

Hepatitis Micro-Elimination in Union Council Panwan Of District Nankana Sahib: A Pilot Project for Eradication Of Viral Hepatitis C From Punjab

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Abstract

Viral hepatitis is highly prevalent in District Nankana Sahib of Punjab, Pakistan, according to the Pakistan Medical and Research Council (PMRC) Hepatitis Survey of 2008. A pilot micro-elimination project based on the "educate, prevent, test, and treat model" was conducted in collaboration with WHO based on the successful "educate, test, and treat" model of Egypt in 73 villages to ensure high levels of testing and treatment coverage of infected persons. Union Council (UC) Panwan of District Nankana Sahib, Punjab was selected for this pilot project. During this project, door-to-door screening was conducted and hepatitis B was administered from October 28 to November 21, 2019. By efficiently utilizing the scarcely available resources, the pilot project was able to accomplish unprecedented coverage in a short period. The seroprevalence of HBV and HCV at UC Panwan was 1.34% and 11.33%, respectively. In UC Panwan, 92.7% of the target population was covered and >80% of HCV patients were treated. Moreover, a high HBV vaccination coverage of 98.7% of hepatitis B-screened negative individuals was also achieved. The results of this study demonstrated the viability and efficacy of this model. This successful model can be scaled up on a mass scale to eliminate Hepatitis C in district Nankana Sahib, other high-prevalence districts, and the whole of Punjab as well.

Keywords: Nankana Sahib, UC Panwan, viral Hepatitis, Micro-elimination, HCV, H&ICP, screening, vaccination testing, treatment.

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1. Introduction

Pakistan has a high prevalence of chronic viral Hepatitis B and C infections. It is the country with the second-highest burden and second-highest prevalence of Hepatitis C infections behind China and Egypt, respectively (Khan et al., 2019; Sievert et al., 2011). As per the World Health Organization (WHO), 257 million people and 71 million people worldwide suffer from chronic Hepatitis B and C viral infections, respectively resulting in 1.1 million deaths every year. Hepatitis B and C can cause end-stage liver diseases such as liver cirrhosis, hepatocellular carcinoma, and liver-related deaths if left untreated (Wiegand & Berg, 2013). In terms of mortality, viral Hepatitis ranks 7th in the world (Spearman et al., 2017). Based on the 2018 seroprevalence survey conducted by the Bureau of Statistics, Government of Punjab, Punjab has a Hepatitis C prevalence of 8.9% and a Hepatitis B prevalence of 2.2%. Pakistan has committed to treating 90% of Hepatitis C patients by 2030 under SDG (3.3) ("WHO Guidelines Approved by the Guidelines Review Committee," 2014). Up to 11 million people in Punjab are infected with HC, requiring 850,000 people to be treated annually.

A program management unit called Hepatitis & Infection Control Program, Punjab was been established in Punjab for the prevention and control of viral Hepatitis B and C and has taken on the role of infection control

throughout the province by managing and disposing of infectious waste generated by health facilities under the Punjab Primary & Secondary Healthcare Department, Punjab. It provides free-of-cost access to generic DAAs to all diagnosed Hepatitis patients through a network of 216 testing and treatment sites at DHQ and THQ level facilities, RHCs, dispensaries, and private partners. A sample transport network has enabled a centralized viral load testing of samples received from all over Punjab through the Hepatitis Reference Cum Public Health Lab and Research Center, Punjab. An electronic medical record (EMR) dashboard provides a real-time overview of the Hepatitis Control Program progress across all testing and treatment sites/ hepatitis clinics.

A pilot Hepatitis Micro-Elimination Project was implemented by Hepatitis & Infection Control Program, Punjab in collaboration with WHO, based on the success of Egypt's "educate, test and treat" model in 73 villages to ensure high levels of testing and treatment coverage among infected persons (Shiha et al., 2018; Shiha et al., 2019). A door-to-door screening campaign was conducted in UC Panwan, District Nankana Sahib, Punjab, Pakistan from 28th October to 21st November 2019 for a target population (12 to 80 years of age). The project was part of multi-pronged and multi-sectoral approaches of Hepatitis & Infection Control Program, Punjab required to eliminate Hepatitis C by 2030, and the key objective of the micro-elimination pilot project was to develop a replicable model and comprehensive "educate, prevent, test and treat" toolkit which could be applied to the entire district of Nankana Sahib and other high prevalence districts in Punjab in the future to eliminate Hepatitis C. Among the four main components of the pilot project were education and community awareness raising, comprehensive preventive interventions, population-level screening, testing, and treatment, and continuous monitoring and evaluation at the district and provincial levels. Using the model implemented in Egypt, this project demonstrated its feasibility as a replicable intervention package for the micro-elimination of Hepatitis C in other high-prevalence districts of Punjab. The hepatitis micro-elimination approach in Punjab supports the target of HCV elimination in Punjab by 2030 in line with the global sustainable development goals.

