New, Emerging and Re-emerging Infectious Diseases

Robert J. Kim-Farley*, M.D., M.P.H.

Ingenuity, knowledge and organization alter but cannot cancel humanity's vulnerability to invasion by parasitic forms of life. Infectious disease, which antedated the emergence of humankind, will last as long as humanity itself, and will surely remain, as it has been hitherto, one of the fundamental parameters and determinants of human history.

-- William H. McNeill (1976)

Infectious diseases have been, in the past and continue to remain, a leading cause of morbidity, disability and mortality in the world. Their control is a constant challenge that faces health workers and public health officials in both industrialized and developing countries. Only one infectious disease, smallpox, has been eradicated and stands as a landmark in the history of the control of infectious diseases. The international community is now embarked on the path to eradicate poliomyelitis and dracunculiasis (guinea worm infection) by the close of this century. Other infectious diseases, such as malaria and tuberculosis, have foiled eradication attempts or control efforts and are re-emerging as increasing threats in many countries. Some infectious diseases, such as tetanus, will always be a threat if control measures are not maintained. New infectious diseases, such as acquired immune deficiency syndrome (AIDS), demonstrate the truth of McNeill's statement above that infectious disease "will surely remain, as
it has been hitherto, one of the fundamental parameters and determinants of human history."

New, emerging and re-emerging infectious diseases have become a focus for the attention of public health prevention and control programmes in both industrialized and developing countries. Such infectious diseases have thwarted any expectation that infectious diseases will soon be eliminated as public health problems and resulted in a widening spectrum of diseases, many of which were once thought to be almost conquered.

Multiple factors contribute to emergence of new or re-emergence of previously known diseases (CDC 1994; Lederberg et al 1992; Murphy 1994), including:

- **human demographic change** by which persons begin to live in previously uninhabited remote areas of the world and are exposed to new environmental sources of infectious agents and insects and animals.
- **breakdowns of sanitary and other public health measures** in overcrowded cities and in situations of civil unrest and war.
- **economic development and changes in the use of land**, including deforestation, reforestation, and urbanization.
- **other human behaviours**, such as increased use of child care facilities, sexual and drug use behaviours, and patterns of outdoor recreation.
- **international travel and commerce** that quickly transport people and goods over vast distances.
- **changes in food processing and handling**, including foods prepared from many different individual animals and transported over great distances.
- **evolution of pathogenic infectious agents** by which they may infect new hosts, produce toxins, or adapt by responding to changes in the host immunity.
- **development of resistance of infectious agents**, such as Mycobacterium tuberculosis and Neisseria gonorrhoeae to chemoprophylactic or chemotherapeutic medicines.
- **resistance of the vectors** of vector-borne infectious diseases to pesticides.
- **immunosuppression of persons** due to medical treatments or new diseases that result in infectious diseases caused by agents not usually pathogenic in healthy hosts.
- **deterioration in surveillance systems** for infectious diseases, including laboratory support, to detect new or emerging disease problems at an early stage.
Important examples of emerging infectious disease threats include:

- **Toxic shock syndrome (TSS)** due to the infectious agent of toxin-producing strains of *Staphylococcus aureus* illustrates how a new technology yielding a new product, super-absorbent tampons, can create circumstances favouring the emergence of a new infectious disease threat.

- **Lyme disease** due to the infectious agent, spirochete *Borrelia burgdorferi*, illustrates how changes in the ecology, including reforestation and increasing deer populations, and suburban migration of the population, can result in the emergence of a new microbial threat that has now become the most prevalent vector-borne disease in the United States.

- **Shigellosis, giardiasis,** and **hepatitis A** are examples of emerging diseases that have become threats to staff and children in child care centres as the use of such centres has increased due to changes in the work patterns of societies.

- **Opportunistic infections**, such as pneumocystis pneumonia, caused by *Pneumocystis carinii*, chronic *cryptosporidiosis* caused by *Cryptosporidium* species, and disseminated cytomegalovirus infections illustrate emerging disease threats to the increasing number of persons who are immunosuppressed because of cancer chemotherapy, organ transplantation, or HIV infection.

- **Food-borne infections**, such as diarrhoea, caused by the enterohaemorrhagic strain 0157:H7 of *Escherichia coli* and water-borne infections, such as gastrointestinal disease due to *Cryptosporidium* species are examples of emerging disease threats that have arisen due to such factors as changes in diet, food processing, globalization of the food supply and contamination of municipal water supplies.

- **Hantavirus pulmonary syndrome**, first detected in the United States in 1993, caused by a previously unrecognized hantavirus illustrates how exposure to certain kinds of infected rodents can result in an emerging infectious disease.

- **Emergence of the new toxigenic Vibrio cholerae O139 strain of cholera in Asia** is an example of a new strain of an infectious disease for which there is no protection from prior infection with other strains or with current vaccines and standard diagnostic tests are ineffective.
Antimicrobial drug resistance as a major factor in the emergence and re-emergence of infectious diseases deserves special attention. Although significant reductions in infectious disease mortality have occurred since the introduction of antimicrobials for general use in the 1940s, drug resistance has emerged because of their widespread use. "Drugs that once seemed invincible are losing their effectiveness for a wide range of community-acquired infections, including tuberculosis, gonorrhoea, pneumococcal infections (a leading cause of otitis media, pneumonia, and meningitis), and for hospital-acquired enterococcal and staphylococcal infections. Resistance to antiviral (e.g., amantadine-resistant influenza virus and acyclovir-resistant herpes simplex), antifungal (e.g., azole-resistant Candida species), and antiprotozoal (e.g., metronidazole-resistant Trichomonas vaginalis) drugs is also emerging. Drug-resistant malaria has spread to nearly all areas of the world where malaria occurs. Concern has also arisen over strains of HIV resistant to antiviral drugs. Increased microbial resistance has resulted in prolonged hospitalizations and higher death rates from infections has required much more expensive, and often more toxic, drugs or drug combinations (even for common infections), and has resulted in higher health care costs" (CDC 1994).

An aggressive public health response to these new, emerging and re-emerging infectious disease threats must be made to characterize them better and to mount an effective response for their control. The World Health Organization (WHO 1995) has outlined the following high priority areas: strengthen global surveillance of infectious diseases; establish national and international infrastructures to recognize, report and respond to new disease threats; further develop applied research on diagnosis, epidemiology, and control of emerging infectious diseases; and strengthen the international capacity for infectious disease prevention and control.

Only through worldwide concerted action will the effort to control infectious disease be effective. We have now entered an era where, as Nobel Laureate Dr. Joshua Lederberg has stated, "The microbe that felled one child in a distant continent yesterday can reach yours today and seed a global pandemic tomorrow" (quoted in CDC 1994). As Hans Zinsser stated over 60 years ago:

Infectious disease is one of the few genuine adventures left in the world. The dragons are all dead and the lance grows rusty in the chimney corner...About the only sporting proposition that remains unimpaired by the relentless domestication of a once free-living
human species is the war against those ferocious little fellow creatures, which lurk in the dark corners and stalk us in the bodies of rats, mice and all kinds of domestic animals, which fly and crawl with the insects, and waylay us in our food and drink and even in our love.

(quoted in Murphy 1994)

References


Correlation of Irrigation and Flood Water Management with Malaria in the Thar Desert

B. K. Tyagi* and S. P. Yadav*

Abstract

The Thar desert in north-western India has experienced an unprecedented spate of malaria epidemics since the mid-1980s. The sudden onslaught of Plasmodium falciparum-dominated malaria in the low-immune desert population inflicted unfathomable misery and took an untimely toll of precious human life, leaving behind a trail of epidemics. While, on the one hand, a meteorological theory has been put forth to link the epidemics with the El Nino Southern Oscillation (ENSO) bringing heavy and erratic monsoon, on the other hand, the inundative vectorism theory has also been offered to correlate the onset of the outbreaks of malaria with the sudden and prodigious increase in the vectors' relative densities triggered by the extensive breeding grounds formed by canal irrigation and surplus flood waters in the Thar desert.

Introduction

MALARIA has resurfaced with a vengeance in several parts of the country hitherto known to be either free from the disease or hypoendemic for malaria. (1) The Thar desert in north-western Rajasthan has, until recently, been known as a less malarious area with potential for sporadic outbreaks in the flood-prone southern desert districts in the Luni river basin. (2) However, since 1990, most parts of the Thar desert have experienced unprecedented malaria epidemics which have taken a heavy toll of human lives. (3)

The epidemiology of malaria in the Thar desert suggested that Plasmodium falciparum-dominated malaria, transmitted both by Anopheles stephensi and Anopheles culicifacies, was particularly rampant in the upper reaches of the desert currently under
extensive irrigation by the Indira Gandhi Nahar Pariyojana (IGNP). However, in true desert areas as well as the flood-prone southern districts, P. vivax-dominated malaria was prevalent.\(^4\)

Irrigation Canals and IGNP

Presently, three major canal systems exist in the Thar desert.\(^5\) The Ganga canal (114 km) was the first to come into existence and became fully operational in 1928, with its 1,251 km long distribution system in Sri Ganganagar district. Along with the Bikaner feeder, it provides water to a culturable command area (CCA) of 3,076,922 ha with 65% intensity. The Bhakra-Sirhind canal project, with its 1,219 km long distribution system, was started in 1955 to utilize the CCA of 3,724,692 ha. However, the most important of all these systems is the IGNP, which is also regarded as one of the world’s most gigantic projects of its kind in a desert ecosystem. It started in 1958 but irrigation in part of the area was initiated only in 1961. With an estimated cost of Rs 2,800 crores, the project, when completed, will include a 649 km long main canal (of which 445 km is in the Thar region) and over 9,000 km long distributaries. Although only two of the three stages envisaged in the project have been completed, the main canal, including the feeder and 5,500 km long distributaries, are currently irrigating 0.7 million ha of land (approximately 50% of the total irrigation potential when fully operational). This Herculean task of bringing water from the Himalayas to the Thar desert aims at transforming vast stretches of the western desert terrain into verdure. As a result, with an investment of Rs 1,161 crores to date, the annual agricultural production has crossed the incredible mark of Rs 650 crores. While several irrigation-intensive crop patterns (such as sugarcane, mustard, groundnut) have been established in some of the canalized desert districts, the production of paddy in Sri Ganganagar, the most irrigated among all desert districts, has topped the list in the whole state.

Transformation of the Thar's Physiography

The Great Indian Thar desert lies approximately between 24°-30° latitude North and 68°-78° longitude East. In Rajasthan, it spans over 75,000 sq km area (ca. 62% of the state’s area) and has a population of 12.8 million people (39% of the state population). Originally organized into eleven desert districts, a twelfth district, Hanumangarh, was recently carved out from Sri Ganganagar district but due to non-availability of authentic geographic, demographic and malarial details, it is, for convenience of description, included in its parental district. The eastern flank of the desert is bordered by the Aravalli range of mountains, while the seasonal Luni river divides the landscape into two, viz., in the north a vast stretch of sand dunes or levees and in the south an expansive
bowl rimmed by flat-topped hills of sandstone and limestone.

The Thar desert bears extremes of ambient temperature, often close to 0°C during the brief winter season and near to 50°C during the hot and sultry summer months. The annual average precipitation, which was, until recently, 250 mm, has since 1990 been 350-400 mm.

Extensive canalization and the resultant new irrigational avenues in the desert have clearly demarcated the region into three physiographically distinct zones: the IGNP command area (i.e. irrigated areas including Ganganagar, Bikaner, Jodhpur and Jaisalmer districts), the IGNP non-command area (i.e. areas which are not covered by the project, including Churu, Jhunjhunu, Nagaur and Sikar) and the monsoon flood-prone areas of the non-IGNP area (including Barmer, Pali and Jalore districts) of which Barmer alone is envisaged in the IGNP III stage but has yet to take off. While beach of the IGNP command area and the non-IGNP area constitute about 10-11% of the total Thar desert in Rajasthan, the remaining 79% is still covered by the truly desertic IGNP non-command area.(6)

Several decades' supply of canal water in the desert region has resulted in a rise of the water table, water-holding potential of the soil and plentiful growth of vegetation, particularly hydrophytic weeds. Such extensive breeding grounds are the preferred sites for A. culicifacies, the most serious vector of malaria in the Indian subcontinent.

A mega-project, such as the IGNP, lured labour forces from some of the hyperendemic states in the country. This was perhaps one of the possible means of transportation of the deadly P. falciparum, which is showing signs of developing resistance to chloroquine. Many of these labourers have permanently settled near their work site and provided the vector mosquito with the parasite which was not found in the local population earlier.

