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The sustainability of hepatitis B immunization within the Universal Immunization Programme in India

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Based on the recommendations of the World Health Organization, India as a member-state is likely to implement universal immunization against hepatitis B through the existing Universal Immunization Programme (UIP). A pilot project is already under progress in two municipal zones of Delhi. This paper begins by reviewing epidemiological features of hepatitis B in India, some established aspects and other emerging trends. The gaps in the existing knowledge base are also given due consideration. The current recommendation is to deliver the vaccine at zero-day for infants in the absence of facilities for antenatal screening and immunoglobulin administration. The paper explores the potential pitfalls for integrating the proposed hepatitis B vaccination with the DPT (diphtheria/pertussis/tetanus) schedule. Based on the findings of the National Family Health Survey, the likely coverage for the states is estimated for both the schedules – zero-day and with DPT. The performance of the pilot phase is reviewed through the results of a coverage survey. The paper also estimates the resources that should be committed to launch the universal immunization of hepatitis B vaccination and the sustainability issues thereof. The paper finally concludes with the position that hepatitis B immunization will 'sink or sail' with the UIP. Further, this should act as an engine for recharging the infrastructure and functioning of the public health system and promote general preventive practices like universal precautions.

Key words: hepatitis B, universal immunization, sustainability, epidemiology, policy, India

Introduction

The Global Advisory Group of the Expanded Programme on Immunization recommended the inclusion of the hepatitis B vaccine in the national vaccination programmes, which was endorsed by the World Health Assembly in 1992 and the World Health Organization (WHO) recommended the same for all countries by 1997 (WHO 1995). India, being a WHO member state, is likely to implement it. A number of dimensions need to be considered before we actually implement it through the Universal Immunization Programme (UIP). The Pilot Phase was operational in Delhi from 1996. On August 14, 2001 hepatitis B vaccine was included in the schedule of universal immunization for infants within the UIP.

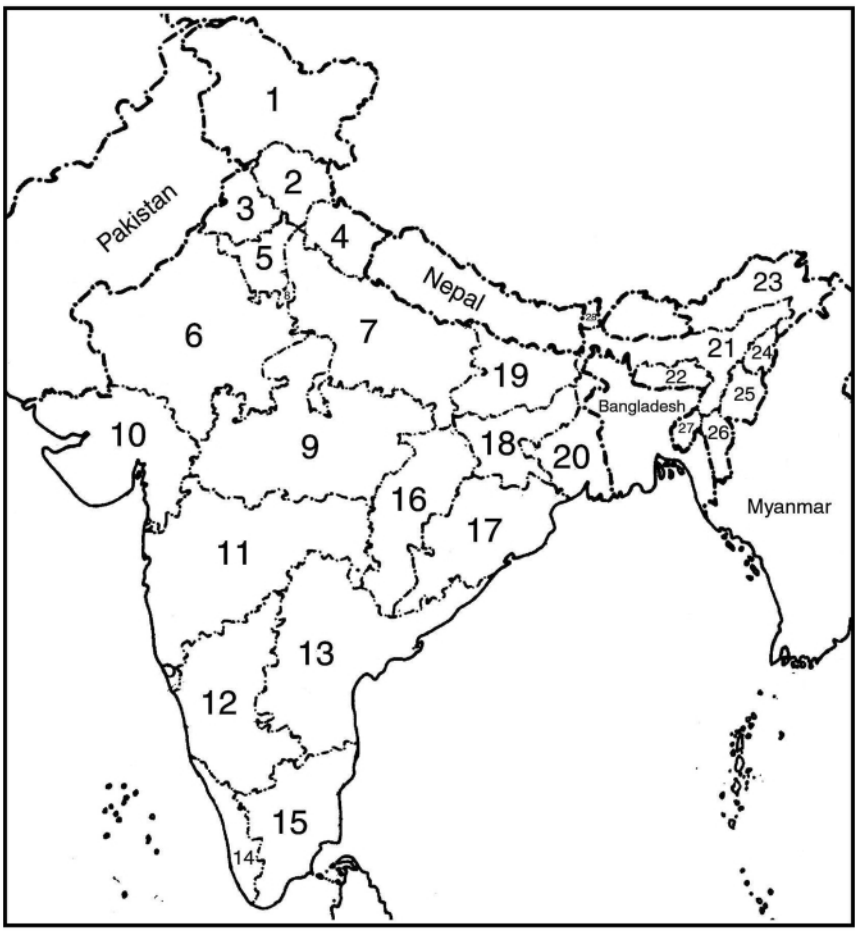
The implementation of the universal vaccination strategy implies a large range of actions and initiatives. The epidemiology of hepatitis B within the total burden of diseases needs to be understood for the Indian population both for deciding on overall control strategies and for best use and implementation of vaccination strategies. This is an area in which we are deficient. The research studies conducted in India are largely hospital and laboratory-based. Knowledge about the transmission dynamics is equally sketchy and the role of perinatal transmission and horizontal transmission among children rests on what is at best inadequate evidence. Although there is little doubt that hepatitis B is a public health problem in India, the implementation of universal immunization of infants with hepatitis B vaccine implies a large requirement and consequent commitment of resources. Furthermore, hepatitis B immunization being reportedly cost effective, we need to compute this within our own context of epidemiology, health resources and functioning of health services. Political support, health manpower training, vaccine procurement and distribution logistics are some of the key inputs necessary for the success of the programme.