2. Methods

Target Population and Project Microplanning

It was decided that UC Panwan in Nankana Sahib district, Punjab, would be the project site. There were 29,400 residents in total, and 19,400 were between 12 and 80 years old (66%). UC outreach teams mapped all general practitioners, lady health visitors, community midwives, private practitioners, quacks, dental clinics, blood banks, barbers, and beauty salons. In addition to planning the number and composition of mobile and fixed teams, the District Health Authority (DHA), Nankana Sahib also developed a transportation plan for logistics and teams. Using a household mapping and micro plan of the Expanded Program on Immunization (EPI), all households in the area were surveyed. Each team consisted of 11 healthcare workers, including screeners, social mobilizers, phlebotomists, injectors, and data entry operators.

Education and Community Awareness Raising

Establishing a culture of local ownership, participation, and accountability was key to promoting various educational and community activities. Schools and communities were used as venues for outreach and awareness campaigns utilizing a variety of communication tactics at the community and UC levels. To increase health awareness in communities and schools, 45 health education events were held. All stakeholders participated in seminars and awareness workshops at the Tehsil and district levels. Meetings and awareness activities at the Tehsil and district levels with participation from all stakeholders were also held in parallel.

Mapping of Target Groups and Comprehensive Preventative Interventions

A comprehensive prevention program, including commercial sex workers, GPs, barbers, beauty salons, and transgender people across the entire UC, was implemented. This included stepping up anti-quackery campaigns, improving licensing programs for barbers and beauty salons, and immunizing target populations, including transgender people and IV drug users, against HBV.

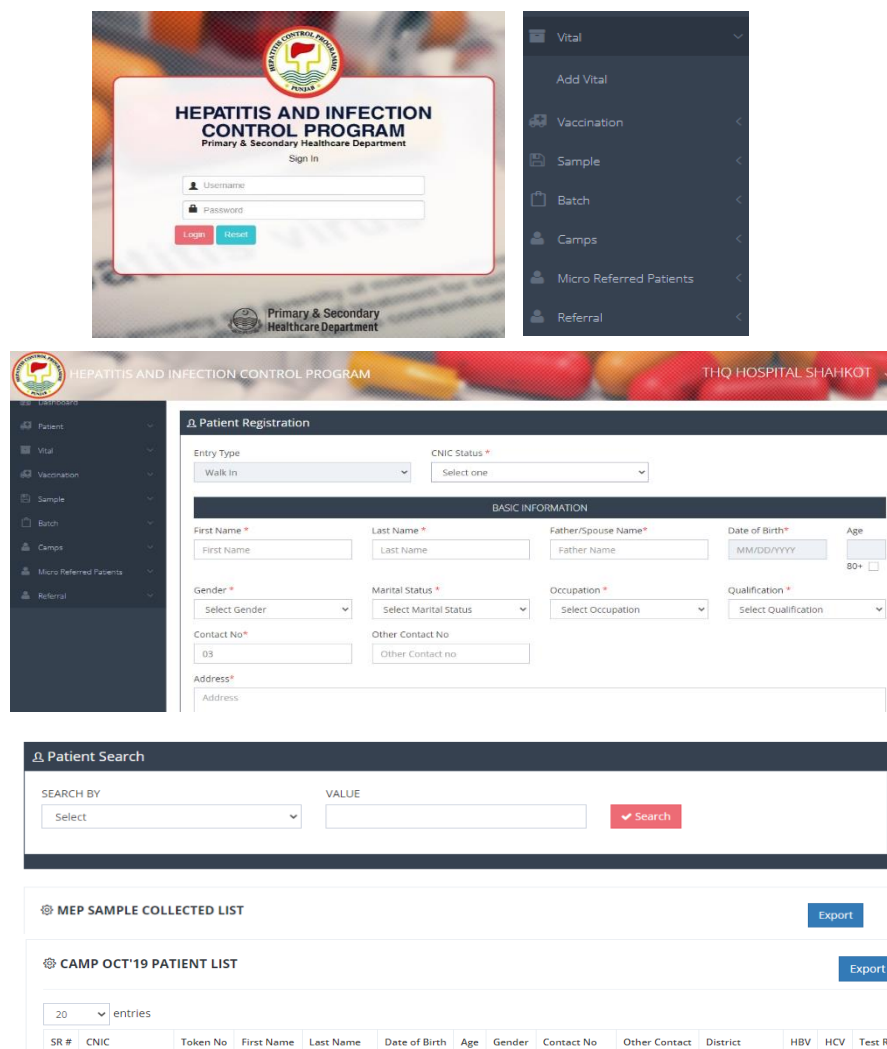
Population-Level Screening, Testing, and Treatment

