Comprehensive Integrated Viral Hepatitis B Prevention and Elimination Program

Department of Health – Central Tibetan Administration (DoHe-CTA)

FINAL REPORT 2023

(ABRIDGED VERSION)

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CHAPTER ONE

SITUATION ANALYSIS AND NEED ASSESSMENT

A. Viral Hepatitis B Burden among Tibetan Refugees in the Indian Subcontinent

Hepatitis B and tuberculosis (TB) are the two diseases among the communicable diseases that are of public health importance to the Tibetan refugee communities living in India & Nepal. As compared to the local host population, the prevalence of hepatitis B among the Tibetan refugee population living in the Indian subcontinent is estimated to be much higher. The prevalence of hepatitis B among the local population in India is estimated in the intermediate endemic zone between 2% - 7% (*WHO 2016*) and, for the local Nepali population, it is estimated in low endemic zone at <2% (*WHO 2016; Shrestha SM & Shrestha S 2012)*.

In a study carried out by Shrestha SM and others (*Shrestha SM, Takeda N et al 2002; Shrestha SM & Shrestha S 2012)*, the prevalence of hepatitis B among Tibetan refugee community in Nepal was found to be around 17% percent. The Nepal study was a representative sample covering the two main regions i.e., Kathmandu and Pokhra regions where most of the Tibetan refugees in Nepal were concentrated. Considering that the survey in Nepal was conducted in the year 1987, the prevalence is likely to have decreased since then. Naveira et al 2018 conducted a systemic review of almost all the studies on viral hepatitis carried out in Nepal and gives an insight into the hepatitis B situation among non-Tibetan and Tibetan communities in Nepal. It also gives a bird's eye view of the study carried out by Shrestha and others, disaggregated by area of residence and age-group of the Tibetans in Nepal.

In 2013, DoHe-CTA and Johns Hopkins University conducted a hepatitis B prevalence and treatment needs survey among the Tibetan refugees residing in Bylakupee Tibetan settlement in South India (DoHe-CTA & JHU2015; *Stevens K et a 2018)* and the survey confirmed the high prevalence of hepatitis B among Tibetans living in Bylakupee, revealing a prevalence of 11.9% among the household population surveyed and 8.9% among the overall population including school and monastic populations. Since Bylakupee settlement is situated in South India, there was some consensus that a hepatitis B prevalence survey needs to be carried out from regions representing Central, North and North-East India.

The 1st & 2nd phase hepatitis B prevalence survey was conducted in 2019 and early 2020 from representative settlements from North, Central and North-East India and it revealed a prevalence of about 7% among Tibetans in India. The 3rd phase (final) of the survey representing South India was also planned for 2020, but due to COVID-19 pandemic, it had to be postponed to 2022. The report in this document includes the final consolidated Hepatitis B survey i.e., the finding of all the three phases of the survey.

B. Comprehensive Integrated Viral Hepatitis Prevention and Elimination Program of DoHe-CTA

When we started the "DoHe-CTA Hepatitis B" project, the host governments (India and Nepal) did not have a fully operationalized "Country Hepatitis B Program" on treatment and management of people

living with chronic hepatitis B infection. In 2019, India came out with an operational guideline and Department of Health, Central Tibetan Administration (DoHe-CTA) decided to adopt it. DoHe-CTA wants to lead the way for Tibetan people residing in India and Nepal, the international mobilization effort by World Health Organization (WHO) and the member nations of the United Nations (WHA) for viral hepatitis elimination. In this regards, DoHe-CTA is pursuing better understanding of the viral hepatitis burden and its epidemiology among the Tibetans through scientific research and operationalization of the "Comprehensive Integrated Viral Hepatitis Prevention and Elimination Program" in the Tibetan refugee settlements where DoHe-CTA has a health facility. "Comprehensive Viral Hepatitis Assessment Study in Tibetan Refugee Settlements", funded by PRM, is one of the key efforts in that direction, and the current survey is designed as operational research within the DoHe-CTA Hepatitis B Elimination Program with plans to cover 30% of the population by 2020, but due to COVID-19 disruption, it had to be postponed until 2022.

Until recently, DoHe-CTA has been working in the area of hepatitis B with a focus on prevention, the key intervention strategy being the universal vaccination against hepatitis B virus for children under the age of 5 (Under-5 Children). It will continue to be the key priority interventions. Additionally, between 2014 and 2017, we have launched the onetime "Catch-Up Hepatitis B Vaccination Campaign" that covered 10,780 school going children from the residential schools in India covering more than 90% of the population.

Now, more individuals with complications of chronic hepatitis B infection come to our attention, and the need to do something about this was felt some years ago. Though the overall cost of preventing the complications of chronic hepatitis B infection with antivirals is likely to be more cost-effective than treatment of complication of chronic hepatitis B infection (chronic liver diseases and liver cancer), the prohibitive cost of antiviral medicines and inadequate infrastructure (both human resources and physical infrastructure) has been a big barrier for large scale introduction. However, the WHO (2016) recommends scaling of diagnosis and treatment of hepatitis B & C and states that "historically, treatment for viral hepatitis was considered too expensive and not sufficiently effective for low- and middle-income countries. The development of safe and effective therapies in the past few years has changed this dynamic. However, most persons with chronic hepatitis infections are unaware of their status. Therefore, a dramatic scaling up of testing with linkage to care and treatment is needed". The WHO (2016) also states that "scaling up access to antiviral medicines can no longer be refused for reasons of high cost, or on the grounds of inequality, lack of infrastructure including human skill at grass-root level, risk of viral resistance or alternative priorities. Access to medicines seems to be appropriate, and it is a cost-effective investment choice for public health intervention even in

developing countries". Over the last few years, the cost of hepatitis B antiviral medicines have come down substantially.

Since 2015, DoHe-CTA has been planning and gearing up for infrastructure development to introduce a comprehensive "Viral Hepatitis Program" at the primary care level that will cover the whole spectrum of prevention & treatment including universal infant immunization, screening for hepatitis B and treatment need, treatment with anti-viral drugs for those who need them, follow-up and development of levels of consultative and referral network for complicated cases. Most people with chronic hepatitis B infection do not present with any symptoms. They are not aware of the condition and do not seek care; a substantial proportion of people are undiagnosed and may present latter with fatal complications. In such a situation, population-based intervention using household level as the "Point-of Contact & Care" may be an appropriate and effective approach.

DoHe-CTA had made the strategic decision to subsidize the cost of hepatitis B treatment with free treatment for those who are living below poverty line (BPL) and a subsidy component for the economically vulnerable group. Infrastructure, both hardware and human resources, are being developed within the primary health system. A series of meetings of experts (international and Indian) and the practicing physicians of DoHe-CTA have taken place from November 2018 to April 2019. To start a hepatitis B treatment program in our community, we needed to leverage the lessons learned from our fight against diseases like TB and use the primary care system to improve and extend the reach of hepatitis B management in our community. Our doctors, who are all primary care physicians needed a clear guideline. In this regard, a Standard Operating Procedure (SOP) for management of hepatitis B was developed in 2019 for the DoHe-CTA doctors. The SOP conforms to the government of India and WHO hepatitis B treatment guidelines.

Due to DoHe-CTA hepatitis B vaccination program for infants under the Universal Infant Immunization Program (UIP), communication strategy for social and behavior changes and other factors, hepatitis B transmission rate is projected to decrease over time. Center for Disease Analysis Foundation (CDAF) had helped us develop a projection model based on the data available prior to 2018, and it showed that the incidence of "complications" of chronic hepatitis B infection i.e., chronic liver diseases including cirrhosis, liver failure and liver cancer (HCC) will increase over the coming years if anti-viral treatment is not initiated to those who require treatment (CADF 2018). By detecting people with chronic hepatitis B infection and treatment needs at an early stage, DoHe-CTA feels that the need for high-cost interventions for liver cirrhosis and liver cancers later on in life can be reduced.

With the completion of the "Comprehensive Viral Hepatitis Assessment Study in Tibetan Refugee Settlements" and the Standard Operating Procedure (SOP) for treatment of hepatitis B infection, it is

expected that our doctors working in primary care level will be able to treat and manage at-least 60% of the patients who require treatment for chronic hepatitis B infection.

A tracker application in EPI INFO 7 was developed to monitor people with HBsAg positive status. The system has in-build constraints and checks to improve the quality of data entry and some degree of automation to improve the ease-of-use functionality for the end users. And, also the system could function as a routine e-monitoring tool at the DoHe-CTA Program Officer level. For example, APRI and FAB4 scores are automatically calculated by the application and the system automatically guide the primary care physicians on the hepatitis B positive persons who need antiviral treatment. The routine data collected in EPI INFO 7 database system will help DoHe-CTA in surveillance and e-monitoring of hepatitis B infection, treatment needs and their treatment with antivirals. In 2022, DoHe-CTA was able to finalize the "Viral Hepatitis Strategy and Action Plan 2030" documents and works towards fulfilling the viral hepatitis related 2030 WHO targets & SDG goals (*UN 2015)*.