Some epidemiological features of hepatitis B in India

The epidemiology of hepatitis B in India is still to be properly understood with respect to the different epidemiological indices. Recent evidence (Thyagarajan et al. 1998) indicates that there are wide variations in prevalence rates (based on HBsAg seropositivity) within the country. States (see Figure 1) have widely varying endemicity rates and within India there are zones of low, intermediate and high endemicity. A meta-analysis by Thyagarajan et al. (2000) reported the prevalence of hepatitis B virus (HBV) infection in the general population of India, ranging from 1.1 to 12.2% with a mean of 3.34%. The major states have been classified on the basis of HBsAg positivity rates. The geographically polar opposite states of Jammu & Kashmir and Kerala constituted the <2% zone. Karnataka, Maharashtra, Delhi, Haryana, Himachal Pradesh and West Bengal showed a prevalence rate of 2–4%. Tamil Nadu, Pondicherry, Andhra Pradesh, Madhya Pradesh, Uttar Pradesh and Arunachal Pradesh belonged to the >4% zone. More studies are required to map out these zones in greater detail. Labelling India as a whole as an 'intermediate endemicity' country is therefore open for debate.

Within the country, different policy approaches will be needed for targeting different endemicity levels. At a session on health sector reforms at the 2001 Indian Public Health Congress in New Delhi (7–9 April), the Union Health Secretary, Government of India, pointed out that as health is state subject, there is a need to reconsider the option of the Central Government opting out of central health programmes (except for specific 'missions' like the Pulse Polio) and reallocating resources to states to implement specific health problems at local levels. There is therefore certainly a case for individual states drawing up situation-specific strategies for tackling hepatitis B within their respective area.

A National Institute of Communicable Diseases community-based study at Alwar (Rajasthan) and Jagdalpur (Madhya Pradesh) found the incidence of viral hepatitis to be about one per 1000 population (Singh et al. 1997, 1998). The studies also revealed that hepatitis B was a minor component of the cases of viral hepatitis in the community. Some Indian institution-based studies project that hepatitis B is responsible for a third of the acute viral hepatitis cases (Singh et al. 1998). While 'jaundice' is associated with about 1% of all causes of deaths, symptoms suggestive of chronic liver disease including cirrhosis are reported to be responsible for only about 0.76% of the deaths (Registrar General of India 1991). Mohandas (2000) reported from incidence data from eight population-based cancer registries and hospital data that hepatocellular carcinoma (HCC) is not a common cancer of the digestive tract in India. The incidence rates of HCC were reported to be much lower than in the Southeast Asian countries. The report estimated 14 120 new cases in 2001, which would be 1.6% of all incident cancers. Indian immigrants also



1. Jammu & Kashmir	8. Delhi	15. Tamil Nadu	22. Meghalaya
2. Himachal Pradesh	9. Madhya Pradesh	16. Chattisgarh	23. Arunachal Pradesh
3. Punjab	10. Gujarat	17. Orissa	24. Nagaland
4. Uttaranchal	11. Maharashtra	18. Jharkhand	25. Manipur
5. Haryana	12. Karnataka	19. Bihar	26. Mizoram
6. Rajasthan	13. Andhra Pradesh	20. West Bengal	27. Tripura
7. Uttar Pradesh	14. Kerala	21. Assam	28. Sikkim

