination, trust, and programme effectiveness.

The programme is supported by a committed workforce and strong clinical foundations, yet remains constrained by system-level inefficiencies, weak coordination, and underutilised capacity. Addressing these challenges requires a shift towards more integrated, responsive, and implementation-focused strategies, aligned with global guidance on achieving sustainable HCV elimination (WHO, 2022a; Handanagic et al., 2024).

V. Conclusion

The findings suggest that Saudi Arabia's HCV elimination programme is underpinned by a committed and motivated healthcare workforce, but its impact is constrained by system-level inefficiencies, including gaps in coordination, resource availability, and continuity across the care pathway. While screening and treatment services are in place, their integration remains limited, reducing the programme's overall effectiveness. Addressing these challenges through strengthened supply chains, decentralised diagnostics, sustained community engagement, and improved communication between central and local levels will be essential to maximise existing capacity and support a more effective and equitable trajectory towards HCV elimination.

Declarations

Ethics approval and consent to participate

Ethical approval was obtained from the Saudi Ministry of Health (IRB: Number 22-14E) and University College London (UCL REC: Project 22581/001 registered in UCL Data Protection Office). All procedures were conducted in accordance with the **Declaration of Helsinki**. All participants provided informed consent.

Availability of data and materials

The qualitative interview data generated and analysed during this study are not publicly available due to confidentiality and ethical restrictions. De-identified excerpts are included within the manuscript. Additional data may be available from the corresponding author upon reasonable request and subject to institutional approval.

Competing interests

The authors declare that they have no competing interests.

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All authors read and approved the final manuscript.

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Figures

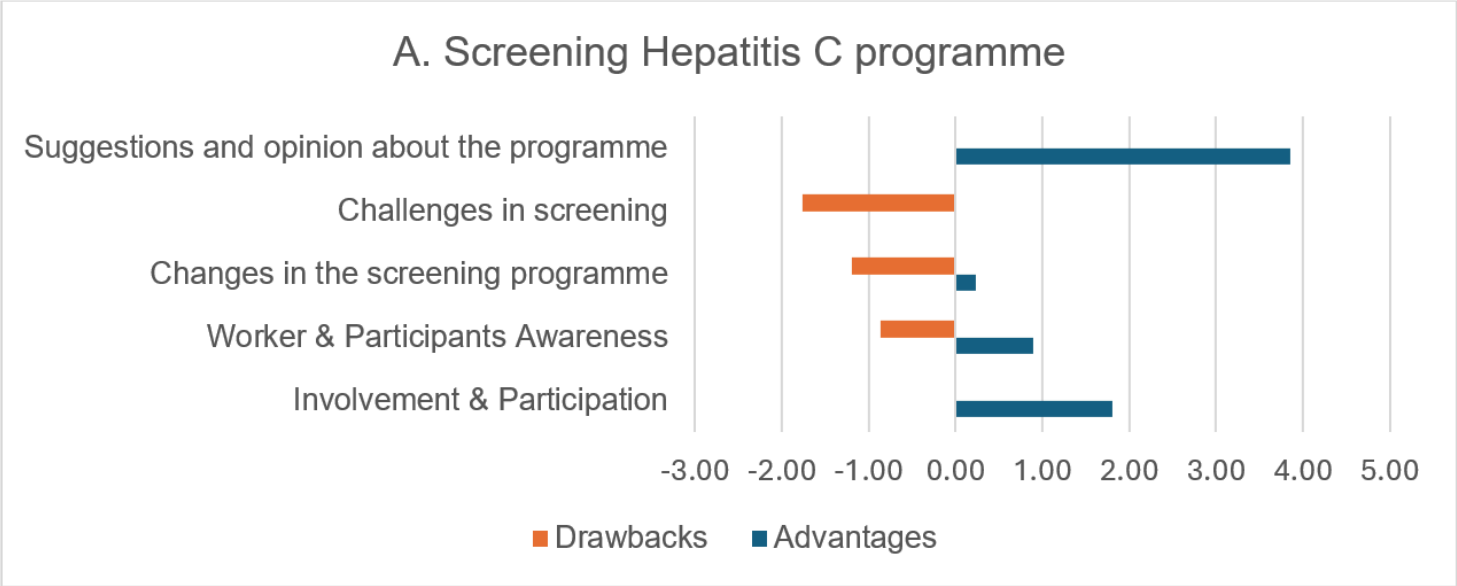

Figure 1

Frequency distribution of advantages and drawbacks identified through NVivo coding: (A) Screening component; (B) Treatment component of the HCV elimination programme.

Supplementary Files

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