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BEYOND THE 'SILENT STORM': EXAMINING THE INFLUENCE OF EDUCATION, HEALTH AWARENESS AND SOCIO-CULTURAL BARRIERS ON HEPATITIS B AND C IN BALOCHISTAN

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Abstract

Hepatitis B and C are still important public health problems in Pakistan, especially in rural and socio-economically deprived regions, in which the level of education and health literacy is low and socio-cultural factors may impede disease prevention and control measures. This study aims to explore the socio-cultural and educational aspects of HBV and HCV among the affected individuals in rural areas of Balochistan, including socio-cultural aspects, knowledge, awareness and preventive measures of affected people regarding health seeking behavior. Twenty hundred adults with HBV and HCV were recruited from government subsided hospitals and were studied using a mixed method ethnographic approach. Descriptive statistics, correlation analysis and linear regression were used to analyse quantitative data and thematic analysis for ethnographic observations, and narrative interviews. Results showed significant lack of knowledge: before diagnosis, 22% of the participants were unaware of what hepatitis was, 27% of the participants had no knowledge of transmission routes, and only 30.5% had any basic knowledge of transmission routes. Transmission risks were significantly associated with infection-related outcomes ($r = .170$, $p = .016$) and living with someone in the household who was infected with the virus was also significantly associated ($r = .151$, $p = .033$). Qualitative results also revealed stigma, family influence, cultural beliefs and access to health services as key factors impacting on test and immunisation. The results demonstrate that health literacy is a key element in hepatitis prevention education and provide evidence for the need to focus health education from a general information to a culturally responsive health education. Community-based strategies that employ local language language, images, demonstrations and participatory learning can increase awareness and preventive health behaviours of underserved populations.

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"Mopping up a flood"

Hepatitis B and C remain a major public health burden and worldwide more than 1.34 million have lost their lives by hepatitis b and c related complications (WHO, 2026). The paramount concern of mortality worldwide is chronic liver disease. It is significantly affecting people's life and dramatically increasing healthcare costs (SK et al., 2019). "Pakistan is one of the few countries in the world where transmission is still ongoing on a large scale" (Ghebreyesus, 2017) remarked the incumbent World Health Organization (WHO) Director in a speech occasioned by Pakistan joining the global goal to eliminate viral hepatitis. Updated figures are hard to come by, especially in rural and remote areas (Raza et al., 2018). The last nationwide survey dates back to 2008 (Medical Research Council), and the population keeps growing. So does the number of hepatitis B and hepatitis C cases (Mehmood et al., 2019). The high incidence rate of viral hepatitis among the Pakistani population adds pressure on the already overstretched and under-resourced public health system; all the more during the COVID-19 pandemic, for which Pakistan is ill-prepared (Saqlainet al., 2020).

Viral hepatitis is a communicable disease transmitted via bodily fluids; horizontally (from person to person), and vertically (from mother to child). Because of the socio-cultural milieu in which this ethnographic intervention moves, we add interfamilial transmission (Butt & Sharif, 2016) and intrafamilial transmissions (Mujeeb & Pearse, 2008; Plancoulaineet al., 2008) of the hepatitis B virus (HBV, of the Hepadnaviridae family) and hepatitis C virus (HCV, of the Flaviviridae family). If undetected and left untreated, acute infections become chronic. Chronic hepatitis can cause a wide range of liver diseases. Health complications include liver cirrhosis, hepatocellular carcinoma (HCC), and lymphomas, and may lead to premature death (Liang, 2009).

The congratulatory words of the head of the international health agency in the above speech were not without a premonition, though. "But it is futile to attempt to mop up a flood," Tedros Adhanom Ghebreyesus said. "We must turn off the tap by taking action to prevent infections," he told his sister, Saira Afzal Tarar, and brother, Mahmoud Fikri, the honorable Minister for National Health Services and Coordination, and all the other distinguished guests assembling for the launch of the National Hepatitis Strategic Framework (NHSF) for Pakistan 2017-2021 (Ministry of National Health Services, Regulations and Coordination, Pakistan Health Research Council, & World Health Organisation; NHSF hereafter). In this address to the Pakistani health leadership, he urged for "urgent action" to reverse the current trend and eliminate hepatitis B and C as a major public health threat by 2030. In short, the country must deal with this "flood" and "mop it up." What triggers this seemingly unstoppable flood, we may ask?

The Islamic Republic of Pakistan accounts for 10% of the world's total HCV infections, but just about 2.83% of the world population (ref). Vis-à-vis 10 million hepatitis C cases and 5 million hepatitis B cases in a total population of 221 million passing, and 23,720 hepatitis-related deaths annually (World Health Organization, 2019), cutting new hepatitis C infections by 80% (Abbas & Abbas, 2020) seems more utopian than bold. Regardless of how rough these approximations are, the numbers capture the urgency to turn off the metaphorical tap invoked in the above locution, pouring out tens of thousands of new HBV and HCV infections each year. No single flick of the wrist will pull to pieces the medical waste recycling industry in Pakistan to which this upbraiding warning alludes and appeals to, and this independent research engages with, ethnographically.

It is no secret that the improper disposal of used and unsterile needles, syringes, cannulas, gauze, cotton pads, and other by-products of healthcare spread viral hepatitis in this part of the world (Mujeeb et al., 2003; Patwaryet al., 2011). Occasionally, the improper management and

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Volume 4 • Issue 4 • August 2026

treatment of healthcare waste cause a stir that subsides as quickly as it emerged. Soon after a well-liked Pakistani socialite (the spouse of a cricketer) tweeted photographs of medical waste washed up on the shores of the Arabian Sea tweeted for fear beach visitors might get hurt, the Sindh Solid Waste Management Board intervened. The popular stretch of sand was sealed off. Garbage collectors descended onto the beach. By noon, the beach was cleared of the debris and reopened to the public (Drury, 2019). Sensational reports, such as this one that made international headlines, suggest these occurrences be the exception, even outlandish, whereas they are political, mundane, and stuff of everyday life for many Pakistanis, as the HBV-positive man who spoke to us about his business during a following up field visit.

In early 2026, we set out to investigate this euphemistic "tap" in its multiple appearances and guises through a cultural lens. With evidence from fieldwork, we will illustrate that inappropriate medical waste treatment is a constitutive element of the social world surrounding hepatitis B and C in this lesser studied part of South Asia's vast hepatitis landscape. Why the law, by itself, will not dry up the lucrative trade in binned medical equipment escaping the incinerator is tied to medical malpractices and cultural practices. The improper disposal and collection of medical waste, injections for unnecessary therapeutic purposes (Janjua et al., 2016), and the circulation of unsafe blood products in primary healthcare facilities are a fertile turf for this illicit trade and for viral hepatitis to spread. With rising access to healthcare, scavenging, recycling, and reselling of medical waste flourishes even. What makes this outlawed industry Afghan refugees (Ahmad, 2004) and other socially marginalized and economically vulnerable sections of the society are drawn into so resilient?

For this field-based social health analysis of HBV and HCV transmission risk in the rural, agricultural Southwest, we concentrate on the health-seeking behavior and threat perception among hepatitis B and C patients. We then create a link of the locally specific issues with lasting medical malpractices that sustain the lifelines of this trade, which is part and parcel of the informal economy. Disentangling this expanding meshwork is at the core of this micro-scale inquiry that seeks to better our understanding of the situation after the scale-up of government-subsidized antiviral therapy at the patient level in the countryside. Instead of critiquing a left-behind public health system that fails the ordinary citizen in a Global South context, firstly we take the position of the local people immediately affected by this unabated epidemic in places where access to public healthcare has been compromised already before the outbreak of COVID-19. The evocative account of a former self-employed medical waste recycling entrepreneur, together with the communications of the other 199 participants of the Jaffarabad patient cohort study expressively bestow a face, a gaze, and a voice to that 'silent storm' (Jiwani& Gul, 2011) sweeping across wide swathes of the Indian Subcontinent, others have called a 'viral time bomb' (Umar et al., 2010).