CHAPTER TWO

STUDY DESIGN, SURVEY INSTRUMENT AND DATA COLLECTION & ANALYSIS PLAN

Prevalence of Hepatitis B & C in the Tibetan Community in India (Operational Research).

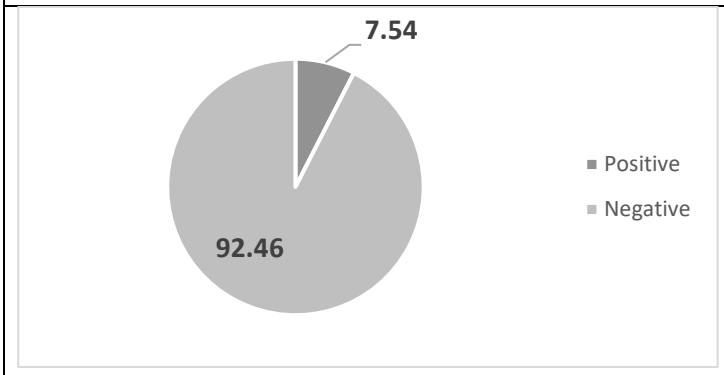
Study Design, Study Participants, Data Collection & Analysis Plan		
S. No	**Sub-title**	**Narrative**
1	Study Name & Type	Prevalence of hepatitis B & C in the Tibetan Community in India (Operational Research - A Cross-Sectional Study).
2	Sample frame & sampling technique	Tibetan population residing in the Tibetan settlements in household units in India was estimated around 40,000 with additional 20,000 – 30,000 estimated in institutional setting in residential schools and monasteries. Conventionally, the Tibetans settlements in India are divided into 4 regions i.e., North, South, Central and North-East which may have different disease burdens. A convenience cluster sampling technique is used by selecting representative settlements/district from the four regions. At the end of the survey, it is hoped that we will cover about 30% (about 20,000) of the population
3	Sample size	We included all the population of the settlements (clusters) selected so that the sample size is large enough to compensate for members who were not present during the study period and those who refused to participate in the study. At the end of the survey, we hope to cover about 30% of the Tibetan population in India i.e., about 20,000 members which also fulfils the WHO 2020 target of "diagnosing 30% of the population living with hepatitis B and C by 2020". A separate demographic profile of the sub-population who refused to participate or who were not in the settlement during the survey period will be analysed to see if there are differences between the participants and non-participants.
4	Sample unit	Household level at the settlements and individual at schools and monasteries.
5	Survey process & instruments	Door to Door or at the camp level. Structured questionnaire form including consent and participant information forms were printed. The algorithm and standard operating procedure (SOP) and prior written protocol for screening, selection criteria for treatment with antiviral, treatment and follow-up management were prepared following a series of meetings of experts (international and Indian) and the practicing physicians of DoHe-CTA. The SOP conforms to the international and Indian guidelines. A team consisting of qualified doctor, lab-technician, nurses/Community Health Workers conducted the survey. Rapid diagnostic/screening test for Hepatitis B and C infection were conducted at the point of care i.e., camp level or at the local DoHe-CTA facility level by the DoHe-CTA survey team. Other advance diagnostics for baseline and treatment need (viral load, LFT, HBeAg, ultrasound/fibro scan etc.) assessment were outsourced to accredited Indian private laboratory from the near-by Indian cities. Those who required anti-viral treatment were given subsidized medicines by DoHe-CTA. The resident DoHe-CTA doctor and the support staff will provide the follow-up care. All the survey team members were given prior orientation workshop on the survey process and the survey instruments. All stakeholders at the settlement level were involved through prior meeting and awareness campaign before the survey. Local level health staff already have deep interaction with the community members at the settlements because of CCOCC (Outreach) program of DoHe-CTA where the nurses/CHWs cover every household at least once a month through outreach visits.
6	Exclusion Criteria	Those not in residence at the Tibetan settlements during the survey period. The survey included all the resident population from the clusters.
7	Study limitation	The Tibetans settlements are divided into 4 regions i.e., North, South, Central and North-East. Selection of a cluster sample from the regions is based on convenience sampling. However, all the population of the settlements selected for the cluster is included in the survey. The design may under-represent the sub-population who are students from the residential schools especially North India. But we have carried out a "Catch-up Hepatitis B Vaccination Campaign" for the students of the residential schools from India between 2014 and 2017, covering at-least 90% of students from the Tibetan residential schools. For the school going age, we will triangulate the prevalence data available from this study and "Catch-up Hepatitis B Vaccination Campaign" while analysing this sub-population.
8	Study period	2019 – 2020 (Extended to 2022 due to COVID-19 pandemic)
9	Risk perception	Dependence on donor funding.
10	Data analysis plan	Prevalence, descriptive study, variance & regression analysis, and modelling

11	Outcome/Utility	The prevalence of hepatitis B and C from the four regions of North, Central, North-East and South India will give us a better understanding of the burden of hepatitis B & C infection for evidence-based planning and decision making. Integration of the survey with "Comprehensive Integrated Viral Hepatitis Prevention and Elimination Program of DoHe-CTA", will bring about seamless continuum of care for those participants from the survey who needs treatment and help DoHe-CTA achieve the WHO target of "By 2030, 80% of eligible persons with chronic hepatitis B virus infection are treated".
12	Expertise/Experience	We have carried out a "Prevalence Study" in Byllakupee in 2013-14 with Johns Hopkins University. Between 2014 and 2017, a "Catch-up Hepatitis B Vaccination Program" in 35 residential schools covering about 90% of student population was successfully completed. Centre for Disease Analysis Foundation (CDAF) will be collaborating with DoHe-CTA and will also serve as the external consultant for this project. Dr. Lobsang Tsering, Internal Consultant will work as the principal researchers and coordinate the activities with Hepatitis B Project Officers, other staff at DoHe-CTA and CDFA
13	Implementation Status	All three phases of the survey were completed and the current report presents the finding of the survey
14	Names of key researchers from India and their institutional affiliation	Principal Investigator: Dr. Lobsang Tsering[1,2] Co-investigators: Ms. Tenzin Dolkar[1], Ms. Tenzin Chodon[2], Ms. Tenzin Lhadon[1], Ms. Tenzin Dechen[1], Mr. Nawang Tsundue Singhe[3], Dr. Dhundup Tashi[4], Dr. Tenzin Loden[5], Dr. Tsetan D. Sadutshang[5]. *[1]Department of Health, Central Tibetan Administration, Dharamsala, India. [2]The Tibet Fund, Dharamsala, India. [3]University of Minnesota Medical School, Minneapolis, USA. [4]Gaden Jangtse Hospital, Mundgod, India. [5]Tibetan Delek Hospital, Dharamsala, India*

CHAPTER THREE
PREVALENCE OF HEPATITIS B & C IN THE TIBETAN COMMUNITY IN INDIA
(OPERATIONAL RESEARCH 2019 - 2022)

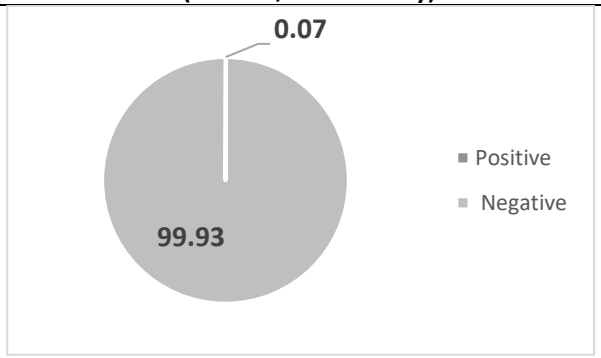
FINDINGS, DISCUSSION & RECOMMENDATIONS

Fig 4.1: Prevalence of Hepatitis B among Tibetans in India (Phase 1, 2 & 3 Survey)



Hepatitis B Status	Frequency (n)	Percentage (%)
Positive	1178	**07.54**
Negative	14439	92.46
Total	15,617	**100.00**

Fig 4.2: Prevalence of Hepatitis C among Tibetans in India (Phase 1, 2 & 3 Survey)



Hepatitis B Status	Frequency (n)	Percentage (%)
Positive	11	**0.07**
Negative	15,631	99.93
Total	15,642	100.00

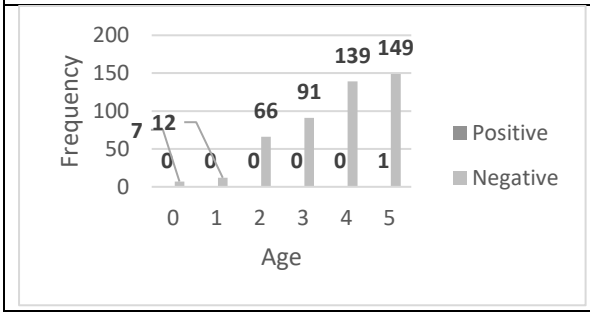
The prevalence of hepatitis B and C among Tibetans in India from this study was **07.54%** (N=15617) and **0.07%** (N=15642) respectively. In comparison, the prevalence of hepatitis B and C among all ethnicity who were resident of Tibetan settlements; were **06.18%** and **0.07%** respectively. Though the prevalence of hepatitis B is lower as compared to the study carried out by DoHe-CTA & Johns Hopkins University in 2014, it is still among the highest in the world. The prevalence of hepatitis B may have been decreasing over the past many years but the rate of decline is a slow one and this is expected. With one or two generation shifts in the near future, we may see a drastic decline in hepatitis B prevalence rate.

