In 2016, in light of the growing public health burden of viral hepatitis, availability of highly effective and

among older children, adolescents, and adults, for whom approximately 6%-10% of all acute HBV infections persist as chronic infection. Of persons with chronic HBV infection, 15%–25% will develop chronic liver disease, including cirrhosis, liver failure, or liver cancer.[4] Accordingly, protecting newborns and young children from HBV infection is the priority for HBV prevention.

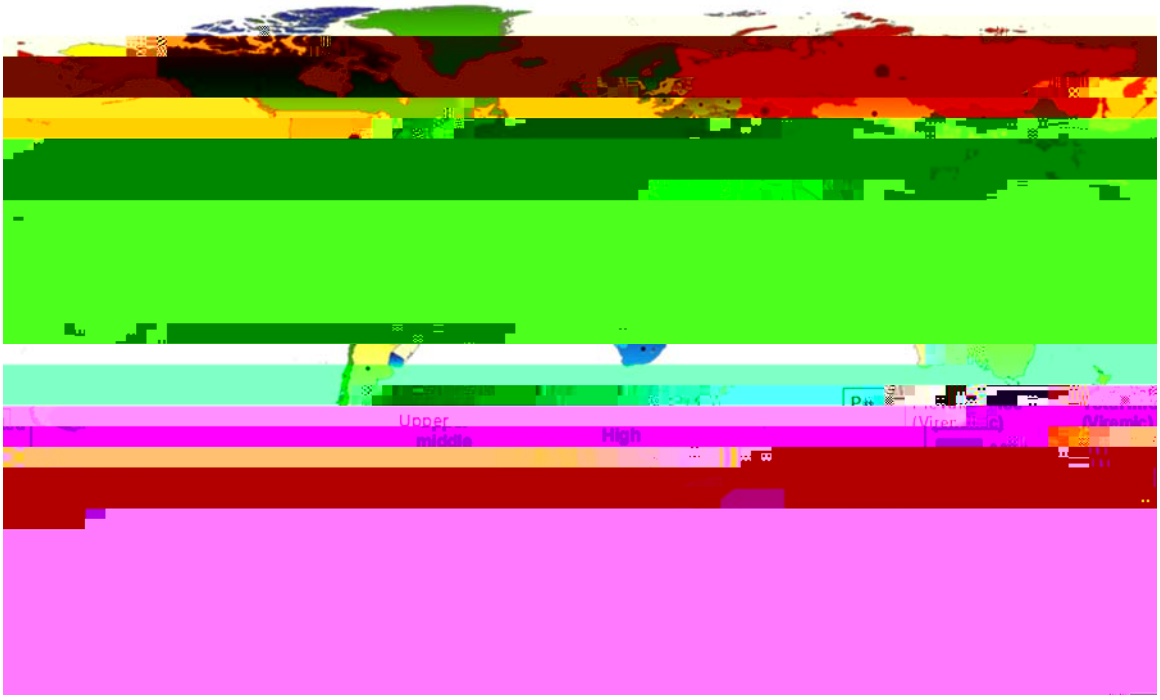
Global efforts to prevent HBV infection are, for the most part, steadily improving. The hepatitis B vaccine, available since 1982, is the cornerstone of HBV prevention. Public health activities to implement hepatitis B vaccine-based strategies have progressively increased over the past 3 decades, beginning with recommendations from WHO in the early 1990s to include the three-dose series of hepatitis B vaccine in routine infant immunization. As a result of this and other global initiatives (e.g., the Global Alliance for Vaccines and Immunizations [GAVI]), reductions in vaccine costs, and the development of pentavalent vaccines, hepatitis B vaccination coverage among infants is high in almost all high-income countries, but vaccination rates remain low in Africa and parts of Asia. Over 90% of childreer BV .4 2. T61.9773 0on. w,nn o o

improved by integrating hepatitis B vaccination with other routine maternal and neonatal health services, which is most readily accomplished when newborns are delivered in birthing facilities under the care of trained attendants.[6] The proportion of children born in such facilities has increased over the last several decades, contributing to increases in hepatitis B vaccination of newborns in China and other countries. Local health-facility policies specifying birth-dose vaccination, standing orders for vaccination, and availability of vaccine in the delivery room are examples of other strategies shown to facilitate high rates of hepatitis B vaccination of newborns in birthing facilities.