Emergent hepatitis C treatment complications corroborate the rising concerns about co-infection. This is particularly the case for patients diagnosed with dual infection (HBV and HCV), which increases the risk of liver damage and other health complications, and those patients who have developed resistance to the first-line drug interferon (Ali et al., 2016).

Farmers and farm laborers are commonly subsumed under the all-encompassing category of 'general population' defined as 'populations at low risk' (Mahmud et al., 2019). Half the Pakistani population works in the agricultural sector (Pakistan Bureau of Statistics). The NHSF makes no mention of agriculturalists, strangely though. Are they not worthy of mention in this strategic policy document geared towards catapulting Pakistan onto the elimination path? Since one in twenty Pakistani is a presumed carrier of HCV (Al Kanaani et al., 2018), would it not be sensible to include farmers and farmworkers in the category of key groups? Moreover, considered the higher

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incidence rate of HCV among the 'womenfolk' (as the female collective is commonly referred to in rural areas) and two-thirds of the female population toiling in the fields and orchards, should public health policy work not target the agricultural workforce? We take to test this plausible argument in a rural, and predominantly agricultural, district located in the fertile Indus River Plain of Balochistan Province that, following the dated 2008 survey, has the highest prevalence of hepatitis B (4.3%) (Butt & Sharif, ibid).

Profiling HBV and HCV infection at the patient level

This micro-scale inquiry attempts to disentangle the social and cultural drivers fomenting the viral hepatitis crisis in the remote and secluded countryside of Balochistan. The preliminary mapping exercise of hepatitis B and C in the agriculture-intensive Jaffarabad District of Nasirabad Division, home to a multi-ethnic, and mostly rural population (ca.69.2%) of 513,813 (Pakistan Bureau of Statistics, 2018) contextualizes the urgency for action in the present and near future. Looking back a little over ten years, between 2007 and 2008, the prevalence of HBV in this district was 5.5% and 5.2% for HCV (Medical Research Council, n.d.b) measured in a population of 501,000 (2004 census data). These rates were considerably higher compared to the prevalence at the province level, i.e. 4.3% and 1.5%, respectively.

According to this epidemiological dataset, the average hepatitis B population was approximately 294,000 in the province. The hepatitis C population was about 102,000 out of a total population of 6,832,000 (2004 census). We underline that by the time of the 2017 census the population size has nearly doubled (12,344,408). Of the 385 people (42 houses with 9.17 people on average, including children) screened in the Jaffarabad district, 21 people tested HBsAg positive. 20 people tested anti-HCV positive. Projected onto the district population, this estimate translates into approximately 28,000 HBV and 26,000 HCV infected people between 2007 and 2008. This was the extent of disease diffusion over a decade ago. We keep it present throughout this study that engages with the cultural style and performance of the medical waste industry, its tenacity, and adaptive capacity within these devout, rule-bound, and tradition-following communities, that have as many as one and more infected person per household (Ahmad, 2004).

We opted for a discursive, rather than a formal, structural, or materialist approach to draw out and enter on the characteristic traits that begin to shine through the statistical analysis of the Jaffarabad cohort study. Their contours become sharper and their relevance clearer through a juxtaposition of the fieldwork records with clinical and epidemiological modeling studies of viral hepatitis transmission in Pakistan. Before we present the social profile of the patient cohort, we introduce the strands resumed in the second part of this paper where we discuss the major challenges that refer back to the core problematic charted in the first part. For reasons that will emerge from the survey data, the spotlight falls not on the people living on the edge of society — sex-workers, injection drug users, prison inmates, refugees, and other high-risk carriers that the local collective mindset holds captive. HBV and HCV infection is commonly thought of in connection with paid sex, crime, recreational drug use, immorality, and the evil, tout court.

Due to the survey findings, the analytic focus of this paper is the ordinary citizen; people met in the street, shops, offices, fields, orchards, hospitals, and lastly, the graveyard. We recall that Ahmad's frequently cited comment in The Lancet opens with an anecdote of mourners gathering around a newly dug grave. The assembled villagers paying their final respects to a 41-year old science teacher, who died of health complications after contracting HCV, wonder, who will be next? Considering that one in 20 Pakistani allegedly is HCV-positive, this haunting question reminds us that he might be we.

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Our descriptive exposition kicks off with the unrecognized and misrecognized transmission risks and associated medical malpractices reverberating in the medical histories of the patients. For instance, the excessive use of injections for unnecessary therapeutic purposes, occurring especially in the private sector (Janjua et al), or the administration of injections when other treatment options are available, which heightens the infection risk from unsafe injection practices. Improperly disposed needles and syringes are a corollary of this first medical malpractice aiding the spread of HBV and HCV among the general population. Ahmad observed that 'routine reuse of syringes in Pakistan's back-street health centers has caused a surge in blood-borne infections such as hepatitis B and C. Our field observations in the streets of Quetta suggest that this happens not just in the unlicensed back-street clinics of the provincial capital, where people from rural areas travel to, to buy remedies for their ailments. But such outlets have a shop front and display their services and special offers aggressively. There is competition.

This informal business, albeit outlawed, has found a niche within the kaleidoscopic health market that comprises a wide range of service providers. When ill or injured, people self-medicate or visit medically and para-medically qualified professionals at licensed clinics and hospitals or they turn to so-called alternate medical services. This umbrella term encompasses traditional, spiritual, and faith healers, hakims, homeopaths, and dais (traditional birth attendants) at non-accredited health outlets (Butt, 2006; Anwar et al, 2015). To complete this colorful jigsaw puzzle, we add the men, women, and children working in the tugged away medical waste recycling workshops, where piles of cannulas, syringes, and needles are washed, dried, polished, repackaged, and readied for sale.

The soaring demand for injection kits is met by a steady supply of the same. Absent or wanting medical waste collection and treatment partners well with the hard-to-die misconception that the injections are the 'most powerful' the best, and the quickest way to administer medicine' (Moinet al., 2018). The country must 'wean itself' off injections, Ahmad maintained. Certainly, there is a logical nexus between the recycling of needles and syringes while the demand soars, and the excessive use of injections, fueled by people's preference for injected medications, and the providers' greed. Not the country, we say, but the people need to wean themselves off injections to tackle that noxious interface. Giving up requesting injections for common illnesses — a treatment modality that yields higher fees compared to other treatment methods (but not necessarily frees the patient from the ailment) — warrants a radical change of mentality. Affirmative technical and legal solutions are important. On their own, however, they are insufficiently effective. Why?

Unsafe injection practices are hard to weed out where people have unquestioned faith in the effectiveness of injections, the healthcare community, included (Lubyet al. 1997). A cohort study of similar size than ours conducted in Hafizabad (Sindh Province) found 44% of HCV-positive patients preferred injections over orally administered medication (Khan et al., 2000 quoted in Ali et al, 2009). Worryingly, their preference for injections remained unchanged even after they were told that 94% of these injections were administered with used (and potentially contaminated) syringes and needles. Most troublesome, from a public health perspective, is that each one of these 18 healthcare workers (who had administered the injections) were unaware that reused injection equipment is a major transmission route for viral hepatitis. Albeit the study dates back 20 years, the findings compellingly show that injection safety negligence cannot solely be ascribed to illiteracy and poverty, as often done in the prevailing discourse of viral hepatitis prevention and mitigation in the Global South (Malik et al., 2017).

