

CORRIGENDUM

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Under the Section 'Communicable Diseases' the title of the first article should **read**: 'A Million Smiles: Eliminating Leprosy in South-East Asia'.

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Under the Section 'Environmental Health', the authors of the article "Water Supply, Sanitation and the Children of Thailand" should **read**: Pakdee Pothisiri, Ms Theechat Boonyakarnkul and Philip A Kingston.

Under the Section 'Comment', the authors of the article "Video-instruction for Blood Pressure Measurement" should **read** M. Mostafa Zaman and Nobuo Yoshiike.

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Add the following at the end of the article before 'Further Readings':

Acknowledgement

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The authors of the article "Water Supply, Sanitation and the Children of Thailand" should **read**: Pakdee Pothisiri, Deputy Permanent Secretary of Public Health, Ministry of Public Health, Nonthaburi, Thailand, Ms Theechat Boonyakarnkul, Director, Sanitation and Health Impact Assessment Division, Ministry of Public Health, Nonthaburi, Thailand, and Philip A Kingston, Environmental Sciences Division, Environmental Protection Agency, Queensland, Australia.

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Editorial

In keeping with its objective of providing a common platform for exchange of ideas and views on various aspects of health and health development in the South-East Asia Region, this issue of the Forum carries articles on diverse and interesting topics.

Since this year's World Health Day theme was: 'Healthy Environments for Children', we have included articles on water supply and sanitation and hygiene, healthy public settings as well as indoor air pollution. Other topics covered include Leprosy Elimination in South-East Asia, Multiple Drug Resistance, Role of Medical Schools in TB Control update on Polio in India etc.

The Notes and News section carries write-ups on important meetings including the Global Alliance for the Elimination of Leprosy (GAEL), the Global Fund on AIDS, TB and Malaria, among others. Several WHO publications in areas covering helminth control in school children, diagnostic imaging, International pharmacopeia, cancer control, cardiovascular diseases and blood safety are featured in the Book Review.

To further extend the scope and readership of the Forum, we invite readers to contribute articles, essays or short write-ups for the next issue. These should be written in an informal, clear and readable style. Comments on published articles are also welcome.

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Health Care

Emerging Problem of Antimicrobial Resistance in Developing Countries: Intertwining Socioeconomic Issues

*Kamini Walia**

"Antibiotic resistance as a phenomenon is, in itself, not surprising. Nor is it new. It is, however, newly worrying because it is accumulating and accelerating, while the world's tolls for combating it decrease in power and number."

- Joshua Lederberg, Nobel Prize winner

The discovery of antimicrobials in the 20th century completely transformed humanity's approach towards infectious diseases. Control of scourges, that once struck terror into the hearts of millions - plague, whooping cough and scarlet fever, seemed a distinct possibility, until the microbes started developing resistance to antibiotics. The dramatic upsurge in the spread of the drug-resistant microbes over the decade is undermining efforts to control infectious diseases. Formerly curable diseases like gonorrhoea and typhoid are becoming difficult to treat, while old killers like tuberculosis and malaria are now arrayed in the increasingly penetrable armour of antimicrobial resistance. It is a deepening complex problem accelerated by overuse of antimicrobials in developed countries and paradoxical underuse of quality antimicrobials in developing nations owing to poverty and resultant dearth of effective health care.

The rise of antimicrobial resistance in human pathogens poses a growing challenge to medicine and public health. From that first case of resistant staphylococcus, the problem of antimicrobial resistance has snowballed into a serious public health concern with economic, social and political implications that are global in scope and cross all environmental and ethnic boundaries. Although antimicrobial resistance affects industrialized and developing nations alike, its impact is far greater in the latter. The problem is that a switch from normally less expensive first line drugs to second or third line drugs involves a dramatic escalation in the price of the treatment. In some of the poorest countries, the prohibitive cost of lengthy treatment and replacement drugs means some diseases are too expensive to treat.

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Factors Contributing to Resistance in Developing Countries

The poverty paradigm: More than any other issue, poverty and inadequate access to drugs continue to be a major force in the development of resistance. In the developing countries, drugs are freely available-but only to those who can afford them. This means that most patients are forced to resort to poor quality, counterfeit or truncated treatment courses that invariably lead to more rapid selection of resistant organisms. A patient infected with a resistant strain may endure prolonged illnesses and hospital stays, which in turn result in lost wages, lost productivity, family hardship and increased infectiousness. Treatment with second and third line drugs is costly, often toxic to the patient and increasingly ineffective, owing to the speed with which mutant organisms develop resistance. In India, 14 million people are estimated to be suffering from active tuberculosis, of which 3-3.5 million are highly infectious sputum cases.

Treatment with effective drugs produced encouraging results till the emergence of drug resistant strains. The outcome of treatment of the patients harbouring multiple drug-resistant *Mycobacterium tuberculosis* has been poor, with a high mortality rate. Their chance of being cured is very low and requires significant expenditure on health care. They remain infectious for a prolonged period and are therefore, likely to infect others¹.

Factors contributing to emergence of drug resistance

Use of

- antibiotics in situations where they are not indicated
- inappropriate antibiotics
- antibiotics of poor quality and potency
- inappropriately low doses of antibiotics

In the United States, the cost of treatment of a single case of MDR-TB can be as high as US\$15 000 for an 18-month treatment regimen. In a country like India, MDRTB is almost the equivalent of a death sentence, as very few patients have the financial capacity or stamina to complete the long treatment regimen required². Irregular, incomplete and inadequate treatment is the commonest means of acquiring drug resistant organisms. The causes for this are many. In fact, only about one-third of patients in India treated under the National

Tuberculosis Control Programme, complete their course of chemotherapy. Many a times, poverty and lack of information forces patients to purchase a single dose of drugs, taken only until the patient feels better.

Misdiagnosis and resistance: Misdiagnosis is just another symptom of weak public health systems in

developing countries. Investigations like blood culture and Vidal tests are not widely available in many of our rural and outskirts of urban areas, where incidence of these infections may be higher due to inadequate secondary conditions. Even if facilities are available, the predominantly poor population of our country are not able to afford these tests. A dearth of proper diagnostic facilities and laboratories means physicians and health workers are forced to engage in the kind of symptom-based guesswork that often leads to misdiagnosis and increased likelihood of prescribing wrong medication. All these factors coupled together subject the patients to an unprecedented, pragmatic and problem-oriented empirical broad-spectrum antibiotics with a tendency to over-treat. This

has been commonly observed in children suffering from enteric fever. A significant proportion of children when managed as outpatients do become targets of the above mentioned shortcomings. Even if the child has multidrug-resistant *Salmonella typhi* infection, it may take a few days to a week before the patient is diagnosed and appropriate management instituted. By that time, the child is sometimes too sick, may need combination broad-spectrum antibiotics empirically awaiting culture tests.