Infants born at home face the greatest challenges regarding receipt of a birth-dose of hepatitis B vaccine. In some countries of Asia and Africa, the majority of infants are born at home; as such, countries in WHO's African region have the lowest rates of birth dose coverage in the world. The absence of country-level policies for hepatitis B vaccination at birth in this region compounds the challenge of protecting this vulnerable population. For infants born outside of birthing facilities, certain interventions can facilitate provision of a birth dose of hepatitis B vaccine, including home visits by providers capable of administering vaccine, education of birth attendants, and improved vaccine availability. Vaccination coverage can also be increased in the home setting through availability of vaccine equipment that simplifies vaccine delivery and needle disposal, such

models indicate that total direct costs of implementing scaled-up interventions would be higher relative to the status quo strategy. However, when longer life expectancy and higher productivity (indirect costs) are considered, the total cost of the elimination strategy is lower than the costs associated with status quo approaches after 2021-2025 (depending on the future drug prices).

The global burden of hepatitis C infection is substantial. Worldwide, 71 million (62–79 million) persons are chronically infected with HCV, corresponding to a prevalence of 1.0% (0.8%-1.1%); nearly 400,000 people die each year from hepatitis C, mostly from cirrhosis and HCC. Hepatitis C is found worldwide, the most affected WHO regions are the Eastern Mediterranean and European regions, with prevalence of 2.3% and 1.5%, respectively (*Figure 2*). Prevalence of HCV infection in other WHO regions varies from 0.5% to 1.0%.[1]



HCV is transmitted primarily through percutaneous exposure that results most commonly from exposures in health-care settings with poor infection control and from injection-drug use. Less often, HCV transmission occurs among HIV-positive persons, especially HIV-infected men who have sex with men (MSM), as a result of sexual contact with an HCV-infected partner, among persons who receive tattoos in unregulated settings, and among infants born to HCV-infected mothers and household contacts. Injection-drug use is a major risk factor for HCV transmission, particularly in high-income countries: an estimated 67% of persons who inject drugs (PWID) worldwide have been infected with HCV.[11] The incidence of HCV is high among PWID beginning soon after they first inject drugs, with the risk for transmission rising

[11] Nelson PK, Mathers BM, Cowie B, et al. Global Epidemiology of Hepatitis B and Hepatitis C in People Who Inject Drugs: Results of Systematic Reviews. *Lancet* 2011;378(9791):571-83.

with the duration of drug injecting behaviors, frequency of injection, and frequency of sharing needles and drug preparation equipment.[12]

For most HCV-infected persons in low and middle income countries, most infections are caused by unsafe medical injections and other medical procedures. Infection control to eliminate exposures to contaminated blood, professional education, development of infection-control programs, and availability of single-use syringes and other safe technologies reduce transmission risk. Education campaigns designed to change social-cultural preferences from injectable medications to equally effective oral therapies reduce risks of HCV transmission, and health systems that monitor infection control provide providers with data to guide quality improvement.[13] Most blood banks around the world screen donated blood for HCV.[14] However, HCV testing in blood banks and other health facilities can be improved by the addition of virologic tests to detect early HCV infection and participation in programs to verify the quality of test technologies and practices.

No hepatitis C vaccine is available, as the genetic diversity of HCV and the lack of immune markers of immunoprotection raise formidable challenges to HCV vaccine development. However, access to clean injection equipment made available through syringe services programs (SSP) and treatment with medication assisted therapy (MAT) each reduce transmission risk by 50%, and if both interventions are available, by 70%.[15] In most countries, two major factors limit the effectiveness of these interventions: a) lack of policies to spur acceptance and implementation of these interventions and b) insufficient capacity to provide a sufficient number of SSP and MAT programs to adequately serve risk populations. The capacity of these programs must be expanded in at least two ways: programs must be sufficient in number to be readily available to persons who inject drugs and must be of sufficient scale to provide enough clean injection equipment (SSPs) and medication to limit injecting behaviors (MAT programs). Public acceptance of SSP (including among law enforcement) and public funds for both services, alone or as part of public-private partnerships, are essential in bringing HCV prevention to scale. Data from health models suggest that integrating HCV testing, care, and treatment into existing programs serving PWID enhances prevention and increases the feasibility m

the duration of therapy.[18] Achieving a sustained virologic response (SVR), the measure of cure, following HCV therapy is associated with a 74% decline in all-cause mortality, 85% reduction in liver cancer, and 93% reduction in liver failure and mortality.[19] Although the initial 2014 U.S. market price of curative HCV medications was high ($86,000-$94,000 per course), drug costs in the United States have declined by at least 50%; HCV therapy is now considered cost saving for treatment of all HCV infected persons.[20,21] With availability of generic formulations for use in low-to-middle income countries, the cost of HCV therapies has also dramatically declined globally, now dropping to less than U.S. $200 per treatment course in some countries. Although quality assurance remains an issue for these generic versions of patent formulations, the large decrease in prices associated with generic drugs greatly reduces cost as an access barrier to HCV treatment in countries where health resources are constrained and for marginalized populations in developed countries.