Wetland Formation through Canal Water

The IGNP command area is characterized by vast areas perennially inundated with seepage water from the canals. In addition, surplus flood water from the seasonal Ghaggar river, whose flow is more or less parallel to that of the Indira Gandhi Canal, has been let into low-lying "escape" lands where it stagnates over large areas. According to an estimate, 8 600 ha is permanently inundated under the IGNP Stage I by the Ghaggar flood water while 1 000 ha has been converted into marshy land due to waterlogging and excessive seepage from the canal in Stage II.(7)
Introduction of Paddy Cultivation Culture in the Thar Desert

Paddy cultivation is often associated with canal irrigation, and several vector mosquitoes use the stagnant water in the paddy fields for breeding. Rajasthan, being an arid state with meagre means of canal irrigation, is not a major paddy producing area in the country. Paddy cultivation has been initiated recently in the Thar desert and is grown in Sri Ganganagar, Sikar and Bikaner districts. Out of the 0.13 million ha under paddy cultivation in Rajasthan, 0.03 million ha (23%) is only from the Thar in Rajasthan. Of the total output of 0.13 million MT annually from the state, the desert districts contribute more than 0.04 million MT, while the Sri Ganganagar district is the highest paddy producer (0.03 million MT). The productivity level of 2 600 kg/ha of paddy is also the highest in Sri Ganganagar district, which is more than the state average of 1234 kg/ha. This increase is attributed to the availability of canal irrigation. (8)

Vector Density and Distribution

A. stephensi is the historical vector of malaria in the desert, even though it carries the disease at a very low magnitude. (9,10) On the other hand, A. culicifacies, which breeds in a variety of habitats, has increased its distribution more or less parallel to the extent of canalized irrigation. (13,14) In villages where no canalized water was available, the A. culicifacies population was insignificant. (15) Both these species have been identified with the malarial parasite. (16)

The canalized irrigation-intensive crops and stagnant seepage water collections have led to the breeding of many other species along with Anopheles culicifacies (e.g. Anopheles nigerrimus, Anopheles splendidus and Anopheles annularis). The physiographic changes in the desert have been drastic, since even Anopheles d’tali has now been recorded from the IGNP command area in Jaisalmer district. (17)

Till 1955, 16 species were reported from Rajasthan (see Table). (18) Most of these species were restricted to the Udaipur zone in southern Rajasthan, and only seven (43.7%) were recorded from five of the eleven desert districts. (19,20) Three more species have since been added to the list, viz. A. nigerrimus from Sri Ganganagar district, and A. d’tali and A. splendidus from Jaisalmer, raising the total to ten (59%). (21)

<table>
<thead>
<tr>
<th>Species</th>
<th>Districts</th>
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<tbody>
<tr>
<td>A. stephensi</td>
<td></td>
</tr>
<tr>
<td>A. culicifacies</td>
<td></td>
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<tr>
<td>Anopheles nigerrimus</td>
<td>Sri Ganganagar</td>
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<tr>
<td>Anopheles splendidus</td>
<td>Jaisalmer</td>
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<tr>
<td>Anopheles annularis</td>
<td>Jaisalmer</td>
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<tr>
<td>Anopheles d’tali</td>
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Table 1. Distribution of Anopheles species in various districts of Thar desert in Rajasthan
Correlation of Irrigation and Flood Water Management with Malaria in the Thar Desert

<table>
<thead>
<tr>
<th>Species</th>
<th>Sri Ganga-nagar</th>
<th>Bikaner</th>
<th>Churu</th>
<th>Jhunjhunu</th>
<th>Nagaur</th>
<th>Jodhpur</th>
<th>Jaisalmer</th>
<th>Barmer</th>
<th>Pali</th>
<th>Sikar</th>
<th>Jalore</th>
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<tbody>
<tr>
<td>A. stephensi</td>
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<td>+</td>
<td>+</td>
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<tr>
<td>A. culicifacies</td>
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<td>+</td>
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<td>A. subpictus</td>
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<td>+</td>
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<td>A. vagus</td>
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<td>A. annularis</td>
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<td>A. splendidus</td>
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<td>A. nigerimus</td>
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<tr>
<td>A. d’thali</td>
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<tr>
<td>A. barbirostris</td>
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<td>-</td>
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<tr>
<td>A. fluviatilis</td>
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<td>-</td>
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<td>+</td>
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</tbody>
</table>

+ = Present; - = Absent; ? = Not surveyed at all; (??) = Presence to be reverified

Both A. stephensi and A. culicifacies have exhibited increasing tolerance to DDT, the most commonly-used insecticide in the malaria control programme. The first report of resistance of A. culicifacies to DDT and dieldrin was from Pali (1962), followed by Sirohi (1963), Jodhpur (1964), Sri Ganganagar (1967) and Bikaner (1976). For A. stephensi, the first instance of development of resistance to DDT was reported from the non-desert Alwar and Kota districts in eastern Rajasthan. All vector species are susceptible to malathion since its introduction in 1980.\(^{(22)}\)

Malaria Prevalence and Recent Epidemics

Out of the three physiographic zones described earlier, the IGNP command area zone, correlates clearly with the flare-up of P. falciparum in the desert. Five major outbreaks involving markedly high representation of P. falciparum corroborate this hypothesis. Sri Ganganagar district, the first of the desert districts to receive canalized water for irrigation, experienced an outbreak of malaria epidemic in 1983 during which there were 4,925 positive cases (P. falciparum 43.4%), which were manifold higher than in the preceding years. Two primary health centres (PHCs), viz., Sangaria and Pilibanga, which were most severely affected, jointly contributed 72.2% of the total
number of positive cases in the district during the epidemic.

District Barmer bore the brunt of the 1990 epidemic that broke out following unprecedented heavy monsoon rains (ca. 960 mm). A total of 19,322 positives cases (P. falciparum 66%) were recorded, which was 2.5 times higher than the positive cases in the preceding year.(22)

During late 1992 and early 1993, an epidemic broke out simultaneously in several districts, i.e., Bikaner (Baju, Kolayat PHCs), Jodhpur (Baap, Phalodi PHCs) and Jaisalmer (Pokharan, Nachna PHCs). In a survey carried out in two desert villages in the vicinity of the Indira Gandhi canal, viz., Madassar and Awai, in early 1993, the SPR recorded was as high as 85% and P. falciparum incidence was 88%.(23) In Jaisalmer district alone, 2,128 positive cases (P. falciparum 73.6%) were reported during the epidemic period as against a combined total of 1,809 cases (P. falciparum 27.6%) in 1990 and 1991.

In mid-1994, an epidemic of malaria broke out, particularly in Barmer, Jaisalmer and Jodhpur districts, which has so far been the worst in the history of the desert, resulting in 452 deaths in Rajasthan alone. Over 60% of cases were due to P. falciparum which was considered to be the main cause of death during the epidemic. The epidemic of 1995 caused 45 deaths even though it was less virulent. However, after the exceptionally high malarious years of 1975 and 1976 all over the country, this was the first time in Rajasthan when the total number of malaria cases exceeded the 0.25 million mark.

There is very little information available on the development of resistance to chloroquine in P. falciparum in the desert region. Earlier investigations carried out between 1981 and 1984 indicated 100% parasite susceptibility to chloroquine (600 mg base). In 1994, in a small sample of 12 cases studied at both Barmer and Jaisalmer, 100% susceptibility was observed in the latter, while 66.6% susceptibility and 33.3% R level were obtained in the former desert district.(24)

Future of the Thar Desert with reference to Malaria Epidemics

The Thar desert is fast changing under the impact of extensive canal irrigation. Until the mid-1980s it remained a low malarious region and P. falciparum was rare in spite of heavy monsoon rains.(25)

It has been advocated recently that the epidemics in the Thar desert region have been influenced by excessive rains triggered by the El Nino Southern Oscillation (ENSO).(26) This hypothesis does not seem to hold good because: (1) a large area in the desert, which is extensively irrigated and covered with seepage water, has become perennially conducive to copious vector breeding, particularly A. culicifacies, beyond established critical densities,
resulting in increasing number of bites on the human host and thereby increasing possibilities of transmitting the malarial parasite amongst the less immune population, and (2) of the four major epidemics, Barmer district, which is highly monsoon-flood prone and is yet to be covered by the IGNP, experienced the outbreak only thrice in 1990, 1994 and 1995, whereas all the IGNP command area-covered districts had experienced outbreaks between 1993 and 1995.

Apparently, the Thar desert is overwhelmingly vectorized due to the availability of newly-created extensive mosquito breeding habitats for the native A. stephensi and the imported A. culicifacies. There is now adequate evidence to prove that while in the IGNP command areas malaria epidemics are due to the combined effects of A. culicifacies and A. stephensi, in the truly xeric conditions of the Thar, malaria is carried exclusively by A. stephensi. In the flood-prone southern desert districts, malaria is, of course, transmitted mainly by A. culicifacies.

Taking cognizance of the above facts, and that extant environmental degradation sustains the mosquito population by creating mosquito breeding grounds, it appears that malaria epidemics will continue unabated in the Thar desert in the near future.

References


The Role of MCH and EPI in the Three Major Strategies for Neonatal Tetanus (NNT) Elimination – Clean Delivery, TT Immunization and Surveillance

Dr N W Vidyasagara*

Introduction

In 1989, the World Health Assembly adopted a resolution to eliminate neonatal tetanus (NNT) from the world by 1995 (WHA42.32). In pursuance of this objective, WHO has supported countries to actively promote NNT elimination as part of an overall EPI initiative. While tetanus toxoid (TT) is specific for the prevention of tetanus in the neonate as well as tetanus in the mother, clean delivery practices result in an overall reduction of maternal and neonatal morbidity and mortality. NNT is common in developing countries and community-based NNT mortality surveys have shown that NNT mortality rates range from less than 5 to more than 60 per 1000 live births, representing between 23 per cent and 72 per cent of all neonatal deaths. The estimate of yearly deaths worldwide due to NNT is placed at over half a million.

The target date for elimination of NNT set by the World Health Assembly has now lapsed, but NNT still remains a significant problem in many developing countries. This does not mean that progress has been negligible. On the contrary, much has been achieved, but more needs to be done if the goal of universal NNT elimination is to be achieved.

Disease Control Strategies in NNT Elimination

The following are the major strategies available for the prevention of NNT:

* Former Regional Adviser, MCH, WHO Regional Office for South-East Asia, New Delhi
Ensuring clean delivery and proper post-delivery practices

This is a long-term strategy that requires a woman to receive trained assistance at delivery with adherence to correct procedures, be it in a medical institution or at home. Promoting this strategy will ultimately result in the overall development of a service infrastructure for the delivery of MCH services, with the added advantage of preventing other causes of neonatal deaths as well as maternal deaths. A clean delivery being a key strategy for NNT elimination, would need to have the following basic ingredients, namely:

(a) A clean perineum and a clean delivery surface; clean hands of birth attendant; clean cutting and care of the umbilical cord. For purposes of the NNT elimination programme, a clean delivery is defined as a delivery attended by health staff in a medical institution or by a trained birth attendant at home, using the hygienic practices referred to earlier.

(b) The place of routine antenatal care services and the quality of care provided not only monitor the progress of pregnancy and appropriate interventions needed but also provide an ideal opportunity to discuss the place of delivery and who would assist at the delivery. Both these issues are crucial to the provision of a clean delivery and the elimination of NNT and therefore need to be identified, even in situations where formal antenatal clinic services are not available.

Protection of pregnant women by immunization with TT

Antenatal care services, when available, offer the ideal opportunity for pregnant women to be immunized with TT which is also a key strategy in the elimination of NNT. Countries that have a well-developed MCH service infrastructure, which is utilized by pregnant women, would find the routine provision of TT immunization at antenatal clinics as the strategy of their choice. Where the reach of MCH services is inadequate, alternative strategies, such as immunization of women in the reproductive age group, will need to be considered till such time as an adequate MCH service infrastructure is developed. The MCH infrastructure would not only be more cost-effective with a wider range of services but would also help to sustain the programme over time. This is of vital importance since the NNT elimination programme is different from other eradication programmes where even after zero cases are reached, the potential for return of the disease is always present. Implementing an immunization strategy will also require sustaining high immunization coverage of the respective target group, correct administration of TT in keeping with the recommended immunization schedule,
maintaining proper cold-chain practice and reliable sterilization procedures.

**Disease surveillance**

A prerequisite for disease surveillance, which is the third key strategy, is the recognition of NNT from other causes of neonatal convulsions. The standard clinical case definition, recommended by the NNT elimination programme, applies equally well for use by medical and non-medical persons alike, namely, normal suck and cry for the first two days of life; onset of illness between 3 and 28 days of life; inability to suck followed by stiffness and/or convulsions.

Reporting of NNT cases, separate from other tetanus cases, is also an important aspect of disease surveillance.

Other disease surveillance activities include:

- monthly reporting, including zero case reporting - in countries where NNT is known or suspected to persist.
- identification of high-risk areas for priority attention.
- sentinel reporting - where accurate reports are not possible from all reporting facilities.
- NNT case investigation - which helps to recognize deficiencies in the delivery of the programme and to initiate appropriate action, and
- analysing the cause of death for all neonatal deaths, especially in countries that have eliminated NNT.

**The Role of MCH in the Strategies for NNT Elimination**

The health of mothers and children being the primary concern of any MCH service, must also necessarily be the responsibility of managers of MCH programmes. In this context, NNT control strategies that ensure a clean delivery, including proper post-delivery practices, and immunization services that protect children from disease, constitutes an integral part of any MCH programme. In countries with established MCH services, EPI was a means to streamline and expand the available immunization services through better management, improved logistics, use of high quality vaccines, proper cold-chain practice, etc. Therefore, notwithstanding the establishment of new management structures to administer EPI, the provision of clean delivery practices, childhood and maternal immunization, as well as achievement of performance/coverage targets related to these activities should logically be a function of the MCH sector. Disease surveillance, though traditionally and functionally the responsibility of CDC/Epidemiological units, reduction of NNT morbidity and mortality being the
ultimate impact indicator of NNT strategies, must also be of serious
cconcern to MCH managers.

Clean delivery and post delivery
practices

A maternal health service that provides
continuity of care through pregnancy,
delivery and the post-partum period,
affords the best opportunity of ensuring
a clean delivery, hygienic post delivery
practices, as well as immunization
services.

The starting point in the provision of
maternal health care is early
identification and registration of all
pregnant women, with periodic follow
up thereafter.

Services could be delivered through:

(a) the formal health care system -
with provision of antenatal care
and trained assistance at
delivery by health staff, either in
a medical institution or at home.

(b) the non-formal system that utilizes
trained TBAs in which the formal
system usually has some linkage
to the TBAs vis-à-vis their training,
supervision and provision of
supplies, such as disposable
delivery kits (DDK), etc.

(c) in extreme situations, the issue of
DDKs directly to pregnant
women with instructions
regarding their use.

Trained TBAs are used by some
countries to meet the shortfall of health
staff for domiciliary care, such as in
isolated communities, where there is a
lack of demand for institutional delivery,
etc. Trained TBAs, unless closely
supervised and followed up, have been
known to revert to traditional practices.
Reliance on TBAs in the long term is not
in the best interests of MCH care. In this
case, countries should be
encouraged to adopt a policy and
develop a strategy for providing trained
health staff for domiciliary midwifery
services, with TBAs being gradually
phased out. The use of ‘home-based’
mother's records, appropriately
developed to meet specific country
situations (for recording events during
pregnancy, delivery and the post-
partum period), needs to be
encouraged. The responsibility for
establishing a clean delivery
programme (including appropriate care
of the cord), is clearly that of any MCH
service/manager. Most importantly, a
commitment to such a programme,
followed by a strategic approach
utilizing available methodologies and
resources, appropriate to the different
country settings (between countries and
within the countries), would, over a
reasonable period of time, provide the
desired result.

For programme monitoring, the level
of trained assistance at delivery would
be an important indicator, based on the
assumption that a trained person would
conduct a clean/hygienic delivery. It
would be well to remember that
‘trained assistance’ should not be
assumed to always provide the desired results, and that periodic supervision and guidance should be a part of the programme. For monitoring purposes, a health information system to obtain the following information should be developed by MCH programme managers:

- An estimate of the number of births during the year (derived from the population of the area and the birth rate).
- Percentage of deliveries conducted in health facilities.
- Percentage of deliveries conducted by
  - field health staff
  - trained TBAs
- Percentage utilization of “disposable delivery kits”.

Other information pertaining to TBAs would include:

- Number trained during the year (new)
- Number that received refresher training during the year
- Numbers in position (active) at end of the year.

