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EDITORIAL**PUBLIC HEALTH: IS IT MISSING IN THE HEALTH SECTOR REFORMS AGENDA?**

The success story of public health is stupendous globally, in India also. The history of public health of developed countries, industrial world in particular, has reiterated three types of investments, namely, improved physical environment achieved by social reformers not doctors; followed by biomedical technologies along with psycho-socio-cultural and economic development, and lately promoting life style changes as the principle determinants of health development.

It appears that the public domain of organized health system is victim of its own success. The growing expectations and demands on public health have become sky-high. Targets led down in 5 years health plans want spectacular achievements. As if 50% reduction of death during infancy, two- third reduction of total deaths or doubling of life expectancy in 50 years etc. is just not sufficient. But the hard fact is that India's 4.5% of GDP is spent on health, its 0.9% is allocated for Public Health. In other words, even the meager resources offered to health services in India is very inequitably distributed. No wonder India ranks 13th from the bottom globally in spending on health.

As a result, the hard own gains of health and life expectancy in India are also threatened by its high disease burden, infectious disease in particular, as a crisis, similar to the global disease burden of middle and low-income countries. Most of these infectious diseases are allowed to gain ground in the backdrop of poverty (1 in 3 are undernourished) and neglect (1 in 5 are not fully immunized). It is worthwhile to mention that low and middle-income

group countries account for only 18% of world income and 11% of global health spending. But, 84% of world population lives in these countries and they bear 93% of disease burden of the world.

Global health experiences have thus amply illustrated that even socio-political changes, which bring about redistribution of wealth, has corollary benefits on public health. The health care providers in most of the countries have not only forgotten its cause effect relationship, they even may resist such changes, if it affects their wealth and income. When confronted with these sensitive social or political issues which affect health, the health care providers have the duty to encourage better distribution of resources. Ironically in low income countries, where total public revenues are scarce, capacity of public sector is weak; the financing of health services are largely in the hands of private sector. As a consequence, large segments of its citizen still have no access to basic and effective health care.

What is our expectation from public health that exists as an organized health system today? The objectives of health system are to improve the health status of people, respond to their expectations and providing protection against the cost of illness, which emanate from the hazards of development, including that of occupational exposure. Shift in interest from just improved access to protection against cost of illness is quite evident.

Thus the health system reforms were initiated by foundation of national health care system. But the dilemma in expenditure in health care for

curative services and public health had adversely affected the speed of health development. Failure to achieve the peoples' expectation had compelled to promote Primary Health Care at affordable cost with commitment for universal coverage.

Lately, the call of WHO for "neo universalism" i.e. high quality essential care, defined by the criteria of cost effectiveness, for every one, rather than either all possible care for the whole population or the only basic care for the poor merit adequate attention. It appears simply as an economic expression of health investments, which is exacted to pay-off well. Unless the cost recovery is ensured, there is every possibility that not only the investments will not give its return, but there is chance of loss of capital investments as well. Nonetheless, there is an enormous gap between the apparent potential of public spending to improve the health status and the actual performance. However, in the spirit of action, significance of public health shouldn't be overlooked, significance of health development undermined and the very essence and necessity of primary health care underrated. The new economic orders of globalization, public private partnership or privatization must recognize evidently that techno-centric innovations or products or health services should be viewed for safe guarding health as a self-reliant culture. It should be a mean for, but not a departure from public health.

Recent initiatives like relocation or restructuring of primary care institutions, project based solution in inaccessible areas, handing over of PHC to NGO etc. are oriented towards the cost recovery only. The reform need to be user friendly.

Instead of donor driven gadgets and technology transfer, the long cherished dream of universalism of primary health care should be nurtured in its true spirit, through the strong health care network, across the country. It should not be technology centric but should influence desirable change in health behavior.

Nevertheless, in rich and poor countries alike, health needs today are much different than those of 100 or even 50 years ago. The changing landscape of health system shows explosive growth of knowledge, technologies that it has gained access to and applied. Despite its enormous contribution the failure of public health to achieve its full potential is due more to systemic failing, than its technical limitations.

The health system includes all the activities designed to promote, restore and maintain health. It covers wide spectrum of services from professional care to care by traditional healers, institutional care to home care and curative to comprehensive health care. Again, for better or worse, health influences education and education influences health. Food and water are other frontiers of health as well. So does the aspiration of health sector reform means competing with other sectors like food or agriculture or education for the share of scarce resources? This simple but disquieting question lies in the reality of the long cherished dream of public health, which can not be offered but can only be acquired by 'organised community efforts'.

Dr. Ranadeb Biswas
Editor

MONITORING THE SIZE OF THE LEPROSY PROBLEM: WHICH EPIDEMIOLOGICAL INDICATORS SHOULD WE USE?

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Summary

The purpose of the study was to discuss the interpretation of epidemiological trends in leprosy, using currently available indicators. A number of leprosy-endemic countries and regions were chosen for which epidemiological data have been published for a period of at least 15 years. Using these examples, relative merit of the registered prevalence rate, the case detection rate, the children proportion among new cases and proportion of new cases with grade 2 disability will be examined for interpreting the leprosy situation in these countries.

Considerable drop of the registered prevalence rates (PR) were evident in all endemic countries. However, this decline was due largely to shortening of treatment and 'cleaning' of leprosy registers and has not been reflected in the annual case detection rates (CDR), except in a few countries. The proportion of new cases with grade 2 impairment had decreased substantially, which indicates earlier case finding. However, the proportion of children among new cases did not change much in the past decade. It is indicated that transmission is still continuing.

We reiterate the conclusion of the ILA Technical Forum that the (annual) case detection rate is the most appropriate indicator for monitoring of leprosy situation in a given country or area. Two additional indicators that helped to interpret the CDR were the proportion of new cases with grade 2 impairments, reflecting the delay between occurrence and diagnosis of the disease, and the proportion of children among new cases, which is used as a proxy indicator for recent transmission.

Key Words: Leprosy situation, Epidemiological indicators

Introduction

Leprosy has been a public health problem in many countries for hundreds of years. In 1991, the World Health Assembly declared the 'elimination' of leprosy, a public health problem, as a goal for 2000.¹ 'Elimination' was defined as a prevalence less than one case per 10,000 population. Earlier, a 'case of leprosy' had been defined as 'someone with a confirmed diagnosis of leprosy, who is in need of anti-leprosy chemotherapy'.² When a patient completed chemotherapy, or was lost to follow-up, (s)he ceased to be a 'case' and was deducted from the prevalence register. Underlying the elimination

strategy was the hypothesis that, because leprosy patients are assumed to be the sole source of infection, its early detection and treatment with Multidrug therapy would reduce transmission of *Mycobacterium leprae*.³ It was expected that once the prevalence fell below this level, the chain of transmission would be broken, and leprosy would disappear naturally.⁴

Since then, the campaign against leprosy was intensified as never before and prevalence rates began or continued to decline in all endemic countries. How can the declining prevalence be explained? Epidemiologically, prevalence (P) is

proportional to the product of the incidence rate (I) and the average duration of disease (D): $P = I \times D^{4,5}$.

However, in the case of leprosy, the indicators used are somewhat different from those mentioned above. The 'prevalence' refers to the number of cases registered for chemotherapy, which is an underestimate of the actual prevalence. This registered prevalence is equal to the annual number of cases detected, multiplied by the duration of treatment with MDT ($P_{reg} = CD \times D_{mdt}$).⁶ The (registered) prevalence is influenced by several factors such as,

- shortening of the duration of treatment. In 1982, dapsone monotherapy was replaced by multidrug therapy (MDT). During the dapsone era, multibacillary (MB) patients were often treated lifelong, while paucibacillary (PB) patients remained on treatment for several years. Under MDT, treatment was now shortened to 6 months for PB patients and between 2 and several years (until skin smears became negative) for MB patients. Fixed-duration 24-dose MB MDT was introduced in 1993. Instead of taking (MB) MDT until skin smears became negative, patients were released from treatment as soon as they had completed 24 months of MDT. In 1997, the treatment of MB leprosy was further shortened from 24 months to 12 months and in some major leprosy endemic countries single-dose ROM treatment (a combination of rifampicin, ofloxacin and minocycline) was introduced for patients with only a single skin lesion;
- methods of case finding (active vs. passive case finding activities);
- geographical coverage of the leprosy control programme;
- over and under-diagnosis; and
- updating of the registers. The so-called 'cleaning' of the registers has contributed tremendously to the decline. In some countries this was already sufficient to 'eliminate' leprosy.⁷

Sharply declining incidence rates, leading to the disappearance of leprosy from previously

endemic countries has been described for a number of countries and regions, including Norway,⁸ Portugal,⁹ Weifang Prefecture in China,¹⁰ the United States, Japan and Taiwan.¹¹⁻¹⁴ Often these declines predated anti-leprosy chemotherapy and were attributed to the improving socio-economic conditions in these countries, sometimes combined with rigorous isolation policies.¹⁵ The declining leprosy incidence was usually marked by an increase of age at onset and an increasing proportion of multibacillary (MB) cases among those detected.¹⁶ Declining case detection rates (CDR) up to the early 1990s were also described in Thailand and Ethiopia, among other endemic areas.¹⁶ Only in Brazil, an increasing CDR was observed. The decline of leprosy in the ALERT leprosy control area (Shoa Province, Ethiopia) was well-described by Groenen.¹⁷ The declining prevalence and case detection rates were accompanied by an increase in MB proportion and a decrease in the proportion of children among new cases. However, despite a dramatic decline in registered prevalence rates over the past decade, it was noted recently that CDRs have remained more or less stable over the past 10-15 years in most endemic countries, even showing an increase at the global level.^{7,18}

As the efforts to control leprosy progress, the questions of how to assess the leprosy situation and monitor the progress of these control efforts, become more and more important. What is really happening with leprosy endemicity in these countries? With prevalence rates decreasing at a rapid pace and MDT very widely available, how can one explain the stable or even increasing new cases detection rates in some countries? Operational explanations have been put forward. These include increased case detection activities, improved geographical coverage of the control programme, over-diagnosis/registration and increased awareness of the population in endemic countries. Interpretation of the epidemiological situation is further complicated by several changes in the definition of the classification 'MB', the shortening of treatment duration and frequent leprosy elimination campaigns (LECs) conducted in the past decade.

Careful assessment and monitoring of the Leprosy situation in a given setting is still crucial if conclusions for rational management and planning

are to be drawn. The epidemiological trends were examined in a number of endemic countries, using available indicators. The likely interpretation with regard to future leprosy control activities were also discussed.

Materials & Methods

Six endemic countries or regions were selected as 'case studies'. The selection was determined by the availability of longitudinal data necessary to calculate the prevalence and case finding indicators. Data on major success stories of leprosy control, such as in Norway, Portugal, China, Japan and Taiwan have already been published.^{9-11,14,19} Observations from these studies will also be discussed, where relevant.

Data on leprosy prevalence and case detection were collected from a number of sources. These included published literature, WHO and other sources on the internet, ILEP statistics, data published by national leprosy control programmes and information available with selected public health experts. Population data were obtained from the United Nations Population database on the internet.¹

Where possible, data were collected on the following indicators:

- Mid-year population
- Registered point prevalence of leprosy (where possible at the end of the calendar year or the beginning of the new reporting year): The number of cases registered for anti-leprosy chemotherapy at that point of time. This figure is used to calculate the (registered) prevalence rate (PR) per 10,000 population.
- Annual case detection rate (CDR): The number of new cases detected during the reporting year per 10,000 population.
- Proportion of MB cases among new cases during the year (%MB). A stable MB proportion is taken as an indication that the CDR reflects the underlying incidence rate. It should be noted that the definition of 'MB' has been adapted several times in recent years. These changes make the interpretation of this indicator more difficult.