Scaling up HCV prevention activities to meet elimination goals is cost-effective, reducing future expenditures for care and treatment for persons with HCV-related morbidities. For example, in Saudi Arabia, where about 103,000 people were living with HCV infection in 2015 (prevalence of 0.5%), models indicate that expanded screening and treatment as part of an elimination effort would result in increased health-care expenses. However, th

Nigeria

Georgia

The country of Georgia has one of the highest burdens of hepatitis C in the world, with an estimated 5% of the adult population, or 150,000 people, living with HCV.[23] The burden of HCV infection is greatest among men aged 30–59 years. Risks associated with HCV infection in Georgia include receipt of contaminated blood products, other exposures in health-care settings, and injection-drug use, the latter being an important driver of the current epidemic. Prevalence is high in the estimated 50,000 PWID living in Georgia.

To address this epidemic, the country of Georgia took the first steps towards HCV elimination in early 2011 by establishing the Global Fund project for HIV co-infected patients, providing HCV treatment in prisons, and offering discounts for medicines for members of the civil sector. In 2013, Georgia engaged the United States Centers for Disease Control and Prevention (CDC) to develop a national serologic survey to assess the national HCV burden and assist with the development of a national plan for addressing the country's HCV epidemic. This synergy prompted Gilead Sciences to join the collaborative response to HCV elimination in Georgia, making available HCV medications free-of-charge to Georgians identified as having HCV infection. These efforts culminated in the launch of the world's first HCV Elimination Program in April 2015.[24]

Implementation of Georgia's HCV Elimination Program has resulted in establishment of two management and screening centers, one in the capital of Tbilisi and one in the west Georgian city of Zugdidi. Although only four clinics were capable of providing care and treatment to HCV-infected persons at the start of the Program, the number of clinics has expanded to 30, increasing availability of testing and treatment services throughout the country. Key activities of the HCV Elimination Program include public awareness campaigns, provider training, blood safety, infection control, and improving implementation of screening activities with linkage to care and treatment. To date, 650,000 people have been tested as part of Georgia's HCV Elimination Program, almost 30,000 of whom have completed treatment. A total of 98% of persons completing treatment have achieved SVR, or virologic cure of HCV. Georgia's HCV Elimination Program model can provide important lessons for future initia

for HCV antibody and, if positive, testing for HCV RNA; tracking performance indicators; providing financial incentives for best practices; conducting case management; and co-localizing HCV and primary care. Although additional models are needed to identify ways to optimize provision of HCV and HBV therapy, Project ECHO (a telehealth approach for bringing specialty support to front-line clinicians managing patients with HCV) has demonstrated in formal evaluations to prepare primary-care providers to care for HCV-infected patients at a level comparable to that of specialists. Project ECHO supported HCV programs are currently operating in 11 countries.

A single test to detect current HCV infection, as a replacement for the current two-test process, would greatly simplify testing to diagnose HCV infection and monitor response to therapy. As more persons are

services, treatment eligibility, and number of starts and completions for therapy. Data to evaluate laboratory services are particularly important, because high quality data are essential for diagnosis and surveillance. Data from vital records and cancer registries are useful for detecting trends in severe morbidity and mortality.

Goals for the elimination of HBV and HCV transmission and disease are feasible. The available interventions are highly effective: hepatitis B vaccination of infants beginning at birth, infection control in health-care settings, harm reduction among PWID, and HBV and HCV testing and treatment. Yet the effectiveness of these interventions can be improved through advances in technology. For instance, micro-needle patches and other vaccine technologies can improve delivery of hepatitis B vaccine for infants born at home. The health benefits of hepatitis B therapies can be enhanced by drug discovery that yields therapies that achieve a functional cure for HBV infection. A single test to detect current HCV infection can expand access to testing and promote receipt of curative therapies. Although these therapies can have a tremendous impact on transmission, a hepatitis C vaccine could play an important preventive role in countries with high rates of HCV transmission and among certain populations, such as PWID and other marginalized populations with limited access to HCV testing and treatment. Finally, standard tools and information technology (IT) applications can help target and evaluate interventions.