Testing facilities remain few. Often, they are under-resourced, especially in the rural, impoverished areas. Unscreened blood

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Volume 4 • Issue 4 • August 2026

transfusions remain a major source of viral transmission in Pakistan (Zaheer &Waheed, 2014). Following a gradual devolution process, the blood processing infrastructure has become as fragmented as the public healthcare system itself (Zaidi et al., 2019).

In the popular consciousness, blood donated by blood-related relatives is generally viewed to be purer compared to the blood of strangers. This diffused preference can take tragic turns. Insisting on testing family-internal donors and/or their blood threatens the donor's honor. The ubiquity of this etiquette, and not solely in the countryside, is inextricably intertwined with the wider meaning of blood and bleeding (Mumtaz et al., 2012).

Experimental Design, Materials and Methods

The research presented in this article started as an ethnographic intervention. We selected 200 HBV and HCV positive adult men and women from the patient records of two district-level hospitals that offer government-subsidized viral hepatitis treatment. Semi-structured questionnaires with open ended and closed questions were compiled in the presence of hospital staff either on site or at the home of the patient, in the event they were unable to travel. The observations made during the survey were recorded in the fieldwork records that contain text as well as photographic materials. We conducted a descriptive statistical analysis. The correlation and linear regression tests were done using SPSS software. Because of the limitations of defining and determining viral infection in retrospective, we shifted our focus to the driving forces of a viscous cycle that contributes to the spread of the disease in this understudied region of Asia's vast hepatitis landscape. The ethnographic anthropological analysis closes in on unchallenged beliefs in the safety and efficacy of therapeutic injections, test hesitancy, immunization resistance, and the preference of family donated blood to address this enduring crisis in the rural, agricultural context of Baluchistan. As the lead question, we borrowed Ahmad's controversially discussed question of whether or not Pakistan is developing into a 'cirrhotic state.' We highlight the urgency to act and classify farmers and farm workers as a high-risk group in the national viral hepatitis elimination agenda.

Profiling a fragment of Balochistan's HBV- and HCV-positive population

We conducted a field survey to develop a social profile of hepatitis B and C infection and transmission risk in rural, agricultural Balochistan. From May 12 to May 21, 2026, we met with 200 recipients of subsidized antiviral therapies in the presence of their treating physicians at the district hospital. Where this was not possible, we met at their home. The study participants were recruited using a systematic sampling technique. Every third person above the age of 18 was selected from about 900 entries in the hospital records until obtaining the envisaged cohort size.

Semi-structured questionnaires were used to start a dialogue with this ethnically diverse patient group. We enquired about their knowledge of the disease and the transmission routes, compliance with the medication regimen, attitudes toward voluntary testing and immunization, and social integration. The patients responded to the open-ended and closed questions in their native language, Balochi (101), Brahui (92), and Sindhi (7).

The questions clustered primarily around demographic and biographical facts (cf. Table 1), the medical history (cf. Table 2), social integration, and risk perception and exposure (Tables 3 and 4).

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Volume 4 • Issue 4 • August 2026

Table 1. An overview of the Jaffarabad patient cohort profile. Field survey, May 2026.

Patient cohort	N = 200			
	n		%	
Infection type				
HBV	95		47.5	
HBC	101		50.5	
HBV + HCV	4		2.0	
Sex				
Male	148		74.0	
Female	52		26.0	
Civil status				
Married	135		67.5	
Single	61		30.5	
Widowed	4		2.0	
Household structure				
Extended family	156	78.0		
Nuclear family	44	22.0		
Age *(mean = 35 years/ range 18-62 years)*			***Men***	***Women***
18-25	20	10.0	13/ 8.8%	7/ 13.5%
26-50	80	40.0	39/ 26.4%	41/ 78.8%
51-62	100	50.0	96/ 64.8%	4/ 7.7 %
Professions			***Men***	***Women***
Farmer/ farmworker	92	46	66/ 44.6%	26/ 50%
State employee	54	27	50/ 33.8%	4/ 7.7%
Self-employed/ handcrafter/ midwife	29	14.5	25/ 16.9%	18/ 34.6%
College student	25	12.5	21/ 4.7%	4/ 7.7%
Education				
Illiterate	68	34.0		
Primary level completed	31	15.5		
Secondary level completed	57	28.5		
Intermediate level completed	28	14.0		
Tertiary level (Bachelor's degree)	16	8.0		

This snapshot confirms that multigenerational households are the social norm in these rural villages, while single households remain the exception. Four-fifths live in extended family households and no one lives in a single household, same-sex relationship, or away from home. We highlight that over two-thirds of the cohort members are married. Very few patients are widowed and none is divorced. Less than one third is single. The unmarried are mostly college students. The age and sex distribution raise questions, though.

Pakistan has a young population with a median age of 22.8 years. The cohort's mean age is higher. Half the cohort is above 50, which pushes up the mean age to 35 years (age range: 18 to 62 years). This statistical detail takes us back to the unequal sex distribution in this sample, i.e. the significantly higher proportion of men. This clearly shows the sex and age-specific incidence pattern that emerged when we split the cohort into three age groups. i.e. 18-25, 26-50, and 51-62 years. We then notice that the women are considerably younger compared to the men, who mostly fall into the

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Volume 4 • Issue 4 • August 2026

third age group. The majority of women are the first and second age categories. Because of familial clustering, we highlight that 90% of the women are of childbearing age. (For arithmetic convenience, we sealed fecundity at 50 years of age in full awareness that viral hepatitis infections have been diagnosed in pregnancies above that threshold).

The level of education and professional background varied considerably between, and across, the three age groups. Eight people hold university degrees. One-eighth is studying. Agriculturalists constitute the largest professional group. Half of the female cohort members are farmers or farm laborers. State employees (public servants) are just below one fourth. 29 people are self-employed, among them two midwives. How representative is this social profile of the usual picture of HBV and HCV-positive people that circulates in the minds of the public at large, and also in the dominant policy discourse of viral hepatitis prevention and control in Pakistan? Poorly, one may observe. What the Jaffarabad cohort profile does is it aligns with the previously mentioned anecdote of a group of villagers in a comparable rural setting gathering around the grave of a middle-aged science teacher who died of hepatitis C related complications. They are members of the general public, read general population, which, by standard definition, includes 'populations at low risk of exposure to HCV infection, such as blood donors, pregnant women, household-based survey participant, among others (Mahmud et al., 2019).'

We note a striking contrast between this characterization of risk, especially when taking account of the worrying HCV infection rate of young male blood donors in Quetta (Khan et al., 2013), and the social standing of male youth in Pakistan's strongly patriarchal society (Chauhan, 2014). These empirical findings prompt us to question the conventional typologies that have been uncritically adopted and readily accepted by the authors of the national viral hepatitis elimination policy. The key groups in the NHSF comprise populations at intermediate risk, i.e. professionals for whom infection with blood-borne diseases is an occupational hazard (e.g. medics, dentists, and healthcare workers, and professionals in the beauty industry); high-risk clinical populations and the special clinical population, i.e. specific patient groups (e.g. thalassemia, hemophilia, hemodialysis, and diabetes patients and patients with renal disorders and liver conditions); and prominently, the socially marginalized and vulnerable people with high-risk behavior; i.e. people who inject drugs and populations at intermediate risk (e.g. sex workers, transvestites, prison inmates, among others).