- Proportion of children (<15 years) among new cases during the year (%children). Since children who develop Leprosy must have been infected in the recent past, the child proportion is used as a proxy indicator for (recent) transmission.⁶ Age-specific case detection rates are not routinely available; the child proportion is the nearest available indicator reflecting age at onset.
- Proportion of new cases with grade 2 (= visible) impairments (%G2). New cases presenting with visible impairments on an average have a longer delay in diagnosis than those without impairment. The 'grade 2 proportion' is therefore used as a proxy indicator for delay in diagnosis.⁶ Incompleteness of examination of the target population and data recording may lead to an under-estimation of the proportion with grade 2 impairments.

Where possible, data was obtained from 15-year period from 1987 to 2002. When occasional data points were missing, the average of the previous and next value was used for that year. Rates were calculated and graphs were made in Excel spreadsheets.

Results

Thailand

Figures 1 and 2 show the trends at Thailand over the past 15 years. The PR decreased sharply until 1995. After that it levelled off. The small further decrease in 1999 may be due to the introduction of 24-month MB MDT. Up to the early nineties, the CDR showed a slowly decreasing trend, with an annual decline of 3.8%.¹⁶ However, from 1990 onwards the decline slowed down to an average of 1% per year. From 1999, the CDR has been stable at 0.15 per 10,000. The MB proportion steadily increased in steps that may reflect changes in the MB classification criteria. The most striking was the fact that there is no downward trend in either the child proportion or the proportion grade 2. A %G2 of 14 indicated a considerable delay in case detection, while the %children of around 5 shows continued transmission of leprosy, even if, it is at a low level.

Ethiopia

A very similar pattern, but at a higher level of endemicity was seen in Ethiopia (Figures 3 and 4). Up to 1988, an annual decline was observed of 9.7%.¹⁶ Figure 3 shows that the decline continued at about the same rate until 1991. However, during the last 10 years, the CDR remained stable at just above 0.70 per 10,000. For the last 3 years, the PR and CDR were at the same level. Over the study period, the %MB increased from 50 to 75%. The %children decreased from 13.6 in 1987 to 6.4 in 1998. However, no further decrease was seen during the last 4 years, again indicating continued transmission. The %G2 increased from 10 to 15% in the last 10 years, showing an increasing delay in case detection.

Tanzania

Figure 5 shows the trends of PR and CDR from 1988 to 2002. No long term data were available for %MB, %children and %G2. The PR decreased to close to the 'elimination level' 1996 (1.14/10,000), but increased again after that. A similar pattern is observed for the CDR, with a decreasing trend until 1995, but a doubling of the rate there after upto 2002.

Nepal - Western Development Region

Figure 6 shows a falling PR, which only stabilised during the last 4 years. The CDR shows no decreasing trend, but reflects quite markedly the 3 LECs held in 1996, 1999 and 2002. After each campaign, (voluntary) case detection dropped back to the level before the campaign. In contrast to Thailand and Ethiopia, the %MB decreased slightly over the study period (Figure 7). The %children was fairly stable between 6-10%. The %G2 showed a dramatic decrease from 24 to 3%, indicating much earlier case finding now than 15 years ago. It should be noted that the latter statistic was not influenced by the increased case finding efforts during the LECs.

India

The Indian data show very similar trends to those discussed above (Figures 8 and 9). After a steep decline in PR, the PR and CDR have been almost stationary between 1995 and 2002. Striking in the Indian data is the very low %G2 and the high

%children in recent years (1.8 and 15%, respectively in 2002).

World (excluding India)

Because of the large number of cases in India, the Indian data may obscure epidemiological trends in the rest of the world. Therefore data are presented for the 'world excluding India' in Figure 10. These show the usual declining pattern in PR, but a slow increase in CDR from 1987 to 1992. Apart from slightly higher rates in 1998-2000, the CDR remained stable from 1992 onwards. Trend data on the %MB, %children and %G2 were difficult to find for recent years. However, calculated figures for 2001 were 54%, 20% and 12%, respectively. The high %G2 indicates delayed case presentation, but also shows that each year nearly 25,000 people present with disability that is often already irreversible.

Discussion

The massive efforts of national governments, WHO and NGOs to work towards the 'elimination of leprosy as a public health problem' has seen many successes. MDT is now available very widely and free of cost. Almost all new cases receive MDT, regardless of where they live. The global case load of leprosy cases on treatment has been reduced by 87% during the study period (1987-2002). And indeed, in 2000, the global prevalence rate dipped below the magic 1/10,000 level. Despite this, the PR is still well above this level in several endemic countries and areas. Of much more concern, however, is the fact that the predicted reduction in case detection rates has not been seen yet. The above sample data show that, even in countries where the elimination target has been reached, evidence of recent transmission can be found and significant numbers of new cases continue to be detected.

It has been claimed that most of the new cases currently detected are in fact backlog cases or 'hidden cases'. i.e., they are not incident cases in whom disease became evident during the previous year, but they have existed for various periods of time without reporting for treatment. While this may be true, the effect of the intensified case finding campaigns on case detection levels has been mixed.²⁰ Trend data from major endemic areas

where repeated LECs have been carried out, comparing 2002 case detection figures those in 1995, show a decrease in 3 areas, more or less equal levels in 2 and an increase in 3 areas (WHO Leprosy Elimination Project, Annual Report 2003). In addition, the low %G2 among cases detected during LECs suggests that most of these were 'incident cases' with a relatively short delay in diagnosis.²⁰ This finding also pleads against the argument that many current new cases are patients who re-register, because they are not satisfied with the results of their previous treatment.

It is possible that the lack of a decline in case detection rates is due to the increased geographical coverage of leprosy control programmes and the higher levels of awareness found in many endemic areas. A (small) proportion of new cases may have wrongly diagnosed ('over-diagnosed'). Yet the large majority of cases are real and require realistic public health planning to ensure the availability of adequate treatment facilities. The above 'case studies' show that such planning cannot be done on the basis of the registered prevalence rate. Given that case detection rates have not declined in many endemic countries, one can only conclude that, until now, the dramatic decline in registered prevalence rates is not due to a decrease in leprosy incidence, but to a combination of shortening of leprosy treatment duration and 'register cleaning'.

Case detection rates are also affected by operational changes, such as changes in case finding methods. However, except in the case of massive campaigns, such as the LECs, these changes are likely to be gradual, particularly when case detection relies on voluntary reporting, as is the case in most countries. Even when LECs are carried out, the excess case detection can be easily estimated and the underlying trend can still be interpreted. This is illustrated by the case study of the Western Region in Nepal, where three such LECs were carried out.

We agree, therefore, with the ILA Technical Forum who stated:

"Prevalence alone is of limited value as an indicator of leprosy control. The new-case detection-rate may be a better indicator; this rate should be analyzed in conjunction with other indicators."¹⁸

It would be sad to loose the current commitment among national governments of leprosy-endemic countries, because an inappropriate indicator was used to measure 'success'.

The 'other indicators' mentioned are the %children and the %G2 among new cases. The former gives an indication of the levels of transmission in the recent past. Several studies have shown that when the incidence of leprosy decreases, age at onset (or detection) will increase.^{13,16,19} The %children will therefore decrease and, when transmission has stopped completely, will eventually approach zero. This is illustrated well by the above quoted study on the ALERT leprosy control area in Ethiopia,¹⁷ and the example of Taiwan.¹⁴ Such a decline was not yet seen in any of the current country studies.

The dynamics of the %G2 are less straightforward. A decrease in %G2 indicates earlier case detection. However, as can be seen in the examples of Nepal and India, this does not mean that CDRs are decreasing also. Indeed, case detection may well improve while case detection rates are increasing, as was recently demonstrated in Brazil.²¹ A substantial delay in detection is often found in low endemic situations, as in Thailand and Ethiopia (Figures 2 and 4). Under very low endemic conditions, key knowledge and skills for diagnosing leprosy are lost and detection delays increase. Analogous to the CDR, both the %children and the %G2 are affected by (changes in) the case detection methods used. For example, an emphasis on case finding through school surveys will result in a higher proportions of children among new cases than when only passive case finding is practices. Similarly, active case finding surveys, such as the LECs, will result in lower grade 2 proportions. This mechanism may at least partly explain the high %children and low %G2 in India.

The %G2 also highlights the key problem in leprosy, namely disability due to untreated nerve damage. Even if no new impairment would occur after the start of MDT, many thousands of people start and finish their treatment, already affected by

irreversible nerve damage. However, evidence shows that 10-20% of people affected by leprosy will sustain additional nerve impairments during or after MDT.²²⁻²⁷ After release from MDT, these people are no longer counted as 'cases' in the leprosy statistics, yet they have often lifelong needs in the area of prevention of disability (POD) and rehabilitation. Adequate services need to be made available to meet these needs.

The %MB is probably the least useful indicator among those discussed in this paper. It has been shown to increase in countries where leprosy was dying out.^{9,19} This is because, on average, MB cases have long(er) incubation periods and, therefore, they are the ones that will continue to appear as new cases, even after transmission is decreasing or has stopped altogether. Furthermore, changes in the definition of 'MB' over the last decade have complicated the interpretation of the long term

trends of this indicator. On the other side, Croft et al. have shown MB patients to be at high risk of developing reactions and nerve function impairment.²⁸ A high MB proportion should therefore serve as a reminder that POD activities are a priority need.

The ILA Technical Forum concluded that, "It is very likely that significant numbers of new patients will continue to present for many years. Thus, it is essential to ensure that leprosy control activities be sustained, even in countries or areas that have officially reached the elimination target".¹⁸

Careful analysis of case detection data, interpreted against a background of (quality) operational procedures, will enable public health managers to make rational decisions to make this possible at the national, regional and sub-regional levels.

Figure 1: Trends in case detection rates in Thailand over a 15-year period

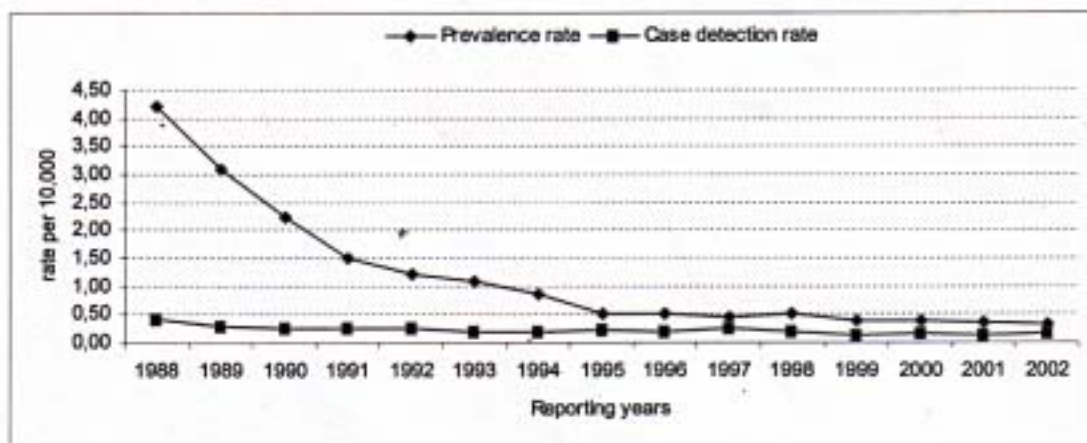


Figure 2: 15-year trends in the proportion of children, patients with grade 2 disability and MB patients among new cases in Thailand