In addition to new technologies, new strategies can improve delivery of effective interventions. Countries with high prevalence for HBV infection can implement national policies and programs for hepatitis B birth-dose vaccination. To improve the care cascade, countries can develop national policies and associated programs for HBV and HCV testing. Care models are needed to simplify HBV a

effective interventions, prevention research that can improve effectiveness, and data to monitor progress toward elimination goals. WHO's Global Health Sector Strategy on Viral Hepatitis focuses resources on the most affected populations, while seeking to ensure well-functioning health services

and HCV elimination programs can bring immediate benefits to those at risk for these diseases. The advocacy organization proposed by ITFDE can play a key role in directing resources to programs that assure key populations have equal opportunities for elimination of hepatitis B and hepatitis C.

5. ***ITFDE recommends improving the quality of public health surveillance and other strategic information sources, particularly for low and middle income countries.*** Data are needed for at least three purposes. First, data are essential for raising governmental and public awareness, identifying priorities, and guiding elimination program planning. Data from representative serologic surveys, disease burden, other epidemiologic information, and cost-effectiveness analyses presented in a compelling manner are key in persuading decision-makers to invest in eliminating viral hepatitis. Secondly, data are needed to monitor indicators of access to recommended vaccination, testing, treatment, and other prevention interventions. These data can be used for program improvement and to call attention to resource needs. Lastly, data are needed to monitor progress toward elimination targets: reductions in HBV and HCV incidence and mortality. Data from well-designed hepatitis surveillance programs, health systems, cancer registries, and vital records can be employed to monitor progress toward elimination targets.

6. ***ITFDE recommends HBV and HCV Elimination Programs engage communities for awareness, planning, and implementation.*** A transparent planning process that openly seeks input from the community increases support for the program, builds trust in the program, and increases demand for viral hepatitis prevention services. Engagement of communities can also help secure and sustain political commitment and stakeholder involvement. Community engagement can promote identification of locally appropriate strategies to assure program accountability (e.g., steering committees with community representatives and annual reports), along with strategies for program implementation, increasing program effectiveness. Social and cultural issues affecting uptake of HBV and HCV preventive services are most effectively identified through engagement of the community. One such issue is stigma. Because the source of stigma can vary locally (from fear of an association between hepatitis B and liver cancer to an association with substance abuse for hepatitis), feedback from and action taken at the community level promotes

to catalyze development of internally funded HBV and HCV Elimination Programs. Low-income countries have the greatest need for external resources during all phases of program planning, implementation, and evaluation. For countries of any income level, public-private partnerships should be actively pursued, as they are important in supporting testing, case management, and access to high-quality diagnostics and therapies.

Hepatitis elimination requires active participation of other health programs and initiatives – e.g., immunization programs and coalitions, maternal and newborn care groups, HIV diagnosis care and treatment, infection control and blood safety communities, etc. The hepatitis control programs in WHO, or CDC and national programs alone will find it very challenging to achieve elimination without the support of implementing partners.

8. ***ITFDE recommends innovative use of new communication and information technologies.*** For example, smart phone technology can be used to educate at risk populations, inform them of prevention options (e.g., locations of syringe service programs), and monitor the role of social media in community engagement. Data collection for key hepatitis B and hepatitis C program indicators and elimination targets should be priorities for national eHealth initiatives and improvements in information technologies for public health surveillance, vital registries, and clinical services.

9. ***ITFDE recommends a research agenda that can accelerate program development, improve effectiveness, and increase the feasibility of HBV and HCV elimination.*** Research can improve prevention technologies as well as improve delivery of effective interventions. For hepatitis B, research priorities include development of new technologies (e.g., micro-needles and auto-disposable hepatitis B syringes) and implementation strategies for providing a timely (preferably within 24 hours of birth) hepatitis B vaccine to newborns. Current hepatitis B therapies effectively suppress viral replication but require lengthy treatment regimens to reduce morbidity/mortality risks. Discovery of medications providing a ful0003 TTj-26.72 -1.15 26.72ueimp02ve delivf1.3(rol e)045 el, pu21.125plem-3s(in

urgency of elimination to decision makers; e) establishing a coalition or partnership to advance the elimination agenda; and f) identifying champions for elimination, particularly from countries bearing the greatest disease burden.