We contend that the so-called household-based survey participants, another cover-up term, deserves greater analytical attention. Another widespread argument we debunk for the cohort study results is poverty and ignorance often cast as drivers of new infections. Does the Jaffarabad cohort profile fit the common argument that widespread ignorance and abject poverty facilitate the spread of viral hepatitis in this part of the world (Aliet al., 2016;)? A hospital-based cross-sectional study (Haq et al., 2013), also conducted in Balochistan, concluded that ignorance, superstition, and misconceptions about viral hepatitis are misguiding people to think they are exposed to the virus when they are not, and vice-versa.

The sampled patients in our study espoused some of those same and similar beliefs, as shown later. That, however, does not make them ignorant. Given how careful the respondents worded their thoughts, fears, and hopes for the future, this profiling of viral hepatitis patients is demeaning. Our sample study illustrates the weakness of these explanatory categories that keep appealing to social health analysts. We put them to one side because blaming a culture of ignorance and economic precarity and vulnerability for this enduring health crisis is an abridgment of the multifacetedness of the inner sociality of this

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An International Peer-Reviewed Open Access Journal
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Volume 4 • Issue 4 • August 2026

epidemic's life world and would defeat this research aims and objectives.

Medical histories

Table 2. Medical history of the Jaffarabad cohort members extracted from the 2026 field survey.

Treatments received before the diagnosis	N	%	N = 200
Medical drug injections	163	81.5	
Cannulas	160	80.0	
Orthodontic surgery/ dental work	114	57.0	
Blood transfusion	99	49.5	
Surgery	62	31.0	
Endoscopy	46	23.0	

The distribution between hepatitis B and C patients is almost equal. Four patients (2%) have a dual infection. These patients' medical history echoes the high-risk factors discussed in epidemiological and clinical studies that included farmers in Pakistan (Ali et al., 2011; Al Kanaaniet al., 2018; Butt & Sharif, 2016).

In the past, four-fifths of the Jaffarabad cohort had medical and dental treatments, which involved injections and cannulas. Nearly as many patients consulted unlicensed healthcare providers. Note the overlap between the percentage of treatments involving injections and cannulas and the percentage of patients who visited self-styled doctors and healers, who administered injections, potentially with recycled needles and syringes.

There is yet another correspondence that stands out. 99 patients, almost half of the group, received blood transfusions. This treatment procedure involves the use of a needle and cannula. That seems obvious, and it is. And yet, linking cause and effect when there are numerous transmission routes is highly problematic. Was the cannula, the needle, or the blood flowing through them, contaminated? The sequence is hard to establish in retrospective, especially if the blood was from a potentially asymptomatic family donor, unwittingly passing on the virus, in the well-intended gesture to save life. There is tragedy in this unrelenting health crisis. Before we turn to the results of the correlation and the linear regression tests, a caveat is in order.

Descriptive risk factor studies are fraught with epistemological and methodological problems. We are grateful for the comments of pediatrician Mohammad Almas Hashmi (2018) at the Foundation University Islamabad and thank him for illustrating the limitations of calculating frequencies of transmission risk factors with his clinical research on parent-child transmission in viral hepatitis patients. We encountered similar issues. The outcome of the descriptive statistical analysis (Tables 3 and 4) performed with the Statistical Package for Social Sciences (SPSS), Version 23 software proves the difficulty to establish the source of infection, retrospectively. Tracing the actual succession of events is sheer impossible with the limited information we have at hand. We include these test results nevertheless to evidence their limited explicative power and a need for a multi-pronged research approach.

A reminder: Correlation ≠ causation!

The outcome of the correlation and linear regression tests, though informative, is not to be taken at face value, we reiterate. We lack the ability to locate and determine the actual source of infection with accuracy. Hence, we like the results of these statistical calculations to be read and

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Volume 4 • Issue 4 • August 2026

understood as an auxiliary in this iterative process, similar to how we used the social profile. The 24 variables comprise the known risk factors (Memon et al., 2012; Saeed & Manzoor, 2014), as well as notions that have come up in face-to-face communications to reflect the cultural sphere in which the ethnographic fieldwork is situated.

They are Civil status (X1); Knowledge of transmission risks (X2); Dental work (X3); Needle prick (X4); Reusable/recycled medical injection equipment (X5); Cannulas (X6); Tattoos (X7); Body piercing (e.g. ear, nose, and ritual self-piercing) (X8); Sharing surma/ kohl (a popular eye liner containing antimony and lead) (X9); Sharing manicure/pedicure tools (X10); Unsterilized scissors and non-sterile cotton pads (X11); Unprotected sexual contact (X12); HBV/HCV-infected mother/father (X13); History of surgery (X14); Endoscopy (X15); Ear wax removal (X16); Sharing miswak/siwak (a type of toothbrush) (X17); Cupping (a traditional healing practice) (X18); Living in a household with a viral hepatitis patient (X19); Sharing contact lenses (X20); Hemodialysis (X21); Sharing razors and visiting barber shops (X22); Unsterilized surgical instruments (X23); Blood transfusion (X24).

Table 3. Risk factors/variables associated with HBV/HCV infection based on the May, 2026 survey.

Variables	Description	Pearson correlation coefficient (r)	Significance
X_1 Knowledge of transmission risks	1 if unaware; 0 if otherwise	.170*	.016
X_2 Reused/recycled injection equipment	1 if used; 0 if otherwise	.201**	.004
X_3 Surgery	1 if had; 0 if otherwise	.175*	.013
X_4 Cupping	1 if done; 0 if otherwise	.184**	.009
X_5 Household with HBV/HCV-infected patient/s	1 if the case; 0 if otherwise	.151*	.033
X_6 Blood transfusion	1 if received; 0 if otherwise	.208**	.003

Six out of these 24 variables showed a positive correlation. Without reading too much into these numbers, we confirm that only a few of the patients said that they did not know this disease until they tested positive. For the linear regression test, we applied the same set of risk factors/variables (X1 - X24).

Knowledge, Health Literacy, and Transmission Awareness

The results show a strong positive correlation with infection ($r = .170$, $p = .016$), which is a crucial sign of a possible knowledge and health literacy gap in the community. When combined with demographic traits that are present in the broader demographic profile, such as low educational attainment or illiteracy, this finding becomes especially significant. The pattern implies that insufficient understanding of hepatitis transmission mechanisms and preventive measures may coexist with restricted access to formal education. Crucially, this should not be seen as proof that hepatitis is directly caused by illiteracy; rather, it highlights the need to investigate the interactions between educational disadvantage, health literacy, access to trustworthy information, and preventive behavior within the study population.

JOURNAL FOR SOCIAL SCIENCE STUDIES
An International Peer-Reviewed Open Access Journal
ISSN (Online): 3006-2071 | ISSN (Print): 3006-2063
Volume 4 • Issue 4 • August 2026

Unsafe Healthcare Practices and Functional Health Education

The results pertaining to blood transfusions, cupping, surgery, and reused injection equipment further highlight the significance of functional health education. People in the community might come across these procedures without having enough knowledge to evaluate infection-prevention techniques, pose pertinent queries, or identify risky procedures. The importance of household-level health education, particularly with regard to transmission routes, prevention, testing, and appropriate protective practices, is also highlighted by the significant association with living in a household with an HBV/HCV-infected person ($r = .151$, $p = .033$). The results offer compelling justification for reviewing and improving health education materials throughout the educational spectrum. Evidence-based information about communicable diseases, blood-borne infections, hygiene, safe medical practices, vaccination, testing, and stigma should be prioritized over sporadic awareness campaigns.