During the pilot phase, five kit stations were set up in villages, and a fixed team was established at the BHU of the selected UC to provide speedy testing for all eligible residents (12 to 80 years of age). Medical care was provided by the Hepatitis Clinic at THQ Hospital Shahkot, including clinical evaluations, laboratory tests, and medical treatment.

Robust and Continuous Monitoring & Evaluation

Each of the interventions and activities centered on each of the four primary pillars of this approach was frequently monitored and evaluated by supervisors at the local and provincial levels, as well as WHO representatives. Through the notification of an oversight committee that included members from all stakeholders, including the Punjab Healthcare Commission (PHC), the Environment Protection Agency (EPA), the Blood Transfusion Authority (BTA), the Institute of Blood Transfusion, and the Society of Family Physicians, oversight and coordination were implemented for regular reviews of progress and quick identification and correction of any bottlenecks. A meeting was held before the phase began, and a second meeting was held to update all stakeholders.

Figure 1: Overview of the purpose-built IT platform for the Pilot Hepatitis C Micro-elimination Project at UC Panwan



Training of Master Trainers and Trickle-down Training

In collaboration with WHO, the Punjab Hepatitis & Infection Control Program developed and updated training materials based on standardized screening, testing, and treatment protocols. All district team members received trickle-down capacity building from upskilled master trainers.

Development of Customized Information, Education, and Communication (IEC) Material

With the coordination and technical assistance of WHO and PITB, the Hepatitis & Infection Control Program, Punjab prepared and printed standardized IEC material for this community intervention.

Development of a Purpose-Built IT Platform

Hepatitis & Infection Control Program's significant competence in application development for the care of Hepatitis patients was relied upon to provide a purpose-built information system for this project with an emphasis on ease of use for the end user. For the end user and management team to follow progress, this cloud-based system offered both an app-based user interface and a web version. Interface screenshots of purpose-built EMR for the pilot Hepatitis C Micro-elimination Project in UC Panwan are shown in Figure 1.

Supplies of Logistics for the Pilot Project

The district of Nankana Sahib received all supplies, including RDTs, PCR sample collection tubes, barcode stickers, centrifuges, and medicines, from the Hepatitis & Infection Control Program, Punjab for this project. For the eligible individuals, the approximate cost of all the logistics needed for the pilot project was PKR 25 million. The District Health Authority covered the expense associated with setting up kit stations and daily team transportation. The WHO Federal Office funded IEC material costs.

Launch of the Pilot Project

Provincial Hepatitis & Infection Control Program, District Health Authority, District Administration, and WHO launched an extensive social mobilization campaign before the official opening and launch of the project. The micro-elimination project pilot began on October 28, 2019, at UC Panwan. At the local level, five (5) kit stations were set up, with 11 people on each team; while the sixth kit station was built at BHU Panwan. The project progress from October 28 to November 21, 2019, which included all aspects of the project, was consolidated; and data was compiled from manual records from the district and the Electronic Medical Record (EMR) dashboard of the Provincial Hepatitis & Infection Control Program.

3. Results

An effective social mobilization campaign

A total of 45 health education sessions were held in local communities and schools. People were taken fully on board and apprised about this activity i.e. presence of screening and testing teams in their neighborhoods several times a day through announcements in mosques. Social mobilizers (LHWs, LHS, and school health and nutrition supervisors) also played an active role in getting people out of their homes for screening. As a result of a successful social mobilization campaign, there was not a single refusal which speaks for itself regarding the success of the awareness campaign. During the pretesting period, LHWs marked doors so they could plan coverage for people who could not be vetted and tested.