Protection of pregnant women by immunization with TT

Preventing NNT by protecting pregnant women through immunization with TT must also be a primary responsibility of the MCH services manager. Two basic approaches have been advocated, namely:

(a) Immunization of pregnant women as part of routine antenatal care services.

- This strategy requires few additional resources, allows for accurate monitoring of the target population and has a potentially rapid impact on the disease. This has been very successful in countries with a reasonable basic MCH infrastructure and/or where pregnant women can be readily identified and provided with the service.

(b) Immunization of women of child bearing age:

- Women attending immunization sessions for children. Few additional resources are needed. This is really a supplemental strategy, but does not allow for proper programme monitoring.
- Women attending the regular health services for whatever reason (preventive or curative). This often poses logistic problems, issues related to deployment of personnel, programme monitoring, etc. The provision of universal TT immunization (as in the clean delivery programme) calls for
commitment and realistic planning depending on the particular country situation. Where MCH services provide TT immunization, the responsibility for coverage and quality of the services would rest with the MCH sector. However, in other situations, linkages would need to be established between MCH and EPI (depending on the management style in the country), to ensure proper service delivery as well as programme monitoring. The need for reducing “missed opportunities” by service providers also needs to be stressed.

From an MCH standpoint, programme monitoring for TT immunization would include the following:

- Percentage visits/contacts for antenatal care (first visit/two or more visits).
- Percentage of antenatal clinics (ANC) providing routine TT immunization.
- Percentage of ANCs routinely reporting TT immunization (TT1, TT2, Booster).

Disease surveillance

Health services traditionally assign disease surveillance to CDC/Epidemiology Units, and is also by definition and function the primary responsibility of these units. This does not however preclude the MCH sector from actively supporting and participating in disease surveillance since therein lies the ultimate assessment of disease control efforts, be it by instituting clean delivery programmes or by providing tetanus toxoid to women.

NNT in particular, with its close relationship to delivery practices, places the MCH care provider in the best position to report the occurrence of any suspected case of NNT. The simplicity of the “Standard Clinical Case Definition” can also be easily taught and understood by any basic health care worker. In this context, it would be relevant to mention that some developing countries routinely investigate, analyse and discuss all infant and maternal deaths. Particular attention is paid to EPI diseases which warrant special investigation of individual cases and follow-up action as deemed necessary. Needless to say, in these situations, there should be close interaction between CDC/Epidemiology Units and MCH.
The Role of EPI in the Strategies for NNT Elimination

As for all EPI diseases, EPI management would need to have a close working relationship with MCH. This is particularly so with regard to NNT elimination. EPI being responsible for overall programme management, must necessarily be the final repository of all information related to the implementation of EPI, though not necessarily having the primary responsibility for implementation of all programme components of EPI. In this context, all EPI data generated by MCH should be transmitted/shared with EPI. This would include:

- Data related to clean delivery (as referred to earlier)
- Coverage of pregnant women with TT immunization
- Coverage of women in the childbearing age with TT (where applicable).

In situations where there was only a rudimentary structure for the delivery of MCH services, EPI, which commenced as a high-profile programme, may have had to take the initiative to establish immunization services, almost as a vertical programme, utilizing whatever resources were available. In such situations, it is likely that immunization services and coverage date would be the direct responsibility of EPI. However, for the sake of programme sustainability, integration with other MCH programme elements need to be encouraged and implemented as early as possible.

Implementation of a system for disease surveillance is the primary function and responsibility of CDC/Epidemiology Units, which, in most countries, have been designated as the focal points for the management of EPI. This would require the following:

- Adopting a standard clinical case definition of NNT, understood and used by health workers at all levels.
- Separate reporting of NNT cases, from other tetanus cases.
- Identifying high-risk areas for priority attention.
- In countries where NNT is known or suspected, monthly reporting by administrative or health area of all cases of NNT, using the standard clinical case definition.
- Sentinel reporting in situations where accurate reporting is weak.
- Investigation of all NNT cases as a routine function of NNT surveillance in order to rectify service deficiencies.

Supporting Activities by Both EPI and MCH

(a) Planning NNT elimination - This activity needs to be carried out jointly by National EPI managers, MCH managers and others
involved in its implementation, for example, health education managers. A concerted team effort by all concerned is required, and a sense of commitment towards the programme at all levels are vital ingredients for success.

(b) Training of EPI and MCH staff should include the TT immunization schedule, strategies to improve coverage, the cold chain, sending and recording procedures, hygienic delivery, surveillance methods, and mechanisms for monitoring and evaluating programme performance.

(c) Supervision and guidance of programme personnel at all levels of implementation.

(d) Creating and monitoring public awareness that would generate a demand for immunization.

Conclusion

Drastic reduction of donor funding, escalating costs of vaccines, and other programme needs have resulted in increased government spending, which has a direct bearing on the sustainability of EPI in terms of quality and coverage. This situation demands closer interaction between MCH and EPI not only to maximise resources but also to demonstrate programme impact and justify resources committed to the programme.

This is the challenge that EPI and MCH managers would have to contend with in the future by working in a spirit of mutual cooperation and understanding if ultimate success is to be achieved.
Nutrition

Risk Factors for Xerophthalmia in Under-six Children in Urban Slums

Devendra W. Khondkar*, N.D. Vasudeo**, Sanjay P. Zodpey***, Nitin N. Ambadekar**

Introduction

HYPOVITAMINOSIS A has the unique distinction of being one of the most important causes of preventable blindness the world over, and xerophthalmia still remains a problem in the developing countries(1). In India alone, 52,000 children are found to go blind every year on account of vitamin A deficiency(2,3). Studies in the recent past have shown that not only does vitamin A deficiency cause blindness but it also has a profound impact on general morbidity, mortality and growth(3,4).

The prevalence of vitamin A deficiency by clinical examination in different parts of India has been estimated to vary from 1.1% to 22.3%(5-11). However, the criteria used for clinical diagnosis have been variable with some workers also including conjunctival xerosis (X1A) in the diagnosis. This problem is more prevalent in slum areas, where conditions such as poverty, overcrowding, infections, malnutrition and improper diet are common, which further contributes to a higher prevalence of xerophthalmia. Though few studies(9,10) regarding the prevalence of xerophthalmia are available from central India, no data are available from urban slums of this part of the country. Hence the present study was undertaken to estimate the prevalence of xerophthalmia among under-six children with emphasis laid on biosocial factors.

Material and Methods

The present cross-sectional analytical study was undertaken in two urban slums (Hasanbagh and Shivankarnagar) which were selected randomly out of 23 slums which are attached to the field practice area under the Urban Health Centre, Deptt. of Preventive and Social Medicine, Govt. Medical College, Nagpur. The study population comprised all the under-six children residing in two selected urban slum.

* Lecturer, Deptt. of Preventive and Social Medicine, Govt. Medical College, Nagpur.
** Professor and Head, Deptt. of Preventive and Social Medicine, Govt. Medical College, Nagpur.
*** Associate Professor, Deptt. of Preventive and Social Medicine, Govt. Medical College, Nagpur.
areas i.e. 1144. Out of these, 50 could not be included because of various reasons; hence 1094 children formed the study subjects.

A house-to-house survey was carried out and information was obtained as per a predesigned proforma. Parents were inquired about night blindness. The history was accepted only when the response was definite and positive. The standard methods and procedures for ophthalmic examination were used to detect xerophthalmia. Ocular examination was done with the help of a bright illuminant torch in natural light. WHO classification was adopted to assess xerophthalmia. WHO report has stated that conjunctival xerosis (X1A) is not recommended for community diagnosis. Because of these recommendations, conjunctival xerosis (X1A), only when accompanied by Bitot’s spots (X1B), has been included in the positive clinical signs of xerophthalmia in the data presented here.

The socioeconomic status of the study subjects was estimated as per modified Kuppswamy Socioeconomic scale. Nutritional assessment was done using Indian Academy of Pediatrics 1971-72 classification on the basis of weight for age. Statistical analysis was carried out by chi-square test and odds ratio with its 95% confidence interval.

Results

The overall prevalence of xerophthalmia was found to be 8.7%. Only the milder manifestations of xerophthalmia viz. night blindness and Bitot’s spots were observed. Not a single case of active corneal involvement was seen. No case of xerophthalmia was seen in children of 0-1 year age group. The prevalence of xerophthalmia was found to increase with increasing age, reaching its maximum at 5-6 year age group (15.8%). The same increasing trend with increasing age was followed by all manifestations of xerophthalmia. Though the prevalence of xerophthalmia is 8.7%, the overall prevalence of signs and symptoms was 10.2% as 16 study subjects had more than one sign/symptom. The statistically significant higher prevalence of xerophthalmia was found in children with more than three years of age. (Table 1).

Table 1. Prevalence of different manifestations of xerophthalmia, according to age

<table>
<thead>
<tr>
<th>Age- group (years)</th>
<th>Number of study subjects</th>
<th>Only night blindness (XN only)</th>
<th>Only Bitot’s spots (X1B only)</th>
<th>Both XN and X1B</th>
<th>Total number with xerophthalmia</th>
</tr>
</thead>
<tbody>
<tr>
<td>0+</td>
<td>184</td>
<td>0 (0.0)</td>
<td>0 (0.0)</td>
<td>0 (0.0)</td>
<td>0 (0.0)</td>
</tr>
<tr>
<td>1+</td>
<td>150</td>
<td>0 (0.0)</td>
<td>3 (2.0)</td>
<td>1 (0.7)</td>
<td>4 (2.7)</td>
</tr>
<tr>
<td>2+</td>
<td>216</td>
<td>3 (1.4)</td>
<td>8 (3.7)</td>
<td>1 (0.5)</td>
<td>12 (5.6)</td>
</tr>
<tr>
<td>3+</td>
<td>158</td>
<td>8 (5.0)</td>
<td>10 (6.3)</td>
<td>2 (1.3)</td>
<td>20 (12.7)</td>
</tr>
<tr>
<td>4+</td>
<td>158</td>
<td>10 (6.3)</td>
<td>10 (6.3)</td>
<td>3 (1.9)</td>
<td>23 (14.5)</td>
</tr>
<tr>
<td>5+</td>
<td>228</td>
<td>15 (6.6)</td>
<td>12 (5.3)</td>
<td>9 (3.9)</td>
<td>36 (15.8)</td>
</tr>
<tr>
<td>Total</td>
<td>1094</td>
<td>36 (3.3)</td>
<td>43 (3.9)</td>
<td>14 (1.5)</td>
<td>95 (8.7)</td>
</tr>
</tbody>
</table>

Table 2 describes the prevalence of xerophthalmia according to stratification of sociodemographic factors. Statistically, a higher prevalence of xerophthalmia was
observed in lower socioeconomic status, illiterate mothers, children with birth order 4 and above and family size of 6 and above, as compared to their respective counterstrata. The maximum prevalence of xerophthalmia was found in grade IV undernourished children (44.4%), whereas the minimum prevalence was observed in nutritionally normal children (1%). The prevalence of xerophthalmia was found to increase with increasing severity of undernutrition (Table 3). Estimates of odds ratios and their 95% confidence intervals confirmed significant association between xerophthalmia and undernutrition.

Table 2. Prevalence of xerophthalmia according to stratification of socio-demographic factors

<table>
<thead>
<tr>
<th>Factor</th>
<th>No. of subjects</th>
<th>No. with xerophthalmia</th>
<th>Chi square</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td>Male</td>
<td>583 (7.9)</td>
<td>49 (9.6)</td>
<td>0.99</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>511</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Socio-economic status</td>
<td>Middle</td>
<td>426 (2.8)</td>
<td>83 (12.4)</td>
<td>30.28</td>
</tr>
<tr>
<td></td>
<td>Lower</td>
<td>338 (4.8)</td>
<td>45 (6.0)</td>
<td>23.02</td>
</tr>
<tr>
<td>Maternal literacy</td>
<td>Illiterate</td>
<td>756 (14.8)</td>
<td>45 (6.0)</td>
<td>23.02</td>
</tr>
<tr>
<td></td>
<td>Literate</td>
<td>668 (12.0)</td>
<td>83 (12.4)</td>
<td>30.28</td>
</tr>
<tr>
<td>Birth Order</td>
<td>≤3</td>
<td>864 (17.1)</td>
<td>34 (14.8)</td>
<td>13.66</td>
</tr>
<tr>
<td></td>
<td>≥4</td>
<td>230</td>
<td>34 (14.8)</td>
<td></td>
</tr>
<tr>
<td>Family Size</td>
<td>≤5</td>
<td>425 (9.4)</td>
<td>23 (5.4)</td>
<td>9.36</td>
</tr>
<tr>
<td></td>
<td>≥6</td>
<td>669</td>
<td>72 (10.8)</td>
<td></td>
</tr>
</tbody>
</table>

Table 3. Relation of xerophthalmia with nutritional status

<table>
<thead>
<tr>
<th>Nutritional status</th>
<th>Number of subjects</th>
<th>Number with xerophthalmia %</th>
<th>Number without xerophthalmia %</th>
<th>Odds ratio (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal</td>
<td>612</td>
<td>6 (1.0)</td>
<td>606 (99.0)</td>
<td>Reference</td>
</tr>
<tr>
<td>Grade I</td>
<td>270 (24.7)</td>
<td>28 (10.4)</td>
<td>242 (89.6)</td>
<td>11.69 (4.78 - 28.55)</td>
</tr>
<tr>
<td>Grade II</td>
<td>145 (13.3)</td>
<td>37 (25.5)</td>
<td>108 (74.5)</td>
<td>34.60 (14.26 - 83.96)</td>
</tr>
<tr>
<td>Grade III</td>
<td>48 (4.5)</td>
<td>16 (33)</td>
<td>32 (67.3)</td>
<td>48.97 (17.99 - 133.29)</td>
</tr>
<tr>
<td>Grade IV</td>
<td>18 (1.6)</td>
<td>8 (44.4)</td>
<td>10 (55.6)</td>
<td>80.80 (23.64 - 276.21)</td>
</tr>
</tbody>
</table>

Total 1094 (100) 95 (8.7) 999 (91.3)

Table 4 shows the relationship between history of infections in the past four weeks and xerophthalmia. Estimates of chi-square, odds ratios and their 95% confidence intervals recognized significant association between history of diarrhoea and measles in past four weeks and xerophthalmia.

Discussion

Vitamin A deficiency is recognized as a major cause of blindness and an important public health problem among under-six children in this country since long. Although many studies have been conducted to assess the prevalence of xerophthalmia in different population groups, very few studies are reported from central India and that too from urban slums.
The sociodemographic characteristics of children residing in urban slums are different from urban areas and rural areas. This difference in sociodemographic characteristics may be the reason for a higher prevalence of xerophthalmia in this population group.