What is satisfying to see in the current survey was that, among the 465 children who were in the under-5 age-group and tested for hepatitis B, only one child (0.22%) had tested positive for hepatitis B and all the rest were negative for hepatitis B (kindly refer fig. 4.3). This finding probably shows that DoHe-CTA's universal immunization program for under-5 children is bearing fruit. This study also showed that among the Tibetan children (age below 18 years), 01.21% (n=38) were positive for hepatitis B surface antigen (hepatitis B virus) out of the total of 3141 children who participated in the survey as compared to the prevalence rate of 01.29% for all ethnicity of the same age group. Kindly refer to fig 4.4.1 and 4.4.2. This contrast with the overall prevalence rate of 06.18% and 07.54% for all ethnicity and Tibetan only ethnicity respectively. The comparative lower prevalence among Tibetan children in the current study probably reflect, among others, the effectiveness of the "One Time Catch-

Up Hepatitis B Vaccination Project" carried out between the year 2014 and 2017 among the students from the Tibetan residential schools in India (kindly refer table 4.1)

fig 4.3
Prevalence of Hepatitis B (Age 0-5 years)

Tibetan Ethnicity



Age	HBV Positive	HBV Negative	Total
0	0 (**00.00**)	7 (100.00)	7
1	0 (**00.00**)	12 (100.00)	12
2	0 (**00.00**)	66 (100.00)	66
3	0 (**00.00**)	91 (100.00)	91
4	0 (**00.00**)	139 (100.00)	139
5	**1 (00.67)**	149 (99.33)	150
Total	**1 (00.22)**	**464 (99.80)**	**465**

fig 4.4.1
Prevalence of Hepatitis B Among Children (Age <18 years)

Tibetan Ethnicity

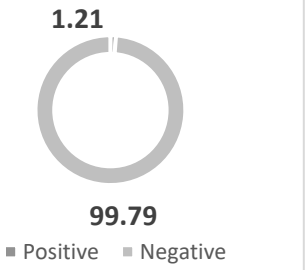
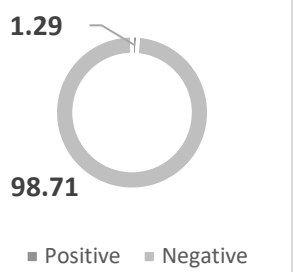


fig 4.4.2
Prevalence of Hepatitis B Children (Age <18 years)

All Ethnicity



Hepatitis B Status	Tibetan	All Ethnicity
	Frequency n, (%)	Frequency n, (%)
Positive	38 (**1.21**)	80 (**01.29**)
Negative	3103 (99.79)	6102 (98.71)
Total	3141 (100.00)	6182

Table 4.1

Catch-Up Immunization Project for Tibetan Schools in India (2014 – 2017)

Age Group	*Hepatitis B Status*		
	Negative	*Positive*	*Total*
0-4	*24 (100%)*	*0 (**0.00%**)*	*24*
5-10 Years	*2,463 (98.52%)*	*37 (**1.48%**)*	***2,500***
10-15 Years	*4,310 (96.94%)*	*136 (**3.06%**)*	***4,446***
15-20 Years	*3,278 (95.10%)*	*169 (**4.90%**)*	***3,447***
TOTAL	*10051 (96.71)*	*432 (**3.29%**)*	***10393***

Table 4.2

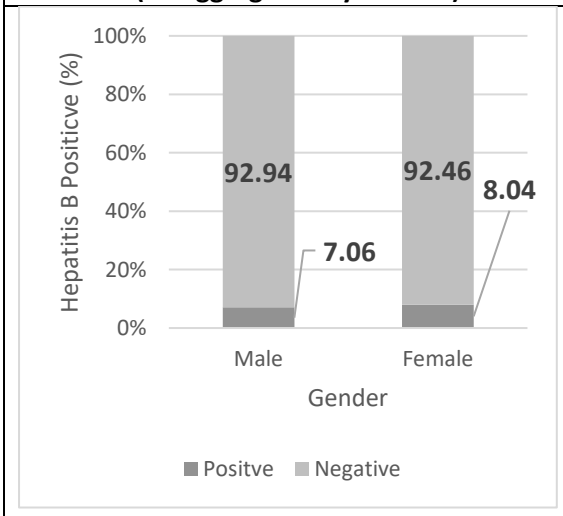
Current Study (2019-2022)

Age Group	*Hepatitis B Status*		
	Negative	*Positive*	*Total*
0-4	*354 (100%)*	*0 (**0.00%**)*	*354*
5-10 Years	*1441 (99.17%)*	*12 (**0.83%**)*	*1453*
10-15 Years	*2699 (98.58%)*	*39 (**1.42%**)*	*2738*
15-20 Years	*2501 (98.08%)*	*49 (**1.92%**)*	*2550*
TOTAL	*6995 (98.59%)*	*100 (**1.41%**)*	***7095***

The comparatively better status in table 4.2 may be due to cohort effect i.e., after 5 years, those who were born in 2017 would have reached age 5 in 2022. Not only this study but CTA-Johns Hopkins study [3,4] had also shown that those born in Tibet had higher prevalence of hepatitis B as compared to those born in India. Additionally, between 2014 and 2017, large Tibetan residential schools e.g., Tibetan Children's Village Schools and Tibetan Homes Foundation schools had more children born in Tibet as compared to children based in the settlements.

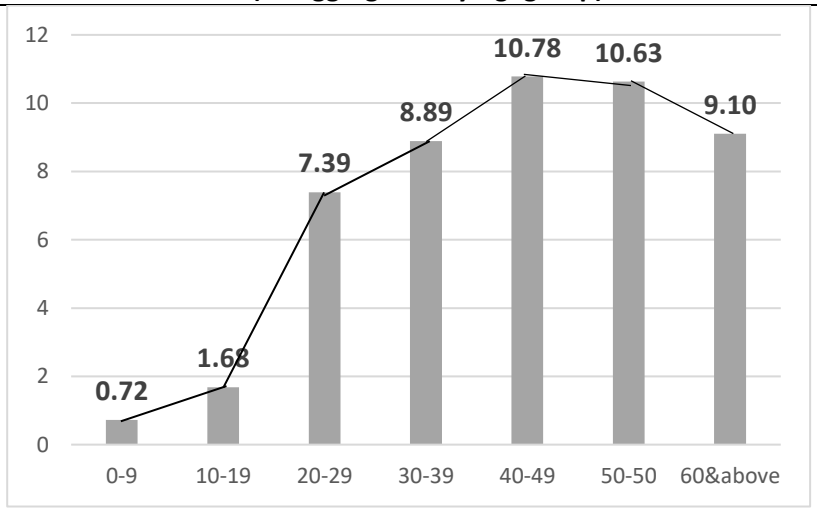
8.04% (n=617) of females were hepatitis B positive while 7.06% (n=561) of males were hepatitis B positive. After adjusting for age, females were more likely to be at greater risk of chronic hepatitis B by 1.19 times as compared to males (p-value 0.005). Hepatitis B positive rate among age-group 0-9, 10-19, 20-29, 30-39, 40-49, 50-59, 60 & above were 0.72% (n=9), 1.68% (n=40), 7.39% (n=128), 8.89% (n=231), 10.78% (n=282), 10.63% (N=205), 9.10% (n=83) respectively. Considering that chronic hepatitis B infection is a lifelong condition, the prevalence or the risk will be cumulative with progressive age as is evident from the fig 4.6. However, the risk decreases with increasing age after age 49. Possible explanation could be that prevalence peaked at this age group i.e., around the year 1981, but the more likely explanation could be that more people died of hepatitis B complication after age 49, giving the false impression of decreasing risk after 49 years of age.

fig 4.5
Hepatitis B Status Among Tibetans in India (Disaggregated by Gender)



Gender	Hepatitis B Test (HBsAg Rapid)		Total
	Positive	Negative	
Male	516 (**07.06**)	7381 (92.94)	7982
Female	617 (**08.04**)	7058 (91.96)	7675
Total	**1178 (07.54)**	**14439 (92.46)**	**15617**

fig 4.6
Hepatitis B Positive Status (%) Among Tibetans in India (Disaggregated by Agegroup)