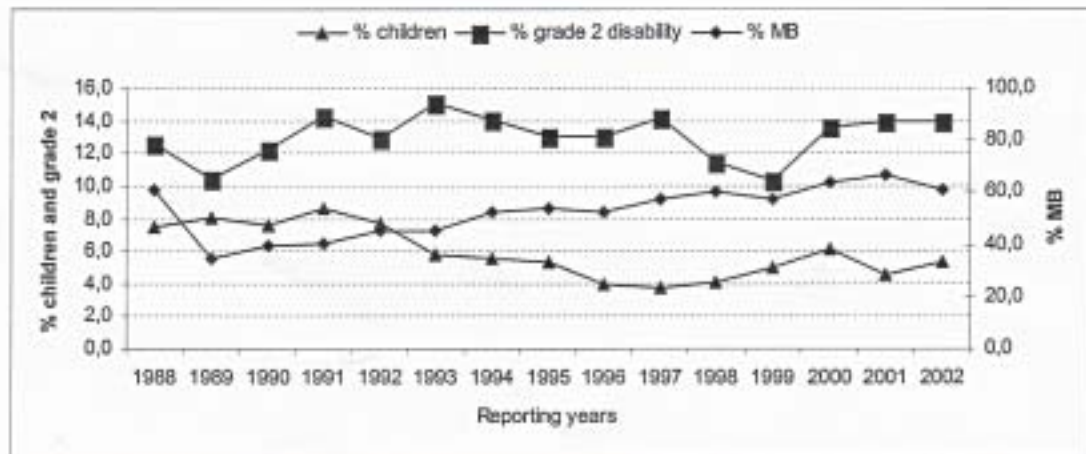


Figure 3: Trends in prevalence and case detection rates in Ethiopia over a 15-year period

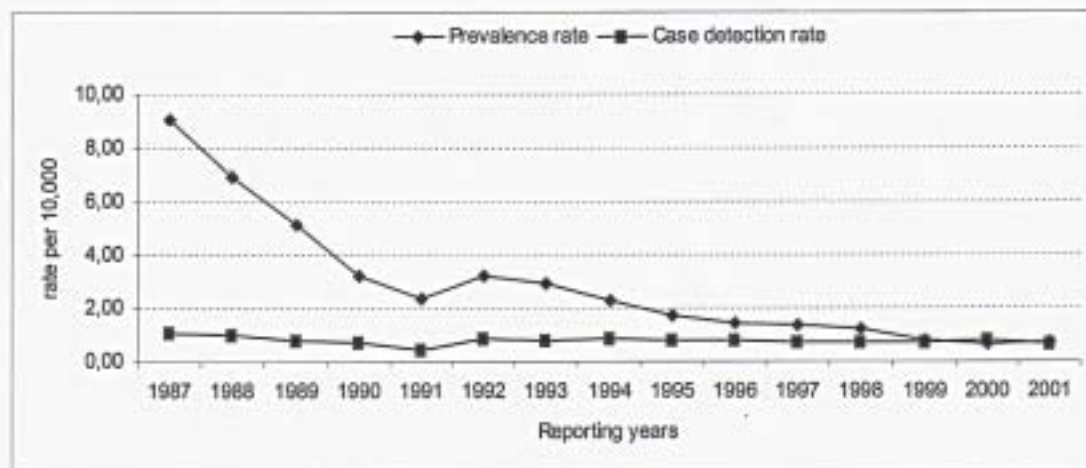


Figure 4: 15-year trends in the proportion of children, patients with grade 2 disability and MB patients among new cases in Ethiopia

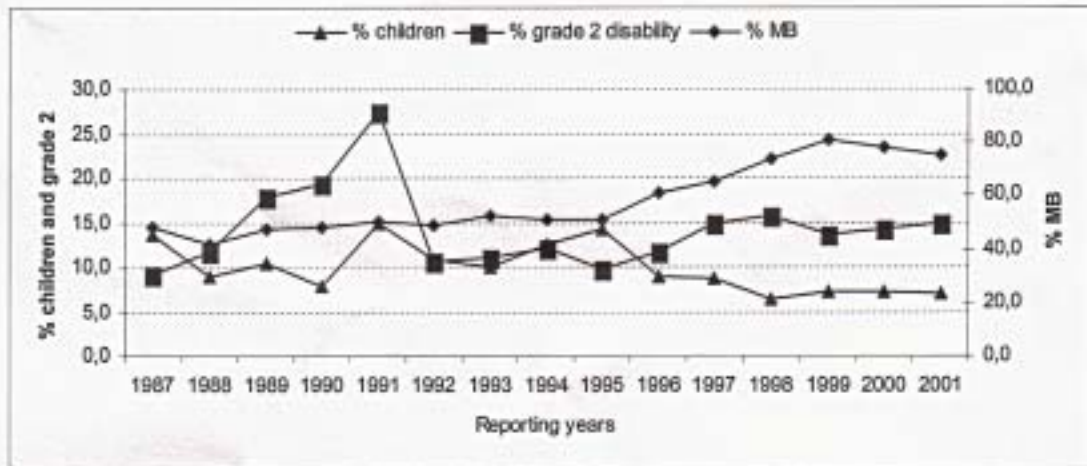


Figure 5: Trends in prevalence and case detection rates in Tanzania over a 15-year period

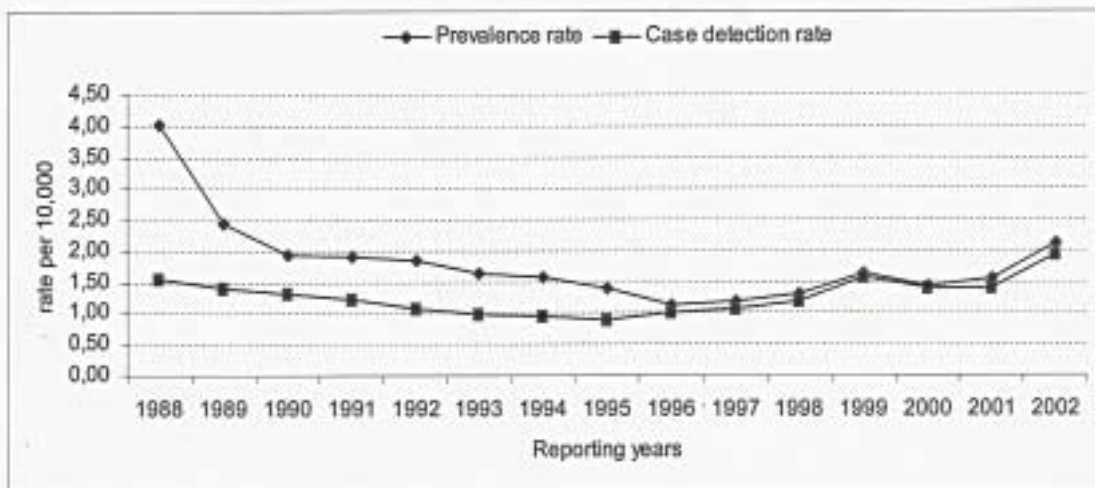


Figure 6: Trends in prevalence and case detection rates in the Western Development Region of Nepal over a 15-year period

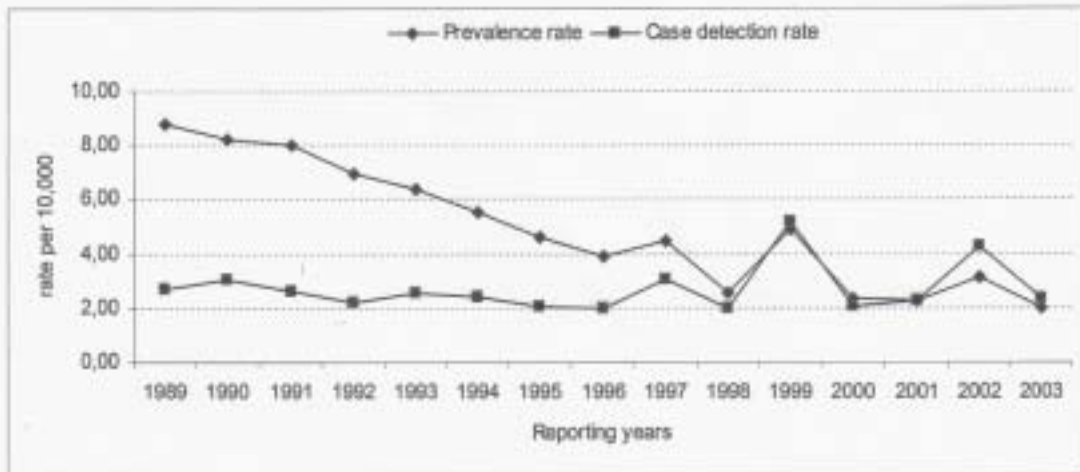


Figure 7: 15-year trends in the proportion of children, patients with grade 2 disability and MB patients among new cases in the Western Development Region, Nepal

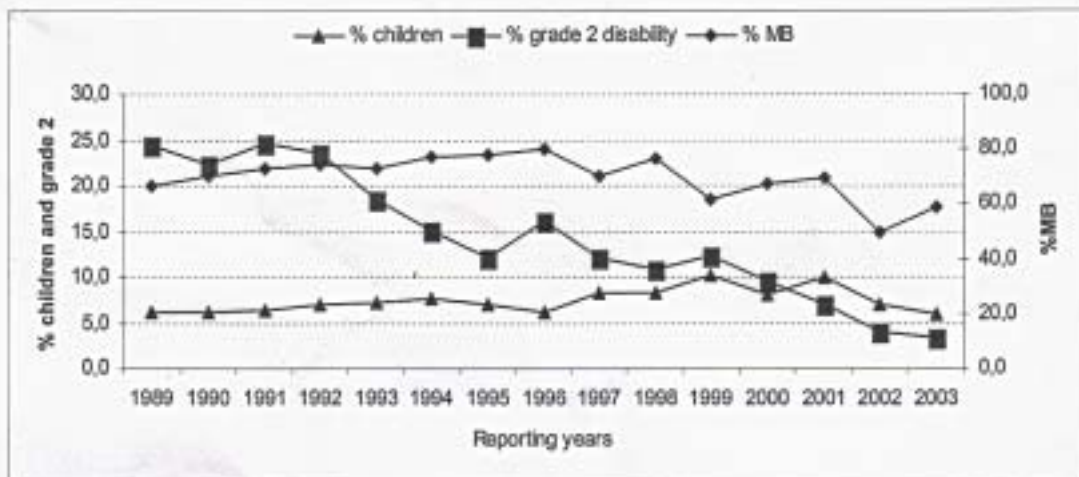


Figure 8: Trends in prevalence and case detection rates in India over a 15-year period

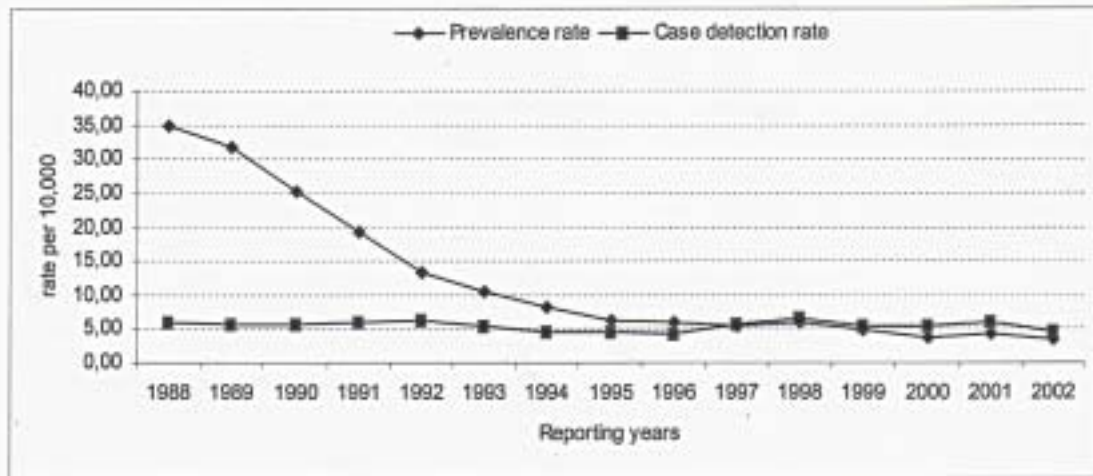


Figure 9: 15-year trends in the proportion of children, patients with grade 2 disability and MB patients among new cases in India