Figure 1. The states of India

have lower incidence of HCC than migrants from Southeast Asian countries. The incidence of HCC in India has been considered to be somewhat mysterious considering the moderately high prevalence of HBV-related chronic liver disease. Alternative estimates by Phadke et al. (2000) have estimated that the HBsAg carrier rate in India is 1.42% of the general population and that the carrier pool is 12.75 million, in contrast to the widely popular estimate of 4.2% average prevalence and a pool of 42.5 million. Further, they computed the HBeAg pool to be only 3.26 million. On average, therefore, only 3.1% of chronic hepatitis B carriers would die of liver diseases in contrast to the widely quoted figure of 25%. In their estimate, less than 0.1% of new-borns will die of the sequelae of hepatitis B infection in their lifetime compared with the average infant mortality of 7%.

One ominous trend that is emerging is that rural endemicity is at a par with or even higher than the urban rates for the general population (Sarkar 1998). A community-based (Chowdhury 1999) study spread across seven Community Development Blocks in rural West Bengal and two urban areas in Calcutta city found an overall asymptomatic carrier prevalence rate of 5.1% (males, 5.5%; females, 4.7%) in the rural study group, compared with 1.02% in the urban. Age less than 20 years, male sex, poor socioeconomic status, illiteracy and history of injections were identified as significant associations for higher HBV carriage in the rural areas. Several hepatitis B outbreaks investigated by the National Institute of Communicable Diseases (1997) across several states have been epidemiologically linked to the use of unsterile syringes and needles by local unqualified medical practitioners. There was evidence of hepatitis C co-infection as well. While the quacks/'Registered Medical Practitioners' have been blamed for their umpteen injections, it is also worth remembering that the state of general health services leaves much to be desired. Primary Health Centres, Malaria Clinics and Immunization Clinics are all major potential sources of spread. Rural studies are very few as of late and this is a very crucial area for further research to develop a rational policy.

The rate of HBsAg positivity among pregnant Indian females range from 0.2 to 7.1% in different studies across the country. From recent evidence (Thyagarajan et al. 2000) the analysis of HBsAg status in pregnant women has shown a range from 1–12.3% with a mean of 4.22%. Rajasthan had reported a prevalence of <2%; Maharashtra and Tamil Nadu were in the intermediate zone (2–4%) and Karnataka, Kerala, Delhi, Haryana and Uttar Pradesh were in the >4% zone. Community studies revealed a 5.7% HBsAg rate in Tamil Nadu; a 5.3% positivity rate was reported from West Bengal.

Data on HBeAg positivity rates are scanty and based on small sample sizes. The HBeAg positivity rate in pregnant women has ranged from 7.8 to 47.8% in several studies with a mean of 24.01%. The HBeAg prevalence in two community studies in West Bengal and Tamil Nadu was found to be 3.8 and 23.6%, respectively. Birth is known to be the time of spread from the mother to the foetus and different Indian reports suggest that 5 to 12% of carrier females are most likely to transmit hepatitis B to their offspring; which is approximately 0.5 % of all new-borns (Bhan 1996).

Current recommendations

Expert bodies such as the Centres for Diseases Control and the WHO recommend, ideally for neonates, the use of both a hepatitis B vaccine and human immunoglobulin (HBIg) (within 12 hours of birth) for effective control of perinatal transmission. Developing countries have optimized by omitting the HBIg in universal immunization programmes. The critical precondition for omitting HBIg is that the vaccine needs to be administered soon after birth. A routine antenatal screening programme will be expensive and has been ruled out for all practical purposes. This makes it imperative that for the vaccine *alone* to protect a neonate, it should be delivered as soon as possible after birth and certainly within 24 hours. It has been argued that in low HBeAg prevalence situations the vaccine is as effective if delivered with the DPT (diphtheria/pertussis/tetanus) vaccine. As has already been demonstrated, HBeAg rates in pregnant women in India have wide variations across states/regions and there is no justification in assuming that HBeAg positivity among Indian mothers is 'low'. Synchronizing the Hepatitis B vaccine with the DPT schedule in India is not going to deliver the desired results.