Table 4. History of infection in past four weeks and xerophthalmia

<table>
<thead>
<tr>
<th>History of infection in past four weeks</th>
<th>Number of study subjects</th>
<th>Odds ratio (95% CI)</th>
<th>Chi square (P value)</th>
</tr>
</thead>
<tbody>
<tr>
<td>With xerophthalmia (n=92)</td>
<td>With xerophthalmia (n=999)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Diarrhoea</td>
<td>40 (12.1)</td>
<td>288</td>
<td>1.79 (1.17 - 2.71)</td>
</tr>
<tr>
<td>Measles</td>
<td>5 (2.3)</td>
<td>12</td>
<td>4.57 (1.28 - 15.78)</td>
</tr>
<tr>
<td>Pneumonia</td>
<td>17 (17.2)</td>
<td>149</td>
<td>1.24 (0.71 - 2.16)</td>
</tr>
<tr>
<td>Respiratory infections</td>
<td>15 (13.9)</td>
<td>139</td>
<td>1.16 (0.65 - 2.07)</td>
</tr>
</tbody>
</table>

* Statistically significant

The present study observed only the milder manifestations of xerophthalmia. Not a single case of corneal involvement was observed in this study. Moreover, no case of xerophthalmia was found in the 0-1 year age group. This may be due to breast-feeding in this age group, which is a rich source of vitamin A. In the present study, significantly higher prevalence was found above three years of age. Similar findings4,10 are also reported by other investigators.

The observed association between various sociodemographic factors (lower socioeconomic status, maternal illiteracy, higher birth order and large family size) and xerophthalmia was also endorsed by the results of previous studies4,6,11. The study5, carried out in the rural area near Nagpur in central India, has estimated 16.8% prevalence of xerophthalmia, which is much higher than what we observed. This may be because of the distinct criteria for diagnosis of xerophthalmia used in this study. WHO report has stated that conjunctival xerosis (KXA) is not recommended for community diagnosis because it is often overdiagnosed and not so specific of vitamin A deficiency12. Because of these recommendations, conjunctival xerosis (KXA), only when accompanied with Bitot's (XIB), was included as a positive clinical sign of xerophthalmia. Additionally, the setting of this study is different i.e. urban slums. Still, the prevalence observed of xerophthalmia in this study far exceeded the prevalence criteria set by WHO for determining the public health significance of xerophthalmia, making it a significant public health problem in the area surveyed12.
history of infections, particularly diarrhoeal
diseases and measles, which is also endorsed
by6,10.

Considering the higher prevalence of
xerophthalmia, i.e. 8.7%, which is much higher
than the criteria laid down by WHO, and the
role of sociodemographic factors identified in
this study in the outcome of xerophthalmia,
comprehensive and effective intervention
strategy for vitamin A deficiency is necessary.

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Introduction

HYPOVITAMINOSIS A has the unique distinction of being one of the most important causes of preventable blindness the world over, and xerophthalmia still remains a problem in the developing countries (1). In India alone, 52,000 children are found to go blind every year on account of vitamin A deficiency (2,3). Studies in the recent past have shown that not only does vitamin A deficiency cause blindness but it also has a profound impact on general morbidity, mortality and growth (3,4).

The prevalence of vitamin A deficiency by clinical examination in different parts of India has been estimated to vary from 1.1% to 22.3% (5-11). However, the criteria used for clinical diagnosis have been variable with some workers also including conjunctival xerosis (X1A) in the diagnosis. This problem is more prevalent in slum areas, where conditions such as poverty, overcrowding, infections, malnutrition and improper diet are common, which further contributes to a higher prevalence of xerophthalmia. Though few studies (5,8) regarding the prevalence of xerophthalmia are available from central India, no data are available from urban slums of this part of the country. Hence the present study was undertaken to estimate the prevalence of xerophthalmia among under-six children with emphasis laid on biosocial factors.
Material and Methods

The present cross-sectional analytical study was undertaken in two urban slums (Hasanbagh and Shivankarnagar) which were selected randomly out of 23 slums which are attached to the field practice area under the Urban Health Centre, Deptt. of Preventive and Social Medicine, Govt. Medical College, Nagpur. The study population comprised all the under-six children residing in two selected urban slum areas i.e. 1144. Out of these, 50 could not be included because of various reasons; hence 1094 children formed the study subjects.

A house-to-house survey was carried out and information was obtained as per a predesigned proforma. Parents were inquired about night blindness. The history was accepted only when the response was definite and positive. The standard methods and procedures for ophthalmic examination were used to detect xerophthalmia(12). Ocular examination was done with the help of a bright illuminant torch in natural light. WHO classification was adopted to assess xerophthalmia. WHO report has stated that conjunctival xerosis (X1A) is not recommended for community diagnosis(12). Because of these recommendations, conjunctival xerosis (X1A), only when accompanied by Bitot's spots (X1B), has been included in the positive clinical signs of xerophthalmia in the data presented here.

The socioeconomic status of the study subjects was estimated as per modified Kuppuswamy Socioeconomic scale(13). Nutritional assessment was done using Indian Academy of Pediatrics 1971-72 classification on the basis of weight for age(14). Statistical analysis was carried out by chi-square test and odds ratio with its 95% confidence interval.

Results

The overall prevalence of xerophthalmia was found to be 8.7%. Only the milder manifestations of xerophthalmia viz. night blindness and Bitot's spots were observed. Not a single case of active corneal involvement was seen. No case of xerophthalmia was seen in children of 0-1 year age group. The prevalence of xerophthalmia was found to increase with increasing age, reaching its maximum at 5-6 year age group (15.8%). The same increasing trend with increasing age was followed by all manifestations of xerophthalmia. Though the prevalence of xerophthalmia is 8.7%, the overall prevalence of signs and symptoms was 10.2% as 16 study subjects had more than one sign/symptom. The statistically
significant higher prevalence of xerophthalmia was found in children with more than three years of age. (Table 1).

Table 1. Prevalence of different manifestations of xerophthalmia, according to age (Percentages in parentheses)

<table>
<thead>
<tr>
<th>Age-group (years)</th>
<th>Numb or study subjec ts</th>
<th>Only night blindne ss (XN only)</th>
<th>Only Bitot's spots (XIB only)</th>
<th>Both XN and XIB</th>
<th>Total number with xerophthalmia</th>
</tr>
</thead>
<tbody>
<tr>
<td>0+</td>
<td>184 (0.0)</td>
<td>0 (0.0)</td>
<td>0 (0.0)</td>
<td>0 (0.0)</td>
<td>0 (0.0)</td>
</tr>
<tr>
<td>1+</td>
<td>150 (0.0)</td>
<td>3 (2.0)</td>
<td>1 (0.7)</td>
<td>1 (2.7)</td>
<td>5 (3.3)</td>
</tr>
<tr>
<td>2+</td>
<td>216 (1.4)</td>
<td>8 (3.7)</td>
<td>1 (0.5)</td>
<td>12 (5.6)</td>
<td>27 (2.5)</td>
</tr>
<tr>
<td>3+</td>
<td>158 (5.0)</td>
<td>10 (6.3)</td>
<td>2 (1.3)</td>
<td>20 (12.7)</td>
<td>42 (3.8)</td>
</tr>
<tr>
<td>4+</td>
<td>158 (6.3)</td>
<td>10 (6.3)</td>
<td>3 (1.9)</td>
<td>23 (14.5)</td>
<td>56 (5.1)</td>
</tr>
<tr>
<td>5+</td>
<td>228 (6.6)</td>
<td>15 (5.3)</td>
<td>9 (3.9)</td>
<td>36 (15.8)</td>
<td>86 (8.7)</td>
</tr>
<tr>
<td>Total</td>
<td>1094 (100)</td>
<td>43 (3.9)</td>
<td>16 (1.5)</td>
<td>95 (8.7)</td>
<td>253 (23)</td>
</tr>
</tbody>
</table>

X² (<3 years vs ≥ 3 years) = 46.51, df = 1, p<0.001

Table 2 describes the prevalence of xerophthalmia according to stratification of sociodemographic factors. Statistically, a higher prevalence of xerophthalmia was observed in lower socioeconomic status, illiterate mothers, children with birth order 4 and above and family size of 6 and above, as compared to their respective counterstratas. The maximum prevalence of xerophthalmia was found in grade IV undernourished children (44.4%), whereas the minimum prevalence was observed in nutritionally normal children (1%). The prevalence of xerophthalmia was found to increase with increasing severity of undernutrition (Table 3). Estimates of odds ratios and their 95% confidence intervals confirmed significant association between xerophthalmia and undernutrition.

Table 2. Prevalence of xerophthalmia according to stratification of socio-demographic factors (Percentages in parentheses)

<table>
<thead>
<tr>
<th>Factor</th>
<th>No. of subjec ts</th>
<th>No. with xerophthalmia</th>
<th>Chi square</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td>Male</td>
<td>Female</td>
<td>0.99</td>
<td>&gt;0.05</td>
</tr>
<tr>
<td>Socio-economic status</td>
<td>Middle</td>
<td>Lower</td>
<td>30.28</td>
<td>&lt;0.001*</td>
</tr>
<tr>
<td>Maternal literacy</td>
<td>Illiterate</td>
<td>Literate</td>
<td>23.02</td>
<td>&lt;0.001*</td>
</tr>
<tr>
<td>Birth Order</td>
<td>≤ 3</td>
<td>≥ 4</td>
<td>13.66</td>
<td>&lt;0.001*</td>
</tr>
<tr>
<td>Family Size</td>
<td>≤ 5</td>
<td>≥ 6</td>
<td>9.36</td>
<td>&lt;0.05*</td>
</tr>
</tbody>
</table>

* Statistically significant
Table 3. Relation of xerophthalmia with nutritional status

<table>
<thead>
<tr>
<th>Nutritional Status</th>
<th>Number of Study Subjects</th>
<th>Number with xerophthalmia</th>
<th>Number without xerophthalmia</th>
<th>Odds Ratio (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal</td>
<td>612 (55.9)</td>
<td>6 (1.0)</td>
<td>606 (99.0)</td>
<td>Reference</td>
</tr>
<tr>
<td>Grade I</td>
<td>270 (24.7)</td>
<td>28 (10.4)</td>
<td>242 (89.6)</td>
<td>11.69 (4.78 - 28.55)</td>
</tr>
<tr>
<td>Grade II</td>
<td>145 (13.3)</td>
<td>37 (25.5)</td>
<td>108 (74.5)</td>
<td>34.60 (14.26 - 83.95)</td>
</tr>
<tr>
<td>Grade III</td>
<td>49 (4.5)</td>
<td>16 (32.7)</td>
<td>33 (67.3)</td>
<td>48.97 (17.99 - 133.29)</td>
</tr>
<tr>
<td>Grade IV</td>
<td>18 (1.6)</td>
<td>8 (44.4)</td>
<td>10 (55.6)</td>
<td>80.80 (23.64 - 276.21)</td>
</tr>
<tr>
<td>Total</td>
<td>1094 (100)</td>
<td>95 (8.7)</td>
<td>999 (91.3)</td>
<td></td>
</tr>
</tbody>
</table>

$X^2$ (Undernourished vs Normal) = 103.94, df = 1, p < 0.001
Odds ratio (Undernourished vs Normal) = 22.87
(95% CI: 9.91 - 52.78)

$X^2$ [Normal vs (I & II) vs (III & IV)] = 133.51, df = 2, p < 0.001

Table 4. History of infection in past four weeks and xerophthalmia

<table>
<thead>
<tr>
<th>History of infection in past four weeks</th>
<th>Number of study subjects</th>
<th>Odds Ratio (95% CI)</th>
<th>Chi Square (P value)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>With xerophthalmia (n=95)</td>
<td>Without xerophthalmia (n=999)</td>
<td></td>
</tr>
<tr>
<td>Diarrhoea</td>
<td>40 (42.1)</td>
<td>288 (28.8)</td>
<td>1.79 (1.17 - 2.75)</td>
</tr>
<tr>
<td>Measles</td>
<td>5 (5.3)</td>
<td>12 (1.2)</td>
<td>4.57 (1.58 - 13.25)</td>
</tr>
<tr>
<td>Passing worms in stools</td>
<td>17 (17.9)</td>
<td>149 (14.9)</td>
<td>1.24 (0.71 - 2.16)</td>
</tr>
</tbody>
</table>

Discussion

Vitamin A deficiency is recognized as a major cause of blindness and an important public health problem among under-six children in this country since long. Although many studies have been conducted to assess the prevalence of xerophthalmia in different population groups, very few studies are reported from central India and that too from urban slums. The sociodemographic characteristics of children residing in urban slums are different from urban areas and rural areas. This difference in sociodemographic characteristics may be the reason for a higher prevalence of xerophthalmia in this population group.
The current study observed 8.7% prevalence of xerophthalmia. The earlier-conducted studies have reported a prevalence of xerophthalmia in the range of 1.1% to 22.3% in different population groups and in different parts of the country\textsuperscript{(5-11)}. The study\textsuperscript{(5)} carried out in the rural area near Nagpur in central India, has estimated 16.8% prevalence of xerophthalmia, which is much higher than what we observed. This may be because of the distinct criteria for diagnosis of xerophthalmia used in this study. WHO report has stated that conjunctival xeroxis (XIA) is not recommended for community diagnosis because it is often overdiagnosed and not so specific of vitamin A deficiency\textsuperscript{(12)}. Because of these recommendations, conjunctival xerosis (XIA), only when accompanied with Bitot’s (XIB), was included as a positive clinical sign of xerophthalmia. Additionally, the setting of this study is different i.e. urban slums. Still, the prevalence observed of xerophthalmia in this study far exceeded the prevalence criteria set by WHO for determining the public health significance of xerophthalmia, making it a significant public health problem in the area surveyed\textsuperscript{(12)}.

The present study observed only the milder manifestations of xerophthalmia. Not a single case of corneal involvement was observed in this study. Moreover, no case of xerophthalmia was found in the 0-1 year age group. This may be due to breast-feeding in this age group, which is a rich source of vitamin A. In the present study, significantly higher prevalence was found above three years of age. Similar findings\textsuperscript{(6,10)} are also reported by other investigators.

The observed association between various sociodemographic factors (lower socio-economic status, maternal illiteracy, higher birth order and large family size) and xerophthalmia was also endorsed by the results of previous studies\textsuperscript{(5,6,7,10)}. In the current study, the prevalence of xerophthalmia was found to increase with the severity of undernutrition and was maximum in grade IV undernourished children. This may be because generally undernutrition is associated with low calorie intake, including low intake of nutrients, viz. Vitamin A, plus undernutrition is generally associated with various infections which further precipitate or aggravate vitamin A deficiency when stores are marginal. This study also observed a significant association between history of infections, particularly diarrhoeal diseases and measles, which is also endorsed by\textsuperscript{(6,12)}.