Socio-Cultural Barriers and Health-Seeking Behaviour

Socio-cultural factors were found as significant obstacles in the path of health seeking behaviour of those who are affected with hepatitis B and C in rural area of Balochistan. Hepatitis stigma can prevent people from starting treatment on time or getting tested and can discourage them from discussing their diagnosis openly due to fear of social judgement and negative reactions. Family influence is also a significant factor in the decision making process with respect to health, especially in rural areas with tight-knit families where other family members may have a say in decisions about testing, treatment, blood donation or health utilization. These results also suggest that there are cultural beliefs and health practices already in place which can influence the perception of the way diseases are transmitted and treated, such as continued trust in injections, family-given blood, traditional and informal health care practices. These beliefs might be especially problematic when people do not have adequate health literacy to differentiate safe from unsafe medical practices. A further barrier is the reluctance to test, due to fear of stigma, family honour, social consequences and lack of available and reliable healthcare services. Likewise, the resistance or reluctance to immunisation could be a lack of knowledge, misconceptions and culturally ingrained ideas of prevention. All of these factors underscore that Hepatitis prevention is more than just having medical services available; it takes culturally responsive health education, which also addresses stigma, boosts accurate knowledge, engages families and communities, and builds confidence in testing, vaccination, and relevant preventive measures. This is in line with the ethnographic findings of the study in relation to the test hesitancy, immunization resistance and holding onto the belief of hepatitis prevention that are embedded in the family culture and holding onto donated blood from the family.

Education, Community Learning, and Preventive Health Behaviour

The results suggest that while hepatitis prevention is a public health and medical issue, it is also a health-literacy and education challenge. Formal education can give people basic knowledge, and health literacy can help them to understand, assess, and use health information in their daily lives. Traditional literacy-based awareness campaigns might be ineffective in communities with low literacy and/or poor access to health information. For this reason health education materials should be devised in simple, culturally appropriate and locally understandable formats such as visual materials, drawings, demonstrations, and practical examples of the transmission, testing, vaccination, safe medical practices, and prevention of hepatitis. Accessibility can be further improved by using Balochi and Urdu communication which can diminish language barrier to understanding. Community based and adult education may also complement

JOURNAL FOR SOCIAL SCIENCE STUDIES
An International Peer-Reviewed Open Access Journal

ISSN (Online): 3006-2071 | ISSN (Print): 3006-2063
Volume 4 • Issue 4 • August 2026

the formal education system in offering access to health knowledge for the less educated population. Community members can be made aware of unsafe practices, question practices related to infection-prevention, be aware of their personal and household risks, and become more confident in implementing infection-prevention practices through participatory learning, demonstrations, community workshops and interactive discussion. These practices are especially relevant in rural agricultural communities where health information can be shared within families, among community networks, health care providers, and local institutions. Thus, there is a potential for developing a wider network of education on hepatitis prevention by cooperation between schools, colleges and universities, health care institutions and community centres, as well as agricultural extension services. Long-term community learning activities, rather than occasional awareness campaigns, should foster health literacy and turn knowledge into practical preventive activities, such as proper testing, vaccination, safe health care practices, and protecting family members. This educational approach can play a role in bridging the divide between hepatitis knowledge and action, to support the strengthening of community capacity to prevent transmission and effectively respond to health risks associated with hepatitis. There is ample evidence that communities with low literacy and access to reliable health information can use visual materials, demonstrate, use Balochi/Urdu communication, and participate in learning.

Educational and Policy Implications

The results are consequential for the education and health literacy in Balochistan, as well as public health policies in the province. The fact that knowledge of hepatitis transmission risks was strongly associated with infection-related outcomes and the lack of knowledge about transmission and prevention practices suggest the need for increased health education, along with medical interventions. On-going, evidence-based health education efforts in schools, colleges, universities, health centers, community groups and agricultural extension services, rather than targeted occasional campaigns, should be used to address and educate rural and underserved populations. These efforts should include readily available educational resources on hepatitis B and C transmission and prevention, the importance of testing, vaccination, and safe medical practices, and how to reduce stigma. In communities where literacy rates are low, and health information is not readily available, there is a need for adult/community education approaches to be prioritized using visual learning materials, Balochi and Urdu language communication, demonstrations, community workshops, Q and A sessions and participatory learning activities. Healthcare providers and teachers can collaborate to educate themselves and others on how to identify unsafe medical practices, seek appropriate medical attention, and take measures to be safe in their homes and communities. Agricultural extension services may offer another avenue of education to reach farmers and farm workers who do not have much access to formal education and/or health care. These community-based approaches have the potential to reach health information beyond the classroom and hospital setting, and to be culturally relevant and accessible in the community. In conclusion, the results indicate that hepatitis is not just a medical and public health problem, but an educational and health-literacy problem in need of collaboration between health and education institutions, health and community groups and rural development groups.

JOURNAL FOR SOCIAL SCIENCE STUDIES
An International Peer-Reviewed Open Access Journal

ISSN (Online): 3006-2071 | ISSN (Print): 3006-2063
Volume 4 • Issue 4 • August 2026

Table 4. Linear regression coefficients of variables associated with HBV and HCV infection based on the field survey, 2026.

Variables	Description	Unstandardized coefficients B	Standardized coefficients Std. Error	Beta	T	Sig.
(Constant)		.739	.123		6.000	.000
X_1 Civil status	1 if married; 0 if otherwise	.254	.073	.234	3.471	.001
X_2 Shared *miswak/siwak*(toothbrush)	1 if shared; 0 if otherwise	-.191	.098	-.132	-1.945	.053
X_3 Unprotected sexual contact	1 if practiced; 0 if otherwise	.266	.076	.245	3.507	.001
X_4 HBV/HCV-infected parent/s	1 if infected; 0 if otherwise	-.099	.047	-.153	-2.126	.035
X_5 Shared manicure and pedicure tools	1 if shared; 0 if otherwise	-.244	.122	-.136	-2.002	.047
X_6 Used unsterilized scissors and/ or unsterilized cotton pads	1 if used; 0 if otherwise	-.187	.092	-.143	-2.039	.043

Eight variables showed an association between risk exposure and infection. Against the backdrop of consanguinity and polygamous marriage, it does not surprise that the civil status (X1), and unprotected sexual contact (X12) were significantly and positively correlated with the transmission of HBV/HCV. 92.5% of the cohort did not use condoms. Protected sex and family planning are practiced little among rural communities. Women generally lack decisional power in matters of sexual and reproductive health (Hamidet al., 2011). Despite a standard error of .78, the standardized coefficient (Beta) was as high as .245. Vertical transmission (from the parent to the child) cannot be excluded simply because the medical history suggests horizontal transmission. Whether the infection occurred before, or after, the marriage the patients could not tell. Prenuptial health checks are uncommon in the study area where test hesitancy is widespread. Soliciting a test invokes suspicion and likely to interfere with successful (arranged) marriage decision-making.

Six variables were negatively correlated with the infection, including sharing miswak/siwak (X17), having an HBV/HCV-infected mother/father (X13), sharing manicure tools (X10), and unsterilized scissors and non-sterile cotton pads (X11). It would be mistaken and misleading to downplay occupational hazards in primary healthcare and the beauty industry. These figures show that one moves on shaky grounds when trying to identify statistically significant associations between previous risk exposure and infection when a disease is transmitted via different and multiple routes, and even more so when the people are unaware of them or ill-informed.