Counterfeit drugs: Counterfeit drugs are also a problem that directly contributes to antimicrobial resistance. Between 1992 and 1994, as many as 51% of counterfeiting cases uncovered by WHO (70% of which were discovered in developing countries) revealed that forged drugs carried no active ingredient whatsoever. Among the counterfeits, yet another 17% contained the wrong ingredient, while an additional 11% contained weaker than recommended concentrations of active medication. Indeed some of these so called "medications" contained poisons capable of causing severe disability or death³. Overall, only 4% of counterfeits contained the same quality of medication as their authentic counterparts. Resistance flourishes wherever antibiotics are used or misused and dispensed at levels lower than treatment guidelines dictate. This means that instead of wiping out infection altogether, medications kill only nonresistant organisms, leaving their tougher counterparts to replicate and spread resistance genes. In India, many drugs are manufactured locally with variable quantity of active ingredient. Over 80 different brands of locally manufactured fluoroquinolone/ciprofloxacin are available in the market. In these circumstances, it is difficult to gauge the

extent of counterfeiting in order to regulate antibiotic use.

Lack of Education: There is a strong correlation between inappropriate prescribed and inappropriate self-medication but generally drug use within these groups is rooted in a complete and multilayered mix of medical, psychosocial, cultural, economic and even geopolitical factors. Within this complex, a number of factors have been associated with suboptimal use of antibiotics, particularly within the context of prescribing and dispensing health care provider groups. These include (i) insufficient prescriber knowledge about differential diagnosis, (ii) kinds of conditions treatable with antibiotics and appropriate therapies for bacterial infections; (iii) patient demands and preferences for treatment; (iv) fear of loss of economic incentives due to patient dissatisfaction arising from non-response to prescribed patient demands; (v) promotional pressures from pharmaceutical industries and (vi) wish to maximize profits. Inadequate drug supply infrastructure, inappropriate or outdated treatment guidelines, lack of access to correct clinical information and work environment factors also contribute in varying measure to inappropriate use of antibiotics by prescribers and dispenser. In developing countries, an acute shortage of qualified health care workers means that patients must rely on their own judgement or that of underqualified doctors, paramedics and other health care workers. Many drug dispensers are undereducated and underinformed. In a study undertaken in Vietnam in 1997, researchers discovered that more than 70% of patients were prescribed inadequate amounts of antimicrobials or the antimicrobials selected to treat proven bacterial infections were simply the wrong choice, while in Bangladesh, 50% of drugs

dispensed in one hospital unit were inappropriate³.

These problems are compounded by lack of control over pharmacies where drugs like ciprofloxacin are dispensed over the counter without authentic allopathic prescriptions. All these factors coupled together, lead to overuse of empirical broad-spectrum antibiotics. For example, every case of fever may not need antibiotics and basic investigations early in the course of fever with regular follow up to look for localizing signs and features of deterioration can go along way in rationalizing our overall antibiotic treatment. Unfortunately, when it comes to prescribing practices, hospitals sometimes unwillingly promote the type of irrational dispensing that contributes to drug resistance. If malaria is clinically suspected by a clinician, even today the practice is to begin with chloroquine, although other antimalarials are readily available and drug resistant malaria cases are known to occur. Out of the total *P falciparum* malaria cases reported in the India, 20-25% have various levels of resistance.

Economic Aspects of the Problem

Regardless of where drug resistance originates, globalization, increased travel and trade ensure that these strains quickly spread elsewhere. To combat this, countries are forced to spend more on antibiotics out of their health budget. The economic consequences of antimicrobial resistance can be staggering.

- For cases of nonresistant *Neisseria gonorrhoea*, genitourinary infections that respond to penicillin, tetracycline or sulfonamides, the cost per

course of treatment is less than US\$ 1, whereas in resistant cases treated with ceftriaxone, ciprofloxacin or spectinomycin, the cost may be as high as US\$ 7, depending upon the drug.

- Similarly treatment of nonresistant cases of pneumonia with sulphamethoxazole-trimethoprim, penicillin, amoxicillin and ampicillin costs US\$ 0.08, 0.21, 0.26 and 0.66 respectively, whereas treatment of methicillin-resistant *Streptococcus pneumoniae* with vancomycin costs US\$ 7, 11-90 times more than the nonresistant cases.
- For cases of adult shigellosis resistant to ampicillin, chloramphenicol, sulfamethoxazole-trimethoprim, tetracycline and nalidixic acid, the cost of five-day course of treatment with ciprofloxacin is US\$ 26.70. This is 86 times more expensive than treatment with sulfamethoxazole-trimethoprim (US\$ 0.31) and 10-11 times more so than treatment with ampicillin (US\$2.61) or nalidixic acid (US\$2.36).
- The cost of treating MDR-TB may be as high as US\$15 000 for an 18-month treatment regimen. In contrast, the first line anti-TB drugs needed for management of drug-susceptible TB cost as little as US\$11 for a six-month regimen.
- WHO estimated that if the cost of the treatment with chloroquine is one, it is 35-40 with quinine and other antibiotics in the developing world.

Indian Scenario

In India, use of antimicrobials is not strictly controlled in hospitals on the basis of policy and restriction and the use of these drugs in the community is of less priority. Many of the people including physicians and patients in India might be inadvertently contributing to the emergence of antibiotic resistance. Emergence of antimicrobial resistance has played havoc with various ongoing national programmes related to control of diarrhoeal diseases, tuberculosis, sexually-transmitted diseases, malaria and so on. In India, the past five years have seen 20% of isolates become resistant to ciprofloxacin, a relatively recent and expensive third line drug. Antimicrobial resistance has complicated the treatment of shigellosis since the 1940s. In the 1940s, sulfonamides were the drug of choice for the treatment of shigellosis, but early in the 1950s, resistance to sulfonamides among *Shigellae* become widespread. Tetracycline was then an effective drug in treating adults and children with shigellosis, but during the 1960s, tetracycline resistance became prevalent. Ampicillin became the recommended drug of treatment for shigellosis cases of all age groups upto the mid 1970s, by which time, 90% of *Shigella* strains became resistant to ampicillin in many areas. Trimethoprim-sulfamethoxazole was then the preferred drug, but increasing resistance to this drug later on led to the use of nalidixic acid in the treatment of shigellosis. Currently, treatment of shigellosis caused by multidrug resistant strains of *Shigella dysenteriae* type¹ is a great problem throughout the world because of development of resistance by the shigella strains. Luckily, there were newer drugs coming up every few years which were effective and could be employed to treat

multidrugresistant shigellosis, salmonellosis, gonorrhoea, etc. But for some diseases like malaria, things came to a dead end after the emergence of drug -resistant strains because of dearth of any new drugs that could be offered to these patients.