Considering the higher prevalence of xerophthalmia, i.e. 8.7%, which is much higher than the criteria laid down by WHO, and the role of sociodemographic factors identified in...
this study in the outcome of xerophthalmia, comprehensive and effective intervention strategy for vitamin A deficiency is necessary.

References

5. Gang, S, Nayar, S, Garg, A, Sane, S. Vitamin A deficiency in preschool children. Indian Pediatrics 1984, 21 : 491-4
Promoting the Application of Research Findings in Health Development

Dr Myint Htwe*, and Dr Stephan P. Jost**

Introduction

Much of the relevant research does not come to the fore due to the lack of application. It is worth considering the possible reasons for this; otherwise, valuable opportunities may be lost as well as resources wasted.

The World Health Assembly, in 1990, urged Member States, particularly developing countries, to create or strengthen mechanisms which would enable consideration of research findings in policy making and health systems operations. It also invited the research community to promote communication of findings and development of technologies to support decision-making and resource allocation processes (WHA43.19).

Application of research findings is as important as the conduct of research itself. The aim should be to transform findings into a context appropriate to the practical environment. Ministries of health and others should, therefore, not only promote and support health research, but also develop built-in mechanisms to evaluate research findings and products. This would alert potential users of the value of research findings. Research is essentially unfinished unless the findings are synthesized and applied in practice to improve the situation. At this juncture, medical research councils, professional bodies, WHO collaborating centres, national centres of expertise and WHO can work together meaningfully to further this goal.

In the health sector, dissemination of research information is generally aimed at three categories of personnel: decision or policy makers, programme managers or public health workers, and clinical staff. As these people are busy

* Regional Adviser, Medical Research, WHO Regional Office for South-East Asia, New Delhi
** Technical Officer, Health Systems Research, WHO Regional Office for South-East Asia, New Delhi
with their own sphere of activities, care should be taken to consider (1) which findings should be disseminated when, and how; (2) the interest, knowledge and characteristics of the intended target population; and (3) a sound and sustainable mechanism to follow up the implications of incorporating research findings into practice.

Barriers to Utilizing Research Findings

The spread of scientific knowledge in society is a complex process. It is influenced by educational, cultural, socioeconomic, environmental and political factors as well as stages of development (Davies, 1992). The attitude of health programme managers towards research and research-based knowledge (and the perception of its utilization) are important determinants for the application of research. Educational preparation and personality factors also matter. Hunt (1981) suggested that clinical and public health practitioners may not apply research findings for the following reasons: (1) they do not know them; (2) they do not understand them; (3) they do not believe them; (4) they do not know how to apply them; and (5) they are not allowed to use them.

Barriers to utilizing research have been studied intensively by many researchers. For example, Funk et al. (1995), surveying nurses in the USA, found the following series of characteristics:

**Characteristics of the adopters (varying research values, skills and awareness).** Lack of awareness of research, or isolation from knowledgeable colleagues with whom to discuss, may pose limitations. Skills may also be lacking to evaluate research quality or the possible benefits of its application. Furthermore, unwillingness to change or try new ideas and approaches were found to be major factors hindering the use of research results.

**Characteristics of the organization (enabling or disabling environment).** Insufficient authority to change according to the findings of research, insufficient time allocated to think of new ideas and methods related to research findings, and lack of support from professional staff working in the same organization, may all result in infrequent application of research findings. In addition, insurmountable administrative issues arising from the proposed changes, inadequate support facilities to implement these, insufficient time to read research papers, absence of in-house fora to discuss relevant research were also identified as major hindering factors.

**Characteristics of the innovation itself (qualities of research).** A range of issues were identified under this rubric. These were non-replicability of results, methodological inadequacies, conflicting results in the literature, late publication of results, and justifiability of conclusions drawn.
Characteristics of the communication (presentation and access to research). There could be a lack of clarity regarding the implications of findings for practice, as well as in the statistical or other analyses used to derive them. Such analyses may have been more complicated than necessary, reducing clarity and readability of research reports.

Promotion of Research Findings into Practice

In order to transform research findings into practice, it is important to critically review the status quo in the light of the overall research process. This would help formulate down-to-earth strategies to permeate the process of research utilization into practice. Closs and Cheater (1994) suggested that utilizing research findings was a highly complex task, requiring a positive attitude towards research. MacGuire (1990) went further. The issue of utilizing research findings in practice was more than simply viewing difficulties as the failure of individuals to respond to new knowledge or to innovations. Several studies developed models of research utilization. Some are based on organizational aspects (Goode, 1992), others on research management and communication processes. Common issues encountered in the countries of the South-East Asia Region are mentioned below. These are useful for formulating key strategies to promote research utilization.

Can researchers help?

Recommendations by researchers may, at times, be abstract, impractical, or too complicated to be understood by policy makers or implementers. This could be detrimental as it may unwittingly lead to a degree of alienation of the research community from policy makers. Definite benefits can be derived from being as straightforward as the subject allows, bearing in mind that reduction to simplicity may not always be possible.

Researchers sometimes tend to work by themselves without consulting decision makers or implementers. They may be so engrossed in the requirements of their research that its relevance to national priorities might be overlooked. Such relevance should be established at the outset of the research process.

Some researchers may use sophisticated designs and statistical procedures hoping that such projects will be viewed as high standard research. This can result in further isolation of research projects from users. Research designs should be appropriate and not be more sophisticated than necessary.

Researchers occasionally present findings in congresses or seminars without linking their relevance to the
functioning of existing provincial or national health care systems. It would be beneficial to do so.

Can procedures be improved?

In some cases, bureaucratic procedures between health or science ministries and research institutions hinder the application of research. It would be worthwhile to improve this by using various mechanisms appropriate to the local situation.

Decision makers are commonly too busy to be involved in the research planning process, especially in setting the research agenda. However, such involvement would be time well spent. At times, they often consider research to be for the sake of research and that research findings have little to do with the decision-making process. This perception may have created an unfortunate parallel approach in pursuing the tasks of planners, researchers or decision makers separately rather than in an integrated way. Furthermore, few countries have advisory or similar committees to put research into practice, or to assess recommendations of research projects with a view to applying these to the existing health care system. Countries may well consider establishing (or strengthening) such mechanisms.

Research, on the whole, is not yet fully built into the planning process of the national health care system. It is usually considered ad hoc as funds may become available or donor pressures arise. At times, this resulted in research activities being carried out independently of planned activities by ministries of health or science. Disjointed activities are not conducive to appropriate application of research. Integration of research planning and implementation can overcome this undesirable state of affairs. Therefore, research policies should best be in consonance with national health policies. Their reciprocity is important. The dynamics of this relationship, once established, can be very beneficial to both. Furthermore, research policies should be consistent within themselves.

Can programme managers help?

Many health care programme managers do not seem to perceive that results from research could substantially contribute to improvements in the effectiveness and efficiency of the health care system. In other words, they are not aware of the fact that research is one of the important and practical tools to solve administrative and managerial problems. There may be an unwillingness to initiate change in the system. Sometimes this is due to the bureaucratic nature of the overall system which is resistant to change. However, a positive attitude towards improving the system is crucial.
Strategies to Promote Application of Research Findings

A series of strategies have been formulated in an attempt to increase the utilization of research findings. Overall, it is considered essential that strategies be practical and generalizable, taking organizational constraints into account (Cavanagh, 1996). Utilization of research should not be seen as a separate entity which is performed independently of other duties (Rogers, 1994). The issues actually span from the planning phase of research to implementation and actual utilization, including the possible implications of utilization.

The strategies outlined below may overlap to some extent, but have been grouped under different categories for ease of reference. Implementation of each strategy may require a set of activities according to local needs.

Strategies related to research planning

- Undertaking research planning within the framework of the existing health development programme planning, including intersectoral linkages.
- Soliciting the guidance of decision makers on proposed research subjects from the very outset of research planning and involve users at appropriate phases of the research process.
- Involving the health programme implementation unit or planning cell in the ministry of health in formulating the research agenda and activities.
- Advocating and motivating policy makers and administrators in recognizing the importance of research to solve health problems through informed and participatory decision making.
- Developing specific funding criteria for research, emphasizing the aspect of application.

Strategies related to conduct of research

- Ensuring high quality of research proposals.
- Maintaining support consistently throughout the research process – from initiation to application of research findings.
- Conducting timely research on the most pressing contemporary problems and future needs.
- Conducting research-cum-action workshop(s).
- Using simple and understandable research designs, and avoid applying complicated statistical techniques if ordinary statistics suffice.
Making research-based recommendations as simple and practical as possible, taking the existing health care system into account.

Proper monitoring and supervision of research using various management tools and communicating interim results to decision makers.

**Strategies related to research institutions**

- Promoting a research culture which nurtures and empowers staff to do priority research.
- Incorporating themes of research utilization into the mission statements of relevant institutions.
- Strengthening links between policy makers and research institutions by including research institutions within the mainstream of decision making in health.

**Strategies related to dissemination of research findings**

- Compiling and computerizing research results by research councils, WHO collaborating centres, or national centres of expertise, with built-in mechanisms for dissemination.
- Setting up special bulletin boards to communicate research findings of current interest to staff of the organization.
- Encouraging staff to attend research conferences and to present papers or posters related to research utilization projects.
- Promoting simplified and high profile advocacy newsletters for senior officials.
- Conducting research fora, or research utilization workshops, involving WHO collaborating centres or national institutions recognized by WHO.

**Strategies related to procedural matters**

- Establishing permanent, built-in mechanisms to communicate relevant research findings to decision or policy makers, to programme managers or public health personnel, to clinical or paramedical staff.
- Restructuring (or forming) pro-active research utilization committees as change agents in research institutions and ministries of health.
- Developing a validation system for research findings of provincial, national or regional significance.
The strategies envisaged above can be put into practice provided there is organizational and professional commitment as well as availability of resources.

Conclusion

Public health programmes can be conceptualized as a pyramid. Research knowledge forms the base of the pyramid. Standards, norms, methods or procedures are developed on this basis. The public health information and documentation systems serve as supporting pillars. The top layers are bound by evaluative research. Therefore, research-based practice, whether derived from fundamental or evaluative findings, is a necessity. This is especially true in today's health care climate where increasing demands for high quality and cost-effective health care prevail.

Successful application of research therefore depends upon the interest and commitment of both researchers and users. It cannot be achieved by individuals working in isolation (Bircumshaw, 1990). If the ultimate benefits of research are ever to reach clients, its findings must be understood and implemented by health managers at all levels of the system. This does not happen rapidly. It requires commitment and willingness to learn because this process is cyclical as well as continuous.

Research utilization is an organizational responsibility. It is best accomplished if there is real commitment to apply research findings at the organizational level. Therefore, translating health research into health care practice is neither easy nor quick (Sheehan, 1986). It remains an enormous challenge.

References


Networking in the Context of Functions of WHO Collaborating Centres

Dr Myint Htwe*

NETWORKING is a dynamic process. It is about establishing a relationship (either formally or informally) among interested partners in areas of mutual interest. In this process, there will be sharing of information and implementation of collaborative activities by members of an organization or organizations in a network system. The efficiency and effectiveness of networking depend not only on the multitude of controlling factors acting on its components (members or organizations) but also on the configuration of the network system itself. The system of work may change or modify itself over time.

Alternatively, networking can be viewed as a formal linkage of organizations and people to undertake specific activities to solve common problems. In the context of WHO collaborating centres, networking can be defined as formal or informal linkages between two or more collaborating centres for the purpose of exchanging information, services and products. Furthermore, collaborative activities in research, training, and other need-based functions can be carried out among them.

Objectives of Networking of WHO Collaborating Centres

The overall objective of networking is to achieve mutually beneficial technical cooperation with goal-oriented unity of action. This can be secured through a process of information exchange and coordination of work between WHO and WHO collaborating centres and also among WHO collaborating centres themselves.

The specific purposes of networking of WHO collaborating centres are to strengthen national institutions and centres of expertise by sharing experience; to foster local, national and regional collaboration in health development; to assist and participate in priority health programmes at national and regional levels; and to achieve more efficient and effective use of available expertise and resources.

* Regional Adviser on Medical Research, WHO Regional Office for South-East Asia, New Delhi
Network Configuration

Structural Aspects

Nodal points, links, and coordinating mechanisms form the three basic elements in any network or network system. In the current context, the nodal points are WHO and WHO collaborating centres. The links between the nodal points are materialized through application of various systems of information technology. The coordinating mechanisms are the rules and regulations, directives or modus operandi of nodal points involved in the network system. The output of a network system depends on the interactions among the three basic elements. It is deemed essential that a network system be dynamic, responsive and flexible.

Network configuration can follow either hierarchical or non-hierarchical patterns. Each has its own advantages and disadvantages. An optimum configuration can be worked out based on the overall objectives of the network system, the characteristic features of the nodal points, the existing inter-relationship among nodal points and other factors.

Networking may be classified into several categories. First, as a non-directed network, where each nodal point connects with every other nodal point in the network, with none directing the network. Second, as a directed network, where focal points are interconnected through one nodal point. Third, as a hierarchical network, where nodal points are grouped in various hierarchical patterns, for example, increasing or decreasing resources and expertise available. The most appropriate pattern should be selected taking the expected output of the network system into account.

Functional Aspects

Generally, several functions are observed in networking. For instance, effective communication, dissemination of information, sharing of resources, creation of a critical mass of technical expertise, refinement of old and developing new methods, provision of a medium for facilitating or achieving agreed objectives, stimulation of dialogues, creating a platform for intellectual exchange of ideas or performing collaborative activities for mutual benefit. Some functions may evolve to gradually include a larger number of partners, for example, national centres of expertise.

Establishing a Network System for WHO Collaborating Centres

A number of issues need to be considered before initiating networking activities. The following information must be available and reviewed thoroughly:

- Current system of work and mission statement (or terms of reference) of each collaborating centre in the light
of the prospective role(s) envisaged.

- Specific technical inputs which each centre can provide for collaborative activities on various health programmes, especially the expertise available.

- Current system of work of WHO (regional and country levels), its objectives, strategies and framework for future planning.

- Past experience of collaborative activities between WHO and WHO collaborating centres in the context of several domains, including the extent of work accomplished by WHO collaborating centres during the past year.

- Strength and weaknesses of parties involved in the network system (for example, in the context of human resources, infrastructure and financial constraints).

- Availability and feasibility of establishing a good database or information source.

Resource sharing or working together entails reciprocity. This implies a partnership approach in which each nodal point contributes something useful to others. Therefore, WHO collaborating centres participating in a network system should fulfil the following basic pre-conditions:

- A certain level of resources to be shared for mutual benefit.