The patients' knowledge about the symptoms and transmission risks was wanting. 22% did not know the disease before receiving the diagnosis. 27% were unaware of how viral hepatitis is transmitted.

JOURNAL FOR SOCIAL SCIENCE STUDIES
An International Peer-Reviewed Open Access Journal

ISSN (Online): 3006-2071 | ISSN (Print): 3006-2063
Volume 4 • Issue 4 • August 2026

A few cohort members linked the surge of hepatitis B and C cases to climate change and atmospheric conditions, such as extreme weather events (e.g., soaring temperatures up to 50 degrees Celsius in the shade, floods following on droughts, among others), but also to the wrath of God. Sharing food with an infected person was perceived as a threat, but sharing contact lenses was not perceived in the same way. 30.5% had a basic understanding of the transmission routes. However, they were inclined to associate viral hepatitis with sexually transmitted diseases (STDs). This tendency does not surprise. The diffused practice of combining hepatitis B and C campaigns with HIV advocacy cements this perception and reinforces the social stigma of viral hepatitis. The harm this association does draw out the second of three ethnographic vignettes that guide and structure the discussion.

Ambitions revisited

Our discussion is grounded in the epistemological premise that 'an ethnographic focus on evidence and efficacy at the local level raises rather than lowers the bar for thoughtful
inquiry and action' (Biehl, 2016). By adopting this position, we situate the Sisyphean task of mopping up a flood in a sociocultural context that can be captured historically and ethnographically, but not quite statistically because of the lack of data and other encumbrances. Domestic and international reactions to Pakistan's adoption of the global goal to eliminate viral hepatitis by 2030 have been mixed (Waheed& Siddiq, 2018; Chhatwalet al., 2019). The alarm sounded by Ahmad is beginning to hit home (Sultan & Khan, 2013) with a wider realization that we are off the 'road to success' (Moinet al., ibid.).

The short-term targets of the NHSF are a 10% reduction of hepatitis B and C cases, and a 30% fall of new chronic HBV and HCV infections by 2021. Updated epidemiological data is difficult to come by. The indicated prevalence rates of the 2007-2008 national survey are lower and no longer reflect the current situation. This suggests a rough calculation offered by Saeed Hamid (2020), Professor and Department Chair of Medicine at Aga Khan University in Karachi. He writes (personal communication), following recently undertaken province-wide surveys, the HCV prevalence in Punjab Province was 8.9% and 5% in Sindh Province. Projecting these figures (partly reported and partly unpublished) onto the national scale, he estimates an overall prevalence rate of about 7%. Again, this might understate the present state of affairs.

We highlight that in some parts of the country, the HCV prevalence has already reached 23% (Parkash & Hamid, 2016). This means not one in 20 Pakistanis, but nearly one in five is infected in those epidemic hotspots. Notwithstanding the deteriorating situation, there is optimism among the higher ranks of the public health administration. Masood Ahmed Nousherwani, Director General Health Services of Balochistan understands the NHSF to provide adequate guidance for prevention, diagnosing the maximum number of patients, and putting them through effective and affordable treatments to eliminate hepatitis C by 2030. We do not find that same optimism in the personal account of one of the male cohort members who chronicles his experience of getting tested, receiving a positive diagnosis, and following a strict antiviral drug regimen.

Vignette 1

"I visited DHQ hospital Tehsil Usta Muhammad for free HBV drugs. But, the authorities did not provide antiviral drugs. They advised me to purchase from Quetta District. I traveled to Quetta city and visited the Head Office. I went to the Chief Minister's Hepatitis Control Program. There, I was told that there is a shortage of medicines in Balochistan and that the Government is trying to purchase medicines. It takes months because of procurement, purchasing, and the arrival of the medicine. Sadly, I was compelled to purchase the drugs from a medical shop where I had to pay thousands of rupees for one month of treatment."[Fieldwork

JOURNAL FOR SOCIAL SCIENCE STUDIES
An International Peer-Reviewed Open Access Journal

ISSN (Online): 3006-2071 | ISSN (Print): 3006-2063
Volume 4 • Issue 4 • August 2026

records (May, 2026). Translated and lightly edited by MAB].

This first ethnographic vignette offers an interesting counter perspective to the positions of health policymakers and modeling epidemiologists. The patient's account casts light on what beneficiaries of government-subsidized therapies might to when the provider, a public hospital, in this case, run out of drugs classed essential in the national guidelines. The National Essential Medicines List (Drug Regulatory Authority of Pakistan (DRA), 2016) recommends specific combination therapies from different drug classes to treat HBV and HCV infections. There is a range of anti-hepatitis B drugs. Among them are the nucleoside/nucleotide reverse transcriptase inhibitors entecavir and tenofovir disoproxil fumarate (TDF). HCV drugs comprise the nucleotide polymerase inhibitors sofosbuvir, the protease inhibitor, simeprevir, the NS5A inhibitor daclatasvir, and the non-nucleoside polymerase inhibitor dasabuvir (Ashraf & Ahmad, 2015). Ribavirin is given in combination with ledipasvir + sofosbuvir, or ombitasvir + paritaprevir + ritonavir, or pegylated interferon alpha, and/or Direct Acting Anti-Hepatitis C Virus Drugs (DAA) that reportedly clear infection in about 95% of the cases within 2-3 months (World Health Organization, n.d.; DRA, pp.44-45; see also Geddawyet al., 2017).

Scaling up HBV and HCV therapies has developed into a flagship of the federal government over the past few years. The Federal Minister of the National Health Services Regulation and Coordination Ministry (NHSRC) takes credit for it: 'I took the challenge of negotiating with the local and international drug companies and by the Grace of Allah made these drugs available to the population within record time and at rates that are cheapest in the world'. But, how cheap is cheap? The locally manufactured sofosbuvir (400g) costs about US$ 15 (Moinet al., ibid.), still a considerable expense for low-income earners. Do people discontinue the treatment because of unaffordable antiviral medication? A hospital-based cohort study conducted at a liver center of a tertiary care hospital in Karachi (Sunduset al., 2013) showed that just one of 165 hepatitis C patients (three were farmers) dropped out for financial reasons. 17 patients were lost to alternative medication; a shorthand for quackery.

Scaling up antiviral hepatitis treatment without boosting voluntary testing and immunization concomitantly is unlikely to produce the expected results, as the following two projection studies (Ayoub & Abu-Raddad, 2019; Lim et al., 2018) demonstrate. By keeping the annual number of treated cases stable at 150,000, the HCV prevalence would still rise from 3.9% to 5.1%. The projected HCV infections would rise to 1,100,000 and result in approximately 1,400,000 deaths. We recall that the current estimated prevalence of hepatitis C is closer to 7%. To reverse that trend, 880,000 DAA treatments annually would be required, the first study concludes. The other mathematical modeling study puts the number at 490,000 treatments a year. Compared to the 160,000 government-subsidized treatments dispensed in 2016 (NHSF), this would be closer to a three-fold increase.