Lessons from an analysis of the NFHS data

The National Family Health Survey (NFHS) is the most recent and comprehensive health survey across all states and districts in India, providing household level data on several health and socioeconomic indicators, including reproductive and child health (and immunization). The first round was conducted in 1992–93 (IIPS 1995). The second round was conducted in 1998–99 and the figures for it have become available very recently. The national strategy being proposed has tried to optimize the delivery schedule by delivering the three doses of the hepatitis B vaccine along with the three doses of DPT immunization beginning at age 6 weeks and at intervals of 4 weeks. As explained above the vaccine needs to be delivered soon after birth, in the absence of an antenatal screening programme.

We estimate the possible efficiency of zero-day delivery by choosing a proxy from the NFHS data – the percentage of assisted deliveries. The 'assisted deliveries' category includes deliveries attended by a doctor, auxiliary nurse midwife, lady health visitor or any other health professional. The figures for institutional deliveries have also been presented, which as expected are lower than those for assisted deliveries. The coverage levels of the third dose of DPT vaccine is also examined to estimate the case for integration of the hepatitis B schedule with the DPT schedule for states from different regions of the country (IIPS 1995). The relevant data are presented in Table 1.

Going by institutional deliveries, for the country as a whole only one-third of children can be reached with a zero-day dose; taking assisted deliveries into account, the figure improves to 42.3% (NFHS-II). The proportion rises to 55.3% (DPT-3, NFHS-II) if it is delivered with the DPT schedule. Even for the capital city state, Delhi, only two-thirds of the children are reached at zero-day according to the survey.

Table 1. National Family Health Survey (selected indicators): 1992–93 and 1998–99

State	NFHS-I Assisted delivery	NFHS-I Institutional delivery	NFHS-I BCG	NFHS-I DPT 1	NFHS-I DPT 3	NFHS-II Assisted delivery	NFHS-II Institutional delivery	NFHS-II BCG	NFHS-II Polio 0	NFHS-II DPT 1	NFHS-II DPT 3
India	*34.2*	*25.5*	*62.2*	*66.3*	*51.7*	*42.3*	*33.6*	*71.6*	*13.1*	*71.4*	*55.1*
Delhi	53.0	44.3	90.1	89.0	71.6	65.9	59.1	92.0	36.9	90.8	79.9
Haryana	30.3	16.7	77.4	80.5	66.8	42.0	22.4	86.8	6.1	89.5	71.1
Himachal Pr.	25.6	16.0	84.5	90.1	78.2	40.2	28.9	94.6	4.2	96.7	88.8
Punjab	48.3	24.8	77.4	81.9	73.6	62.6	37.5	88.7	11.2	88.4	82.0
Rajasthan	21.8	11.6	45.7	47.8	29.7	35.8	21.5	53.9	3.2	47.8	26.1
Madhya Pr.	30.0	15.9	56.8	60.8	43.7	29.7	20.1	64.9	10.1	62.8	37.0
Uttar Pr.	17.2	11.2	48.9	52.2	34.1	22.4	15.5	57.5	4.7	57.3	33.9
Bihar	19.0	12.1	33.9	42.8	29.1	23.4	14.6	37.7	3.6	39.7	24.2
Orissa	20.5	14.1	63.3	69.0	56.3	33.4	22.6	84.7	14.6	80.1	61.9
W. Bengal	33.0	31.5	63.1	73.7	51.9	44.2	40.1	76.5	2.1	77.9	58.3
Arunachal Pr.	21.3	19.9	46.2	50.0	38.7	31.9	31.2	54.2	4.5	57.4	41.8
Assam	17.9	11.1	48.2	53.4	31.0	21.4	17.6	53.5	3.1	57.4	37.5
Manipur	40.4	23.0	63.8	66.1	43.3	53.9	34.5	71.0	32.1	76.4	59.1
Meghalaya	36.9	29.6	43.7	36.8	22.9	20.6	17.3	46.1	11.5	44.8	25.4
Mizoram	61.5	48.9	77.3	83.6	71.8	67.5	57.7	88.2	4.6	86.9	69.5
Nagaland	22.2	6.0	19.4	21.3	12.5	32.8	12.1	46.1	5.5	48.1	29.6
Goa	88.4	86.8	93.5	93.9	86.7	90.8	90.8	99.2	31.6	97.6	93.4
Gujarat	42.5	35.6	77.1	77.8	63.8	53.5	46.3	84.7	5.3	83.1	64.1
Maharashtra	53.2	43.9	86.9	90.0	83.1	59.4	52.6	93.7	8.3	94.9	89.4
Andhra Pr.	49.3	32.8	73.9	77.3	66.1	65.2	49.8	90.2	5.3	89.8	79.5
Karnataka	50.9	37.5	81.7	80.6	70.7	59.1	51.1	84.8	26.4	87.0	75.2
Kerala	89.7	87.8	86.1	84.8	73.7	94.0	93.0	96.2	60.6	96.0	88.0
Tamil Nadu	71.2	63.4	91.7	95.0	86.5	83.8	79.3	98.6	85.5	98.6	96.7