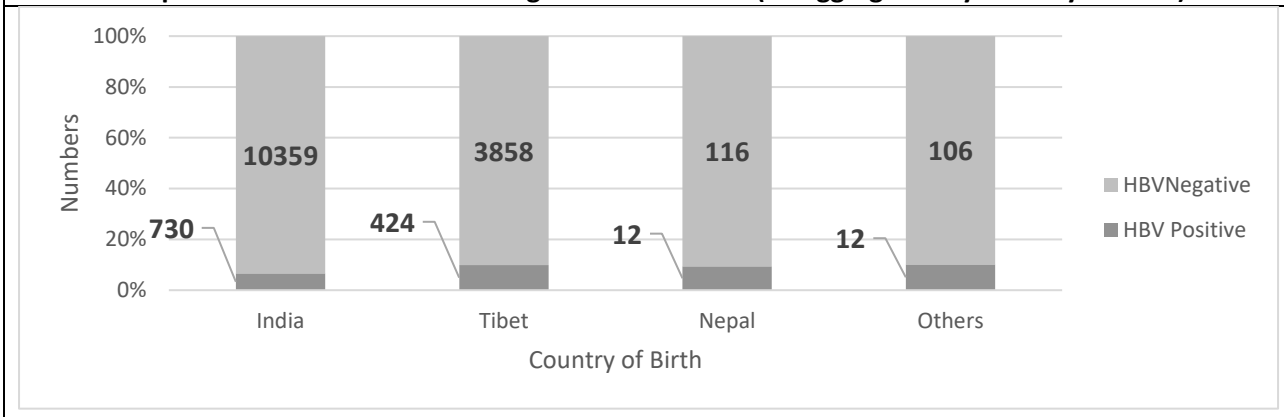


	Age Group						
HBsAg +ve	**0-9**	**10-19**	**20-29**	**30-39**	**40-49**	**50-59**	**60 & above**
%	**0.72**	**1.68**	**7.39**	**8.89**	**10.78**	**10.63**	**9.10**
n	9	40	128	231	282	205	283.00

Those who were born in Tibet are more likely to be at risk of hepatitis B chronic infection by 1.5 times (p-value=0.004) compared to those born in India after adjusting for age and gender. This finding validates the previous study carried out in Byllakupee in 2014 by DoHe-CTA and Johns Hopkins University. The marital status of those who participated and who were hepatitis B positive in the survey were 5.85% (n=415) among unmarried; 9.61% (n=636) among married; 8.57% (n=96) among widow and 8.21% (n=16) among separated or divorced. However, there is no statistical significance

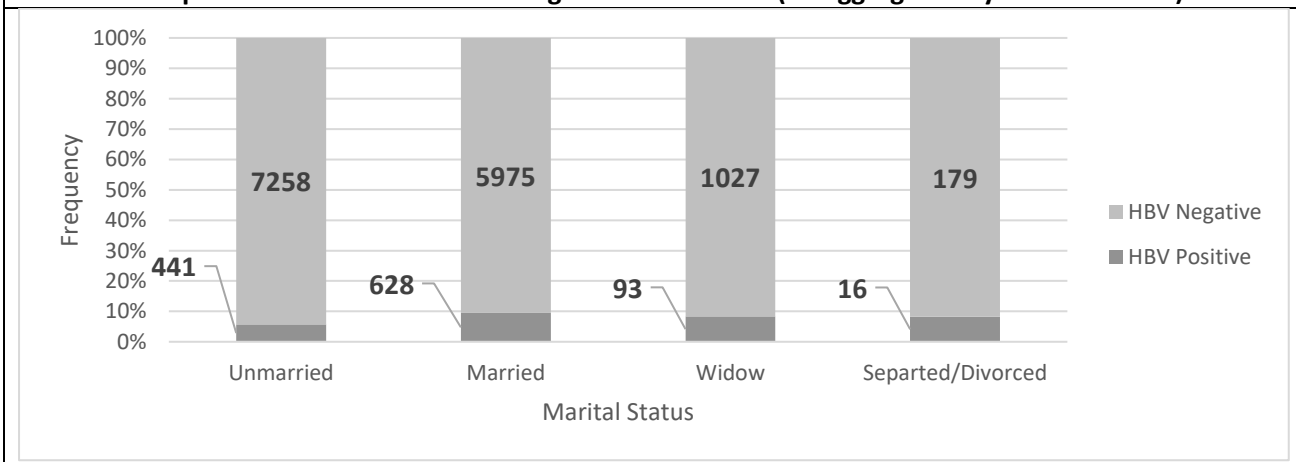
after adjusting for gender and age. Hepatitis B positive among different occupations were 2.32% (n=83), 09.94% (n=287), 9.44% (n=144), 9.97% (n=95), 9.45% (n=69), 11.20% (n=57), 7.70% (n=177) 8.98% (n=184) and 9.15%(n=80) for students, unemployed, business, agriculture, self-employed, retired, salaried, monk/nun and others respectively. However, there is no statistical significance after adjusting for gender and age.

fig 4.7
Hepatitis B Positive Status Among Tibetans in India (Disaggregated by Country of Birth)



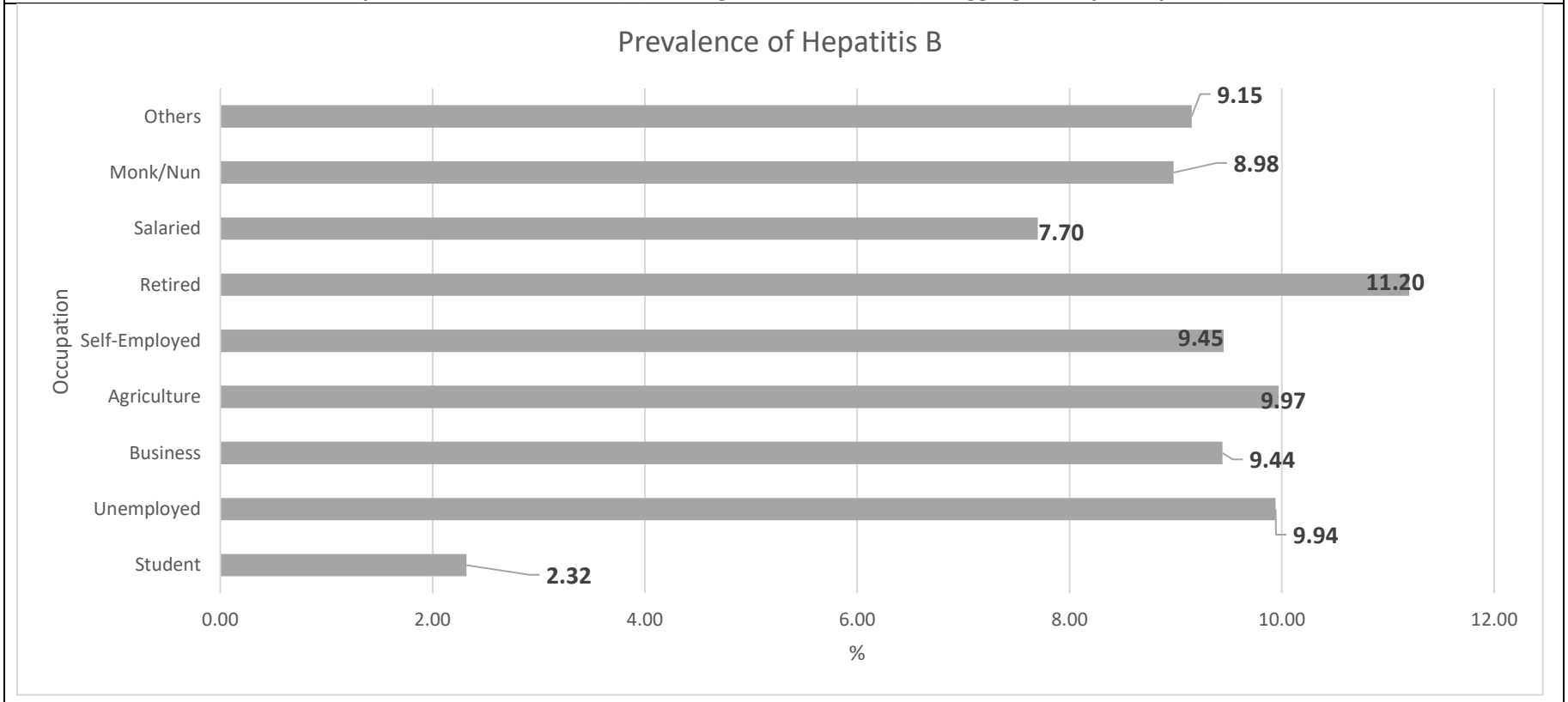
HBV Status	India	Tibet	Nepal	Other	Total
HBV Positive	730 (06.58)	424 (09.90)	12 (09.38)	12 (10.17)	1178 (07.54)
HBV Negative	10359 (93.31)	3858 (90.10)	116 (90.63)	106 (89.83)	14439 (92.46)

fig 4.8
Hepatitis B Positive Status Among Tibetans in India (Disaggregated by Marital Status)



Marital Status HBV Status	Unmarried	Married	Widow	Separated / Divorced	Total
HBV Positive	441 (05.73)	628 (09.51)	93 (08.30)	16 (08.21)	1178 (07.54)
HBV Negative	7258 (94.27)	5975 (90.49)	1027 (91.70)	179 (91.79)	14439 (92.46)