We note that these hypothetical projections are contested. Abbas and Abbas (2020) compellingly contend that 'even the most aggressive strategy cannot tackle the lofty goal of a decrease in hepatitis C-related mortality by 65% by 2030.' They disagree with Lim and colleagues that the target could be met 'by prioritizing comprehensive screening to higher prevalence groups (people who inject drugs and adults aged ≥30 years), increasing the rates of referral (with minimal loss to follow-up), and introducing rescreening for high-risk groups (which in turn would increase the total number screened per annum), WHO's targets for decreasing the incidence of new hepatitis C infections by 80%' (quoted from Lim et al. 2020). Cost-benefit analyses drawn up from a distance should factor in the exploitative loopholes; loopholes that are benefitting profit-seeking

JOURNAL FOR SOCIAL SCIENCE STUDIES
An International Peer-Reviewed Open Access Journal
ISSN (Online): 3006-2071 | ISSN (Print): 3006-2063
Volume 4 • Issue 4 • August 2026

prescribers and providers the most when government-subsidized drugs are out of stock.

Advocacy for social and individual behavioral change (Suhail et al., 2016) is another approach to curbing the number of new infections. Urging people to change their health-seeking behavior, however, stands on weak grounds, especially in devout, tradition-following, rule-bound communities where kin relationships influence and shape everyday life; health decisions, included. To prevent new infections, we need a better understanding of the active and passive role of kin relations. About half of the arranged marriages are consanguineous (Pal, 2017). This blood-relatedness calls attention to perinatal and intrafamilial virus transmission (Mujeeb & Pearse, 2008; Plancoulaineet al., 2008). Familial clustering (Jamil et al., 2020) was found in pregnant patients and their blood donors (Ghanghro and Ghanghro, 2016) in the Naushahro Feroze District, which borders on the Jaffarabad District.

Another matter more often than not decided in consultation with the family collective is immunization. Four cohort members received treatment for tested hepatitis B and C. Nearly half of the patients were treated for hepatitis B. Why did they not get vaccinated? (Currently, there is no effective and safe HCV vaccine). Hepatitis B keeps spreading not withstanding intensified vaccination globally (Coppola et al., 2016). Pakistan rolled out the WHO-recommended three-dose hepatitis B vaccine through the Expanded Program of Immunization in 2009. Khyber Pakhtunkhwa (formerly the North-West Frontier Province (NWFP) was the first province to introduce the birth dose. Nevertheless, the HBV immunization rate remains low among the general population, and even among medics and primary healthcare staff, the uptake of compulsory HBV vaccination is slow (Yousafzai et al., 2014).

How to explain this diffused immunization hesitancy across Pakistani society? Resistance against 'colonial immunization' (Peckham, 2018) is fierce and displayed openly and violently in Balochistan, where conspiracy theories and rumors spread at the speed of social media. Western interference into national, tribal, religious, and local affairs, including health, is disliked. The 2011 (sham) hepatitis B vaccination campaign in Abbottabad leading to the capture and killing of the then wanted Taliban leader (Rafique et al., 2015; Rubenstein, 2015) caused a considerable backlash that is yet to subside. Resentment against vaccination runs high and deep in the Southwest; a land, divided by feuds, political sectarianisms, militant insurgency, violence, and civil unrest.Vaccination teams have repeatedly come under attack inside hospitals, clinics, health camps, and also in the street in broad daylight.

Vignette 2

"Ultimately, it was very difficult for me to share this bad news with my family, friends, and neighbors because of rumors about the transmission and risk factors of the disease. Unfortunately, it is quite embarrassing for a community to accept HBV-infected patients. I shared this bad news with my near and dear ones. As expected, most of the family members, relatives, and friends, behaved standoffishly. My family's behavior was not good. They feared that they might acquire HBV through household items, by sharing food and living in the same house, which worsened my condition. Sadly, there was no one to care for me in my family. Fortunately, I have a few friends who always encourage me to fight this disease." [Fieldwork records (May, 2026). Translated and lightly edited by MAB].

Strict adherence to the drug regimen is critical as is early diagnosis of the disease because 'delayed diagnoses result in chronic liver disease, hepatocellular carcinoma, and cirrhosis (Waheed& Siddiq, 2018). Finding the missing millions living with viral hepatitis is pivotal to reach 'the other side of the tunnel' (Mahmood, 2016). Underdiagnosis remains high in the Jaffarabad District where, following district public

JOURNAL FOR SOCIAL SCIENCE STUDIES
An International Peer-Reviewed Open Access Journal
ISSN (Online): 3006-2071 | ISSN (Print): 3006-2063
Volume 4 • Issue 4 • August 2026

health officials, about 90% has not been tested for either HBV and HCV. How to explain this reluctance to take a test? Is it ignorance? Is it for shame? We already dismissed the first possibility along the lines of a growing body of anthropological literature that engages with ignorance analytically and theoretically (Highet al., 2012; Hobart, 1993). Test hesitancy is tied to the social stigma of viral hepatitis. Viral hepatitis, as indicated earlier, is widely thought of as a venereal disease in this geographical region. Calling viral hepatitis the 'AIDS of Pakistan' naturalize that stigma. So does piggyback hepatitis B and C prevention and treatment campaigns on HIV advocacy work.

We highlight the negative implications of those cost-saving tactics and that misnomer in places where sexuality education is repressed (Shaikh and Ochani, 2018), desires veiled, and the domestic confinement of the 'womenfolk' understood to protect besides their honor and wealth, their health. Here, we specify that women were among the 20 patients unable to meet with us at the hospital. This is a faint reminder that socially enforced restriction on female movement makes it harder to reach them. A largely underdiagnosed population, therefore, is attributable not solely to the asymptomatic nature of the disease as the 'silent storm' notion implies, but also to the cultural norms and practices undermining disease prevention and control. We see a double enclosure at work here. This double-bound foments prejudice and discrimination, as well as the silence enveloping the carriers of this stigmatized disease. The feared reaction of family and friends to a positive test result is a deterrent to get tested in the first place, and understandably so.

Vignette 3

"I was running a business of scrap in Dera Allah Yar. The business of scrap was the only means of earning for my family. I had a wonderful time doing this business. But, unfortunately, this changed my life when at the shop. Accidentally, I got pricked by a needle of a used syringe that I ignored at the time, as I did not know about the outcome. In 2025, I felt fatigued, abdominal pain, and lost appetite. I visited the DHQ [District Head-Quarter] hospital. I had to go through some medical tests, including hepatitis. I was dazed while being informed that I have been infected with HBV. Instantaneously, a lot of rumors that HBV is a fatal disease, and it has no cure, and it can be transmitted to family members came to my mind." [Fieldwork records (May, 2026). Translated and lightly edited by MAB].

This revelation needs no wordy exegesis. The last of these three vignettes brings full circle the constitutive elements and dynamics of that vicious cycle whose iteration we examined from the ground up. This ethnographic analysis has brought to the fore these oftentimes neglected links couched in the euphemisms of closing a tap, mop up a flood, and a silent storm. The participants of this study helped us to unpack them one by one from the bottom up. What next? The scale and relentlessness of South Asia's unabated viral hepatitis crisis ask for 'tentacular thinking' (Haraway, 2016). We enter into this thinking mode that following Donna Haraway combines feeling with trying to identify what is 'attachable and detachable' from the situations witnessed, documented, analyzed, and discussed.

Include regular education on hepatitis and communicable diseases in the curriculum of schools, colleges and universities of Balochistan with special focus on the modes of transmission, vaccine, testing, safe health care procedures, stigma and critical analysis of health information instead of frequent awareness sessions. The article itself advocates the need for ongoing, evidence-based health education across educational settings and communities.