In 1990, almost all cholera isolates in New Delhi, India were sensitive to cheap first line drugs like furazolidone, ampicillin, cotrimoxazole and nalidixic acid. Now, formerly effective drugs are largely useless in the battle to contain cholera epidemics. Control of tuberculosis, which is a major public health problem in India, has been complicated by the emergence of drug-resistant strains. The current threat is due to the emergence of strains resistant to the two most potent anti-TB drugs i.e. isoniazid and rifampicin. There has been no increase in the prevalence of initial drug resistance in India over the years (Table 1); however, relatively high prevalence of acquired resistance has been reported from parts of Gujarat, Wardha, New Delhi, Raichur and North Arcot districts (Table 2). The magnitude of drug resistance problem in India to a large extent is due to acquired resistance. The prevalence of MDR-TB has been found to be at a low level in most of regions of India. The low level of resistance to isoniazid and streptomycin with 5-10% and 2-11.4% respectively and with a nil resistance to rifampicin observed in Indian children really indicate that there is apparently no alarming increase in the incidence of MDR tuberculosis. New drugs for tuberculosis are unlikely to come up in the near future; hence the key to success remains adequate case finding, prompt and correct diagnosis and effective treatment of infective patients for prevention of drug resistance.

Table 1. Summary of studies on initial drug resistance among *M.tuberculosis* isolates in India ⁽¹⁾

S. No.	Location	Period	No. of isolates	Any resistance (%) to				
				S	H	R	SH	HR
1	9 centres-ICMR I	1964-65	1 838	14.7	12.5	ND	6.5	ND
2	9 centres-ICMR II	1965-67	851	13.8	15.5		NA	ND
3	GCI-SH, Chennai	1976	254	14.2	15.4	ND	4.7	ND
4	Bangalore	1980s	436	5.7	17.4	3.0	3.9	1.1
5	Wardha	1982-89	323	14.9	21.4	8.0	8.0	5.3
6	Gujarat	1983-86	570	7.4	13.8	0.0	4.2	0.0
7	Bangalore	1985-86	588	4.8	17.3	2.9	3.0	1.4
8	North Arcot	1985-89	2 779	11.6	21.3	1.7	8.0	1.6
9	Pondicherry	1985-91	1 841	8.1	10.8	1.0	3.7	0.8
10	Kolar	1987-89	292	5.1	32.9	4.4	4.1	3.4
11	Raichur	1988-89	244	11.4	19.3	3.3	6.6	3.3
12	North Arcot*	1989-90	241	-	12.9	2.5	-	1.7
13	North Arcot*	1989-98	747	-	19.0	11.8	-	4.4
14	Jaipur	1989-91	1 009	7.6	10.1	3.0	1.7	0.9
15	New Delhi	1990-91	324	ND	18.5	0.6	ND	0.6
16	Military Hosp. Pune	1992-93	473	8.2	3.2	4.0	2.1	1.0
17	Tamil Nadu State	1997	384	6.8	15.4	4.4	4.4	3.4
18	North Arcot**	1999	282	12.4	23.4	2.8	8.5	2.8
19	Raichur**	1999	278	7.2	18.7	2.5	4.0	2.5

*Tuberculosis Research Centre, unpublished findings

**Tuberculosis Research Centre, interim results (to be published)

Table 2: Summary of studies on acquired drug resistance among *M.tuberculosis* isolates in India⁽¹⁾

S.No.	Location	Period	No. of isolates	Any resistance (%) to		
				H	R	HR
1	Gujarat	1980-86	1 574	47.7	28.3	
2.	Gujarat	1983-86	1 259	15.5		ND
3.	Wardha	1982-89	302	47.0	12.6	9.6
4.	North Arcot	1988-89	560	67.0	12.0	10.9
5.	Raichur	1988-89	111	52.3	17.1	17.1
6.	New Delhi	1990-91	81	60.5	33.3	33.3
7.	Tamil Nadu (4 dts)	1996	162	-	-	20.3
8.	Tamil Nadu State	1997	16	(50.0)*	(25.0)	(25.0)
9.	North Arcot	1999	16	(81.00)	(69.00)	(69.00)
10.	Raichur	1999	11	(100.00)	(100.00)	(100.00)

Resistance to single and multiple drugs have been reported from various parts of the country. Prevalence of MDR-TB ranges from 0-6%. Primary MDR-TB is believed to be less than 3.2% and acquired MDR-TB less than 6%. Data available from longitudinal studies indicate a gradually rising trend. In a multicentric study carried out by INCLIN in India, it has been shown that large number of *S. pneumoniae* isolates from urban settings were resistant to chloramphenicol, when compared against isolates from rural settings. Prevalence of chloramphenicol resistance was shown to decline from 24% (1994) to 3% (1996). Similar trends have been reported in an isolated study done for *Salmonella typhi*. This could be accounted for due to lower prescription of chloramphenicol by physicians owing to most microorganisms becoming resistant to this particular drug. In India, no systematic surveillance is being done at the national level to gauge the extent and trend of drug resistance in the country. The studies conducted so far have made clear the necessity for systematic and judicious action to curb the induction of antimicrobial resistance in India.

Controlling Antimicrobial Resistance

There are two ways of fighting development and spread of resistant bacteria. The first is to reduce the use of antimicrobial agents to decrease selection of resistant bacteria. About 85-90 percent of antibacterial drugs are used in the community and upto 80% of these are used to treat respiratory infections. Thus major efforts have to be targeted on diagnosis and treatment of respiratory tract infections in the community. Sales of antibiotics over the counter without prescription should be stopped. Statistics on

the use of antimicrobial agents (including sales over the counter) are of key importance for changing prescription patterns, but at present are available only in some countries. We also need to know the patterns of prescription of antibacterial agents in different infections to identify where clinical practice needs to be improved. Since 80% of patients in India seek medical help from private practitioners, it is essential to involve private practitioners in this kind of initiative. Better surveillance is needed to understand and document the interplay between antibiotic use and resistance to devise initiatives to decrease unnecessary prescribing and prolong usefulness of existing antibiotics. Establishing such surveillance presents several problems. It is easy to count resistance rates of bacteria received at laboratories, but these organisms form a biased sample, because (a) laboratory requesting varies greatly among clinicians; (b) some diseases (such as chronic obstructive respiratory diseases) are more likely to generate laboratory specimens than others (pneumonia); (c) some age groups, particularly the elderly, are more likely to have specimens taken than others, and (d) primary case specimens are usually sent only from patients who have failed to respond to empirical treatment. Ideally, resistance should have clinical denominator (number of infected patients) not a laboratory one (number of isolates), but this is not easy except in uncommon diseases. Also, what has been lacking is cross testing of data gathered by different approaches and relating it to prescribing data. Such cross validation is an attractive strategy for comprehensive surveillance; if centralized surveys with high quality microbiology confirm the trends in routine data, then greater confidence can be placed in these routine data sets, which are sufficiently large

for relating to prescribing data. Many countries are currently grappling with these challenges, as there is no internationally agreed consensus on standards for surveillance of antimicrobial resistance (e.g. priority pathogens, surveillance methodologies, minimum data, data sharing or exchange and data analysis or interpretation). A clear vision of minimum surveillance standards that should be in place is critical and much could be learned from sharing experiences between countries.