Notes: Jammu and Kashmir is not included as data from this state were partial.
Assisted delivery is defined as delivery conducted by doctor, auxiliary nurse midwife (ANM), lady health visitor (LHV) or other health professional.
Tripura is excluded as data for this state are not available for NFHS-I.
Sikkim is excluded as data for this state are not available for NFHS-II.

None of the major states in the Northern, Central and Eastern regions of the country can possibly have a zero-day reach of more than 20–45% except Punjab. Synchronizing with the DPT schedule means that the figure (NFHS-I) rises to a maximum of about 40% in the most critical '*BIMARU*' states (Bihar, Madhya Pradesh, Rajasthan, Uttar Pradesh). The NFHS-II registered a sharp rise in DPT-3 figures for several smaller states of this region but the cause for concern is the decline in DPT-3 coverage for the critical states – Bihar (29.1 to 24.2%), Madhya Pradesh (43.7 to 37.0%), Rajasthan (29.7 to 26.1%) and Uttar Pradesh (34.1 to 33.9%).

The geographically and administratively challenging North-East shows a bleak picture. For assisted deliveries, except for Mizoram (both the rounds) and Manipur (second round), all the states have figures lower than the national average. The picture is similar for institutional deliveries. The DPT-3 coverage shows improvement in the second round, but with a large range from 25.4% in Meghalaya to 69.5% in Mizoram (a fall from 71.8%) in the first round.

The situation is much better in the major Western and Southern states, particularly in Maharashtra, Kerala and Tamil Nadu, more so if the DPT coverage rates are taken into account. For the zero-day dose (assisted deliveries), however, none but Kerala and Tamil Nadu cross the 50% mark.

A new indicator available in the figures for NFHS-II is the Polio 0 dose. The National Immunization Schedule recommends a zero-day dose for polio along with BCG at birth (Park 2000). A close scrutiny of the BCG and DPT-1 coverage figures reveal their uncanny similarity along with that of OPV-1, across states. This implies that despite the emphasis on BCG being administered at zero-day, in reality most of the BCG coverage is being done during the first 'triple antigen' session. The national average for Polio 0 coverage was 13.1% (NFHS-II). The figure reported from Delhi was 36.9%, where institutional deliveries are at 59.1% and assisted deliveries 65.9%. The highest coverage predictably came from Tamil Nadu at 85.5%, followed by Kerala (60.6%). The figures for the major Northern, Central and Eastern states were: Punjab, 11.2%; Rajasthan, 3.2%; Madhya Pradesh, 10.1%; Uttar Pradesh, 4.7%; Bihar, 3.6%; and West Bengal, 2.1%. The situation was as bad in the better performing major Western and Southern states: Maharashtra, 8.3%; Gujarat, 5.3%; and Andhra Pradesh, 5.3%. Karnataka had relatively better figures at 26.4%. The Polio 0 coverage figures are probably the best indicators for forecasting the state of the zero-day coverage of hepatitis B universal immunization.