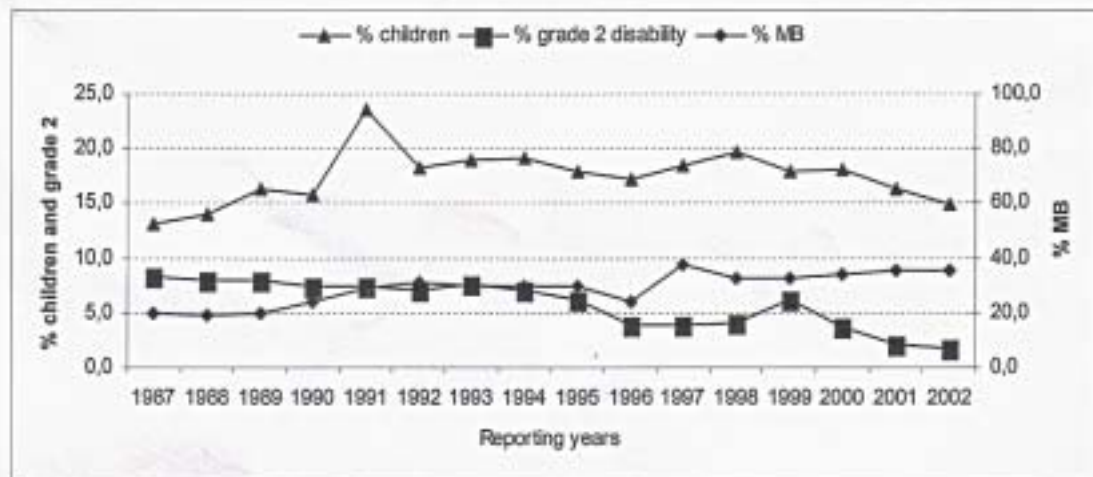
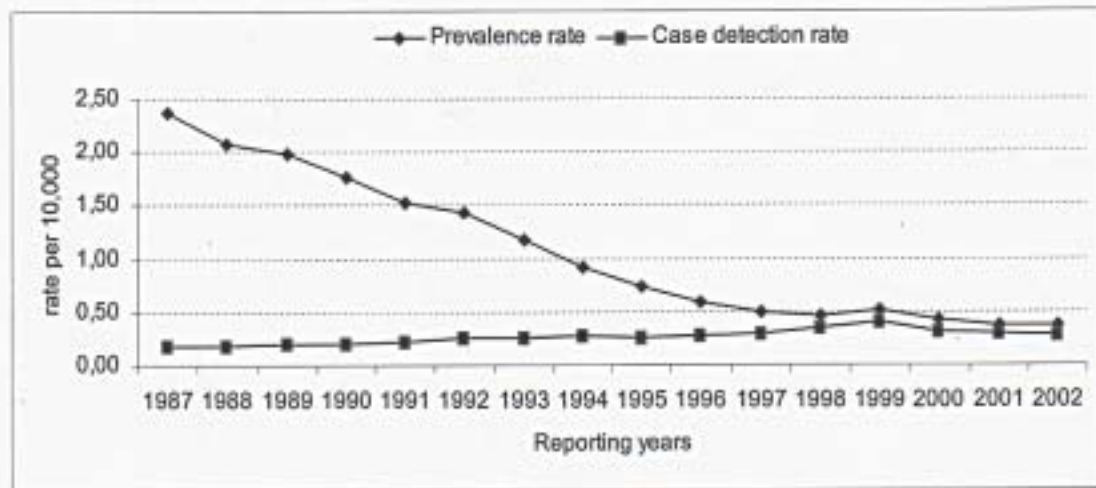


Figure 10: Trends in prevalence and case detection rates in the 'world minus India' over a 15-year period



Conclusions

1. Prevalence rates of patients registered for treatment are not useful to assess the current leprosy situation in an endemic area.
2. Trends in case detection rates will reflect the underlying incidence in most situations. This is therefore the key indicator for epidemiological analysis.
3. Trends %children and %G2 among new cases give key information on recent transmission and delay in case detection. They should be analysed alongside trends in CDRs.

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COMMUNITY UTILISATION OF SUBCENTRES IN PRIMARY HEALTH CARE – AN ANALYSIS OF DETERMINANTS IN KERALA

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Summary

The determinants of utilisation of subcentre services in a random sample of 247 subcentres from three out of 14 districts of Kerala were investigated. Physical verification of the facilities was done in a subset of 90 subcentres and household surveys of 750 households were performed in the service areas of those subcentres. About 30 per cent of the beneficiaries utilised services of the subcentres during the reference period. The relationship of selected predictor variables on utilisation of the services was found out. The district in which a subcentre was physically present was found to be the most important correlate of its utilisation.

Introduction

Kerala state, located along the south western coast of India, is reportedly an example of its 'good health achievements at low cost' and health indices of Kerala state are approximately those of the established market economies¹. In addition to facilitating factors like high female literacy, an effective public distribution system and land reforms; the well-organised primary health care delivery system are also considered to play a key role in attaining these health achievements in Kerala. Nonetheless, considerable heterogeneity in the utilisation of subcentres have been noted within the state. Lack of facilities, vacant posts, worker absenteeism and poor supervision have been thought to be responsible for the poor utilisation of some subcentres. The Objective of the present study was to evaluate the impact of local subcentre factors on this utilisation of these institutions by the community. Specifically, the study investigated the relative contributions of subcentre infrastructure, available medical facilities, staffing pattern, job vacancies, supervisory pattern of the workers, and the geographic location of the subcentre to the community utilisation of subcentres.

Materials & Methods

Primary Health Centres and subcentres from 3 out of 14 districts of the state were chosen for the study. The districts selected were Palakkad from north, Kollam from south and the capital district of Thiruvananthapuram. Out of 247 primary health centres (PHCs) in the three districts, 44 were randomly selected using stratified multistage sampling technique. All the 274 subcentres under their administrative jurisdiction, 94 each in Palakkad and Thiruvananthapuram and 86 in Kollam, were included in the study. A subset of 90 subcentres was randomly selected for detailed evaluation including household survey.

One of the investigators visited all the selected subcentres during months of December 1997 to February 1998. The 'log books' and other documents maintained at the subcentres, field tour diaries of the multipurpose health workers and other available records were carefully scrutinised. Using a checklist of 20 basic medical facilities considered essential for proper functioning of the subcentre. The field investigator evaluated medical facilities available at each subcentre.

A schedule for household survey was prepared, in consultation with public health experts, epidemiologists and district administrators and pretested before the survey.

Multipurpose workers designated their fieldwork area into twenty *day-blocks*, each block of 50-60 households to be covered in a day's work. One day-block was randomly selected from each of the 90 subcentres in the study sample and household survey of beneficiaries was conducted in these day-block areas using "cluster sampling method" as used in the immunisation coverage studies².

A 'potential beneficiary' was defined as any member who qualified for coverage by any of the national health programmes administered through the subcentre. Information about potential beneficiaries in each of the selected national health programmes (included in the multipurpose health workers scheme) was collected from the participant households. The details of beneficiaries who actually received any service, during a reference period of three months preceding the survey, were documented. The reference periods for immunisation and family welfare services were six months and five years, respectively, this was because a shorter reference period was considered to be inadequate in these cases. A total of 750 households (263 from Palakkad, 244 from Thiruvananthapuram and 243 from Kollam) were surveyed.

Focus group discussions with multipurpose health workers, middle level supervisors, district officials, local administrators and state officers were also conducted. Some of the district and state officers were personally interviewed.

The community utilisation of subcentres was ascertained by determining the proportion of potential beneficiaries who actually received services from the subcentres during the reference period, i.e., the ratio between potential beneficiaries actually served and the number of potential beneficiaries identified. The number of potential beneficiaries served included all those who received any of the services including motivational advices

(such as, contraceptive acceptance) from the multipurpose health workers. This outcome variables were calculated for each of the 90 chosen subcentres.

Several variables which can potentially affect the utilisation of subcentres viz., the subcentre infrastructure (defined by the presence or absence of its own building), subcentre technical facilities (defined as the proportion of 20 basic facilities available on site), the staffing pattern (male versus female MPWs) and staff vacancies (proportion of posts filled), patterns of supervision (by the middle level supervisors and the medical officers), local residence of the JPHN (at the subcentre premises or away from it) and the district of location (Palakkad, Thiruvananthapuram or Kollam) of the subcentres were evaluated.

Multivariable linear regression analysis was done to assess the simultaneous and independent association of utilisation of subcentres with each of the predictor variables already defined.

Results

It is evident from Table 1 that only half of the subcentres evaluated had buildings of their own. Half of the subcentres in the sample had both the multipurpose workers. Majority of the JPHNs did not reside at the subcentre premises. Multipurpose workers of most of the subcentres were supervised by middle level officials.

Table 1: Characteristics of the study sample

Variable	Subcentres (n=90) Yes (%)
Subcentres building	49 (54.4)
Two MPWs in position	51 (56.7)
Both workers are females	84 (93.3)
JPHNs staying in subcentres	28 (31.1)
Supervision by middle level supervisors	81 (90.0)
Supervision by medical officers	53 (58.9)

Utilisation of subcentres: Only about 30 percent of potential beneficiaries (5.6% to 63.0%) utilised the

subcentres during the reference period. When immunisation services were considered alone, about 90% (range 80-90%) of potential beneficiaries were served by the subcentres.

The focus group discussions also endorsed the view that the subcentres were not being fully utilised by the communities. They stressed on the need for re-defining job functions of the multipurpose health workers. They also emphasized changing pattern of community health needs in the wake of the demographic and epidemiologic transitions in Kerala³.

Multivariate analyses: Several multivariable models were constructed to evaluate the impact of selected predictor variables on the outcome of interest, viz., the performance of subcentres. Models incorporating all variables affecting different aspects of subcentre function simultaneously, stepwise forward and stepwise backward elimination models were considered.

Table 2: Determinants of subcentre utilisation in the districts of Palakkad, Thiruvananthapuram and Kollam (Multivariate Regression)

Variable	Beta (SE)	p Value
Constant	34.97 (2.17)	
Thiruvananthapuram district	-6.51 (3.07)	0.0371
Kollam district	-7.22 (3.07)	0.0210

All the mathematical models studied yielded consistent results. These results suggest that the district in which a subcentre was physically located was the most important correlate of its utilisation. The negative signs of the regression coefficients for Kollam and Thiruvananthapuram districts suggest that subcentres in these districts were less utilised in comparison to those in Palakkad district (Table 2).

In absolute terms, 35% of potential beneficiaries utilised subcentres in Palakkad compared to 27.8% and 28.5% in Kollam and Thiruvananthapuram,

respectively ($p < 0.04$). Once the district variable was entered into the multivariable models, none of the remaining predictor variables were associated with utilisation of subcentres. The study evaluated several interaction term incorporating the district variable and other predictor variables (like the presence of a building or the stay of JPHN, which are generally thought to be of importance in the utilisation of subcentres) in order to investigate if systematic interdistrict variations in one of the predictor variables could explain the findings. None of the interaction terms were statistically significant: e.g. presence or absence of own buildings for the subcentres to function in ($p = 0.08$), proportion of multipurpose health workers positions filled ($p = 0.87$), staffing pattern ($p = 0.61$), supervision by the medical officers ($p = 0.77$), JPHN residence at the subcentre premises ($p = 0.19$), technical facilities available at the subcentres ($p = 0.17$), staffing pattern (one female and one male worker, ($p = 0.89$); and both female workers, ($p = 0.61$).