Owing to considerable logistical difficulties in implementation and evaluation, there have been only a few studies of the effectiveness of measures to control resistance in community-acquired pathogens. The best known of these studies is the reduction in the use of macrolides (such as erythromycin) in Finland in the 1990s, which was cited as the cause of a 50% reduction in the proportion of group A streptococci in that country that were resistant to macrolides⁵. The temporal sequence of changes in macrolide use and resistance raises some questions about the cause-effect relationship in this study, but if one attributes the observed decline in resistance to the intervention, then the approximate time scale of that decline is of the order of five years. A similar attempt was made in Iceland to control the spread of a highly successful penicillin-resistant clone of *Streptococcus pneumoniae* by curtailing the use of β -lactam antibiotics. In this case, penicillin resistance declined by over four years⁶. The dynamics of highly successful clones, which can be driven by factors other than antibiotic use, could also complicate interpretation of changes in resistance, particularly in the latter case⁷. Perhaps the most pessimistic is the recent finding that almost complete cessation of sulphonamide use in UK during the 1990s

was accompanied by a small increase in the prevalence of resistance to this class of drugs in *Escherichia coli*. A likely explanation is that plasmids containing sulphonamide resistance determinants also contained genes encoding resistance to other antibiotics, whose continuing use during the study period maintained selection for multi-resistance plasmids⁸. Taken together, these limited data suggest that interventions to control antimicrobial use could in certain cases, result in declines in resistance, with moderate success. Interventions to control resistance in hospital-acquired infections have been studied much more frequently and provide an illuminating contrast to interventions directed against resistant community-acquired infections. In several cases, the prevalence in hospital-acquired infections has declined substantially (by more than half) within weeks or months following implementation of control measures, which often include both changes in antibiotic use policies and interventions to reduce transmission of bacteria within hospitals.

International surveillance of antimicrobial resistance depends on a strong national surveillance system which is difficult to achieve in developing countries owing to the scarcity of diagnostic facilities in laboratories. The future priority must be to improve laboratory infrastructure in developing countries. This will not only benefit individual patients, but will also provide early warning of emergence of resistant isolates and surveillance data on trends.

Besides strengthening surveillance to reduce antibiotic consumption, we need a multifaceted approach that includes education of doctors, widely accepted recommendations for good clinical diagnosis

and treatment and follow-up of compliance with such guidelines. Development of clinical practice guidelines must be supported by other educational activities, as multifaceted interventions tend to be more effective than single interventions⁹. Formal continuing medical education conferences and distribution of printed materials have little impact on doctors' behaviour unless reinforced by other strategies^{9,10}. These and other activities, however, may enhance the adoption of clinical practice guidelines if they are actively promoted to clinicians and endorsed by opinion leaders in each community.

Educational interventions for patients and parents at outpatient clinics must be an important component of public education campaigns. In order to increase public understanding of antibiotic resistance and to change expectations about the use of antibiotics, the key elements should include a public relations campaign, clinic-based education and community outreach activities. For example, education and information can be disseminated through community organizations, schools, child care centres and pharmacies. All interventions must be supported by national and local policies that promote judicious antibiotic use.

Interventions to contain antimicrobial resistance

- Training of prescribers and dispensers, and use of guidelines and formularies;
- Establishing infection control committees guidelines for antimicrobial use, and surveillance of antimicrobial use in hospitals;
- Developing national drug policies, essential drugs lists and standard treatment guidelines, and
- Ensuring undergraduate and post-graduate training on antimicrobial resistance in medical schools.

Conclusion

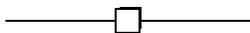
Increase in bacterial resistance entails increases in direct health care costs that India can ill afford, for example, increased mortality, morbidity and decreased productivity due to absence from work. The existing situation demands the prudent use of antimicrobials. Given this fact, it is clear that inappropriate or imprudent use of antimicrobial agents should be discouraged at all costs, especially for prophylactic purposes and in settings where the likelihood of infections is low. Effective, systematic and judicious efforts are needed to curb the evolution of antimicrobial resistance in India and other developing countries. Efforts made in this direction to advocate rational drug use, continued active surveillance of resistance, studies of newer mechanisms of resistance formulations and implementation of clear hospital policies and antibiotic use will go a long way in tackling the problem of drug resistance. We need to use our resources carefully to widen access to appropriate medications to encompass all people, regardless of race, gender or socioeconomic status, while at the same time reserving compounds to treat only those diseases for which they are specifically required. It is also critical to establish national surveillance systems which can detect and respond to antimicrobial

resistance at an early stage. The problem of drug resistance is not just a problem of the health sector any more, but it has enormous social and economic dimensions. The current situation demands a more focussed approach in this direction. This can be

achieved by bringing the policy-makers, representatives of funding agencies and community health workers on a common platform and then designing an effective and feasible strategy to combat this menace.

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Communicable Diseases

A Million Smiles: Eliminating Leprosy in South-East Asia

Than Sein* and Kyaw Lwin**?

Leprosy patients are humans with eyes seeing others smiling and laughing, with ears hearing jokes and laughter, and with faces that could smile and laugh, but who never laugh or smile once they have acquired the disease. Now with multi-drug therapy, they are smiling and laughing like others.

- Excerpts from "Thitsar Yaysin [Holy Truths]" by Chit San Win#

Introduction

Leprosy is a disease recognized globally as a dreadful illness associated with the great social, mental, and physical suffering. In ancient days, people knew leprosy as "Kushtha" as it was termed in Sanskrit. The disease is supposed to be originated in India and spread around the world over 2 500 years ago.¹

For centuries, people believed that there were many causal factors for leprosy, even of genetic origin. Leprosy patients and their families had to leave their homes and stay in

far-away, isolated places. Many countries made laws to keep patients away from public places and isolated them in leprosy asylums, sanatoriums or hospitals (leprosaria) or colonies. According to early records, there were more than 19 000 leprosaria all over Europe in 1 200 AD. Before the discovery of treatment, only dedicated persons capable of a great deal of perseverance and missionary spirit could provide care to the leprosy patients and their families.

Dr Gerhard A Hansen, a Norwegian pathologist, proved in 1873, the presence of rod-shaped bacteria in leprosy patients. Albert Neisser of Breslau later confirmed the presence of this bacteria in 1879 by employing staining techniques developed

1 Noordeen SK, *The epidemiology of leprosy*. In: Hastings RC, ed. *Leprosy*, London Group Ltd, 1985, 15 - 30

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**Retd. Deputy Director-General of Health, Yangon and National Leprosy Consultant, Department of Myanmar

Chit San Win, *Thitsar Yaysin (Holy Truths)*, Yangon 1999

by Robert Koch of Germany. Around the same period, people did not believe the arguments made about leprosy that bacterial infection transmitted by nasal secretions caused the disease. The First International Leprosy Conference held in Germany in 1897 concluded that leprosy was incurable.² Dr Hansen's portrait appeared on stamps of many countries celebrating World Leprosy Day in 1964 and the 100th anniversary of the discovery of the leprosy bacillus.