Concerns emerging from a coverage survey of the pilot project

In keeping with the proposed national policy, a pilot project was launched in Delhi on 1 October 1996. The actual implementation was delayed by 2 months by an epidemic of Dengue Haemorrhagic Fever that was raging in Delhi at that time. The pilot phase was conducted in two Municipal Zones of East Delhi – Shahdara (North) and Shahdara (South). The strategy was to administer the zero-day dose for infants born in the University College of Medical Sciences and Guru Tegh Bahadur Hospital, which is the only Medical College in that part of the city and the nodal centre for the pilot phase. For the rest of the infants, the hepatitis B vaccine was administered with the DPT vaccine. A coverage survey was conducted after the pilot phase had been implemented for nearly 2 years. The standard 30 cluster technique was followed in two areas – Nand Nagri and Seemapuri for a population of 65–70 000 population each. The salient findings of the survey (Rajoura et al. 1998) are presented in Table 2.

Table 2. Vaccination coverage survey, Sept–Oct 1998

	Coverage (%)		
	Nand Nagri	Seemapuri	NFHS (Delhi)
BCG	86.9	84.5	90.1
OPV 3	77.7	71.4	75.0
DPT 3	77.7	71.2	71.6
Measles	73.4	70.6	69.6
All	68.5	65.7	57.8
None	9.3	10.2	6.7
Hepatitis B 1	35.7	26.5	–
Hepatitis B 3	18.9	21.6	–

NFHS = National Family Health Survey

What is of concern is the unusually low coverage of the hepatitis B vaccine in clusters even where coverage of DPT is otherwise high and is located within 2–3 km of the nodal institute. This poor coverage has been attributed primarily to problems with vaccine supply. The project was a collaboration between the (state level) Government of Delhi and the WHO. WHO had promised to supply 1 million doses of Engerix-B (Smithkline Beecham) for 3 years (Addlakha 2000). The drop out rates between the first dose and the third dose are 18% in Seemapuri and 47% in Nand Nagri. Barely one child in five actually completed the full schedule of three doses. The other factors identified for non-immunization were lack of information, obstacles and lack of motivation.

The problems of resource availability

The introduction of the hepatitis B vaccine will make large demands on resource allocation and availability. The net infant population has been estimated by demographic modelling for the years 2002–2006 (Das and Dasgupta 2000) taking into account the crude birth rate and infant mortality rate. The number of paediatric doses of hepatitis B vaccine required annually to fully cover this infant population will be 62.6–79.5 million, assuming zero wastage. While production capacities are adequate for DPT and OPV, the same cannot be said about the hepatitis B vaccine. Currently, this vaccine is almost exclusively imported. Only one company reportedly manufactures the recombinant vaccine in India but this is available in only select retail stores (Addalakha 2000). Should India decide to go for universal immunization, virtually the entire requirement will have to be imported as indigenous production capacities are miniscule.

Table 3. The arithmetic of costs of inclusion of the hepatitis B vaccine in the Universal Immunization Programme

	Year	
	2002	2006
Estimated net doses of hepatitis B vaccine[a]	62.6 million	79.5 million
Additional cost for hepatitis B vaccine only: institutional price for hepatitis B vaccine (recombinant) @ Rs.1050/10 ml.	Rs.3286.5 million	Rs.4173.75 million
Total cost for quadrivalent vaccine (DPT + Hep B): institutional price for quadrivalent vaccine @ Rs.925/10 doses	Rs.5790.5 million	Rs.7353.75 million

[a] based on net infants calculated by Das and Dasgupta (2000).
Notes: The cost has been computed on the assumption of zero wastage. An analysis of data (Das and Dasgupta 2000) available from the Ministry of Health and Family Welfare revealed that in 1995, the supply of DPT vaccines was about 25% higher than the net infant population and going by actual performance (supply minus infants immunized) the 'gap' is to the tune of 50%.
Although the data summarized in the table should not strictly speaking be used for ceteris paribus comparisons, they do at a preliminary level indicate that at current institutional prices, the cost of the quadrivalent vaccine would turn out to be much higher even after adding the cost of DPT vaccine to that of the recombinant hepatitis-B vaccine.
This arithmetic of costs has not included the cost of syringes. As the UIP does not yet advocate disposable needles/syringes our position is that the increase in costs on this account will be marginal.