Discussion

Subcentres in India are generally believed to be under-utilised because they are ill-equipped, understaffed and inappropriately supervised⁴. Two important findings emerged from this study. Firstly, subcentres were utilised by only about a third of the potential beneficiaries. Secondly, the most important correlate of utilisation of subcentres was the district in which they were physically located. It was found that local factors at the subcentre level were not the principal determinants of utilisation of these grass root level institutions.

The under-utilisation of subcentres in Kerala should not in itself be surprising. It may sound paradoxical in a state with high health achievements and a wellknit primary care system⁵. The fact that higher levels of primary health care provision (like the primary health centres and Community Health Centres) are more accessible in terms of connectivity and are more attractive in service provision (as they have doctors and paramedical personnel) may be important in the under utilisation of subcentres by the community. Moreover, majority of the subcentres are located at the periphery of their service areas, very often in difficult to reach locations. Several factors may contribute to this observation. The high education level of the

community in Kerala has been reported to be associated with a high degree of self referral to specialist care⁵. This practice of self-referral is further facilitated by the ready access to higher levels of medical care (private and government run hospitals and private clinics) through out the state. Furthermore, Kerala is presently undergoing an epidemiologic transition with an increasing burden of chronic diseases⁶. Subcentres in Kerala are not specifically geared to deal with the burden of chronic diseases.

The greater utilisation of subcentres in Palakkad district also may be attributable to several factors: Palakkad is the most economically backward district of the three studied. The socio-economic backwardness of Palakkad necessitates maximum utilisation of whatever health care resources that are available. The community in Palakkad also has limited access to the higher levels of governmental health care facilities (the secondary and tertiary levels). Moreover, in contrast to the other two districts, the private health care delivery sector in Palakkad is relatively underdeveloped.

The underutilisation of subcentres, in all three districts evaluated, raises important questions for health systems research. The study emphasises that, attempts to improve infrastructure or staffing patterns only may not necessarily translate into an increased utilisation by the community, unless such efforts are coupled with a better understanding of the determinants of utilisation of subcentres at a district level. Perhaps the frame work of subcentre functions should be district-specific, i.e., tailored to meet specific health needs of a given district.

The large sample of subcentres evaluated and the ascertainment of both the outcome and predictor by a single field observer were the strengths of the present investigation. However, since only three of 14 districts were evaluated and only one day block out of twenty for every subcentre was sampled for household surveys, the study did not reveal the acceptance of the services by the entire community within the catchment area of the subcentre.

In a large random sample of subcentres in Kerala state, the study noted a generally low utilisation of these institutions by the community. Additionally, the district of location of the subcentres was identified as the principal correlate

of their utilisation. This study emphasises the importance of further research to identify the factors affecting the utilisation of subcentres at the district level.

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STATUS OF MATERNAL AND NEW BORN CARE AT FIRST REFERRAL UNITS IN THE STATE OF WEST BENGAL

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Summary

A study was conducted in 12 First Referral Units (FRUs), selected through multistage sampling, from 6 districts of West Bengal. Infrastructure facilities, record keeping, referral system and MCH indicators related to newborn care were documented. Data was collected by review of records, interview and observation using a pre-designed proforma.

Inadequate infrastructure facilities (e.g. no sanctioned posts of specialists, no blood bank at rural hospitals declared as First Referral Units etc.); poor utilization of equipment like neonatal resuscitation sets, radiant warmer etc, lack of training of the service providers were evident. Records/registers were available but incomplete. Referral system was found to be almost non-existent. Most of the deliveries (86.1%) were normal delivery. Deliveries (87.7%) and immediate neonatal resuscitation (94.9%) were done mostly by nursing personnel. Institution based maternal, perinatal and early neonatal mortality rates were found to be 5.6, 62.4 and 25.2 per 1000 live births respectively. Eclampsia (48.9%), hemorrhage (17.7%), puerperal sepsis (7.1%) were reported to be major causes of maternal mortality. Common causes of early neonatal mortality were birth asphyxia (54.3%), sepsis (14.6%) and prematurity/LBW (12.4%).

Key words: First Referral Units, New born care, Neonatal, Perinatal, Mortality.

Introduction

During last few decades, infant mortality has declined steadily, but less so in neonatal and perinatal deaths^{1, 2}. The neonatal period still contributes to more than 50% of infant mortality and morbidity.³ The leading causes of neonatal and perinatal deaths like Low Birth Weight (LBW), birth injuries, birth asphyxia, hypothermia and neonatal infections are largely preventable^{4, 5, 6}. Simple, affordable and effective measures like promotion of institutional deliveries; essential maternal and newborn care; early detection and appropriate management of obstetric emergencies and those of sick newborns can reduce such deaths to a large extent.

First Referral Units (FRUs) are sub-district hospitals (SDH), Rural Hospitals (RH) and Community Health Centers, sufficiently equipped with logistics and trained manpower and are

earmarked for emergency obstetric care and the care of sick newborns. Established at strategic locations within the health care delivery system, these centers cater the referral needs of the Block PHCs / PHCs as envisaged in the National Child Survival and Safe Motherhood (CSSM) and Reproductive and Child Health (RCH) programmes. It is expected that proper functioning of the FRUs, adequately supported by well formulated referral system, will contribute positively to bring down maternal and infant deaths, neonatal and perinatal mortality rates in particular.

Thus, the present study was undertaken in selected FRUs of West Bengal during the period of October 1997 to April 1998 to identify infrastructural facilities available at these FRUs for providing maternal and newborn care, record keeping and referral system and also to ascertain the relevant MCH indicators in the FRUs.

Materials and Methods

Multistage sampling procedure was followed to select 12 FRUs located at six different districts of West Bengal. At the first stage, two districts were chosen from each of the three administrative divisions of West Bengal (viz. Presidency, Bardhaman and Jalpaiguri), by simple random sampling technique. From each of the six districts thus selected, two FRUs were selected by simple random sampling technique at the next stage.

All the selected FRUs were visited by team of investigators comprising of 3-4 trained faculty members of the department of Community Medicine of different Medical Colleges of Kolkata. The data was collected by review of records, physical verification, interview of head(s) of the institutions and observing the services using a pre-designed proforma and checklists.

Physical facilities, neonatal resuscitation sets and radiant warmers, health manpower and their training status etc were assessed. Quality and completeness of record keeping were assessed by analysis of relevant records available. Referral system was assessed by review of referral records and interview with the head of the institutions. Performance in relation was assessed by analysis of records and registers for last one year and relevant MCH indicators were computed. Similarly in-depth analysis of labour room register was done for last seven days to assess availability and involvement of different categories of hospital personnel in intranatal and newborn care.

Results

Infrastructural facilities:

Profile of the FRUs: Total 12 FRUs were studied. Six were Sub Divisional Hospitals (SDH) and others were Rural Hospitals (RH). Bed strength of Rural Hospitals and SD hospitals varied between 25-50 and 125-250 respectively. In some of the FRUs, average daily inpatient load was more than sanctioned beds. In two FRUs more than 20% of the existing beds were lying vacant. All labour rooms had tap water supply. All the FRUs except one, had their own ambulance or arrangement for transport of emergency patients. None of the six Rural Hospitals had blood bank. SD hospitals had blood bank, but 50% of those blood banks were functioning upto 4 P.M. or 5 P.M only.

Health manpower and training status: None of the studied Rural hospitals had sanctioned post of specialists like Paediatricians, Anaesthetists & Gynaecologists. But SD hospitals had specialists. General Duty Medical Officers with post graduate qualification were also utilized locally to provide specialist services.

Regarding CSSM training status, only 7 (58.3%) of the superintendents and 9 out of 27 (33.3%) specialists (Paediatrician / Gynaecologist / Anaesthetist) working in those FRUs, had CSSM training. Only 25.9% of those specialists had undergone integrated skill oriented training for essential newborn care and management of

Table-1: Annual status of different MCH indicators in the sample FRUs

Sample FRUs	No & percentage of mothers delivered by				Live births	Still births
	Normal delivery	Forceps	Caesarean section	Total		
Rural Hospitals	5077 (98.75)	62 (1.21)	2 (0.04)	5141	5039	91
Sub-Divisional Hospitals	17356 (82.9)	687 (3.4)	2878 (13.7)	20921	20167	917
Total	22433 (86.1)	749 (2.9)	2880 (11.0)	26062	25206	1008

Figures in parentheses indicate percentages

diarrhoea and ARI in children. Only 2 of the 421 indoor nursing personnel had undergone CSSM training.

Availability and utilization of equipments for neonatal resuscitation and management of sick neonates: Equipment kits (E-P) had been provided to most of the FRUs as one time assistance⁷ under CSSM programme, but the supplied equipment were not being utilized in majority of these facilities. Though neonatal resuscitation sets (kit-N of FRU kits, which mainly contains catheter suction rubber; endotracheal tube; stillete for endotracheal tube; infant laryngoscope; mask with ventilatory bag; battery with dry cell and resuscitator etc.) were supplied to 10 FRUs, only 40% of these hospitals were using those set. Again, out of 10 FRUs with radiant warmers, only 50% were able to utilize open care resuscitation system with radiant warmers to manage low birth weight, hypothermic, or asphyxiated babies.

Record keeping and referral system:

Only two FRUs (both SD hospitals) maintained referral records for out-going referrals only. None of the superintendents was found to be aware of the circular issued by the Department of Health &

Family Welfare, Govt. of West Bengal, mentioning the catchment area or draining PHC/BPHC for their FRUs.

On an average, only 5-10% of the total obstetric cases attending those FRUs were actually referred cases from peripheral units. All the superintendents informed that majority of those referred cases carried no referral notes. Usually referred cases were accorded priority attention. But system of providing feedback information to referring units was non-existent. Linkage development with peripheral institutions were not given due attention.

Labour room registers were available and updated in all the centres. However, birth weights were not recorded in some cases. Death registers were also available and updated, but causes of deaths were not mentioned in some cases. Investigators faced great difficulties in identifying maternal deaths as pregnancy status of the deceased women were not recorded routinely. Line listing of all maternal and neonatal deaths was not available in any of the FRUs.

Relevant MCH indicators:

Deliveries and births: In last one year, total 26,062 pregnant mothers delivered in these

Table-2: Health personnel involved in intranatal and newborn care in the sample FRUs during last seven days

Type of Hospital	Personnel involved	Deliveries				Resuscitation
		Normal	Forceps	C.S.	Total	
Rural Hospitals	Nurses	111	0	0	111	1
	GDMO	0	0	0	0	0
	Obstetrician	0	0	0	0	0
	Paediatrician	0	0	0	0	0
Sub-Divisional Hospitals	Nurses	423	3	0	426	36
	GDMO	6	1	14	21	2
	Obstetrician	0	8	46	54	0
	Paediatrician	0	0	0	0	0
Total		540	12	60	612	39

Note: GDMO= General Duty Medical Officer, C.S. = Caesarean Section

hospitals. 86.1% were delivered normally, 2.9% had forceps delivery and 11% were delivered by caesarian section. More than 80% of the deliveries were conducted at the six SD hospitals.

Table 1 showed that caesarian deliveries were not being performed except very rarely at the Rural Hospitals. Out of 26,214 total births (live births and still births), birth weights were recorded in 95.6% newborns. Incidence of low birth weight (< 2.5 kg at birth) was found to be 36.3%.

Personnel involved in intranatal and newborn care: Table-2 aptly illustrated nurses' roll as an important determinant for the availability of

as revealed from the registers. MCH indicators were observed to be higher for the SD hospitals as compared to the rural hospitals. Overall early neonatal mortality rate in the studied FRUs was found to be 25.2/1000 live births and perinatal mortality rate was as high as 62.4/1000 live births (Table-3).

Birth asphyxia was the leading cause of early neonatal mortality contributing to 54.3% of the total early neonatal deaths during last one year. Other important causes recorded in the death registers were sepsis (14.6%), pre-maturity/LBW (12.4%) and ARI (8.1%). In 5% of the early neonatal deaths, cause of death was not recorded in the register.