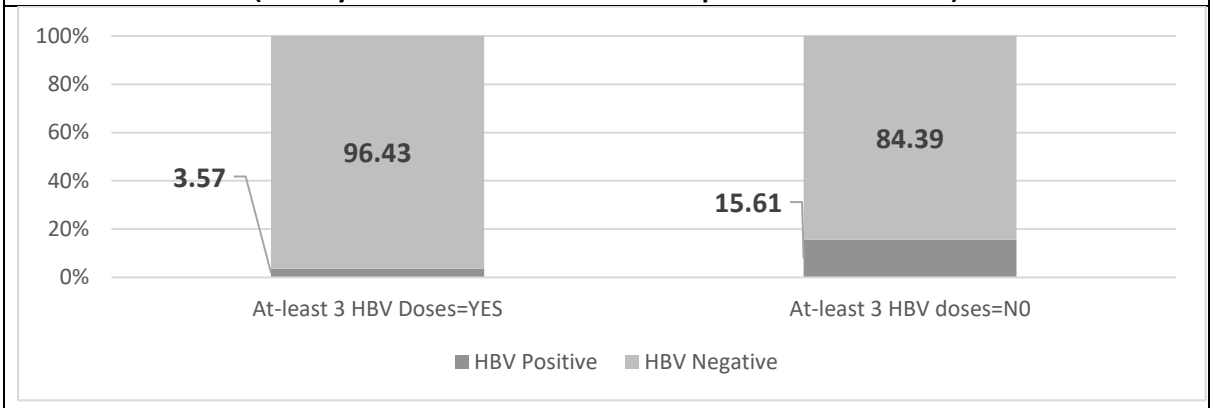
fig 4.9
Hepatitis B Positive Status (%) Among Tibetans in India (Disaggregated by Occupation)



Occupation	Student	Unemployed	Business	Agriculture	Self-Employed	Retired	Salaried	Monk / Nun	Others	Total
HBV Positive (n, %)	83 (02.32)	287 (09.94)	144 (09.44)	95 (09.97)	69 (09.45)	57 (11. 20)	177 (07.70)	184 (08.98)	80 (09.15)	1199 (07.67)
HBV Negative (n, %)	3500 (97.68)	2600 (90.06)	138 (90.56)	858 (90.03)	661 (90.55)	452 (88.80)	2122 (92.30)	1865 (91.02)	794 (90.85)	14436 (92.33)

Fig 4.10 shows that among those who self-reported as having taken at-least three doses of hepatitis B vaccination; only 3.57% (n=374) were hepatitis B positive, while it was 15.61% (n=804) for those who did not have at least three doses of hepatitis B vaccination. After adjusting for age and gender, the risk for a person "not fully vaccinated" is 4.63 times higher (p-value <0.001) as compared to a person who is fully vaccinated (3 or more doses of hepatitis B vaccination) showing that vaccination is effective and should be a priority intervention.

fig 4.10
Hepatitis B Positive Status (%) Among Tibetans in India
(History of Atleast Three Doses of Hepatitis B Vaccination)



Complete Hepatitis B Vaccination / Hepatitis B Status	Hep 3 Dose YES (Self-Reported)	Hep3 Dose NO (Self-Reported)	Total
HBV Positive n (%)	374 (**03.57**)	804 (**15.61**)	1178 (07.54)
HBV Negative n (%)	10091 (96.43)	4348 (84.39)	14439 (92.46)

Interventions of DoHe-CTA related to universal infant hepatitis B vaccination and prevention of mother-newborn infection under RMNCH+A program (earlier MCH Program) seem to be effective to a large extent and bearing fruits. To keep the momentum going, DoHe-CTA should make the universal immunization of infant a top priority intervention to improve the coverage rate to above 90% in the next few years. Previously, we did not have population level data on "at-birth hepatitis B immunoglobin prophylaxis of newborns" born to hepatitis B positive (HBsAg) positive mothers even though DoHe-CTA under its MCH Programs gives free hepatitis B immunoglobin. In 2022, we collected the relevant data during the "Household Listing Survey" through outreach visit (CCOCC Program) at the household level.

We need to setup a very effective intervention for infant hepatitis B immunization and prevention of mother-child hepatitis B transmission and their indicators for monitoring & evaluation. And the indicators could be:

A. Universal Infant Hepatitis B Immunization (Outcome Indicators)

1. "At-birth" hepatitis B vaccine coverage rate (hepatitis B birth dose within 24 hours of birth).

2. Complete hepatitis vaccination coverage rate (a minimum of three doses of hepatitis B vaccines in infancy).

B. Prevention of Mother-Child Hepatitis B Transmission (Outcome Indicators)

1. Proportion of pregnant women screened for hepatitis B (HBsAg) during ANC (Ante-Natal Care) visits

2. At-birth hepatitis B vaccination coverage rate for newborn of hepatitis B positive mothers

3. Anti-HBsAg (immunoglobin) serum coverage rate for all children born to hepatitis B positive mothers

C. Cumulative Incidence Rate of Hepatitis B Infection for Children 5 Years of Age (Impact Indicators).

This indicator will be difficult to calculate from a routine database. A survey every 5-10 year may have to be carried out.

CHAPTER FOUR

PREVENTION OF VIRAL HEPATITIS B TRANSMISSION

UNIVERSAL IMMUNIZATION OF UNDER-5 CHILDREN AND PREVENTION OF MOTHER TO CHILD TRANSMISSION OF VIRAL HEPATITIS B (PMTCT)

Department of Health, Central Tibetan Administration (DoHe-CTA) was established in 1981. TB Control Program and Under-5 Immunization Programs were among the first programs DoHe-CTA initiated at the time of its inception. I had the opportunity to be the consultant to the newly started Reproductive Health Project of DoHe-CTA in 1996-97. At that time, we were monitoring the immunization activities conducted by the health facilities run by the organization. The hepatitis B vaccination program for under-5 probably began around 2009. In 2014, Ms. Tenzin Chodon carried out a secondary data analysis of immunization program of DoHe-CTA in the Tibetan settlements and the study included five primary care hospitals namely; Dekyiling, Bylakupee, Hunsur, Kollegal and Mundgod. The study found that the at-birth hepatitis B vaccination coverage for the five primary care hospitals for year 2010 and 2011 was 12.33% and at-least 3 dose of Hepatitis B vaccine given was 55.76%. Further inquiry revealed that infants were getting vaccination from Indian private practitioners and there might have been under-reporting of coverage at the community (population) level. The study was followed by pilot population-based studies at two settlements in India and the findings revealed at-birth hepatitis B vaccination rate at 42% (Tenzin Chodon 2015, Tenzin Chodon 2017). The experience of study designs and field works from the above studies was the basis for the community-based immunization survey conducted by DoHe-CTA in 2017. DoHe-CTA survey (DoHe-CTA 2017) verified vaccination card and registers through house-house visits for the cohort of children born between 2014 and 2016 through the newly started "CCOCC Outreach Program" of DoHe-CTA (refer table 4.3) and found that the "At-Birth" hepatitis B vaccination rate was 47.49% and coverage rate of "At-least three hepatitis B doses" was 83.66%. Earlier a study outsourced to AMS by DoHe-CTA/Tibet Fund (AMS 2018) in 2016 was very helpful but did not address the question of "At-birth hepatitis B vaccination coverage" of infants. We needed an accurate baseline data on the above indicators and the community-based Under-5 Immunization survey was planned for that. Around the same time DoHe-CTA Health Information System (DoHe-CTA HIS) was undergoing an overhaul and the adoption of the DHIS-2 DoHe-CTA HIS platform and CCOCC outreach program was intended to serve as a tool for collecting routine almost real-time population Under-5 immunization database. However, evaluation (Lobsang Tsering 2018) of the database of the immunization module of DHIS-2 revealed probable under-reporting of data from the community and the backend immunization database was complicated and difficult to analyze by the DoHe-CTA HIS Program Manager.

We tried to get the population Under-5 Immunization data for the cohort of children born between 2017 and 2021 through the Household Listing Survey in 2022 (Lobsang Tsering 2023) and the "At-Birth hepatitis B vaccination rate was 84.89% (n=1588) and coverage rate of "At-least three hepatitis B doses" was 91.86% (n=1585) (refer table 4.4). The same survey also showed that 50 (4%) out of the

total of 1252 pregnant women screened for hepatitis B during antenatal visits gave positive result for hepatitis B (HBsAg Rapid antigen) and of these 50 HBsAg positive women, 49 (98%) of their children had received "At-Birth" hepatitis B vaccination and also "complete doses" of hepatitis vaccination (three or more doses) in their infancy (refer table 4.5). Also, 46 (92%) children born to the 50 women received hepatitis B immunoglobin during the period 2017 to 2021.

411 under-5 children born between 2017 and 2021 had laboratory report for HBsAg and out of which two children had tested positive for hepatitis B infection. Only 19 out of these 50 children born to mother who had tested positive for hepatitis B virus during an ante-natal visit had laboratory report for HBsAg and one child was found to be positive for hepatitis B (HBsAg) despite having "At-birth", "At-least Three Doses" of hepatitis B vaccination (refer table 4.6) and hepatitis B immunoglobin at birth.