Interventions aimed at preventing disease

The Deputy District Health Officer of Tehsil Shahkot diligently pursued preventive interventions in the tehsil, paying particular attention to UC Panwan. In addition to 35 barbers being selected for testing, three quack clinics were shut down as a result of UC Panwan's anti-quackery initiatives. Transgender people were also

included in screenings, testing, vaccinations, and treatment for Hepatitis B and C.

Total Coverage Information and Pre-Testing Phase of the Pilot Project

According to the district's feedback, UC Panwan's target population was 19,400 individuals between the ages of 12-80. More than 17,000 individuals were screened, immunized for Hepatitis B, and blood samples were taken from those who tested positive for Hepatitis B and/or C. The Hepatitis & Infection Control Program had already registered 966 individuals through its operational Hepatitis Clinics. A total of 17,981 individuals were screened at UC Panwan, and 92.7% of the target population was appropriately screened, immunized, and tested (Table 1, Figure 2). The percentage distribution of gender among pre-tested individuals in UC Panwan is shown in Figure 3. There were 53.53% males and 46.42% females.

Table 1: Summary of total coverage information, target population, number of individuals pre-tested through Hepatitis Micro-elimination pilot project

Total Population of UC Panwan	29,400
Target Population	19,400
Total Registered and Screened	17,981 (17,015 newly pre-tested through micro-elimination plus 966 already registered and screened through macro-elimination)
Percentage of Registrations and Screenings out of Target Population	92.7 %

Figure 2: Registrations and screenings for Hepatitis B and C through Hepatitis Micro-elimination pilot project

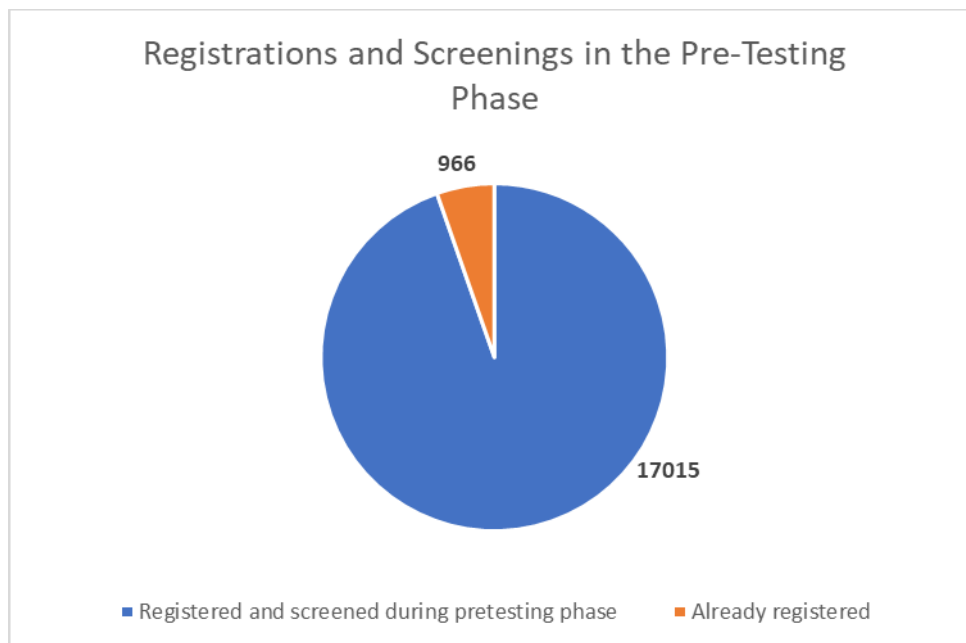
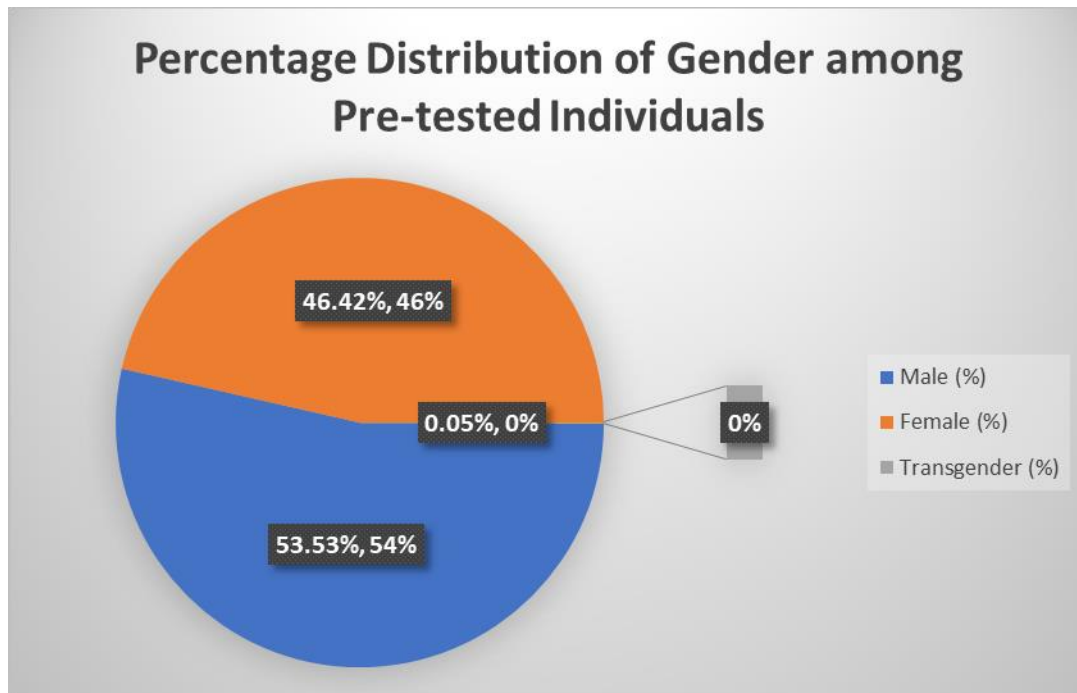