- A viable and realistic work plan, with necessary technical back-up to achieve agreed objectives.

- Authority to work collaboratively and flexibly in the spirit of give and take.

- An effective and efficient system of communication.

Several functional activities are envisaged in the network system of WHO collaborating centres. These activities are linked to one another, either explicitly or implicitly. It is important to avoid duplication of work through good planning as well as harmonious adjustment of activities.

Taking into consideration the above issues, an appropriate network configuration should be developed to meet a series of requirements:

- To achieve agreed objectives

- To put in place operational procedures facilitating collaboration

- To implement strategies for promoting and sustaining networking (including long-term support to strengthen networking)

- To develop programme areas and specific activities to be carried out jointly in the form of integrated work plans
To harness resources (current and anticipated) effectively using different approaches

To monitor and evaluate the system in a simple and practical way, including identification of parameters and development of a database for future use.

To propose a framework for phased expansion of collaborative activities.

Monitoring and Evaluation of Networking Activities

Monitoring and evaluation are essential for any network to be viable and sustainable. They are also important for improving the effectiveness and efficiency of the system itself. There are two levels of monitoring and evaluation. The first level closely monitors and evaluates individual activities implemented according to the terms of reference and specific work plan. Importantly, the second level monitors the performance of the network system itself. At present, there is a growing need to develop a comprehensive mechanism for monitoring and evaluation of activities of WHO collaborating centres. It is imperative that a simple methodology for monitoring the programme of work entrusted by WHO to the collaborating centres be developed and applied.

Conclusion

Under the network system, WHO collaborating centres can be regarded not only as institutions that collaborate with WHO but also as valuable partners for local, national and regional health development. Frequent contacts among the staff of WHO collaborating centres are found to be the most effective and useful way to make the network system dynamic and sustainable. WHO can serve as a catalyst in this respect.

Successful networking may have a number of vital benefits. For example, speedy exchange of information among national authorities, institutions and WHO on a range of issues; fostering institutional linkages on research, training and national health programmes; transfer of technology among the centres; well-established centres assisting more recently designated ones. Unless there is networking of WHO collaborating centres, these and other potential benefits may be hard to come by.

References


Health Manpower Development

Health Manpower Development in an Indian State

Dr Shiv Chandra*

Public systems throughout the developing world are consistently involved in improving health services. In spite of the vastly improved technology and communication facilities, delivery of health care by these systems to communities remains a labour-intensive process. Eventually, manpower remains the critical component in the delivery of health services. Realizing this fact, in a northwest state of India, efforts are under way to make manpower less costly and yet be fully capable of meeting the goals set by the state.

Rajasthan is the second largest state in India covering a land area of 0.34 million sq km, half of which is the Thar desert and half traversed by the Aravali hill ranges. Thus approach to many of its 33,000 inhabited villages and 200 towns (containing a total of 50 million population) is difficult. Over the past 40 years since the state was reconstituted, a number of organizational changes have been effected in the health system of the state. In the early 1990s, the population : health subcentre ratio in the state reached 1:4133 and an indoor bed was available for every 1452 persons. The public system of the state has approximately 1500 specialists, 4000 generalists, 10,000 clinical nurses, 2000 field supervisors and 12,000 grassroot health functionaries.

During the beginning of this decade, a crude birth rate of 33.1, a crude death rate of 10.6, infant mortality of 96 per 1000 live births and 29 percent couple protection rate remained a matter of concern in the state. Most of the health and demographic indicators were at a comparatively worse position on the intracountry comparative scale in spite of investing 2.5 percent of the total budget outlay on the health sector for many years. In this background, health manpower development became a crucial issue for the state.

* Professor (Community Health), State Institute of Health and Family Welfare, HCMRIPA Campus, Jaipur - 302017, India.
Beginning

A state-wide diagnostic study of the health organization in Rajasthan state, conducted in the late 1980s, revealed that health professionals working in the state were not aware of the departmental objectives. They were never oriented to the organization while being inducted in the system. Low morale and low efficiency of a large number of health professionals was also attributed to the total absence of in-service training programmes.

Part of this study covered assessment of the training needs of various cadres and critiquing the status of training institutions in the state by an expert group. It was found that training institutions in want of effective leadership were carrying on with a group of trainers without any team spirit. The linkages between the system and the training institutions on the one end, and between the various training institutions on the other, were weak and non-existent. Eventually, the low quality training imparted at regional and district levels by various training institutions was pushing them to a state of redundancy. Thus, while formulating a long-term Family Welfare Project in the early 1990s, an in-built mechanism for consistent manpower development was proposed.

Strategy

A project with a heavy input for manpower development envisaged the following strategy:

- A new institutional arrangement in which existing training institutions were to be given enough autonomy for their strengthening and intricate networking.
- A human resource development cell to be constituted at the state directorate level which may coordinate staff development of 40,000 health professionals in the state.
- The personnel management information system of the whole organization to be developed in phases.
- Recruitment of competent and committed trainers after restructuring the training institution.
- Revision of the curricula for basic courses of grassroot functionaries.
- Formulation of a training policy linking training with career development; development of a mechanism for sustenance of basic skills in them; and
- Streamlining of the in-service training programme for various cadres.

Apex Institute at State level

The State Institute of Health and Family Welfare was established as an apex training and research institute for the health sector of the state. As an
autonomous body, it is not subordinate to the public system. Eventually, it is in a position to guide, counsel and give consultancy to the organization of health services of the state. Its primary mandate is to improve the quality of training to health professionals and involve itself in operational research so as to facelift the health care delivery system of the state. Since its inception in 1995, it has taken the lead to network regional and district-level training institutions and play a proactive role to generate a positive organizational culture.

In its two years of existence, it has been able to train around 500 doctors directly and prepare 75 trainers through a specially-designed programme on enhancing their training competence. The Institute also prepared a variety of printed material which may be used by trainees in the long term. Table 1 summarizes the basic and in-service training programmes that have crystallised for various levels.

### Table 1. In-service programmes to be conducted at various levels

<table>
<thead>
<tr>
<th>Training institute*</th>
<th>Basic course</th>
<th>In-service training</th>
<th>Management Development Programme</th>
<th>Executive development programme</th>
<th>Training of trainers</th>
</tr>
</thead>
<tbody>
<tr>
<td>ANM Trg. Centre (12)</td>
<td>+</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>Distt. Trg. Centre (15)</td>
<td>+</td>
<td>+</td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>HFWTC (3)</td>
<td>–</td>
<td>+</td>
<td>–</td>
<td>–</td>
<td>+</td>
</tr>
<tr>
<td>SHFW (1)</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
</tbody>
</table>

Note: Figures in parentheses indicate number of institutions.

### Regional Training Centres

In the late 1950s, throughout India, Family Planning Training Centres were created on the basis of one per 10 million population at the regional level to give thrust to human resource development in the health sector. Two such Regional Family Planning Training Centres were functioning in Rajasthan for almost four decades. They were inconsistently involved in training the health professionals. With the passage of time, the role of these training centres widened and they were redesignated as Health and Family Welfare Training Centres (HFWTCs). In 1995, one more HFWTC was established exclusively for the desert districts of the state, which constitutes more than half of the land area.

At the outset, the training competence of the faculty of these three HFWTCs was enhanced through a
specially-designed long-term training of trainers, after which all the regional training institutions were made to function on a uniform pattern. These institutions are basically involved in the in-service training of Medical Officers and supervisory staff (Table 2).

**District Training Centres**

There were 27 training schools at the district level in the state. These institutes were exclusively meant to cater basic courses for Auxiliary Nurse Midwives who function at the grassroot. Each year, these schools admit 60 young women for a basic training of three semesters. These schools were following stereotyped training methods with obsolete curricula for more than a decade. Changes overdue in the contents and courses were introduced at the first instance.

Further, 15 of these ANM training schools were identified to take on the additional responsibility of organizing regular in-service training programmes for ANMs. Since each of such identified school was catering to the in-service training needs of peripheral functionaries of one or two districts assigned, these institutions were redesignated as District Training Centres (DTCs). These DTCs have been gradually equipped with kits for child survival and Safe Motherhood for demonstration and skill development. Although only one batch has passed out after this change was initiated, yet it has given hope of preparing manpower with a better capacity.

**Table 2.** In-service training conducted in various institutes, by cadre

<table>
<thead>
<tr>
<th>Cadre</th>
<th>Number of courses planned per year</th>
<th>Trainees expected per course</th>
<th>Duration of course (in days)</th>
<th>Frequency of training for trainees</th>
<th>Venue of institutions</th>
</tr>
</thead>
<tbody>
<tr>
<td>ANMs</td>
<td>165</td>
<td>30</td>
<td>12</td>
<td>Two yearly</td>
<td>DTC 1</td>
</tr>
<tr>
<td>Male Health Workers</td>
<td>75</td>
<td>30</td>
<td>12</td>
<td>Three yearly</td>
<td>DTC</td>
</tr>
<tr>
<td>Lady Health Visitors</td>
<td>75</td>
<td>30</td>
<td>12</td>
<td>Three yearly</td>
<td>HFWTC</td>
</tr>
<tr>
<td>Sector Supervisors</td>
<td>75</td>
<td>0</td>
<td>12</td>
<td>Three yearly</td>
<td>HFWTC</td>
</tr>
<tr>
<td>Medical Officers</td>
<td>33</td>
<td>30</td>
<td>12</td>
<td>Three yearly</td>
<td>HFWTC</td>
</tr>
<tr>
<td>Senior Medical Officers</td>
<td>15</td>
<td>30</td>
<td>12</td>
<td>Three yearly</td>
<td>HFWTC</td>
</tr>
<tr>
<td>Distt. Level Managers</td>
<td>2</td>
<td>30</td>
<td>12</td>
<td>Three yearly</td>
<td>SIHFW</td>
</tr>
<tr>
<td>State level Executives</td>
<td>1</td>
<td>20</td>
<td>6</td>
<td>Three yearly</td>
<td>SIHFW</td>
</tr>
<tr>
<td>TOT for DTCs</td>
<td>4</td>
<td>25</td>
<td>48</td>
<td>Once only</td>
<td>HFWTC</td>
</tr>
<tr>
<td>TOT for HFWTCs²</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>
Ten to 20 percent of the total health manpower of the state has so far undergone in-service training in the various state institutes. All those who have received training in the recent past have made sincere efforts to improve their performance - a fact reported from service delivery points to the training system. Their better morale and positive attitude over the months following training indicates a better future for health services.

Training Policy

Concurrently, a training policy for the state is on the anvil. It not only aims at a sustainable, strong training system but also takes care of recruitment and holding of better trainers; strengthening linkages between training institutes and service delivery organizations; and promoting the role of training in operational research. All these steps ultimately aim at improving the quality of health care delivery in the state.

The career development of health professionals at various levels will be linked with successful participation by them in different kinds of training. The policy assumes that such a process would further refine the techno-managerial and communication skills of health manpower which, eventually, would accelerate the journey towards achieving the goals envisaged in the National Health Policy of India.

Unmet Challenges

It is difficult to incorporate all the desired positive changes in one stroke in a large public system. Some of the strategic changes could not be executed due to resistance from various quarters. These include:

1. Failure to develop a personnel management inventory system (PMIS): In view of the large task force, it was envisaged that personnel-related information would be computerised in phases and that the 4000 Medical officers of the state would be taken up in the first instance. The system failed to gather necessary information from more than 2000 doctors over two years. For want of a PMIS, problems are faced in nominating personnel for training and retrieving data in respect of trained and untrained manpower.

2. A Human Resource Development Cell at the state level could not be established. It is only because of the enthusiasm of the training institutes that rosters for training
are prepared manually but the sustainability of this process is doubtful.

(3) Restructuring of the Faculty of HFWTCs and DTCs: A high-level committee has conducted an in-depth exercise for restructuring the training institutes at regional and district levels. It has given concrete recommendations on the recruitment and placement of trainers and pruning of training institutes and making them more productive. Since old-timers are afraid to move from training institutes and the system is apprehensive of the impending ‘cultural shock’, the recommendations of the Restructuring Committee have so far not gathered any momentum.

(4) A high-level Screening Committee has done a voluminous exercise of identifying the right trainers. Bringing such trainers to the training institute requires an interchange of health professionals with the service delivery set up within the health system. A number of ‘old timers’ in the training institutes are displaying resistance and it is apprehended that status quo may be maintained.

(5) Although the urgency of linking training with career development was realized at the top level, delay in concrete decisions is affecting the credibility of trainings.

(6) Although a number of committees at central and state levels have stressed the need to recognize public health as a speciality, it is not given its due by the state. Eventually, doctors who reach managerial positions on the basis of seniority and without any back-ground in community health, take a long time to develop an understanding on their new assignment.

(7) Enthusiasm to take up a variety of projects in the health sector creates compulsions for frequent changes in directions from top to down. This adds to the pressure over the training system of conducting frequent and varied orientations.

Just as every cloud having a silver lining, the consciousness of these disappointments is impelling the decision-makers at the helm to search for better answers.

Evaluation

This exercise on health manpower development has been linked up with a concurrent evaluation process. Five different independent agencies in different parts of the state have been
assigned the task of concurrent evaluation. Many of the 32 indicators that this evaluation has taken into consideration, directly appraise the performance of field functionaries and executives. Since the concurrent evaluation would be carried on for five years, the data generated would yield valid information on the change in attitude, skills and performance of manpower trained during this period. Three rounds conducted so far have already indicated a positive change. The training system is also developing a mechanism for impact evaluation.

Conclusions

A number of activities to develop human resource in the health system of the state of Rajasthan has proved rewarding. Managers at regional and district levels have started realizing the importance of streamlining and sustaining the value of training. But a spate of funding agencies with proposals for new strategies and temptation to work with a variety of agencies may influence the crystallization of the training process. Realizing the opportunities and associated threats in the new avenues, there is ample scope for the state to steer the health system in a productive direction. The case of Rajasthan is generating a number of lessons for health manpower development throughout the developing world.

References

A Simple Methodology to Determine Provision and Utilization of Health Services

Than Tun Sein* and Win May**

Abstract

In health planning, especially health manpower planning, it is vitally important to determine the provision and utilization of health services. Currently, provision of health services is calculated mainly in terms of either population per health facility or population per category of health worker, i.e. in terms of availability. A few studies have utilized the concept of geographical accessibility, and calculated the percentage of population living within three miles of a government health unit. With regard to utilization of services, service volume statistics are all that is usually reported, which makes comparisons difficult because of the differences in population characteristics. This study aims to present a methodology to determine the provision and utilization of health services by microanalytical methods, including functional analysis. In order to test this methodology, a rural health centre in Thanatpin Township was used as a model. It was found that this was a simple methodology that could easily be used by health services managers.