The only treatment given to leprosy patients in those days consisted of chaulmoogra oil extracted from the seeds of Kalaw tree, *Taraktogenos kurzii* or *Hydnocarpus kurzii*, which originated in South-East Asia. This oil given as an injection, though not curing the disease, arrested the progress. An Egyptian stamp issued in March 1938, commemorating the First International Congress on Leprosy in 1897, showed a branch of chaulmoogra with leaves and flowers. The chaulmoogra tree also featured on a Fiji stamp of 1970 in honour of the closing of the Makogai Leprosy Hospital.³

Scientists at the US Public Health Service Hospital in Carville, Louisiana, USA developed the first effective drug for treating leprosy-called Promin in the mid-1940s. Within a few years, an oral drug made from a related chemical - a sulphone-based drug called as dapsons (DDS or diamino-diphenyl sulphone), replaced the painful daily Promin injections. Later, various clinical trials proved the effectiveness of dapsons in a single dose

of 50-100 mg daily for several years. Dapsons became the drug of choice in arresting the progress or in curing the disease.⁴ Mass treatment with oral dapsons for all leprosy cases became the standard intervention for leprosy control and many countries applied this strategy quite vigorously.

After extensive use of mass treatment with dapsons for a few decades, the number of leprosy cases in many endemic countries dropped significantly. Some countries even closed down sanatoriums and hospitals due to lack of patients. This brought the first real hope of curing leprosy in all endemic countries.

Leprosy is a chronic infectious disease caused by *Mycobacterium leprae*, which mainly affects the skin and peripheral nerves, and, if left untreated, can cause permanent damage to the nerves, eyes, and other organs. The disease has two main clinical features. One is the paucibacillary type, a relatively mild form of the disease, characterized by the pale or reddish coloured, flat, or raised skin patches with a definite loss of sensation. The other is multi-bacillary type which is known to be more infectious and is associated with symmetric skin lesions, nodules, plaques and damage to multiple peripheral nerve trunks resulting in deformities developing in the limbs and face.

Multibacillary leprosy patients constitute about 30-50% of the total leprosy cases. The mode of transmission remains uncertain, but the most probable mode of spread from person to person is primarily through nasal

² WHO, Action Programme for Elimination of Leprosy, Status Report 1996 [WHO/LEP/96.5]

³ Tom Wilson, *Unclean! The Leper on Stamps* [<http://www.philatately.com/philatately/leprosy.htm> access on 22/2/02]

⁴ Kyaw Lwin & B. Zuiderhoek, *Leprosy control in Myanmar*, Netherlands Society of Tropical Medicine, 1997

droplets and close skin to skin contact. Majority of the newly detected leprosy cases are skin smear negative and can be regarded as non-infectious. The disease can affect all age groups and both sexes, but commonly affects people in their most productive years, usually around 20-30 years. Many patients at the time of diagnosis feel that they would never be able to smile again and would have to live in isolated places.⁵

The severe stigma attached to the disease poses social problems not only to the patients, but also to their families and the community. The stigma actually makes people try to conceal the early signs and symptoms of the disease, which in return leads to further worsening of the disease resulting in more significant disability later. Because of the deformities and disabilities seen in some of the patients and the social stigma associated with the disease, a considerable burden is being imposed on the family members and community. The disease does not kill but is capable of causing permanent and progressive physical disability and consequent psychological damage, if not diagnosed early and treated properly. In the past, due to patients being unable to obtain proper treatment from the health services, the affected persons were usually stigmatized leading to shame, anxiety, and a lack of self-confidence that often results in self-isolation and even suicide.

Nowadays, advancements in chemotherapy, early diagnosis, and treatment can stop the spread of infection and cure the disease. Those who contract leprosy can now happily lead completely

normal lives. Under the strategic framework of the World Health Organization (WHO), many endemic countries introduced leprosy elimination programmes in the early 1990s with significant progress in reducing the burden of disease and in controlling infection. People became aware that early diagnosis and treatment with Multi-drug therapy (MDT) which is available at the nearest health facility could cure the disease and prevent disabilities. The people have been empowered with the knowledge and resources to get rid of this age-old scourge. Millions can now have big smiles on their faces. HOW?

Leprosy Control

The reservoir of leprosy in the Region in the early nineteenth century was enormous. The estimates in the number of cases in the late 1940s were over a million in India, 80 000 in Indonesia, 110 000 in Myanmar, 4 000 in Sri Lanka and 100 000 in Thailand. Similar large number of leprosy cases prevailed in Latin America, Africa, other parts of Asia and the Pacific. The countries of WHO South-East Asia Region made a request to WHO at the Second World Health Assembly in 1948, to address the problem on a global scale. The first WHO Expert Committee on Leprosy held in Brazil in 1952 confirmed that leprosy was not a highly infectious disease and that the use of dapsone through ambulatory and domiciliary treatment could cure the disease with limited temporary isolation.⁶ In the same year, Brazil issued a stamp with a portrait head of Fr. Joseph Damien de Veuster (1840-89), a Belgian priest, who had devoted his life to a leper colony on the

⁵ Tin Myint et al, A comparative KAP study of leprosy patients and members of the community in Hlaing and Laung-Lon townships, *Leprosy Review*, 1996 67: 18-27

⁶ WHO, Fortieth Anniversary Volume (Revised), 1992, WHO-SEARO

island of Molokai, Hawaii, USA and a slide of leprosy bacilli.

Based on the recommendation of the first WHO Expert Committee, most endemic countries started establishing national leprosy control campaigns, or specialized vertical disease control programmes, with technical and financial support from WHO and other development partners including international NGOs. The main disease control strategies included: a) active intensive case finding through mass population surveys, contact tracing and school surveys; b) domiciliary treatment with dapsone for all types of cases, at least for a minimum period of five years and in some cases for life; c) case-holding and release from control, and d) education campaigns.

While all endemic nations were embarking on the above mentioned control activities, there were several technical and operational problems which were impeding progress. These were related to the number and distribution of cases, various types of clinical manifestations, poor understanding of infection and its underlying disease immunology, lack of a sensitive and specific laboratory test for diagnosis, criteria for release from control and proper management of complications.

Leprosy is one of the principal tropical diseases, addressed by the UNDP/World Bank/WHO Special Programme for Research and Training in Tropical Disease (TDR). Since the 1960s, WHO and TDR advocated and coordinated many clinical and health services research studies on leprosy. Most endemic countries were involved in field trials on vaccines and chemotherapeutics for leprosy. One well-known study on leprosy was a "BCG and Leprosy Trial" in Myanmar,

Malawi, Uganda, New Guinea and India in the 1960s-70s to determine the possible role of BCG vaccination in the prevention of leprosy.⁷ The results showed that the effect of BCG vaccination varied from one study to the other.

WHO's rifampicin trial conducted in Myanmar from 1976 to 1983 in the same geographical areas of the "BCG and Leprosy Trial" showed successful treatment results with remarkable reduction of new cases and good clinical and bacteriological improvement of infectious cases.^{8,9} Similar studies done in India, Thailand and other countries within and outside also showed the successful use of combined therapy of rifampicin, dapsone and other drugs.