Table-3: Important MCH indicators in the sample FRUs during the year

Institutions	MMR/1000 LB	Still birth rate 1000 births	Perinatal mortality rate/1000 births	Early neonatal mortality rate/1000 LB
Rural Hospitals	1.4	17.7	25.6	9.1
SubDivisional Hospitals	6.6	43.5	73.3	29.9
All FRUs	5.6	38.4	62.4	25.2

Note: MMR = Maternal Mortality Ratio, LB = Live Births

intranatal and immediate newborn care. Out of 612 deliveries conducted in last 7 days, 87.7% were conducted by nurses.

Again, 94.9% of the 39 neonates requiring resuscitation received the same from nurses conducting deliveries. Neither forceps delivery nor caesarean section took place in rural hospitals during last 7 days. The study also revealed that 23.3% of the total caesarean operations at the Sub Divisional hospitals were conducted by General Duty Medical Officers (GDMO).

Maternal, perinatal and neonatal mortality: 141 maternal deaths were reported, giving an overall maternal mortality ratio of 5.6/1000 live births. Major causes of maternal mortality were found to be Eclampsia (48.9%), Haemorrhage (17.7%), Puerperal sepsis (7.1%) and Septic abortion (4.9%)

Discussion

Proper functioning and adequate infrastructural facilities of FRUs are essential prerequisites to provide effective newborn care and to reduce the neonatal and perinatal mortality rates. But the present study revealed quite unsatisfactory infrastructural status and its functioning. In none of the Rural Hospitals, declared as FRUs, sanctioned post of specialists and blood bank were found. Similar findings were also revealed by a study on availability and use of EmOC in four districts (Purulia, Bankura, Purba & Paschim Medinipur) of West Bengal⁸. In addition to this, training status of the service providers of the FRUs on CSSM & integrated skill oriented training was very poor. This is of special significance, in relation to indoor nursing personnel. None, except 2 of the 421 indoor nursing personnel in the sample FRUs had

undergone CSSM training. But they are mostly involved in intra-natal and immediate new born care including resuscitation. Therefore, formulation & implementation of clear cut guidelines regarding facilities in the establishment, including posting of adequate number of specialists, round the clock supply of blood & blood transfusion services etc. merit urgent attention. This also indicates necessity to train/retrain all the nursing personnel with emphasis on safe delivery and essential newborn care as envisaged in CSSM/RCH.

Despite availability, more than half of the FRUs were not using the kit N & radiant warmer which are very vital equipment for management of asphyxiated, hypothermic & low birth weight babies. Similar observations were made in other studies^{8, 9}. Here again, lack of training and /or trained personnel in those hospitals were reported to be the main reason.

It is needless to mention that complete and accurate records alongwith a well-formulated referral system will facilitate provision and monitoring of appropriate newborn care. But this important aspect probably was found to be most neglected in the studied FRUs. Relevant records and registers were either incomplete or not available. Two-way referral system was almost non-existent. Similar observations were also reported by other studies^{8, 9}. Serious efforts must be made to standardize, maintain, complete and update the relevant records and registers.

In the studied FRUs, most of the deliveries were normal deliveries (86.1%) and overall proportion of caesarean section was only 11%, which was slightly higher than most of the FRUs in North 24 Parganas district (2.4% - 9.6%) as reported by another similar study.⁹ However, caesarean section as proportion of all institutional deliveries taken together was reported to be higher by a recent study⁸ in three districts of West Bengal e.g. Purba Medinipur (16.01%), Paschim Medinipur (15.29%), Purulia (12.55%); but lower in Bankura (7.19%).

Hospital based mortality rates specially MMR, neonatal mortality rate etc. are not good indicators of risk of maternal and neonatal deaths in

developing countries. Still, valuable information could be gained from hospital based studies due to many reasons, specially in countries where this may be the only source of available data¹⁰. High maternal, perinatal and early neonatal mortality ratio/rates were found in the present institution based study. Although it cannot be compared with other population based reports/studies; but indirectly points towards the quality of services rendered by the FRUs. However, the major causes of maternal and early neonatal mortality as revealed from the study corroborates with other available reports and studies⁸.

All pregnant women are at risk of complications. About 15% of pregnant women experience serious complications during pregnancy or at the time of deliveries that require hospitalization and medical or surgical interventions¹¹. A FRU is expected to cater a population of 3-5 lakhs. At the average national birth rate of 29.2 per 1000 population, 8800 to 15000 live births are expected in a population of 3 or 5 lakhs respectively. Thus 1300 to 2200 women (15%) with obstetric complication should be seen in a FRU, presuming all cases come to FRU for treatment¹². But it was observed from Table 1 that the numbers were substantially less than estimated. This might indicate that women in need of emergency services are probably not receiving adequate medical care at the appropriate institutions and deliveries are being conducted under conditions of high risk of maternal and perinatal mortality (unless treated in private hospitals or district hospitals, if such facilities are available in the area). This was more marked in Rural Hospitals where there were no sanctioned posts of specialists, blood banks were not available and facilities for caesarean section were almost non-existent though all the studied rural hospitals were declared as FRUs.

Instead of stockpiling of supply & equipments only, quality assurance of several aspects of services at FRUs and development of support and linkage with peripheral health institutions etc. are the essential pre-requisites to ensure capacity building of the Institution.

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SERO SURVEILLANCE OF LEPTOSPIROSIS AMONG SEWER WORKERS IN PUNE

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Summary

Leptospirosis is an important occupational disease affecting people coming in contact with animals and their discharges. The occurrence of infection in ones workplaces is linked to the environment to which the worker is exposed and the adaptability of the organism in that working environment. Rodents usually abound in underground sewers and are carriers of leptospira. The urine of rodents and other animals present in that area is likely to contaminate these sewers. Leptospira are excreted in the urine of infected animals. Thus sewer workers are at a potential risk of leptospirosis. The prevalence of leptospirosis in these workers could thus indirectly predict the presence of the disease in animals in a particular geographical niche. Total seventy-eight sewer workers from 5 different municipal wards in Pune were examined to find out the evidence of past infection with leptospira using microagglutination test (MAT). The prevalence rate was found to be 16.6%. The serovars to which antibodies were detected include autumnalis (38.4%), pyrogenes (23.0%), canicola (15.3%) and pomona (15.3%). Evidence of leptospiral infection was found to be maximum in sewer workers in the areas of the city that were infested with rodents and stray animals.

Introduction

Leptospirosis is considered both as an occupational disease and a zoonosis. Individuals at risk include farmers, abattoir workers, sewer workers and miners^{1, 2, 3}. The sewer workers, due to the nature of their activities are routinely exposed to drains and sewers. The urine of rodents and other animals is likely to contaminate these sewers and create a natural environmental niche for leptospira. Consequently, the sewer workers are at high risk of acquiring leptospirosis. A sero surveillance study was carried out to assess the rates of past infection with leptospira amongst the sewer workers employed by the Pune Municipal Corporation.

Materials and Methods

The present study was conducted in five wards of the Pune Municipal Corporation. 5 ml. of blood samples were collected from 78 apparently healthy sewer workers working in these five wards. A detailed history of any major illness over the last

six months was recorded and clinical examinations were done. Sera were separated and stored at - 4° C. Samples were also obtained from 30 age and sex matched healthy individuals working in the offices. Informed consent was taken from subjects and controls.

Microagglutination Test (MAT) was carried out on all the samples using a battery of twelve antigens derived from pathogenic serovars namely *Leptospira interrogans* (*L.interrogans*) serovars australis, autumnalis, ballum, canicola, copenhageni, grippotyphosa, hardjo, javanica, pomona, pyrogenes and tarassovi. Patoc-I strain of *Leptospira biflexa* (*L.biflexa*) serovar patoc was also included in the test. This saprophytic strain behaves as a genus specific antigen and detects antibodies against most pathogenic serovars⁴. All strains were maintained in Ellinghausen-McCullough-Johnson-Harris (EMJH) medium. MAT was carried out as per the standard protocol⁵ with titers from 25 onwards. In situations where multiple serovars reacted with serum samples, the one that reacted

most strongly was considered as the infecting serovar. Titers more than or equal to 100 were considered as indicative of past exposure as per established criterion³. The battery of serovars used was obtained from the WHO-FAO leptospirosis reference centre, Brisbane, Australia.

Results

Out of the 78 sewer workers, 13 (16.6 %) demonstrated antibodies to leptospiral antigens at or above the significant titer and all had significant titers to serovar patoc. Six out of these 13 (46.1%) were in the age group 31-35 years. In addition, 3 sewer workers had a titer of 50 and 1 had a titer of 25. None of controls were seropositive. Out of the 5 municipal wards studied, maximum prevalence of seropositive workers was found in the ward lying in the western region of Pune (Table 1).

Table 1: Regional distribution of the positive samples of at or above significant titer

Region of the city	Number of samples	Number positive (%)
Western Pune	10	4 (40)
Eastern Pune	15	4 (26.6)
Central Pune	19	3 (15.7)
Southern Pune	21	2 (9.5)
North-Central Pune	13	0 (0.0)
Total	78	13 (16.6)

Amongst the various serovars, infection with autumnalis was found to be most frequent (38.4%). Other serovars responsible for infection included pyrogenes, canicola and pomona (Table 2).

Table 2: Prevalent serovars among samples positive at or above significant titer

Serovar	Number positive (%)
L.interrogans var autumnalis	5 (38.4)
L.interrogans var pyrogenes	3 (23.0)
L.interrogans var canicola	2 (15.3)
L.interrogans var pomona	2 (15.3)
L.biflexa var patoc only	1 (7.6)

One sample was reactive with serovar patoc but not with any of the pathogenic serovar antigens-used in the present study. None of the sewer workers included in the study had any acute illness at the time of study. Three workers had a history of fever in the preceding one month.

Discussion

Leptospirosis is one of the most common zoonosis in the world. However, little data is available regarding epidemiology of the disease, even in those individuals who are at risk of acquiring the disease. These individuals include farmers, abattoir workers and sewer workers. They have frequent exposure to animals. Sewer workers often work under unhygienic conditions and are likely to be infected due to their frequent contact with contaminated urine in drains. Abrasions are common in body extremities, which are likely during entry into or exist from the drains. These abrasions serve as a portal of entry for leptospira.

The seroprevalence of leptospirosis in our study was 16.6%. In addition, 4 (5.1%) sewer workers had antibody titer lower than 100. The low antibody titers may be due to the presence of cross reactive antibodies or due to infection in distant past. This prevalence indicates that environmental niches of leptospira are present in Pune. Varying degrees of seroprevalence has been reported in literature. In sewer workers in Sri Lanka, a seroprevalence rate of 16% was found⁶. Another study on sewer workers from Chennai reported a higher seroprevalence of 30.5%⁷. Other occupations associated with animals have also demonstrated seroprevalence against leptospira. A study conducted in Vietnam found a seroprevalence rate of 18.8% in the rice growing areas of the country⁸. In a study carried out by Everard et al⁹, the seroprevalence rates were 7% in meat processors, 33% in rice field workers and 45% in sugarcane farmers.

In this study, majority of workers, seropositive for leptospirosis, belonged to age group 31-35 years. Highest seroprevalence rate was found in western part of Pune. This area of the city is rapidly developing, which led to the problems of rapid urbanisation. Stray animals like cattle, dogs and pigs are present in large numbers. Urine of these potential reservoirs of leptospirosis frequently contaminate the drains of this area. Seroprevalence against serovar pomona, which commonly infects pigs³, was found only in this ward. Rate of

seroprevalence was also high among sewer workers from Eastern Pune where a wholesale grain market is located. This area is infested with rodents.