Introduction

Health manpower development (HMD) research is one of the most difficult components of health systems research (Ramalingaswami, 1982). Yet it is an essential of HSR and one which needs attention. HMD research is required not only for health manpower planning and management but also for health systems development and, last but not least, for the development of education and training programme of health personnel.

One of the methods that has been used to provide a framework for systematic health manpower planning, management of work, people and organizations is the technique of work

* Deputy Director, HSR Division, Department of Medical Research, Yangon, Myanmar
** Rector, Institute of Nursing, Yangon, Myanmar
study. "Work study" is a generic term for those techniques, particularly method study and work measurement, which are used in the examination of human work in all its contexts and which lead systematically to the investigation of all the factors which affect the efficiency and economy of the situation being reviewed, in order to effect improvement (International Labour Office, 1978). Strombom (1981) defines it as "a study undertaken to identify activities and tasks which need to be carried out to meet identified health needs, and analysis of these activities or tasks in view of, among other things, establishing job descriptions and curricula for various categories of health workers, and evaluating the effectiveness and efficiency of health services, including manpower".

A number of studies have been conducted on health personnel in Myanmar. Than Win et al (1981) conducted a work study on the peripheral health care teams using the technique of activity sampling. Other studies include the time utilization of voluntary health workers (Aung Tun Thet and Myint Thaung, 1981) and the role and performance of voluntary health workers in primary health care in Buma (Thein-Maung-Myint and Aung Tun Thet, 1982) and time utilization of voluntary health workers in Bassein East township (Thein-Maung-Myint and Sann Shwe, 1983). Sann Shwe (1984) also conducted a work study of the health personnel of selected rural health centres in Bassein East Township. Besides work sampling studies, maintenance of detailed diaries or work log have also been used to document specific worker activities. Than-Tun-Sein et al (1990) used the diary method to document the activities of hospital pharmacists.

In all the above studies, the time spent has been shown in terms of percentage distribution of time into productive and non-productive activities. This study aims to show that a simple methodology can be used to determine service unit activity from work-sampling observations, in order to yield functional analysis data for health services provision.

Materials and Methods

Health services provision

The principal method used in the present study is the observational method using the "shadow" approach. For each category of health worker in a selected township (Thanatpin), observers were assigned to record the activity being carried out at five-minute intervals. In a single day, from 8:00 am to 5:00 pm, within the total period of 9 working hours, 108 observations were made for each category of health worker. Since the observational period lasted 9 days, a total of 972 observations were recorded for each person. The orthodox approach in activity sampling is the use of an activity/task list developed for each staff category. In the absence of such a list, the observers were trained to record the particular activity which she or he has observed.
and later these were consolidated into 35 different activities.

Health services utilization

In the case of health services utilization, service volume statistics are the most widely used. In this study, a rural health centre (RHC), Minn Ywa, in Thanatpin township, was selected. Service volume statistics were collected and a survey was also done in Minn Ywa to determine the population, persons with illness, service users as well as those using other kinds of health care. All the 921 households (total population of 4,643) of Min Ywa village tract were included in data gathering. From this, a detailed analysis was further done.

Results

Health services provision

In this study, activity sampling of health personnel was translated into estimated hours devoted to the activity of interest, taking into consideration the number of hours per week that the health unit was operating.

Table 1 shows that 256 out of 2,916 observations of the 3 medical officers, that is 8.8 percent, was associated with direct curative care. Since the health unit operates 35 hours per week and sampling is conducted randomly over the period of operation, it can be estimated that medical officers devoted 8.8 percent of the 105 hours or 9.21 hours per week to curative care (see Table 2).

Table 1. Tally of work-sampling observations

<table>
<thead>
<tr>
<th>Category of worker</th>
<th>Direct service</th>
<th>Support activity</th>
<th>Non-productive</th>
<th>Total observations</th>
<th>No. of workers</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Curative CDC MCH HE</td>
<td>Travel</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Medical Officer</td>
<td>256 – 2 216 853</td>
<td>16</td>
<td>853</td>
<td>125</td>
<td>1664</td>
</tr>
<tr>
<td>Nursing personnel</td>
<td>1162 352 667 261</td>
<td>261</td>
<td>3370</td>
<td>1963</td>
<td>2917</td>
</tr>
<tr>
<td>Other public health workers</td>
<td>295 61 5 83</td>
<td>83</td>
<td>1861</td>
<td>1006</td>
<td>2521</td>
</tr>
</tbody>
</table>

CDC = Communicable diseases control
MCH = Maternal and child health
HE = Health education

Other public health workers refer to 1 Health Assistant, 1 Lady Health Visitor, 1 Midwife and 1 Public Health Supervisor grade (2) of Minn Ywa Rural Health Centre, and 1 Public Health Supervisor grade (1) and 1 Midwife of Thanatpin Urban Health Centre.

Table 2. Activity hours for a work-week
It can be seen from Tables 1 and 2 that the relative frequency of observation did not correspond with the size of the workforce. Whereas the 2,916 observations of the medical officer were representative of 105 hours of effort per week, the 10,692 observations of the nurses were representative of 385 hours of effort per week and the 5,832 observations of the other public health workers reflected 210 hours of effort per week.

Thus, these observations need to be transformed into activity hours devoted to specific functional areas. This was done separately for each category of health personnel. The conversion factor for the medical officer was 105/2916, that for the nurse was 385/10692, and that for other public health workers was 210/5832.

After the observations were transformed into work hours for each category of worker, the hours were summed up to obtain a profile of the proportional distribution of effort for the health unit as a whole. In this study, it was found that 36.5 per cent of the available time in the health unit was spent non-productively.

Table 3 shows the relative contribution each type of worker made to the total effort in specified functional areas. Of the 14.9 hours devoted to communicable disease control (CDC) per week, public health workers contributed 14.8% or 2.2 hours. Decision-makers would need to decide whether this was appropriate since they had been specifically trained to perform this function. To illustrate another example, nurses contributed 41.9 hours or 67.8% of curative activities. This also needs to be considered by the decision-makers as to its appropriateness and whether they had been adequately trained to perform this function.

<table>
<thead>
<tr>
<th>Category of worker</th>
<th>Direct service</th>
<th>Support</th>
<th>Travel</th>
<th>Non-productive</th>
<th>Total hours</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Curative</td>
<td>CDC</td>
<td>MCH</td>
<td>HE</td>
<td></td>
</tr>
<tr>
<td>Medical Officer</td>
<td>9.2</td>
<td>-</td>
<td>0.1</td>
<td>0.6</td>
<td>30.7</td>
</tr>
<tr>
<td>Nursing personnel</td>
<td>41.9</td>
<td>12.7</td>
<td>24.0</td>
<td>9.4</td>
<td>121.3</td>
</tr>
<tr>
<td>Other public health workers</td>
<td>10.7</td>
<td>2.2</td>
<td>0.2</td>
<td>3.0</td>
<td>67.0</td>
</tr>
<tr>
<td>All</td>
<td>61.7</td>
<td>24.3</td>
<td>24.3</td>
<td>13.0</td>
<td>219.0</td>
</tr>
<tr>
<td>Percentage</td>
<td>8.8</td>
<td>2.1</td>
<td>3.5</td>
<td>1.9</td>
<td>31.3</td>
</tr>
</tbody>
</table>

Table 3. Relative contribution of each type of worker to the total effort in specified functional areas (Percentage)
Health Manpower Development

<table>
<thead>
<tr>
<th>Category of worker</th>
<th>Curative</th>
<th>CDC</th>
<th>MCH</th>
<th>HE</th>
<th>Support activity</th>
<th>Travel</th>
<th>Non-productive</th>
<th>Total observations</th>
<th>No. of workers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Medical Officer</td>
<td>14.9</td>
<td>1</td>
<td>0.4</td>
<td>4.6</td>
<td>14.0</td>
<td>4.0</td>
<td>23.4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nursing Personnel</td>
<td>67.8</td>
<td>85.2</td>
<td>72.3</td>
<td>72.3</td>
<td>55.4</td>
<td>63.5</td>
<td>41.1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other public health workers</td>
<td>17.3</td>
<td>14.8</td>
<td>23.1</td>
<td>23.1</td>
<td>30.6</td>
<td>32.5</td>
<td>35.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>100.0</td>
<td>100.0</td>
<td>100.0</td>
<td>100.0</td>
<td>100.0</td>
<td>100.0</td>
<td>100.0</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Health services utilization

Since the majority of activity hours of the RHC staff in a work-week, with regard to direct services, was spent on curative care (Tables 4 and 5), the authors looked at this aspect in detail. The findings are shown in Table 6.

Table 4. Tally of work-sampling observations for Min Ywa Rural health Centre in Thanatpin township

<table>
<thead>
<tr>
<th>Category of worker</th>
<th>Direct service</th>
<th>Support activity</th>
<th>Travel</th>
<th>Non-productive</th>
<th>Total observations</th>
<th>No. of workers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Health Assistant (HA)</td>
<td>76</td>
<td>21</td>
<td>253</td>
<td>247</td>
<td>262</td>
<td>972</td>
</tr>
<tr>
<td>Lady Health Visitor (LHV)</td>
<td>100</td>
<td>21</td>
<td>319</td>
<td>270</td>
<td>203</td>
<td>972</td>
</tr>
<tr>
<td>Midwife (MW)</td>
<td>114</td>
<td>30</td>
<td>170</td>
<td>240</td>
<td>210</td>
<td>972</td>
</tr>
<tr>
<td>Public Health Supervisor grade (2) (PHS-2)</td>
<td>13</td>
<td>4</td>
<td>452</td>
<td>150</td>
<td>353</td>
<td>972</td>
</tr>
</tbody>
</table>

Table 5. Activity-hours for a work-week of Min Ywa Rural Health Centre in Thanatpin township

<table>
<thead>
<tr>
<th>Category of worker</th>
<th>Direct service</th>
<th>Support activity</th>
<th>Travel</th>
<th>Non-productive</th>
<th>Total hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>HA</td>
<td>2.7</td>
<td>0.8</td>
<td>9.1</td>
<td>8.9</td>
<td>13.0</td>
</tr>
<tr>
<td>LHV</td>
<td>3.6</td>
<td>0.8</td>
<td>11.5</td>
<td>9.7</td>
<td>7.3</td>
</tr>
</tbody>
</table>
Discussion

Health services provision

From the above results it can be seen that a more complete picture of the activity of different categories of health personnel can be obtained by converting observations into work hours. Also, the relative contribution of each type of worker to the total effort in specified functional areas could thus be used as a basis for future planning. In this study, for example, due to the relative inattention paid to CDC activities by the public health workers, a crippling of CDC effort may be proposed. This would involve another 4.4 hours of additional direct service time plus corresponding increases in supportive activities and travel. However, in view of the fact that 90.7 hours of non-productive time were available, this should easily be accommodated.

Thus, this would be of benefit to decision-makers who could either reallocate the tasks or make sure that the appropriate amount of time was being spent on the activities in primary health care that these different categories of workers were expected to perform. This type of microanalysis would also be of value in health manpower planning and calculation of the optimal mix of health personnel.

Table 6. Analysis of utilization

<table>
<thead>
<tr>
<th>Measures</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Households surveyed</td>
<td>921</td>
</tr>
<tr>
<td>Individuals surveyed</td>
<td>4642</td>
</tr>
<tr>
<td>Persons with illness</td>
<td>399</td>
</tr>
<tr>
<td>Service users</td>
<td>152</td>
</tr>
<tr>
<td>No. with multiple visits</td>
<td>50</td>
</tr>
<tr>
<td>Total visits</td>
<td>231</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Consulters</th>
<th>No.</th>
<th>(Percentage)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rural Health Centre</td>
<td>152</td>
<td>38</td>
</tr>
<tr>
<td>General practitioner</td>
<td>51</td>
<td>12.7</td>
</tr>
<tr>
<td>Traditional medicine practitioner</td>
<td>94</td>
<td>23.6</td>
</tr>
<tr>
<td>Self medication</td>
<td>102</td>
<td>25.5</td>
</tr>
<tr>
<td>Total</td>
<td>309</td>
<td>100.0</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Indicators</th>
<th>Values</th>
</tr>
</thead>
<tbody>
<tr>
<td>Utilization rate</td>
<td>4.9%</td>
</tr>
<tr>
<td>Morbidity rate</td>
<td>8.59%</td>
</tr>
<tr>
<td>Consultation rate</td>
<td>38.0%</td>
</tr>
<tr>
<td>Visits per consulter</td>
<td>1.52</td>
</tr>
</tbody>
</table>
It has been the usual practice to deal at the macro analytical level, quantitatively with the number of health personnel to plan for, usually taking into consideration the projected growth of population and service requirements and balancing it with supply projections, taking into consideration attrition rates. However, it is not enough for the health planner to decide at the macro level the balance in numbers of health personnel of various types and the consequent adequacy of training capacity. It is also important to perform microanalysis so as to convert the service needs to the specific activities and skills required in order to determine the appropriate mix of health personnel required to provide the requisite services. Thus, it would be an idle question to ask how many doctors are needed or how many nurses are needed, without establishing service loads as well as to determine the extent that these health personnel should be provided with the skills associated with the requisite services.

Thus it can be seen that the work sampling observations which have commonly been used in Myanmar since the early 1980s are easily transferable into hours of service unit activity, using this simple methodology. The authors hope that more health researchers will avail of this methodology to obtain data which would be of value at the micro analytical level.

**Health services utilization**

Since service volume statistics are not very useful for comparative purposes because of area differences in population, utilization rates can be used whereby the number of patients visiting the RHC out of a total population can be calculated. Comparison of utilization rates alone, though, can be misleading. An area may lag behind the others in terms of utilization, but the underlying reasons may be different. It could be due to lower morbidity and thus less need for services. Or, it may be that the extent of service coverage was low, i.e., only a small proportion of people with illnesses received care. Or, it may be that the intensity of utilization was high, i.e., some individuals may have repeatedly visited the RHC.

These can be determined by calculating the morbidity rate, consultation rate and visits per consulter. The decision-maker would then know whether the RHC has received broad coverage or whether a few individuals are being served to the point of over-utilization whereas the majority remains without services.

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**References**


Lessons from Manipal to Nepal: A Brief Profile of HRD Lessons

Dr R.P. Pai*, Nagendra Prakash*, Dr S.R. Pai*

Abstract

Self-financing type of medical education was facilitated by innovative HRD technique. Quality of medical education was achieved by utilizing the experience and expertise from different fields viz. governmental, NGOs, industrial and military backgrounds. Linking any activities with teaching in health care was achieved by cross subsidy concepts.