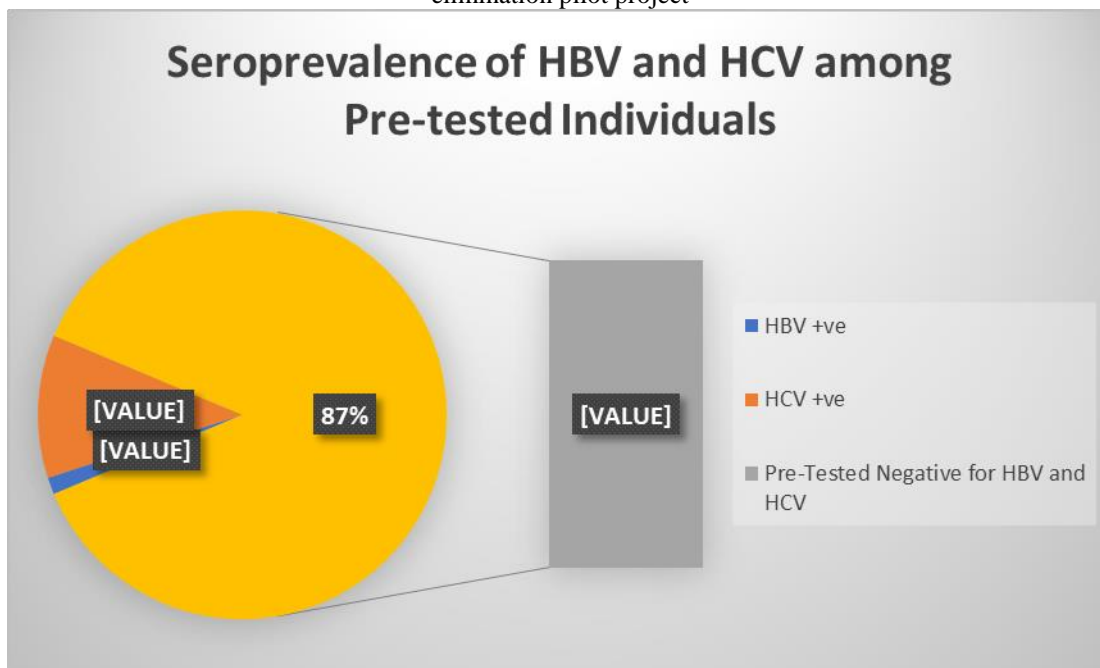
Figure 3: Percentage distribution of gender among pre-tested individuals in UC Panwan.