Seroprevalence against serovar autumnalis was found to be most common. This serovar is predominant in many parts of India such as Tamil Nadu¹⁰. We have earlier documented serovar autumnalis as the most common cause of leptospirosis amongst febrile patients in Pune¹¹. Seroprevalence against serovars grippityphosa and australis which are common in endemic areas like Andaman Islands^{12, 13} was not found in our study. The geographical variation in the distribution of serovars is related with the predominance of animal reservoirs. One sample in this study had significant antibody titer against the serovar patoc but not against any pathogenic serovars. It is possible that serovars other than those included in our battery of antigens are also prevalent in this region.

Reports of leptospirosis from Maharashtra are infrequent and a detailed seroepidemiological study needs to be carried out. Data regarding the seroprevalence of the disease in various occupational groups will help to identify the individuals at risk. Prevalence of antibodies in an occupational group is an indication of existence of infection in that community. Awareness about this disease will lead to better working conditions and use of prophylactic clothing and equipments such as boots and gloves by individuals belonging to selected occupations. Use of a safe and effective vaccine can also be considered for individuals at risk. It is also essential to carry out large-scale epidemiological study to assess the seroprevalence and baseline titers in the general population.

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A STUDY ON ARSENICAL DERMATOSIS IN RURAL COMMUNITY OF WEST BENGAL

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Summary

The spatial distribution of chronic arsenicosis due to consumption of arsenic contaminated tube well water in different districts of West Bengal was gradually unfolding since 1983. Arsenical dermatosis was found to be the commonest and earliest manifestation of chronic arsenic toxicity. This study was conducted in Baruipur block of South 24 Parganas district of West Bengal. Total 313 people selected from three randomly selected villages with reported arsenic contamination in tube well water and 342 people living three randomly selected villages without such evidence of contamination were examined as control population. 5.97% of exposed population and 2.05% of unexposed population showed melanosis ($p < 0.01$). Moreover, 5.11% of exposed population and 0.88% of unexposed population showed keratosis ($p < 0.01$). The prevalence of dermatosis among exposed population was also seen to have increased with increasing age, from 7.19% in 0-19 year age group to 37.50% in above 40 year group ($p < 0.001$). Prevalence was also found to be more with increase in level of contamination. The prevalence rate of dermatosis among unexposed group was 2.92%. But age adjusted prevalence rate among exposed group was 19.08% at arsenic contamination level of 0.487 ppm. Mean arsenic concentration in nail and hair samples of exposed group was also found higher than the prescribed limit.

Key words : Arsenical dermatosis, chronic arsenicosis.

Introduction

Human being is universally exposed to arsenic that exists in nature, mainly through its presence in food and drinking water. In certain areas high natural arsenic content of drinking water has caused endemic chronic arsenic poisoning¹. Arsenic contamination of ground water and consequent ill health of people consuming the contaminated water has been reported in Taiwan, Antofagasta, Chili, Laquenera, North Mexico, Cordoba province in north of Argentina and many other parts of the World². Chronic arsenicosis was first diagnosed in School of Tropical Medicine, Calcutta in 1983³. Since then, chronic arsenicosis due to consumption of arsenic contaminated tube well water was gradually known in few districts in the southern part of West Bengal. It was estimated that in seven districts of West Bengal, approximately one million people were consuming arsenic contaminated water above

maximum permissible limit and more than 2 lakhs were likely to show arsenic related skin problems⁴. Melanosis in the body was found to be the earliest symptom of chronic arsenic toxicity. Diffuse nodular keratosis on palm and sole is a sign of moderately severe toxicity. Combination of melanosis and spotted palmoplantar keratosis almost points to arsenic toxicity, excluding hundreds of isolated pigmentation and nodular rough skin due to other causes. Detection of arsenic in body tissue, e.g. nail, hair etc. confirms the diagnosis⁴. With this background, the present study was conducted with the objectives

- to find out prevalence rate of arsenical dermatosis among the exposed population,
- to compare the skin manifestations of persons drinking arsenic contaminated drinking water with the same among unexposed group.

Materials and Methods

A cross sectional observational study was carried out for a period of 9 months (from September 1996 to May 1997) in a rural population of Baruipur block of South 24 Parganas district with exposure to arsenic contaminated drinking water and a matched control population of same area without such exposure. Sample size has been estimated to be 300 by the formula $4PQ/L^2$, where confidence interval was 95%, absolute precision 5% and prevalence rate 25%³. Based on the reports available with State Water Investigation Directorate (SWID)⁵ and All India Institute of Hygiene and Public Health, three Gram Panchayats (G.P.s) of Baruipur Block, namely Ramnagar 1, Ramnagar 2 and Dhapdhapi 2, where numbers of tube wells contaminated with arsenic were maximum compared with other G.P.s in the block, were selected as study areas. All the villages of these gram panchayats were stratified as arsenic contaminated villages (arsenic content of tube well water more than maximum permissible limits i.e. 0.05mg/L⁶) and non-contaminated villages (arsenic level ≤ 0.05 mg/L). One village from exposed area and one village from unexposed area from each of the three gram panchayats were first selected by random sampling. Then one subvillage from each of the selected villages was chosen randomly. Thus a total of three sub-villages having exposure to arsenic contaminated tube well water and three such without such exposure were selected. Each village is naturally subdivided into many small localities separated from one another by roads, cultivating lands etc. These are popularly known locally as "para"s. In this study they are termed as sub-villages. A pretested and predesigned proforma covering both household and individual characteristics was used. A house to house visit was done and individuals of the selected households were examined clinically for the skin manifestation. A total of 313 people in the exposed and 342 people in the non-exposed group were examined. The level of arsenic in water source of both exposed and non-exposed sample population was determined spectro-photometrically. Nail and hair sample of one elderly member of every alternate household both in exposed and non-exposed group were analysed for arsenic content to confirm the diagnosis of chronic arsenic poisoning.

Results

Most of the people in exposed and non-exposed areas were engaged in agriculture either directly or indirectly. No pesticide containing arsenical compound were used here. In that block no factories were manufacturing arsenical product. All were Hindu by religion. 64.22% in exposed group and 71.93% in non-exposed group belonged to scheduled caste community. By age, sex, literacy, occupation and economic status, the exposed and unexposed group under study did not differ significantly from each other.

Government of West Bengal has taken initiative to replace contaminated tube well by deep tube well in affected areas in its first phase action plan⁷. As a consequence, many deep tube wells were installed in the study area during the period of 1986 to 1992. At the time of data collection, 73.80% people of affected areas, who were previously exposed to arsenic contaminated water were found to be consuming arsenic free water. Population of three affected sub-villages were exposed to 0.111ppm, 0.3 ppm & 1.05 ppm of arsenic in drinking water respectively. People added to these households by birth or marriage after the installation of safe water source were not exposed at all to arsenic contaminated water.

Table-1: Prevalence of Melanosis and Keratosis among exposed and unexposed population

Study Subjects	Dermatitis*	Melanosis**	Keratosis***
	No (%)	No (%)	No (%)
Exposed population (n=313)	50 (15.97)	30 (9.58)	16 (5.11)
Unexposed population (n=342)	7 (2.05)	7 (2.05)	3 (0.88)

*Z=6.33, P<0.01 **Z=4.11, P<0.01 ***Z=3.23, P<0.01

50 out of 313 exposed population had dermatosis. So overall prevalence of dermatosis was

found to be 15.97% (table-1). Different manifestations of dermatosis included melanosis (9.58%), depigmentation (11.50%) and keratosis (5.11%). These were not mutually exclusive. Prevalence rate of melanosis and keratosis in exposed population (9.58% & 5.11% respectively) was much higher compared with that in unexposed group (2.05% & 0.88% respectively). This difference was found to be statistically significant ($p < 0.01$) (table 1).

Table-2: Age and sex wise distribution of dermatosis among exposed population (n=313)

Personal factors (n)	Dermatosis No (%)
Age (yrs)*	
0-19 (139)	10 (7.19)
20-39 (118)	19 (16.10)
≥ 40 (56)	21 (37.50)
Sex **	
Male (161)	30 (18.63)
Female (152)	20 (13.51)

* $\chi^2 = 18.07$, $df=2$, $p < 0.001$

** $\chi^2 = 1.27$, $df = 1$, $p > 0.05$

Among those suffering from melanosis, 60% had diffuse melanosis, 30% had spotted melanosis and 10% had rain-drop pigmentation. A total of 16 people i.e. 5.11% of exposed population were found to have keratosis (table-1). Thickened palm and sole was present among all of them, 62.56% showed papular keratosis, 37.5% showed nodular keratosis and only one person showed nodule on the skin.

Table 3: Age adjusted prevalence rate of dermatosis

Population group	Level of arsenic exposure (ppm)	Age adjusted prevalence rate (%)
Unexposed (n=342)	≤0.05	2.92
Exposed (n=313)	0.487	19.08

$z=6.62$, $p < 0.01$

Prevalence of dermatosis among exposed group was seen to be increased with advancement of age starting from 7.19% in 0-19 year age group to 37.50% in above 40 year group ($p < 0.001$) (table 2). Youngest person exhibiting dermatosis was 16 years old. Dermatitis was identified in 18.63% of male and 13.15% of female population (table-2). The difference was not significant statistically ($p > 0.05$).

Age adjusted prevalence rates were found to be 2.92% and 19.08% among unexposed & exposed population respectively (table-3).

Table-4: Arsenic concentration in nail and hair in exposed and unexposed population

Biological material	Arsenic concentration (ugm/gm) Mean±S.D	Statistical significance $t_{65}/(p)$
Nail		
exposed group (n=33)	3.91±3.15	5.62 (<0.01)
Unexposed group (n=34)	0.10±0.11	
Hair		
Exposed group (n=33)	2.31±1.22	9.62(<0.01)
Unexposed group (n=34)	0.25±0.31	

Mean arsenic concentration in nail and hair of exposed population was 3.91 ugm/gm and 2.314 ugm/gm respectively, both values were much higher than the prescribed value i.e. 1 ugm/gm (table-4).

Discussion

Baruipur block of South 24 Parganas is a well known area of arsenic contamination in tube well water. During 1986 to 1992 few deep tube wells were installed in the locality. As a result majority of the residents started consuming arsenic free water, though they were previously exposed to it. In the present study prevalence of dermatosis in exposed population was found to be 15.97%. Melanosis was

found in 9.58% of population (table 1). In Tawian, 18.4% of hyper pigmentation was identified among at risk population⁸. In 1987 the prevalence of diffuse melanosis in exposed population in West Bengal was 25.1%³. Another study in West Bengal estimated that 20% of people exposed to arsenic contaminated tube well water were showing arsenical skin lesion⁴. Typical rain-drop pigmentation of the skin in 8.82% was found from among 4171 persons drinking arsenic contaminated water⁹. In the present study prevalence of keratosis in exposed group was 5.11%. Almost similar findings were revealed in another epidemiological survey conducted in the district of South 24 parganas⁹. Prevalence of palmo-planter keratosis in exposed group and non-exposed group were reported to be 3.64% and 0.11% respectively. The larger sample size and wider area of coverage probably made the difference. A study in Taiwan reported that 7.11% of exposed population were suffering from keratosis⁸.

Prevalence of dermatosis was found to be high in elderly age group. It was found that prevalence of chronic arsenicosis increased steadily with age¹⁰. Difference in duration of exposure might be responsible for this findings. In the present study youngest person found to exhibit dermatosis was 16 years old. Other authors found dermatosis even in a 14 months old child and that youngest one with hyperpigmentation was 5 yrs and the youngest with keratosis was 15 years of age^{3,10}. During present study, very few younger people were consuming contaminated water.

Duration of exposure had an influence on prevalence and severity of chronic arsenicosis¹⁰. In the present study duration of exposure, was found to vary among the exposed group. So, it was very much difficult to ascertain actual duration of exposure, since contamination of affected tube wells were difficult to ascertain during different periods, instead of duration only, dose of exposure i.e the level of contamination of tube wells to which people were exposed either currently or in the past was taken into account.