While many countries recorded gains in controlling the disease with considerable reduction of the case load in the 1970s, there were several operational problems. These included inadequate provision of drugs to ensure regular treatment to all registered cases, the poor attendance of patients at leprosy special clinics or primary health care facilities resulting in low cure rates, and weak case finding activities and poor case management. Despite the limited education campaigns, the social stigma towards the disease did not change as expected, thus hampering the early detection and treatment of cases.

⁷ Kyaw Lwin et al, BCG Vaccination of Children Against Leprosy Problems and its Results over a 25 year period, 1948-1973, WHO Bulletin 63 (1985) 1069-1078

⁸ Kyaw Lwin et al, Rifampicin Trial in Upper Myanmar, Report of WHO-SEARO Research Grant, 1976-1984 (Unpublished)

⁹ Ko Ko, Kyaw Lwin and U Thauung (ed.), Conquest of scourges in Myanmar, Myanmar Academy of Medical Science, 2002, Yangon, p144

Despite intensive efforts carried out for over five decades, the number of leprosy cases had gone up steadily globally. The prevalence increased from 8.4 cases per 10 000 population in 1966 to 12 cases per 10 000 population in 1985. In the South-East Asia Region, leprosy remained a major public health problem with millions of people suffering from this dreadful disease. Out of a total of 10-12 million cases globally, the Region accounted for around 50% of this, with India having an estimated 4 million cases (See Table 1 below).

Table 1. Leprosy Cases in WHO South-East Asia, 1987

Country	Estimated cases	Registered	Percentage
Bangladesh	150 000	34 328	23.0
Bhutan	10 000	5 000	50.0
India	4 000 000	2 600 000	65.0
Indonesia	233 000	115 000	49.6
Maldives	2 000	1 677	83.8
Myanmar	700 000	275 377	39.3
Nepal	100 000	33 159	33.1
Sri Lanka	14 000	112 666	80.5
Thailand	140 000	115 758	82.6
Total	5 349 000	3 192 134	60.0

Source: WHO Fortieth Anniversary Volume (Revised), 1992, Table 42

While millions of leprosy patients were identified and registered for treatment, many of them (ranging from 30-90 percent) were not able to receive treatment regularly due to either lack of drugs or inaccessibility. Irregular and intermittent treatment with a single drug, dapsone, for a longer period, led to the development of the dapsone-resistance. Six highly endemic countries in the Region reported increasing number of secondary drug resistance with dapsone. In addition, some endemic countries reported primary dapsone-resistant leprosy cases.

During the late seventies and eighties, with the strengthening of basic health services and introduction of primary health care concept and principles, many countries attempted to integrate the specialized vertical disease control programmes like immunization, malaria, tuberculosis and leprosy control programmes into the general health services. Due to the complexity of specific control strategies for major endemic diseases like leprosy, malaria, tuberculosis and other vaccine preventable diseases, there were many operational issues. A lot of resistance to fully integrate the specialized disease control services into basic health services was observed from both sides. The mode, pace and degree of integration therefore varied considerably from country to country. While Thailand, Sri Lanka, and Myanmar were able to integrate leprosy control activities as part of their general health care systems in the eighties, India and Nepal initiated integration in the late nineties.

While the endemic countries in the Region were struggling to control leprosy with intensive case findings and treatment with dapsone, WHO in collaboration with other international agencies, tried to develop a tool for primary prevention, i.e. a vaccine of good immunological potency. The International Research Network on Immunology of Leprosy (IMMLEP), which was part of WHO-TDR, conducted a series of field trials with a few candidate leprosy vaccines. This, however, did not yield favourable results compared to the achievements made in reduction of cases by the strategy of case finding and treatment with dapsone. Future advances in molecular biology and genomics may open possibilities for second generation vaccines or appropriate drugs. However, this needs a lot of resources and investment in new technology.

Leprosy Elimination

During the mid-seventies, countries started integrating vertical leprosy control activities into basic health services. At the same time, many endemic countries initiated clinical field trials on combined chemotherapeutic regimens, especially to combat dapsone-resistant strains, with the support of WHO-TDR and the Scientific Working Group on Chemotherapy of Leprosy (THELEP). Based on the scientific findings and with the increasing problem of dapsone-resistant, WHO, in 1981, recommended the Multidrug Therapy (MDT) regimen as the standard treatment for all leprosy patients. Initial responses from national control programmes on this recommendation ranged from guarded optimism to outright condemnation. However, due to very encouraging results of MDT demonstrated in many national programmes, more countries adopted the WHO recommendation. WHO Multidrug Therapy (MDT) regimen means:

- (1) Treatment of paucibacillary (PB) adult cases with a standard two-drug combination of dapsone 100 mg daily and rifampicin 600 mg once a month for six months (six PB-MDT blister packs), and
- (2) Treatment of multibacillary (MB) adult cases with a standard three-drug combination of dapsone 100 mg daily rifampicin 600 mg once a month and clofazimine 300 mg once a month and 50 mg daily for twelve months (12 MB-MDT blister packs).

With the concerted efforts of WHO and international NGOs, leprosy endemic countries started recognizing the high efficacy of the MDT regimen for the treatment and cure of the disease and the gravity of the

problem of dapsone-resistance. All those diagnosed with leprosy, irrespective of early or late stages, could be appropriately treated and cured within six to twelve months.

Some countries introduced the MDT regimen as early as 1982 as part of their national control programme, while some introduced it later. Majority could not implement due to the heavy investment required for drugs and logistics. With WHO's persistent advocacy, the Nippon Foundation (and the Sasakawa Memorial Health Foundation) of Japan, Novartis of Switzerland, the World Bank and other bilateral and multilateral international agencies, and international and national NGOs, joined as global alliance partners to eliminate leprosy. This enhanced partnership has led to all endemic countries being able to provide MDT to all patients free of charge within a short period.

Curing leprosy was not the challenge, but searching and treating leprosy patients in all corners of the world became a challenge for national health authorities. All endemic countries acknowledged the success in reducing the cases, especially infectious ones through expanded coverage of MDT regimen. The countries declared their commitment at the Forty-fourth World Health Assembly in May 1991, by adopting a resolution (WHA44.9), stating that they would promote the use of all control measures including MDT, together with case-finding, in order to attain the global elimination of leprosy as a public health problem by the year 2000. Elimination of leprosy means "reducing the prevalence of leprosy cases to a level below one case per 10 000 population".