Seroprevalence for HBV and HCV

Among the total new registrations through the Micro-elimination Pilot Project i.e. 17,015, the 228 were pre-tested to be positive for HBV while 1,927 were found positive for HCV representing HBV and HCV prevalence of 1.34% and 11.33%, respectively (Figure 4).

Figure 4: Seroprevalence of HBV and HCV among pre-tested individuals through Hepatitis Micro-elimination pilot project



Vaccinations against Hepatitis B

The first dose of the Hepatitis B adult vaccine was administered to 16,787 of the 17,015 screened individuals in UC Panwan, as well as 515 of the 966 individuals already registered. Consequently, 17,302 individuals out of 17,981 were vaccinated for HBV and issued vaccination cards by Hepatitis & Infection Control Program, Punjab, representing 96.22% coverage overall while 98.7% for newly pre-tested individuals (Table 2).

Quantitative RT-PCR and Enrollment in Treatment

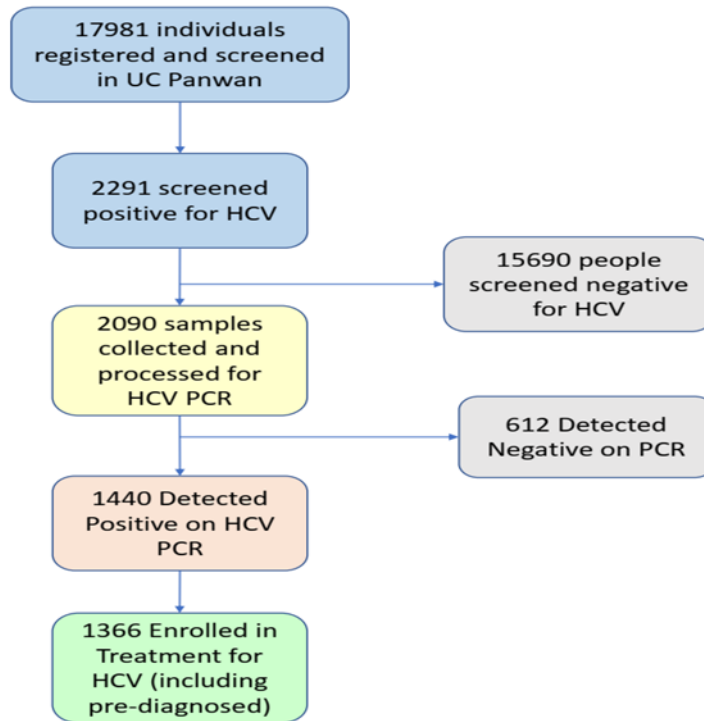
Hepatitis Micro-elimination pilot project related various indicators, as well as the numbers of individuals already registered at UC Panwan through Hepatitis Clinics, are shown in Table 2. As part of the Hepatitis & Infection Control Program, Punjab, Hepatitis Reference Laboratory and Research Centre, Lahore, used standard procedures of PCR processing to analyze blood samples collected for quantitative PCR using Roche Cobas 6800 and Abbott M-2000 HCV PCR systems. 1843 PCR samples were processed for HCV for newly pre-tested individuals while 247 samples for HCV PCR were processed for already registered individuals; while for HBV PCR, 207 samples were of newly pre-tested individuals and 11 of already registered individuals. Therefore, a total of 2090 PCR samples were processed for HCV and 218 PCR samples were processed for HBV (Table 2).

Individuals detected positive on PCR underwent baseline investigations and assessments, and accordingly were enrolled in treatment for HCV (sofosbuvir + daclatasvir) or HBV (tenofovir/entecavir/telbivudine). In total, 1366 HCV patients and 46 HBV patients were enrolled in treatment, including pre-diagnosed patients as shown in Table 2. Among the newly diagnosed HCV patients through the pilot Micro-elimination project i.e. out of 1301, 1052 HCV patients were enrolled in treatment representing an HCV treatment coverage of 81%. Figure 5 shows the combined cascade of care analysis for Hepatitis C including pre-tested individuals through the Hepatitis Micro-elimination pilot project plus already registered through Macro-elimination.

Table 2: Counts of various indicators recorded and monitored through the Hepatitis Micro-elimination pilot project and already registered individuals of UC Panwan through Hepatitis Clinics.