Table 4.3

Hepatitis B Vaccination Status of Children Born 2014 – 2016
Source: Household Based Immunization Survey 2017 (25 settlements)

Indicator A.1: At-Birth Vaccination Coverage Rate

Hepatitis B Vaccination	2014	2015	2016	Total
HBV at Birth	172	189	168	529
	39.91	53.39	51.06	47.49%
HBV Day 2 – 6	48	52	38	138
	11.14	14.69	11.55	12.39%
HBV Day 7 - 42	34	9	8	51
	7.89	2.54	2.43	4.58%
Missing (Not Given)	177	104	115	396
	41.07	29.38	34.95	35.55%
Total	431	354	329	1,114

Indicator A.2: Complete Hepatitis B Vaccination Coverage Rate

Hepatitis B 3 or more vaccines	2014	2015	2016	Total
NO	62	43	77	182
	14.39	12.15	23.40	16.34%
YES	369	311	252	932
	85.61	87.85	76.60	83.66%
Total	431	354	329	1,114

Table 4.4

Hepatitis B Vaccination Status of Children Born 2017 – 2021

Indicator A.1: At-Birth Hepatitis B Vaccination Coverage Rate

At-Birth Hepatitis B Vaccination	2017	2018	2019	2020	2021	Total
HBV0 = YES	322	305	300	279	240	1446
	76.85%	87.14%	89.29%	90.29%	89.89%	**86.02%**
HBV0 = NO	27	26	20	20	24	117
	6.44%	7.43%	5.95%	6.47%	8.99%	6.96%
No Record / Don't Know	70	19	16	10	3	118
	16.71%	5.43%	4.76%	3.24%	1.12%	7.02%
Total	419	350	336	309	267	1681

Source: Household Listing Survey 2022 (38 settlements)

Indicator A.2: Complete (3 or more doses) Hepatitis B Vaccination Coverage Rate						
Complete Hepatitis B Vaccination	**2017**	**2018**	**2019**	**2020**	**2021**	**Total**
At-least 3 doses=YES	359	341	320	297	259	1,576
	84.07%	94.46%	93.84%	95.81%	97.37%	**92.43%**
At-least 3 doses=NO	3	3	5	3	3	17
	0.70%	0.83%	1.47%	0.97%	1.13%	**1.00%**
No Record / Don't Know	65	17	16	10	4	112
	15.22%	4.71%	4.69%	3.23%	1.50%	6.57%
Total	427	361	341	310	266	1705
Source: Household Listing Survey 2022 (38 settlements)						

Note: *The recently implemented Out-Reach (CCOCC Program) at household level may increase coverage; improve equity and data collection*

Table 4.5

Hepatitis B Vaccination Status of Children Born 2017 – 2021
Hepatitis B Positive Mothers During Pregnancy
Source: Household Listing Survey 2022 (38 settlements)

Indicator B.2: At-Birth Hepatitis B Vaccination Coverage Rate						
At-Birth Hepatitis B Vaccination	**2017**	**2018**	**2019**	**2020**	**2021**	**Total**
HBV0 = YES	9	14	11	10	10	54
	100.00%	100.00%	100.00%	90.91%	100.00%	**98.18%**
HBV0 = NO	0	0	0	1	0	1
	0.00%	0.00%	0.00%	9.09%	0.00%	01.82%
Total	9	14	11	11	10	**55 (100%)**

Complete (3 or more doses) Hepatitis B Vaccination Coverage Rate						
Complete Hepatitis B Vaccination	**2017**	**2018**	**2019**	**2020**	**2021**	**Total**
At-least 3 doses=YES	9	13	11	11	10	54
	100.00%	92.86%	100.00%	100.00%	100.00%	**98.18%**
At-least 3 doses=NO	0	1	0	0	0	1
	0.00%	07.14%	0.00%	0.00%	0.00%	01.82%
Total	9	14	11	11	10	**55 (100%)**

Note: *The recently implemented Out-Reach (CCOCC Program) at household level may increase coverage; improve equity and data collection*

Table 4.6

Indicator B.1: Hepatitis B Positive Mothers During Pregnancy for Children born 2017 – 2021

Hepatitis B Status during Pregnancy						
ANC HBV Status	**2017**	**2018**	**2019**	**2020**	**2021**	**Total**
Positive	9	14	11	11	10	**55**
	2.59%	4.13%	3.56%	3.81%	3.92%	**3.57%**
Negative	339	325	298	278	245	1485
	97.41%	95.87%	96.44%	96.19%	96.08%	96.43%
Total	348	339	309	289	255	1540
Source: Household Listing Survey 2022 (38 settlements)						

Indicator B.3: Hepatitis B Immunoglobin (Anti-HBsAg) Given Status for Children born 2017 – 2021 Hepatitis B Positive Mothers During Pregnancy						
Hepatitis B Immunoglobin (Anti-HBsAg) Given Status	**2017**	**2018**	**2019**	**2020**	**2021**	**Total**
YES	8	12	11	10	10	51
	88.89%	92.31%	100.00%	90.91%	100.00%	**94.44%**
NO	0	0	0	1	0	1
	0.00%	0.00%	0.00%	09.09%	0.00%	1.85%
No Record	1	1	0	0	0	2
	11.11%	7.69%	0.00%	0.00%	0.00%	3.70%
Total	9	13	11	11	10	**54 (100%)**

Source: Household Listing Survey 2022 (38 settlements)

Child's Hepatitis B Status - Mother is Hepatitis B Positive during Pregnancy				
Child Hepatitis B (HBsAg) Status	**Hepatitis B Immunoglobin (Anti-HBsAg) Given**			
	YES	**NO**	**No Record**	**Total**
Positive	1 (**01.96%**)	0 (0.00%)	0 (00.00%)	**1 (01.82%)**
Negative	19 (**37.25%**)	1 (100.00%)	0 (00.00%)	20 (36.36%)
Not Done	26 (**50.98%**)	0 (00.00%)	2 (66.67%)	28 (50.91%)
Don't Know	4 (**07.84%**)	0 (00.00%)	1 (33.33%)	5 (09.09%)
No Record	1 (**01.96%**)	0 (00.00%)	0 (00.00%)	0 (01.8%)
Total	**51 (92.73%)**	**1 (01.82%)**	**3 (05.45%)**	**55 (100.00%)**

Source: Household Listing Survey 2022 (38 settlements)

In the current hepatitis B Prevalence survey (2019-2022), 65.73% (N=20545) of all participants gave history of taking at-least three doses of hepatitis B vaccination. This is a high coverage rate for an entire population (all age-group) made possible by mass campaign or public health intervention effort. Many Tibetan adults may have acquired natural immunity following hepatitis B infection (we must bear in mind that about 90% of people who acquire hepatitis B infection in adult life will clear the infection by body defense. In a resource constraint situation, for adult population, we could use an at-risk approach rather than try to vaccinate everyone through a free vaccination campaign. However, at an individual level, if a person wishes to have hepatitis B vaccination, then it could be encouraged as an out-of-pocket pay mechanism except for the groups who are especially at higher risk. During the current survey, we have selected two high risk groups (family members of hepatitis B positive participants of the survey and person using injecting drugs or even oral drugs) for vaccination if they were not fully vaccinated. In addition, health care workers were advised to ensure that they are fully vaccinated and their anti-HBsAg antibody levels are adequate.

Vaccination is the best intervention against hepatitis B infection. Our immediate target set to achieve 90% coverage (status) for "at-birth" vaccination and 95% coverage for three dose hepatitis B vaccination for infants by 2020 was missed by a very small margin. The two indicators given above are also the WHO SEARO suggested target for 2020 with hepatitis B elimination goal for 2030. Our first

priority is to get vaccination target of 95% (at-least 90%) for “At-birth Hepatitis B Vaccination” and “Three or more doses of Hepatitis B Vaccination” in infancy by 2025 and we must make every effort in this direction.

The current prevalence study showed that the Tibetan community in the subcontinent is in an intermediate endemic zone in terms of hepatitis B prevalence rate. World Health Organization states that “most of the burden of HBV-related disease results from infections acquired in infancy through perinatal or early childhood exposure to HBV because infection acquired at an early age is more likely to become chronic than infection acquired later in life. The rate of development of chronic HBV infection is inversely related to the age at acquisition of the infection, occurring in approximately 80%–90% of infants infected during perinatal period, 30%–50% of children infected before the age of 6 years, and in <5% of infections occurring in otherwise healthy adults. Because the highest risk of going into chronic hepatitis B infection is there if infection is acquired at an early age, birth dose of hepatitis B vaccination is the most effective tool to decrease, in the long term, the burden of chronic carriers in the community. “Typically given in a series of three doses, the vaccine provides protection from infection in more than 95% of healthy infants, children, and young adults. In infants born to infected mothers, vaccination reduces the likelihood of developing HBV infection by 3.5 times. The vaccine’s efficacy in preventing perinatal transmission however, decreases as the time-period between birth and the first dose increases. The risk of HBV infection among infants born to hepatitis B surface antigen (HBsAg) positive mothers was found to be eight times higher when the birth dose was administered seven days after birth, compared to when it was administered within the first three days after birth. In areas where chronic infection is endemic, it is especially critical that the first dose of the hepatitis B vaccine is administered with minimal delay after birth” (WHO 2017).