Keywords: Medical education, Self-financing scheme, Human resource, innovative community involvement.

Introduction

The late Dr T.M.A. Pai (1898-1979) started the first self-financing, Kasturba Medical College in 1953. His innovative schemes have helped innumerable people in India and abroad. Today, Manipal group of organizations manage more than 60 educational institutions. More than 7,500 teaching beds are available for the needy, deserving and the desired through the Medical College Hospital network.

The aim of this article is to share the lessons learnt in Manipal for building the Medical College at Pokharan, Nepal.

Lesson No. 1: Include retired teachers in creative team

When the Medical College was started in 1953, the late Dr T.M.A. Pai found that experienced teachers were retiring either at the age of 55 or at 58 because of government rules and regulations. Much before the present concept of liberalization, privatization and
When the experts of Medical Council of India came for inspection, whom did they see? They saw their mentors, Gurus and teachers creating a new medical college. Rest is history!

In Nepal we took advantage of this lesson to form the core team.

Lesson No. 2: Experts and other officials from the Services

Because of the policies of the Services (Army, Air force and Navy) a large number of retired experts from the Services were available. They included teachers from the Army Medical Corps (AMC). Since many of them held senior teaching posts, their expertise came handy in extending the activities of the medical colleges to the community. Even today the trend continues in a big way.

Today, retired senior officers of the Indian Army look forward to suitable placements with the Manipal group of organizations. Nepal traditionally has close links with the Indian Army. Today, the College of Medical Sciences, Pokhara, has more than four retired executives from the Indian Services.

Lesson No. 3: Lateral movement of faculty on sabattical and on lien

The promotion policies in various government medical colleges were fixed. As a result, all could not aspire to become Professor or Head during their life time in the colleges. The Medical College also benefited because of the expertise as they fulfilled the needs of the Medical Council of India. The faculty members were happy because it provided lateral mobility and promotion. This innovative lateral movement is a good example of human resource development in the field of medical education.

Lesson No. 4: Link up every activity with teaching and training.

The late Dr T.M.A. Pai linked every activity taking place with the Medical College and other group of institutions with services, teaching, training and research. This policy helped to promote dynamism and enterprise.

(a) Because the students were evaluating the teachers on a regular basis, the teachers were always up-to-date in that subject.

(b) Since the training was going on (as in nursing, postgraduate training programmes), the
institutions could get inexpensive expertise.

c) The whole place was bubbling with activity as services to the community was the sine qua non of all activities planned by the Medical College.

Lesson No. 5: Join hands with local service clubs

Joining of hands with local service clubs helped to provide a cross section of the expertise from different walks of life. For example, Dr Pai made the scheme of providing free artificial limbs a great success by reaching the poorest of the poor through the service clubs. The club had the human resource to reach the target audience in the interior pockets of South India.

The Medical College advanced money. As a result, the social objectives of the College was achieved through service, teaching of undergraduate students, nursing students, postgraduates, doctoral candidates and allied health workers. This was achieved with maximum utilization of the human resource by a simple process of identifying and involving them.

Lesson No. 6: Community participation through banks

The late Dr Pai had started Syndicate Bank. He became a champion of the rural sector through the banks. He could feel the pulse of the people. The health care services could reach the interiormost portion of the reference area because of the goodwill that had been generated by him through the branches of the Syndicate Bank. Lesson learnt: Use valuable resources and outlets for health care delivery.

Lesson No. 7: Community participation through school teachers and schools

The Academy of General Education was started by the late Dr Pai in 1942. These primary, middle and high schools gave Manipal a good community base. This was achieved through the hospital network and the banks.

A huge pool of teachers was available to perform the role of change agents. Subsequently, when rural maternity and child welfare centres were developed, the schools acted as feeders in conducting child survival and safe motherhood (currently called as RCH) programmes.

Lesson No. 8: Associate membership of hospitals for medical practitioners

In implementing various programmes of the medical college hospital and training of students, the goodwill of the general medical practitioners was a great help. Dr Pai initiated a scheme whereby registered medical practitioners took active part in the
overall objectives of service, teaching, training and research of the Medical College. These associated members had access to the college library of Continuing Medical Education (CME) taking place in the Medical College and had certain privileges for the treatment of their patients in the hospital. This scheme had worked extremely well.

**Lesson No. 9** : Joining hands with international organisations

Various international nongovernmental organisations (INGOs) were always on the lookout for a partner in the developing country. For example, the PL-420 scheme recognized Manipal for establishing the first burns centre in India. The Canadian Retired Executive Organisation sent their experts to assist various departments to give an international competitive edge. Operation Eye sight Universal (OEU), an international nongovernmental organization based in Calgari, gave 50% contribution for the development of community-based ophthalmic care.

Direct Relief International, Santa Barbur, USA, an INGO, not only sent equipment which are donated by various hospitals to the developing countries but also sent experts in various fields.

**Lesson No. 10** : Linkages with industry

The late Dr Pai emphasized the great potential of training skills available with industries. His philosophy of starting the Valleyview Health Club, linkages with the banking industry and other industrial houses through his contacts gave inputs form different fields which is required for the development in the overall context of health.

All the above lessons were modified to suite the local requirements in Pokhara, Nepal, to create a self-financing medical college and hospital.
The Influence of Television on Children

Dr M.S. Ravindra*

TELEVISION used to be a good educational tool in good old days with few specific programmes for children’s viewing. The programmes meant for children had the right amount of child-specific material. With advancement in technology and under pressure from sponsorships the number of channels available on television and cable has tremendously increased. This has made the child sit glued to the television the whole day. Is this a good trend? What do specialists in child development say?

Let us not discuss about the moral values of today’s television programmes. Let us presume that the child watches only those programmes that are designed to be safe for the developing mind. The readymade programme on television have a numbing and mesmerising effect on the child’s mind. This cuts off the child from directly experiencing the huge variety and rich treasures of this world. Parents sometimes switch on the television in order to quieten a noisy child. But prolonged watching of television would deprive the child of social contact with parents and other members at home. Interpersonal contact within the family is crucial for social and linguistic development of the child. What is more important is giving the child an opportunity to imagine and exercise one’s own creativity through conventional ways, such as story telling, book reading and various other social and art-related activities. Spending a lot of time with the children creatively is an excellent way to prevent the child from taking to wrong ways in life. Parents may feel that it is less bothersome to them when the child spends a lot of time in front of the television. Some of them may be content that they only let their children watch special programmes
meant for children and scientific programmes. But reading novellostory books is a more active way of learning as this makes them create their own characters and improve their imaginative skills rather than accepting pre-designed characters on the screen.

Researchers and specialists today agree that the television prevents the child from:

- grasping and analysing information and then applying them in everyday life.
- practising motor and art skills.
- practising the fine coordination between the hand and the eye.
- exploring his or her curiosity.
- solving problems which they face from day to day.
- thinking analytically.
- improving their verbal skills.

In today’s world it is also not possible to totally deprive the child of television watching. The best way to start de-addicting a child from television is by limiting the elders at home watching television! Chalk out those absolutely essential programmes and limit the viewing only to them. Aim to achieve the accepted TV watching norm for a child of about one hour per day. Wish you all the best and your child a lively realistic future.

* Kartik Nethralays 89, 7th Cross N.R. Colony, Ashoknagar, Bangalore – 560 050
A dusk bathes Male with its gentle light, the fish market on the eastern waterfront stirs to life. Boats of all shapes, sizes and vintage are lined up across the road, as fishermen unload an amazing assortment of fish. These are mostly plain tuna or yellow-fin tuna, catfish, swordfish and, at times, small sharks.

Within a couple of hours, most of the fish has been sold and the fishermen prepare to return home to their distant islands. This scene is repeated every day, every month, throughout the year. The only difference is that on certain days the catch is very good. On others, it is not as good.

Good or bad, come rain or shine, this is the life the fishermen have known. And, like Ismail Sharif, they would not exchange it for any other. As he prepares his boat to return to his tiny island, Difushi, Ismail says that as long as he can remember, his life has revolved around the ocean, his boat and fish. Pausing to give some instructions to his mates on the boat, Ismail admits that the day’s catch was disappointing. “It was poor, with just about 250 fish. On a good day, the tally can be as high as 1,500. The last time that happened was nearly six months ago”, he adds, his weather-beaten face creasing with a few more lines.

As a child, fishing with his father, Ismail recalls that the catch used to be much better. “We didn’t have motorized boats. In fact, with motorized ‘dhonies’, you can now travel longer distances. But there are more fishermen, on faster boats and with increasing pollution levels, there seem to be fewer fish”. What Ismail would like to see an end to, is the practice of netting. “If everyone did pole and live fishing, like we do, there would be plenty of fish for all” he adds.

Looking younger than his 50 years, Ismail says that he enjoys good health. “I had a major problem last year and was ill for over six months. I cannot afford to
be ill as I support a large family”, he says.

Ismail recalls that when he was a child, there was a lot more illness—“Many children used to die in infancy. There were hardly any health workers. Now there are workers who come regularly to the island. His children – he has seven – are checked up regularly, as is his wife. When asked to recall the happiest day of his life, one almost expects Ismail to say that it was the day he caught the biggest fish that one could imagine. But his answer has nothing to do with fish. “My happiest day was when I married my present wife, Zulfa, seven years ago. This was my best catch”, he says, a wide grin lighting up his face.
The Role of MCH and EPI in the Three Major Strategies for Neonatal Tetanus Elimination
WHO Executive Board

The 101st session of the WHO Executive Board was held from 19-30 January 1998.

The Executive Board considered the new global health policy - Health for All in the 21st Century. Based on this policy, the Board proposed for adoption by the Fifty-first World Health Assembly the World Health Declaration which speaks of the improvement of the health and well-being of people as “the ultimate aim of social and economic development”.

The Board examined and proposed for adoption by the Fifty-first World Health Assembly, resolutions on: tuberculosis; cloning in human health; blinding trachoma, and the WHO revised drug strategy. The Board also noted the report by the Director-General on infant and young child nutrition and the fact that the Director-General had decided to hold a technical consultation on HIV and infant feeding prior to the forthcoming World Health Assembly. Other resolutions adopted by the Board concerned: health promotion; the elimination of leprosy and Chagas disease; emerging and other communicable diseases; antimicrobial resistance; sanitation for high-risk communities, and prevention of violence: anti-personnel mines.

The Board nominated Dr Gro Harlem Brundtland for the post of Director-General of the World Health Organization. This nomination will be submitted to the Fifty-first World Health Assembly, which will meet in Geneva from 11-15 May 1998. The new Director-General will take office on 21 July 1998.

Intercountry consultation on WHO mega country initiative on health promotion

An Intercountry Consultation on WHO Mega Country Initiative on Health Promotion was held in the Regional Office from 4 to 6 February 1998.
Speaking at the Consultation, the Regional Director, Dr Uton M. Rafei, said that the South-East Asia Region accounted for a high proportion of deaths due to infectious diseases. Together with emerging noncommunicable diseases, such as cancer and cardiovascular diseases, the Region carried an exceptionally heavy burden of health problems. In order to deal with these health problems it was essential to effectively confront the social, economic and environmental health factors. Environmental degradation was contributing significantly to death and disability among millions of people annually. The role of health promotion thus became critical. By the year 2020, it was estimated, 25 per cent of the population of the Region would be living in slums and thus be at high risk from communicable diseases, social alienation and violence. This would be a fall-out of rapid industrialization and the high level of poverty, which was a major obstacle to solutions to health problems.

The objective of the Mega Country Initiative was to support participating countries to build and strengthen their national capacity for health promotion. This would help them to deal effectively with most of the health challenges as well as their determinants in the ten most populous countries in the world. Three of these, viz., Bangladesh, India and Indonesia, belonged to the South-East Asia Region. The critical ingredients for effective health promotion had been clearly outlined in the strategies of the Ottawa Charter. They also underscored the potential of health promotion making a difference to the global health status, including that of the South-East Asia Region.
Book Review

International Travel and Health

Vaccination Requirements and Health Advice
Situation as on 1 January 1998

This annual guide, updated each January, issues authoritative advice on the medical and personal precautions needed to protect the health of international travellers. Addressed to physicians, tourist agencies, airlines, and shipping companies, the book presents the latest information on general precautions to be taken by all travellers, health risks specific to different geographical areas, vaccinations recommended or advised by WHO, and vaccinations legally required for entry into each of the world’s countries. Though the main emphasis is on prevention, country-specific information on common diseases may also help physicians track the cause of illnesses acquired abroad.

The book provides a convenient country-by-country list of required vaccinations, together with pertinent information on the malaria situation, for every country in the world. For malaria, epidemiological details are given for all countries with endemic areas, including notes on geographical and seasonal distribution, altitude, predominant species, and status of resistance. The recommended chemoprophylactic regimen is also given for each country with malarious areas.

The book includes information on geographical risks, which alerts readers to the main arthropod-borne, food-borne, and water-borne diseases and other health hazards commonly found in different parts of the world. It also offers advice on what travellers can do to protect their health while abroad, whether from the risks posed by contaminated food and water or from diseases spread by insect bites.
Guidelines for Contributors

REGIONAL Health Forum seeks to inform and to act as a platform for debate by health personnel including policy-makers, health administrators, health educators, and health communicators.

Contributions on current events, issues, theories, and activities in all aspects of health development are welcome. Contributions should be original and contain something of interest to those in health policy and practice, some lesson to be learned, some idea, something that worked, something that didn't work, in fact anything that needs to be communicated and discussed on a broader scale. Articles, essays, notes, news and views across the spectrum of health development will be published.

Papers for submission should be forwarded to the Editor, Regional Health Forum, World Health Organization, Mahatma Gandhi Road, New Delhi 110002, India (e-mail address: editor@who.ernet.in).

Contributions should:

- be written in the English language;
- be written in an anecdotal, informal, lively and readable style (so that sophisticated technologies, for example, may be easily understood);
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- not normally exceed 3000 words in length (letters to the editor should not normally be longer than 1000 words).

Authors are responsible for:

- ensuring that their contributions contain accurate data and references (and are requested to check the accuracy of both before submission);
- obtaining permission to use copyrighted material (if used). The letter granting such permission should be attached to the manuscript when submitted;
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The use of tables and illustrations should be restricted to those that clarify points in the text. All illustrations and tables should be numbered consecutively and should be lightly marked on the back with the figure number, and the author's name should also be indicated.

- Graphs and figures should be clearly drawn and all data identified.
- Photographs should be on glossy paper, preferably in black and white.
- Each table should be submitted on a separate sheet of paper.

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