Indicators	Newly Pre-tested Individuals in UC Panwan	Already Registered through Hepatitis Clinics	Total
Total Registered	17015	966	17981
Total Screened	17015	800	17815
HCV Screened Positive	1927 (11.33%)	364	2291
HBV Screened Positive	228 (1.34%)	13	241
HCV PCR samples collected and processed	1843	247	2090
HBV PCR samples collected and processed	207	11	218
HCV Detected	1301	139	1440
HBV Detected	172	1	173
HCV Enrolled	1052 (81%)	314 (including pre-diagnosed for HCV)	1366
HBV Enrolled	38 (22%)	8 (including pre-diagnosed for HBV)	46
Total Vaccinated for HBV	16787 (98.7%)	515	17302

Figure 5: Combined cascade of care analysis for Hepatitis C: pre-tested individuals through Hepatitis Micro-elimination pilot project plus already registered through Macro-elimination.



4. Discussion

To achieve the highest levels of testing and treatment coverage for HCV-infected persons, the Hepatitis & Infection Control Program, Punjab, in collaboration with WHO, conducted a pilot micro-elimination program based on the successful "educate, test and treat" model of Egypt in 73 villages (Shiha et al., 2018; Shiha et al., 2019). From October 28 to November 21, 2019, door-to-door screenings were conducted in UC Panwan, District Nankana Sahib, Punjab, Pakistan for the target population (12 to 80 years old). The micro-elimination pilot project's main objective was to create a replicable model and comprehensive "educate, prevent, test, and treat" toolkit that could be used to achieve micro-elimination of Hepatitis C in Nankana Sahib and other high-prevalence districts in Punjab in the future. Hepatitis C must be eliminated by 2030 in Punjab as part of the Hepatitis & Infection Control Programme. By a PMRC survey conducted in 2008 ("Pakistan Hepatitis B and C Prevalence Survey 2007-2008"), Nankana Sahib district had a high prevalence of viral hepatitis; in addition, Nankana Sahib had an established infrastructure, strong district leadership, and commitment to implementing this project.

In a short period with the available resources, the pilot project achieved unheard-of results. In UC Panwan, 92.7% of the target population was covered (Table 1) and >80% of the detected HCV patients were enrolled in treatment. It was, however, due to social factors at the patients' level that some were not able to enroll in treatment, transportation constraints to the nearest Hepatitis Clinic, some opting for private treatment or herbal or traditional medicines, and others that some patients could not enroll in treatment. Yet, health education sessions played a significant role in guiding and encouraging the majority of the population to get tested and treated. Furthermore, 98.7% of the newly pretested individuals were vaccinated against HBV as a result of such sessions. This project demonstrated the practicability and effectiveness of this model as a replicable intervention package for the micro-elimination of Hepatitis C in Nankana Sahib as well as other high-prevalence districts of Punjab based on the model implemented in Egypt.

Conclusion and Recommendations

Hepatitis is a Public Health Emergency in Pakistan. Particularly in Punjab, the prevalence is highest among all provinces. Micro-elimination is a proven effective strategy for the elimination of Hepatitis C from communities with high disease burdens of Hepatitis B & C. Pakistan is facing an alarmingly high prevalence of Hepatitis C and needs mass-level interventions to curtail this huge disease burden. The success of this pilot project is an encouragement for the Government and health planners. Future strategies can be built upon this successful intervention. This must be scaled up and replicated across all the 13 high-prevalence districts of Punjab. Elimination of Hepatitis C using a micro-elimination approach can bring Pakistan closer to the elimination target of end hep 2030. Following are a few recommendations:

1. According to the Hepatitis Micro-elimination pilot project, the prevalence of HBV in UC Panwan was 1.34% and HCV was 11.33%. Punjab's district-wise prevalence reported in the PMRC survey, in 2008 is about 15 years old, and a new survey is direly needed to determine the current prevalence of Hepatitis B and C in Punjab.
2. Furthermore, a Rapid Diagnostic Testing kit was used to determine the prevalence of viral Hepatitis. According to a previous study (Rana et al., 2023) the reliability of RDTs is questionable; a more reliable screening method should be used instead of relying on RDTs.
3. Moreover, the Government should allocate more resources to Hepatitis C Micro-elimination in other UCs of Nankana Sahib as well as in other high-prevalence districts in Punjab so that the target of Hepatitis elimination by 2030 may be realized.
4. The robust involvement of the community must be ensured in all future interventions so that the desired outcomes may be ensured.

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