A chronically infected person (chronic hepatitis B infection) is at high risk for development of liver cirrhosis and liver cancer (HCC). Hepatitis B vaccination is very effective in preventing long term complication of chronic hepatitis B infection, as evidenced by a dramatic decrease in the incidence of HCC (liver cancer) and mortality due to liver disease, observed among vaccinated persons in Taiwan since the introduction of hepatitis B vaccination. “From 1977-1980 to 2001-2004, the age and sex adjusted rate ratios for individuals aged 5 to 29 years decreased by more than 90% for CLD and HCC mortality and by more than 80% for HCC incidence, which were higher than the previously reported reduction (70%) in HCC incidence for youth aged 6 to19 years”[9].

I am optimistic that, with some “nudge” from all sides, we could reach the DoHe-CTA target of 95% immunization coverage for infants. It may not be a difficult task for us to have the immunization coverage rate of 95% within three years’ time, i.e.; by the end of 2025. Till now, our approach to the immunization program has been rather passive, i.e.; we wait for the people, most of the time, to come

to our health facilities (or go to other facilities) to get the vaccinations. We could now become a more proactive facilitator for the community to take all their vaccines on time. In general, we have the system and the human resources in place to make it proactive. DHIS2 is a tracker software and each child could be notified of their next vaccination either through an electronic reminder system (Tenzin Chodon 2017) or through in-person house visit i.e., we could operationalize an immunization reminder system either with e-reminder (mobile phone messaging) or with door–door reminder through our monthly outreach visits (CCOCC Program). A behavior change (both provider and beneficiary) is possible through the DoHe-CTA CCOCC program, supplemented by a conducive environment including visits to households for immunization reminder and social & behavior change communication (SBCC), to make the WHO/UNICEF "*Immunization Agenda 2030: A Global Strategy to Leave No One Behind* and SDG3 goals realistic.

CHAPTER FIVE

TOWARDS VIRAL HEPATITIS ELIMINATION GOAL OF 2030

(TREATMENT OF HEPATITIS B INFECTION IN TIBETAN COMMUNITY IN INDIA)

Almost all the countries including India had adopted the WHO/WHA 2030 hepatitis B elimination goals and targets. Table 5.1 gives the WHO hepatitis elimination target for the year 2030. The milestones to reach regarding treatment of people with chronic hepatitis B & C is that 30% of the people with chronic hepatitis B & C will be diagnosed by 2020 and by the year 2030, 90% of population with hepatitis B & C will be diagnosed and 80% needing treatment will be put on treatment.

Table 5.1: OVERVIEW OF WHO VISION, GOAL, KEY INDICTORS AND TARGETS

Indicators / Target				2015	2020	2030
Service Coverage	**Prevention**	1.Three-dose hepatitis B vaccine for infant (coverage%)		82%	90%	90%
		2. Prevention of mother-to-child transmission of HBV: hepatitis B birth-dose vaccination or other approaches (coverage %)		38%	50%	90%
		3.Blood & injection safety (coverage%)	Blood safety: donations screened with quality assurance	89%	95%	100%
			Injection safety: use of engineered devices	5%	50%	90%
		4.Harm reduction (sterile syringes/needle set distributed per person per year for the people who inject drugs (PWID)		20	200	300
	Treatment	5a. Diagnosis of HBV and HCV (Coverage %)		<5%	30%	90%
		5b. Treatment of HBV and HCV (Coverage %)		<1%	-	80% eligible
Impact leading to elimination		Incidence of chronic HBV and HCV infection		-	30% reduction	90% reduction
		Mortality from chronic HBV and HCV infection		-	10% reduction	65% reduction

Reproduced from WHO Document

Community based screening of the entire population for hepatitis B and C seems to be an appropriate strategy as is evident from the current "DoHe-CTA Hepatitis B Prevalence" survey. Most of the chronic hepatitis B infections do not present with any symptoms and a substantial proportion of people with hepatitis B and C are undiagnosed and may present later in life with fatal complications or lifelong disabilities. Also, more and more people with chronic hepatitis B infections come to our attentions with complications like liver cirrhosis and liver cancers (HCC) and the need to do something about this was felt a few years ago. The WHO states that "in 2013, viral hepatitis was a leading cause of death worldwide (1.46 million deaths, a toll higher than that from HIV, tuberculosis or malaria, and on the increase since 1990). More than 90% of this burden is due to the sequelae of infections with the hepatitis B virus (HBV) and hepatitis C virus (HCV). Prevention can reduce the rate of new infections, but the number of those already infected would remain high for a generation. In the absence of additional efforts, 19 million hepatitis-related deaths are anticipated from 2015 to 2030. Treatment now can prevent deaths in the short- and medium term"

Over the last few years, the cost of hepatitis B antiviral medicines have come down substantially. In such a situation, population-based intervention at household level or Primary Health System as the "Point-of-Contact & Care" may be an appropriate and effective strategy as this approach addresses access, equity, inclusiveness and coverage. Also, many people with chronic hepatitis infections are unaware of their status and the proactive approach of reaching out to the population through outreach visits from primary health system to scale up testing with linkage to care and treatment could be an effective intervention to achieve the WHO 2030 target.

Considering that treatment of chronic hepatitis B with antivirals are likely to be lifelong and donor funding will be available for a limited time period only, DoHe-CTA must ensure that there is uninterrupted supply of medicines for those whose medicine cost are to be subsidized. Though there is no known drug resistance to Tenofovir, a possibility must always be kept. The "number to treat" is likely to be far less than we have projected in the past and, because of the small population size of the Tibetan community in the Indian subcontinent, it is not difficult to secure a "Hepatitis B Drug Fund" till the government of India hepatitis B treatment program is fully operationalized and reaches all Indian villages and in-turn also the remote Tibetan settlements.

The Tibetan settlements in India are conventionally divided into four regions i.e., North, South, Central and North-East India. Between 2019 and 2022, some of the settlements from these four regions were taken to represent the Tibetan population staying in India for the prevalence survey of viral hepatitis B and C. The data of all the hepatitis B positive people detected from the 2019-2022 population-based screening (survey phase 1-3) was entered into epi-info 7 database and those who needed antiviral treatment were offered the medicines. New cases detected after 2019-2022 population screening either through the monthly house-house outreach visit under the CCOCC program of DoHe-CTA or through self-visit at the DoHe-CTA local settlement health facilities were also entered into the database. In the year 2022, the whole population of Hunsur settlement was screened for hepatitis B & C and the data so obtained was also included in this report. In 2023, Mungod and Delhi population has undergone similar population-based screening and the data from Mundgod and Delhi is not included in this report.

Table 5.2 shows that between 2019 and 2022, out of the total of 23618 residents of the Tibetan settlements (all ethnicity) in India and who were screened for hepatitis B infection (HBsAg), 1669 peoples were found to be positive for hepatitis B infection and 507 out of those who were positive for hepatitis B (HBsAg Positive) agreed to take the antiviral medicine. If we assume that the total Tibetan population residing in India at 70,000, the coverage rate of the population screened for hepatitis B is 33.74% (n=23618) showing that we are within the WHO target for hepatitis B coverage for the year 2020 i.e., WHO Indicator 5a - Diagnosis of HBV and HCV Coverage %. kindly refer table 5.1. Also,

30.38% (n=507) among those who were HbsAg positive were started on anti-viral treatment as of 31st December 2022.

Table 5.2: Population Screened for Hepatitis B Infection and Treated with Antivirals (2019 – 2022)			
Hepatitis B Infection (HBsAg) in Tibetan Settlements in India by Individual Settlements (All Ethnicity)			
Health Facility (Settlements)	**Number of individuals screened for Hepatitis B as of 31-12-2022 (All ethnicity)**	**Number of Hepatitis B Positive Individuals Registered in Hospital as of 31-12-2022 All Ethnicity**	**Hepatitis B positive on anti-viral treatment as of 31-12-2022**
1: Dekyiling Hospital	**Frequency (n)**	**Frequency (n)**	**Frequency (n)**
Baluwala	96	4	0
Clementown	519	38	5
Dhariwal	43	8	2
Dekyiling	985	77	17
Kamrao	53	1	1
Khera	86	1	0
Lakhanwala	124	15	0
Manduwala	259	13	5
Poanta	373	20	2
Puruwala	198	6	1
Raipur	146	8	1
Rajpur	153	9	4
Sataun	80	2	1
2: Bir Hospital			
Bir	1627	117	21
Chauntra	932	87	14
Kullu	143	8	0
3: Bylakupee Hospital	6546	412	81
4: Dharamsala (Delek Hospital)	3084	267	101
5: Kollegal Hospital	1257	133	31
6: Ladakh PHC (Choglamsar + Jangthang)	451	192	152
7: Mainpat PHC	481	20	3
8: Miao PHC			
Miao	997	34	1
Tezu	324	9	0
9: Odisha Hospital	1226	78	19
10: Hunsur Hospital	1435	110	45
Total	**23618**	**1669**	**507**
Total Population**	**78000**		
Coverage	**30.28%**		**30.38%**
*** Adjusted to include non-Tibetan ethnicity residing in Tibetan settlements in India*			
*** About 19% of the population may consist of non-Tibetan Ethnicity.*			

DoHe-CTA has a Hepatitis B Strategy and Action Plan in place. Table 5.3 gives the current state on specific activities based on CDC framework. Table 5.3 shows that we are able to reach the target for the year 2020/2022 for most of key indicators. 86% of infant were given hepatitis B vaccine birth dose (Indicator C3) by 2021 and while 92.03% of infants had at-least three doses of hepatitis B vaccines.