For confirmation of diagnosis, nail & hair were examined. In each case, mean arsenic concentration was found significantly higher compared to that of unexposed group (table 4). Average concentration of arsenic in unexposed group was found to be within prescribed limit. The findings of this study were similar to findings of many other authors^{3,4,11}.

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INJECTION SAFETY AND ITS IMPACT IN INDIA: A LITERATURE ANALYSIS

AMARDEEP THIND

Summary

Unsafe injection practices have been implicated in the worldwide spread of hepatitis B, hepatitis C, HIV or any parasitic disease with a blood phase, such as malaria, filaria and syphilis. Review of injection safety in India also revealed that use of injection is often inappropriate, injections are administered with unreliable safety measures. Studies in India have documented the association of injection use and spread of hepatitis C and kala-azar also. Some measures to address the issue are also discussed.

Introduction

The WHO defines a safe injection as "one that does no harm to the recipient, does not expose the health care worker to any risk and does not result in waste that is dangerous for the community."¹ It is known that unsafe injections can lead to the spread of hepatitis B, hepatitis C, HIV or any parasitic disease with a blood phase, such as malaria, filaria and syphilis².

The aim of this literature review was to summarize evidences of injection use and its safety issues in India. An extensive literature search (including published articles and the Internet) was undertaken for articles containing the keywords India and injection. Total 19 articles with empirical data on injection use and safety were retrieved and reviewed. Drug utilization studies have demonstrated that inappropriate pharmaceutical prescribing habits of injections including unnecessary and inappropriate injections is widespread in India³. It is estimated that globally 5-10 x 10⁹ injections are given per year, more than half being administered in developing countries.⁴ Precise estimations of use rate of injections is difficult. Estimated daily requirement of approximately 25,000 syringes and needles during 1992⁵ is an indirect evidence of its high use.

Tracking prescriptions at two primary health centres in Pondicherry for one year, it was found

that on an average, a prescription included 2.71 drugs and almost half of the patients received injections, mostly vitamin B complex and antibiotics.⁶ Similar results were obtained by examining prescription practices of doctors in Satara district (Maharashtra) also. One study from two large urban Delhi hospitals revealed an extremely low rate of injection use (0-4%).⁷ Comparing prescriptions across a range of health providers, the use of unnecessary drugs in 47% of cases, with injections in a quarter of cases were also reported⁸. Studies report that nearly one third to half of patients attending outpatient clinic receive injections.^{3,9} A study from Vellore reported that (70-90%) of patients seen by RMPs received an injection¹⁰.

Safety of injecting practices

A nurse at rural PHC gives about 1,50,200 injections, for which usually 10 glass syringes and 25 needles were available¹¹. The sterilization equipment were non-functional due to several reasons.

Injection practices of RMPs from vellore provides evidence for unsafe injecting practices¹⁰. In less than 20% of cases steel injecting needles are used, needles and syringes were often re-used by flushing with warm water, but rarely rubbed with alcohol, distilled water for reconstitution, swabbies of injection site with rubbing alcohol.

In 30% cases, disposable needles were flushed and placed back into a disposable needle packet for re-use. In only 7% of cases, RMP were observed to discard a disposable needle after single use¹⁰.

On the other hand, a relatively high rate of use of disposable syringes was reported in a study from North India¹². A study by Pal et.al analyzed 48 different syringe and needle products from 11 manufacturers and found that microorganisms could be isolated in 56% of the samples. It included bacillus micrococcus, staphylococcus epidermidis, serratia, pseudomonas aeruginosa and fungi. All syringes and needles had been certified as sterilized, the specific method was noted only in 40%⁵.

Risks of injection practices

Injection by a glass syringe had significant risk of transmission of hepatitis B in a village in West Bengal¹³. Studies from Gujarat, from Sirsa (Haryana) and Rajahmundry (Andhra Pradesh) have reported that Hepatitis B was linked to unnecessary therapeutic injections^{14,15}. It is not only in rural areas that these unsafe practices exist. Researches have documented that exposure to re-usable needles in a large government hospital was associated with Hepatitis B injection¹⁶.

Kala-azar patients treated locally in Bihar and Delhi had greater chances of contracting blood borne infections^{17,18} due mostly to unsafe sterilization practices and re-use of syringes and needles.

Association between polio and intramuscular injections was more due to injecting a child intramuscularly during a febrile phase rather than unclean syringes and needles per se^{2,19,20}. Study documenting other complications such as abscesses and nerve injuries were rare.

According to WHO, a safe injection is one which is prepared with clean hands in a clean area, medication drawn from a sterile administered with a sterile needle and syringe, which are discarded after use in a puncture proof container for appropriate disposal¹. WHO recommends following steps for safe and appropriate use of injections.

IEC for health workers, incentives against overuse of injections, waste disposal infrastructure,

adequate funds for IEC, training, waste disposal systems and purchase of safe injection equipments are necessary.

Training of practitioners for safe injecting practices will be rewarding.

Ensuring strict quality control during manufacture and distribution of disposable equipment must be encouraged.

There are instances of scavengers collecting used needles and sold them back to vendors, who re-sell these in open market²¹.

Reports of using easily available pressure cookers to sterilize injecting equipments²² or using bleach should be investigated further^{23,24}.

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ASSOCIATION NEWS

Nominations are invited from interested members, for election to the following posts of the Indian Public Health Association for the year 2005-2006.

(A) Office bearers (Association)

1. President (one post)
2. Vice-presidents (four posts) — One from each of the four regions i.e. east, west, north, and south.
3. Secretary General (one post) — To be elected preferably from the place where HQ is situated.
4. Treasurer (one post) — To be elected preferably from the place where HQ is situated.
5. Joint Secretaries (6 posts) — Two Jt. Secretaries will be elected preferably from the place or jurisdiction of HQ secretariat and one from each of the four regions.
6. Central Council members (Ten posts) — Twomembers from the place of HQ secretariat and two each from four regions.

N.B. Regions distribution : East - WB, Sikkim, Assam, Orissa, and all NE states & UTs, West—Gujrat, Maharastra, MP, Chattisgarh, Rajasthan, Goa, Lakshdeep, North—Bihar, Jharkhand, Uttaranchal, UP, Harayana, HP, Chandigarh, Punjab, J&K, South—AP, Kerala, Karnataka, Tamilnadu, Pondichreey, A&N Island.

(B) Office bearers (Editorial board)

1. Editor (one post)
2. Associate editors (two posts)
3. Joint editirs (two posts)
4. Assistant editors (two posts)
5. Managing editor (one post)
6. Asstt. Managing editor (one post)
7. Members of the Editorial board (Ten posts)

N.B. The Managing Editor, Asst. Managing Editor and either the Editor or chief Editor should preferably belong to the place where the HQ is situated to facilitate functioning of IIPH, Chief editor will be elected by the central council that will be ratified in the AGB. All the members of Editorial Board should preferably be from academic and research Institutes or with a background of research and publication in IIPH or any indexed Journal or a Masters degree from recognised university or has carried out research project under the guidance of donor agencies like ICMR, DST, WHO, UNICEF etc.

As per the decision of the Annual General Body meeting held at Nagpur in the year 2003, a non-refundable fee of Rs. 500/-. (Rs. five hundred only) as a demand draft drawn in favour of 'Indian Public Health Association should be enclosed along with each nomination form, otherwise nomination will be considered invalid.

The nomination form and relevant details regarding election of office bearers are available in the Website - <http://WWW.ipha.net> and can be downloaded or may be obtained from HQ secretariate of the IPHA, Kolkata.

Only those nominations forms complete in all respects will be considered. Incomplete froms will be summarily rejected and no correspondence will be entertained, in this regard . Last date for submission of nomination along with the DD is 30th September 2004 by 2.00 P.M.

PROFORMA OF NOMINATION FOR THE ELECTION OF OFFICE BEARERS

We hereby nominate Sri/ Sm./ Dr
(Name in block)

Designation:

Address:
.....

I PHA Membershig Id No

For the post of for the calendar year

In the region (if applicable) Date.....Place.....

Proposed by:

Seconded by:

Name in block

Name in block

IPHA Membership ID:

IPHA Membership ID:

Address:
.....

Address:
.....

Signature

Signature

DatePlace

Date.....Place

I hereby give my consent to contest for the above mentioned post and my bio-data is enclosed herewith.

Full signature of the candidate

Date Place

N.B. Enclose Bio data containing Name, Date of Birth, Qualification, Present position, Professional Experience in years, Total Year of Membership, Duration of membership of IPHA and other organisations, Whether holding any post of office bearers/ Central Council member in the Headquarter Secretariat or in it's branches as office bearers or Executive Body members, Achievements, awards, fellowships and Projects, Publications and other relevant information, if any.

INDIAN JOUURNAL OF PUBLIC HEALTH

Form IV (See Rule 9)

Statement of ownership and other particulars about newspaper (Indian Journal of Public Health)
to be published in the first issue every year after last day of February.

- | | | |
|---|----|---|
| 1. Place of publication | :: | Indian Public Health Association
HQ Secretariate
110, Chittaranjan Avenue,
Calcutta 700 073 |
| 2. Periodicity of the its publication | :: | Quarterly |
| 3. Printer's Name | :: | Prot. (Dr.) Asok Mandal |
| Whether citizen of India? | :: | Yes |
| If foreigner, state the country of origin | | Does not arise |
| Address | | 110, Chittaranjan Avenue
Calcutta 700 073 |
| 4. Publishers's name | :: | Prof. (Dr.) Asok Mandal |
| Whether citizen of India? | :: | Yes |
| If foreigner, State the country of origin | :: | Doses not arise |
| Address | | 110, Chittaranjan Avenue
Calcutta 700 073 |
| 5. Editor's Name | :: | Prof. (Dr.) R. Biswas |
| Whether citizen of India? | :: | Yes |
| If foreigner, state the country of origin | :: | Does not arise |
| Address | | 110, Chittaranjan Avenue
Calcutta 700 073 |
| 6. Name and Address of Individuals
who own the newspaper and partners
or shareholders holding more than
percent of total capital | :: | Indian Public Health Association, a
voluntary non-profit professional public,
health organisation of Public Health
workers in India. |

I, Prof. (Dr.) Asok Mandal, hereby delcare that the particulars given above are true to the best of my knowledge and belief.

D.ated : 31st March, 2004

Sd/- Dr. Asok Mandal

WORLD WATER DAY

(22ND MARCH 2004)

BACKGROUND

The theme of **WORLD WATER DAY**, 22nd March, 2004 was dedicated to **Water in Disasters**. The two lead agencies are the **World Meteorological Organisation (WMO)** and **United Nations International Strategy for Disaster Relief (UN-ISDR)**.

Water is a basic requirement for life and health. Water and health are intimately related. Emergencies and disasters can occur anywhere in the world and affect human health, people's lives and infrastructure etc. Disaster lead to environmental health problems. It poses threat to human health, well being and survival. The effects of disasters lead to disruption of water supply and sanitation facilities, pollution of water sources and spread of disease vectors and agents.

The **World Water Day** provides the opportunity to bring attention to

- The importance of water and sanitation in emergencies and disasters,
- Ensures humanitarian health assistances.

Ensure that the lessons learnt are used to reduce vulnerability related to poor water and sanitation.

All actions planned on **World Water Day, 2004** will work towards raising awareness among general public and towards bringing in positive change in public opinion.

Get the message out by

- Documenting the problems on water in disasters, gaps and priorities, to raise awareness and stimulate action.
- Packaging the messages in droughts, floods, landslides, and tropical cyclones.
- Mobilise others. Approach local partners with an outline of activities for **World Water Day** and for their involvement and support.
- Work with the **Media**. Make sure the message you wish to present to the media is newsworthy.

(Source: Water and Disasters, a practical guide to celebrating among promoting World Water Day, 22nd march 2004. Web site: www.worldwaterday.org & www.who.int)