Elimination of leprosy as a public health problem within a certain target date is

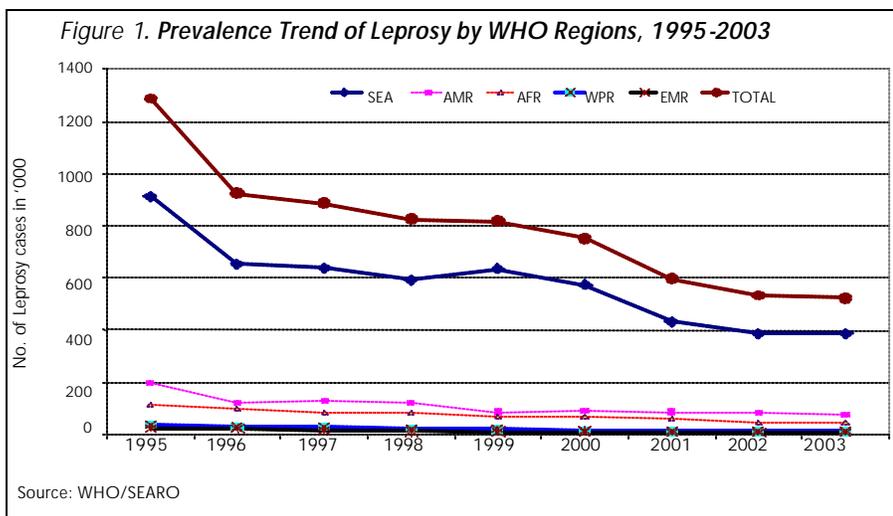
possible due to the following unique opportunities:

- (1) *an epidemiological opportunity*, the current leprosy burden is a result of new cases accumulated over several years and even decades. The burden has decreased tremendously during the last decade due to early case detection and treatment regularly with appropriate drugs;
- (2) *a technological opportunity*, the MDT regimen is highly effective in interrupting transmission and curing the disease;
- (3) *a political opportunity*, there is a strong political commitment in all leprosy endemic countries; and
- (4) *a resource opportunity*, a number of national and international development partners and NGOs are committed to support leprosy elimination efforts.

However, such opportunities may not last for long and thus, WHO and its Member States have set the *time-bound target*, in order to make concerted efforts during a limited period.

The soundness of the current strategy (controlling the disease by massive case finding and management with MDT regimen for all registered cases) is evident (see Figure 1).

At the beginning of 2001, globally the total number of cases dropped tremendously to a level of below one case per 10 000 population in 122 endemic countries. The prevalence of leprosy reduced tremendously by 90% globally, from around 5.5 million cases to less than 0.6 million at the end of 2000.¹⁰ In the South-East Asia Region, the number of registered patients dropped from 3.7 million in 1985 to about 385 000 in April 2003. This number is still the highest among all WHO Regions.

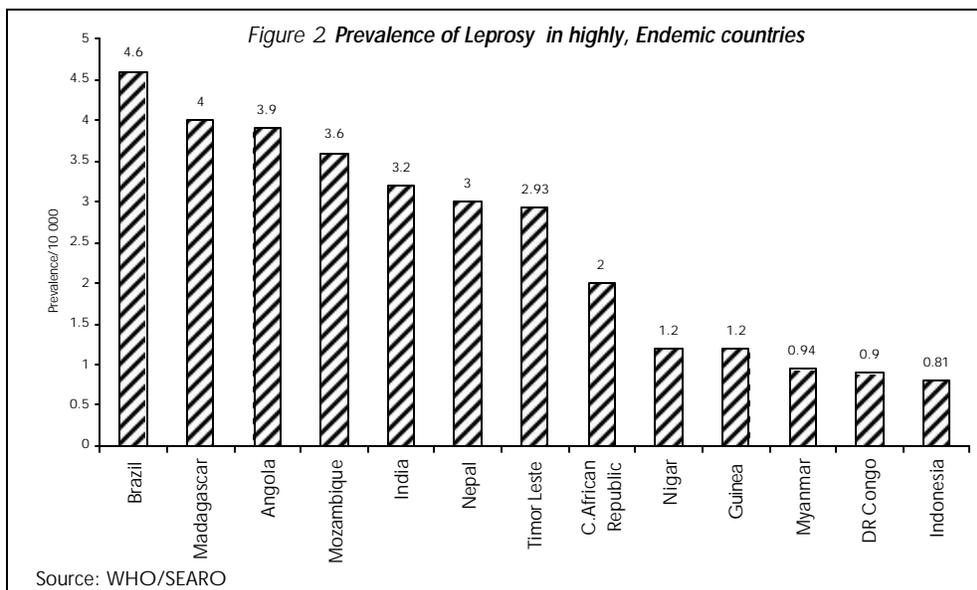


¹⁰ WHO, Leprosy Status Report, 2001 WHO Geneva 2002

Of the 13 highly endemic countries globally (see Figure 2), three from this Region- India, Nepal and Timor-Leste – have leprosy prevalence of around three per 10 000, whereas Myanmar and Indonesia have reached below one per 10 000 population by early 2003.¹¹ With intensive control efforts, since 1982 cumulatively, over 11 million leprosy patients were cured and discharged by end 2002. The total number of registered leprosy cases in early 2003 is about 385 500 with the estimated prevalence rate of 2.46 per 10 000 population. Comparatively, China reached the global elimination target at the national level in 1981, at the provincial level in 1992, and at the county/city level in 1996. In 1998, the prevalence of leprosy (active cases only) of 0.049 per 10 000 population in China was significantly lower than that at the global level (1.67 per 10 000 population).¹²

Bangladesh, Bhutan, Indonesia, Maldives, Myanmar, Sri Lanka, and Thailand, having achieved the national elimination goal, are now working towards achieving sub-national elimination. The factors contributing to achieving the global goal in many countries included:

- Integration of vertical leprosy campaign activities into the general health services;
- Effective collaboration and partnerships with NGOs, service organizations, media and key community groups;
- Effective implementation of case detection, treatment and case holding activities;



¹¹ WHO Special Ambassador's Newsletter, No.2, June 2003

¹² Xiang-Sheng Chen et al, Leprosy in China: epidemiological trends between 1949-1998, *WHO Bulletin*, 79 (4)(2001) 306-312

- Special initiatives like Leprosy Elimination Campaigns (LECs) and Special Action Projects for Elimination of Leprosy (SAPEL)
- Strong political commitment and mobilization of adequate resources by Member Countries; and
- Technical and financial support from WHO, the World Bank and other international and national NGOs.¹³

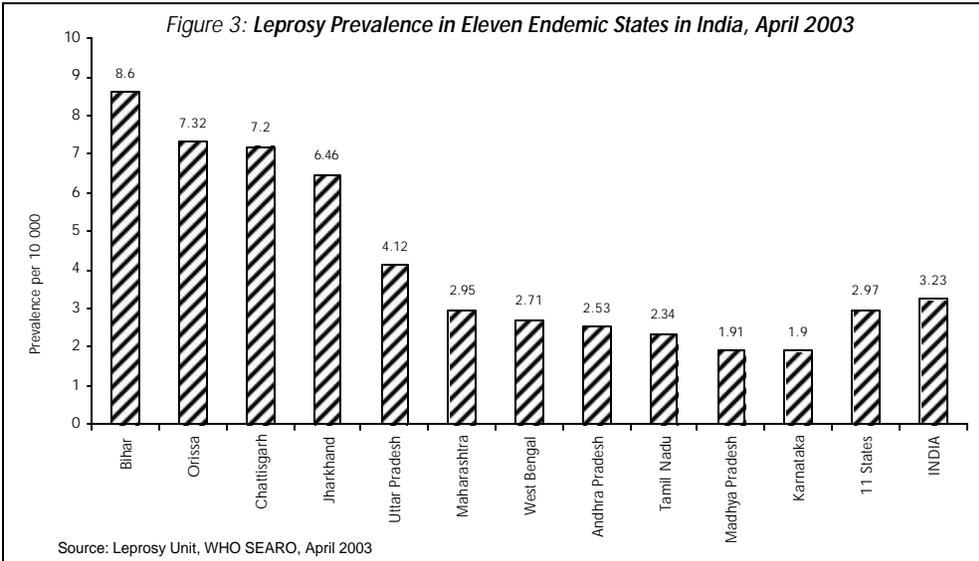
India, Nepal and Timor-Leste, who are yet to achieve the national elimination target, are mounting massive efforts for leprosy control. India had around 345 000 cases by April 2003. Nepal reduced its prevalence