Table5.3: DoHe-CTA Core Viral Hepatitis Indicators (Adapted from CDC Framework)							
Indicator of Progress	**Indicator Name and Definition**	**Hepatitis Virus**	**Data Source**	**Target**			
				Baseline	**2020/2022**	**2025**	**2030**
				Status 2014-2016	**Status**	**Target**	**Target**
A. Reduce New Infections							
1. Increase hepatitis A and hepatitis B vaccination in children							
i. Coverage of At-birth HBV Vaccination	C3: Number and proportion of timely hepatitis B vaccine birth dose (within 24 hours of birth)	B	-Survey -DHIS2 Immunization Module	48.90%[1] *(Immunization survey 2017)*	86.00%[2] *(HH_Listing Survey 2022)*	90%	95%
ii. Coverage of Complete (hep3) infant HBV Vaccination	C3: Number and proportion of at-least three doses hepatitis B vaccine among infants	B		84.91%[1] *(Immunization survey 2017)*	92.03%[2] *(HH_Listing Survey 2022)*	95%	95%
iii. Coverage of HAV Vaccination under-5	Number and proportion of at-least one dose hepatitis A vaccine among under-5	A		No Data	No Data		
2. Decrease Perinatal Viral Hepatitis Infections							
i. At-birth HBV vaccination of new-born born to HBsAg + mother	Number and proportion of infant born to HBsAg positive mother given HBV vaccination at-birth (within 24 hours)	B	-RMNCH Program[1] data -Survey[2]	No Data	54 (98.18%)[2] *(HH_Listing Survey 2022)*	100%	100%
ii. Screening for HBV during pregnancy	Number & proportion of pregnant women screened for HBsAg during anti-natal visit	B		No Data	No Community Data *(HH_Listing Survey 2022 shows that 4% positive for HBsAg)*	100%	100%
iii.Post exposure prophylaxis (PEP)	Number and proportion of new-borne (HBsAg positive mother) who received hepatitis B Immunoglobulin (HBIg)	B		No Data	51 (94.44%)[2] *(HH_Listing Survey 2022)*	100%	100%
3. Reduce New Infection among High-risk Groups through Hepatitis B Vaccination							
i. PWID (also include oral nonmedical substance addiction)	Number and proportion of PWID (also include oral nonmedical substance addiction) given three dose hepatitis B vaccine among those who volunteered for vaccination	B	-Survey -Register	-	No Data	50%	100%
ii. Household contact	Hepatitis B vaccine coverage for household contacts of a person who is HBsAg positive	B		-	No Data / Get?	80%	100%
iii. Health Workers	A16: Hepatitis B vaccine coverage for DoHe-CTA health workers	B, C		-	-	100%	100%

	% Health workers under DoHe-CTA whose antibody to HbsAg (Anti-HBs) status is known	B		-	-	100%	100%
	% Health workers under DoHe-CTA with antibody to HbsAg (Anti-HBs) is >10 IU/mL	B		-	-		
B. Reduce Morbidity							
1. Awareness of Infection							
i. Increase proportion of people with hepatitis B who know their infection status	C6: Number & proportion of people living with HBV diagnosed	B	-Survey	DoHe-CTA/Johns Hopkin Study 2014	>30% (DoHe-CTA Program Database)	70%	90%
ii. Increase proportion of people with hepatitis C who know their infection status	C6: Number & proportion of people living with HCV diagnosed	C	-Survey	No Data	>30% (DoHe-CTA Program Database)	50%	90%
2. Engagement in Cascade of Care-							
i. Increase proportion of people with hepatitis B engaged in hepatitis B-directed medical care	C7: Number and proportion of people with HBV taking treatment for HBV (those eligible for treatment as per SOP)	B	-Survey -HBV Treatment Register (Digitised version in EPI-INFO)	No accurate Data	30% (DoHe-CTA Program Database)	30%	80%
ii. Increase proportion of people with hepatitis C engaged in hepatitis C-directed medical care	C7: Number and proportion of people with HCV taking treatment for HCV	C	-HCV Treatment Register (Digitised version EPI-INFO)	No Accurate Data	No Accurate Data	30%	80%
iii. Increase proportion of people with hepatitis C who have cleared hepatitis C virus infection	C8: Number and proportion of people with chronic hepatitis C started on DDR anti-viral reporting cure for chronic HCV	C	Survey HCV Treatment Register (Digitised version EPI-INFO)	No Data	No Data		
Iv. Viral suppression of hepatitis B	C8: Number and proportion of people with HBV and needing treatment taking treatment and reporting viral suppression for chronic hepatitis B as per guideline/SOP	B	HBV Treatment Register (Digitised version in EPI-INFO)	No Data	No Data		
v. Facility level injection safety	C5: Number and proportion of unsafe injections among known PWID	B, C	Rapid assessment (survey)		??	5%	0%
vi. Blood safety	A18: Number and proportion of blood/blood products transfusion given which are screened for HBV, HCV	B, C	Rapid assessment (survey)		??	100%	100%

	Number and proportion of non-remunerated voluntary blood donations.	B, C	Rapid assessment (survey)		??	100%	100%
vii. STI services	Number and proportion of DoHe-CTA health facilities providing or assist linkage to care for STI services, including access to condoms, lubricants, HIV testing	B, C	Rapid assessment (survey)		??	100%	100%
C. Reduce Disparities							
i. Increase utilization of hepatitis B and hepatitis C prevention services among PWIDs		B, C					
ii. Complete HBV Vaccination	See above	B	Rapid assessment (survey)				
iii. Needle Syringe Exchange	C4: Syringes & needles distributed/PWID/year	B, C	Rapid assessment (survey)	May not be feasible		200	300
iv. OST (Opioid Substitution Therapy) services	Number and proportion of opioid-dependent PWID who received OST	B, C	Rapid assessment (survey)			40%	80%
D. Develop & Strengthen Surveillance Mechanism							
i. Strengthen capacity to accurately report viral hepatitis by health facilities	Number and proportion of health facilities reporting data of acceptable quality	B, C	-Survey -DHIS2		>50%	80%	100%
ii. Strengthen capacity to analyse, describe, and disseminate viral hepatitis data for public health action	DoHe-CTA capacity to analyze, describe, and disseminate viral hepatitis data for public health action	A, B, C	-Annual Report		YES	YES	YES
iii. Develop effective outbreak response and surveillance systems in place to monitor HAV and HEV outbreaks and outcome	DoHe-CTA has effective outbreak response and surveillance systems in place to monitor HAV and HEV outbreaks and outcome	A, E	-DHIS2 IDSP Dashboard	NO	(DHIS2-IDSP Dashboard if improved further could serve the purpose)	YES	YES
E. Achieve Elimination of Viral Hepatitis as Disease of Public Health Importance							
i. Reduce HBV Incidence	C9: Cumulative incidence of HBV infection in children 5 years of age	B	-Survey	0.25%	Get Data	0%	0%
ii. Reduce HCV Incidence	C9 Incidence of HCV infection	C	??	No Data			
iii. Reduce Mortality	C10 Number and proportion of death from hepatocellular carcinoma (HCC)	B, C	-DHIS2 mortality module -Survey	??			<1%
F. Disease Burden							

i.HBV Prevalence	C1: Prevalence of chronic HBV infection	B	-Survey	DoHe-CTA/Johns Hopkin Study 2014	7.54%		4%
ii.HCV Prevalence	C1: Prevalence of chronic HCV infection	C	-Survey		0.07%		0.02%
G. Improve Health System							
i. Strengthen Infrastructure for HBV testing	C2: Number and proportion of health facilities providing/assist in rapid or confirmatory HBV testing	B	-Rapid assessment		??	90%	100%
ii: Strengthen Infrastructure for HCV testing	C2: Number and proportion of health facilities providing rapid /assist in rapid or confirmatory HCV testing	C	-Rapid assessment		??		
Iii. IPC Policy: Develop and implement safe injection and infection prevention and control (IPC) policies.	Number and proportion of health facilities implement safe injection and infection prevention and control (IPC) guidelines	B, C	-Rapid assessment		??	YES	YES
H. Reduce Hepatitis A and E							
Coordinate with WASH project officer to implement key WASH indicators		A, E	-				

(Indicator C3). More than 30% of the Tibetan population in India were screened for Hepatitis B & C (Indicator C6). And among those people living with HBV infection and eligible for treatment as per SOP, more than 30% were taking treatment for HBV (Indicator C7).

Now, we need to plan and work to achieve the targets we have set for 2025 and focus our attention to addressing infection control in health care facilities and prevention and control of hepatitis B & C among people with drug/substance addiction.

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