Initiate community based adult health-literacy initiatives among the people of Balochi and Urdu language, rural and low-literacy rural communities, by using visual materials, demonstrations, participatory workshops and family based learning through collaborative efforts of teachers, healthcare workers, community centres and agricultural extension services. In

JOURNAL FOR SOCIAL SCIENCE STUDIES
An International Peer-Reviewed Open Access Journal

ISSN (Online): 3006-2071 | ISSN (Print): 3006-2063
Volume 4 • Issue 4 • August 2026

relation to the study's results, conventional literacy campaigns might not work in communities that lack such services, and participatory education that is culturally responsive can facilitate better uptake of knowledge into preventive action.

In the interest of evidence-informed health policymaking (Haq et al., 2017), we end with a plea to split up the all-encompassing category of the general population into sub-groups. Listing agriculturalists alongside other professional groups at risk not only would make the national viral hepatitis strategy more inclusive but also enable new partnerships to break that suffocating silence. For instance, novel alliances could be forged between the national elimination program and the widely ramified provincial agricultural extension services within the remit of mass micro-scale interventions. Examples of collective action of this kind targeting professional groups other than medics and healthcare workers include a health public-private partnership in the beauty industry. In 2017, the All Pakistan Hairdressers and Beauticians Association joined hands with the Primary and Secondary Healthcare Department Punjab. Professionals and trainees working at registered barber shops, hairdresser salons, and beauty parlors are newly entitled to free hepatitis B immunization (The Nation, 2017). Why not seeding such mass micro-scale interventions among farming communities through the agricultural extension services?

Conclusions

This study is important to understand the intricate relations between hepatitis B and C, education, health literacy, socio-cultural barriers and preventive health behaviour among the affected people of rural areas of Balochistan. The study's findings highlight that hepatitis transmission and prevention is a complex and multilayered phenomenon, not just a biomedical one, by synthesizing qualitative evidence with ethnographic observations and patient narratives.The study's findings also illustrate that hepatitis transmission and prevention is a complex and multilayered phenomenon, not just a biomedical one, by drawing upon and synthesizing qualitative evidence, ethnographic observations and patient stories. Instead they are situated in the context of other education, social, cultural, family and health care contexts. The results indicate that people with HBV and HCV face various complex issues such as limited HBV and HCV knowledge, infection misconceptions, unsafe health care practices, stigma, testing barriers, vaccine resistance, family members' influences, and challenges accessing needed health services. Therefore, an effective response to hepatitis must be integrated, with medical interventions supported by ongoing education, culturally sensitive communication, community engagement and enhancing health literacy.

One significant finding is the low levels of knowledge and awareness of hepatitis among participants. Prior to diagnosis, 22% of the participants did not know about the disease, 27% had no knowledge of the nature of the disease's transmission, and only 30.5% had some information about the transmission of hepatitis. The relationship between transmission risk knowledge and outcomes of infection further underscores the significance of health literacy for prevention behavior. However, these results should not be taken as a proof that lack of education or being unable to read and write is directly linked to the occurrence of hepatitis. Instead, they highlight the way low-capacity access to accurate health information can be found alongside educational disadvantage, and how this can increase the likelihood that people do not acknowledge risk, challenge unsafe actions, make informed choices and take preventive action. Therefore, knowledge should not only be defined as understanding that Hepatitis exists, but as being able to understand how it is transmitted, to recognize risks, to be able to identify factual information from misconceptions, and to apply the facts to making health-related decisions in the everyday world.

JOURNAL FOR SOCIAL SCIENCE STUDIES
An International Peer-Reviewed Open Access Journal
ISSN (Online): 3006-2071 | ISSN (Print): 3006-2063
Volume 4 • Issue 4 • August 2026

Thus, Education becomes a pivotal part of Hepatitis Prevention in Balochistan. The results indicate that there has to be a shift from the short-term and sporadic dissemination of awareness to a long-term educational strategy, carried out through schools, colleges, universities, healthcare institutions, and community groups. Health education should offer age and evidence appropriate information on how HBV and HCV are transmitted, tested, why get the hepatitis B vaccine, blood safety, safe injection practices, prevention, and stigma. Educational institutions may help to spread facts and to build health literacy and the ability of their students to make health decisions for themselves, their families and their communities. There could be joint development of local content and learning activities by teachers and health workers. In the longer term, there is potential for communicable disease prevention and health literacy to become a part of formal education, which could produce a new generation more knowledgeable about measures to avoid unsafe practices and how to spread accurate health information inside the home and community. This is especially relevant given the fact that the article reveals that hepatitis is both a public-health issue and an educational and health-literacy issue.

Concurrently, the education needs which emerged in this study cannot be met through formal education. There was a significant number of respondents with a low level of formal education; in the studied population 34% were classified as illiterate and a relatively small proportion attained tertiary education. Community and adult education should therefore constitute an important part of hepatitis prevention. Messages for education should be accessible to those with varying levels of literacy and presented in culturally appropriate ways such as visual materials, illustrations, practical demonstration, interaction and participatory community workshops. It focuses specifically on the importance of local language and local learning through the community as a means of communicating awareness rather than the traditional "text-based awareness" methods. This education should also allow for community members to identify risk factors for healthcare, household transmission risks, the importance of testing and vaccination, and the ability to correct misinformation without stigmatizing persons living with hepatitis.

The socio-cultural results also show that a better knowledge does not necessarily lead to preventive behavior. Stigma, family honour, misconceptions related to disease transmission, trust in therapeutic injections and/or blood donated by family, traditional and informal healthcare practices, and family engagement in healthcare decisions all affect individuals' responses to hepatitis. Educational interventions need to be culturally responsive, however, and not reliant on the one-way delivery of biomedical information. Health-learning processes should incorporate involvement of families and influential community actors to discuss misconceptions that occur in the social contexts where health decisions are actually made. Education that is culturally sensitive and inclusive to local language/culture and corrects incorrect beliefs could be more effective in increasing confidence in testing, vaccination, correct treatment and preventive measures.

The study also highlights the specific conditions of rural farmers groups. Agricultural communities are important sectors of the study population but they may lack the opportunity for formal education, access to accurate health-related information and health care services. The results thus contribute to the development of greater cooperation between the education, health, community and agricultural sector institutions. Agricultural extension service may also be another educational medium which can be used to disseminate hepatitis information to farmers, farm workers and their families. The authors suggest linking such services to the hepatitis elimination initiative to reach preventative education into rural areas. This method may serve as a way of making health education more than just a class at

ISSN (Online): 3006-2071 | ISSN (Print): 3006-2063
Volume 4 • Issue 4 • August 2026

school or hospital, but an aspect of everyday life in the community.

In conclusion, the study highlights that tackling hepatitis B and C in rural Balochistan is not just about increasing diagnosis and treatment. In order to realize sustainable prevention, knowledge, health literacy, educational opportunities, culturally responsive communication, as well as community capacity building, must be enhanced in tandem with accessible health care services. The education should thus be seen as a fundamental part of the hepatitis prevention programme and not as an additional awareness campaign. It is crucial for schools, health services, families, community groups and agricultural extension services to work together on an ongoing basis in order to turn knowledge into informed prevention action. Hepatitis-control efforts can be better tailored to the needs of underserved rural populations by addressing misinformation, stigma, unsafe practices and barriers to health-seeking behaviour with locally appropriate education. Overall, the combination of education and health literacy and medical and public-health interventions provides a more holistic approach for the reduction of preventable transmission, the facilitation of timely testing and vaccination, affected persons' support, and the enhancement of communities' response capacity in a sustainable way to hepatitis B and C in Balochistan.

Declaration of Interest

Declarations of interest: none.

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