On the basis of information available from the Ministry of Health and Family Welfare, the total cost of the UIP, on vaccines and equipment, including the cold chain equipment, amounted to Rs.2460 million in 1995–96. Rs.1200 million was spent on supply of vaccines and about a third of the expense was for the cold chain. The cold chain will need some augmentation for which the cost input will not be high. Earlier authors had estimated the cost of the paediatric dose of hepatitis B vaccine to be US$0.70 for plasma derived vaccines; cost for recombinant vaccines has been estimated to be US$1.25–1.3 (Mahoney 1990; Ramalingaswami 1996). At current institutional prices being offered to the Government for multi-dose recombinant vaccines, an additional Rs.3286.5–4173.75 million per year will be required to procure the vaccines if recombinant vaccines are inducted into the programme. This does not allow for any wastage. Will the budgetary support of almost double the UIP for several diseases be available? This will also be subject to foreign exchange rate fluctuations since a substantial portion of the vaccine requirement will have to be imported. Taking into account the proposed adoption of a quadrivalent vaccine in the programme to replace the conventional DPT vaccine, at current institutional prices, the total cost of these four vaccines (with the help of the quadrivalent vaccine) will be Rs.5790.5–7353.75 million per year for the net number of infants between 2002 and 2006 and without wastage. The details are available in Table 3.

In a situation of dwindling social sector spending in a resource-constrained economy currently undergoing structural adjustment, resources will not be easy to come by. Considering that the total budget for 'health and family welfare' in 2000–2001 has been Rs.58 530 million (Government of India 2001), how justified will such additional expenditure be on just one disease with low epidemiological priority? If the funds do come as 'soft loans' (as there are for other disease control programmes such as the AIDS Control Programme and the DOTS-oriented Revised National TB Control Programme), the question of sustaining resource input will be vital. As no one is envisaging an 'eradication' of hepatitis B with hepatitis vaccine, the immunization, once begun, will have to be a continuing intervention for the foreseeable future. Is it justifiable to spend so much on an intervention of such questionable cost-effectiveness in the Indian context?

Conclusions

Thus our analysis questions the introduction of hepatitis B vaccine in the UIP on the grounds of:

(1) low coverage of immunizations at birth and the DPT-3;
(2) wide variations in endemicity within a vast country, raising the possibility that immunization policy should be based on epidemiological need, state by state (universal access for infants within a state), rather than on nation-wide universal immunization;
(3) short and long term financial sustainability.

Considering jaundice/viral hepatitis as a problem, we cannot but observe that enteral (faeco-oral transmission) forms of the disease are definitely of greater magnitude as a public health problem than hepatitis B, for which neither any 'quick remedy' like vaccine nor any great activism is available. Education and campaigns focusing on 'safe food' and 'safe hands' can, to some extent, serve to cut down faeco-oral forms of spread. 'Safe water' and 'safe surroundings' (environment) call for a far greater degree of macro-level changes and require overall re-orientation of priority and allocations for water supply and sanitation, along with strengthening of health services infrastructure. Unless these commitments go up drastically, how far are we justified in committing ourselves to expenditures of this magnitude for an intervention of such limited outreach and doubtful sustainability?

Further, considering chronic liver disease, how much of it is caused by hepatitis B and how much by other causes such as

alcoholism needs to be examined. Primary prevention of hepatitis B itself requires proactively and urgently tackling the problem of negligence in the practice of universal precautions for infection control in medical practice. Limiting sexual transmission is a common measure for minimizing spread of all the conventional reproductive tract infections (STDs), HIV/AIDS and hepatitis B. Such interventions in the 'social' and professional' processes may require much less financial input, but much more human interaction to change attitudes, and lead to more 'sustainable' results.

Alternatively, and ignoring the issue of financial resources, if India does take on hepatitis B vaccination in the mass programme, can this (together with the measures for other new and re-emerging communicable diseases) act as an engine for strengthening the infrastructure and functioning of the public health system at large? Our position is that hepatitis B immunization is going to 'sink or sail' with the care during childbirth and the UIP, and these are dependent on the functioning of the general health services. A unified integrated strategy encompassing 'safe injections', 'safe blood' and 'safe procedures' will go a long way in the prevention of all blood-borne and sexually transmitted infections – known and unknown. If we take this opportunity to recharge our health services in general, and the UIP in particular, it will have proved of value, otherwise it may be yet another case of lost opportunity and sub-optimal utilization of scarce resources.

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