from 24 000 cases in 1985 to 7 300 by mid-2003. Timor-Leste still has 250 registered leprosy cases as of April 2003 (See details of leprosy situation in Table 2).

India alone represents around 60% of prevalence of the leprosy case-load and 75% of new cases world-wide. Most leprosy cases concentrated in 11 endemic States, including Bihar, Orissa, Chhattisgarh, Jharkhand and Uttar Pradesh where the prevalence rate is over 4 per 10 000 population (as shown in Figure 3). It also highlights that without effective control activities in these areas, it might not be able to reach the global elimination target.

Table 2: Leprosy Situation in SEA Countries, April 2003

Country	Population in 1 000	Registered leprosy cases	Prevalence rate/ 10 000	Newly detected cases in 2002	NCDR/ 100 000	Cumulative cured with MDT since 1982	Year reaching elimination
Bangladesh	129 248	8 143	0.63	9 844	7.62	140 440	1998
Bhutan	659	33	0.50	13	1.97	940	1997
India	1 067 482	344 377	3.23	473 658	44.37	10 383 038	2005
Indonesia	207 840	16 837	0.81	12 377	5.96	257 690	2000
Maldives	270	19	0.70	29	10.74	1 163	1996
Myanmar	52 827	4 965	0.94	7 386	13.98	226 698	2003
Nepal	24 154	7 291	3.02	13 830	57.26	94 448	2005
Sri Lanka	19 086	1 639	0.86	2 214	11.60	34 534	1995
Thailand	61 879	1 905	0.31	1 000	1.62	56 561	1994
Timor-Leste	849	249	2.93	281	33.10	N.A.	2005
SEA Region	1 564 294	385 458	2.46	520 632	33.28	11 195 512	2005



Elimination Efforts

In order to expand coverage and reach out to leprosy cases, both in rural and urban areas, all highly endemic countries have adopted the special campaigns, called "Leprosy Elimination Campaigns" (LEC) since 1995. The aim of LEC was to improve peripheral health services and provide leprosy patients with easy access to diagnosis and treatment. It aimed to access leprosy cases who for various reasons were not detected and/or did not have access to regular treatment. LEC was a short-term concerted effort covering relatively large population groups and involving the maximum number of health workers through a combination of three strategies. These included: (i) promoting community awareness and involvement in leprosy control activities; (ii) improving and strengthening the capacity of basic health services and leprosy workers in improving case detection and in management of cases with MDT; and (iii) expanding coverage of case finding and management with MDT.

Over 30 countries have implemented LEC during the last few years, covering more than a billion people. India, Nepal, Bangladesh, Indonesia, and Myanmar successfully conducted LEC during 1998-2001 covering nearly a billion people, during which over a million new cases were detected and treated. Through LEC initiatives, countries launched community awareness and mass media campaigns, including organizing the National Leprosy Days/Weeks. With these efforts, the number of new registered cases increased including the proportion of voluntary submission. LEC actually contributed the observed increase in annual rates of case detection. While the purpose of LEC is to get more cases treated, the global study showed a significant decline in case detection trends after repeated LEC.¹⁴

¹⁴ WHO, *Leprosy elimination campaigns: impact on case detection* WER, No.3, 2003 78, 9-16

In order to reach usually underserved and difficult-to-access areas, especially people living in conflict-affected areas, some endemic countries introduced the "Special Action Projects for Elimination of Leprosy (SAPEL)", with full support from the national and state governments and international partners. Because of specific local circumstances such as ethnicity, tribal culture, geographical inaccessibility, rapid migration, and fluid movement of people around border areas, many endemic countries organized joint collaboration, involving the community, NGOs, and private health services, or through joint action between the neighbouring countries at border areas.

The aim of SAPEL is to find undiagnosed and untreated cases living in difficult underserved or unserved areas, where the general health services infrastructure is inadequate. SAPEL promoted the self-reliance and self-help by utilizing locally trained health workers (community volunteers) and local chiefs. Though the number of new cases brought through SAPEL was limited, it served an important role in bringing health care to the underserved people. Many countries piggy-backed SAPEL with essential health packages, like polio and routine EPI immunization, health education and the provision of primary health care services.

Building Partnerships

One reason for the rapid progress towards achieving the leprosy elimination goal is the commitment made by WHO, the Nippon Foundation and the Novartis for providing the necessary drugs free of cost. During 1995-1999, WHO provided all MDT drugs, free of cost, to over 70 countries utilizing the over US\$ 50 million Drug Fund, donated by the Nippon Foundation. WHO utilized this

Drug Fund to purchase the necessary MDT drugs from commercial providers and to ship them to the endemic countries. WHO reached an agreement in late 1999 with the Novartis, who in turn agreed to provide MDT drugs free of cost to all countries in need, up to the end of 2005. Novartis has also committed to provide all freight and handling costs to the port of entry. WHO worked closely with Novartis for planning the annual production, distribution and procurement on behalf of all leprosy endemic countries.

WHO started providing the MDT drugs in blister packages to all endemic countries since 1995. In 2001, 60 endemic countries received over 4 million blister packs of MDT drugs from WHO. The Nippon Foundation supported leprosy control activities in the areas of training, integration, LEC and SAPEL, monitoring, and evaluation. In addition, other international NGOs working in leprosy also supported the national programmes in elimination as well as prevention of disabilities and rehabilitation.

In pursuit of the global leprosy elimination goal, the governments of major leprosy endemic countries, WHO, and other development partners together formed the Global Alliance for Elimination of Leprosy (GAEL) in late 1999. Initial partners of this alliance included the governments of highly endemic countries, WHO, the Nippon Foundation, Novartis, the World Bank, the International Federation of Anti-Leprosy Associations (ILEP), and the Danish International Development Assistance Agency (DANIDA).

The main purpose of this global forum was to advocate the highest level of commitment to leprosy elimination, mobilize

resources, monitor progress, and actively bring in new partners to join the global elimination effort. GAEL organized its first meeting in New Delhi, India in January 2001. The Delhi Declaration, adopted at this very first meeting of the GAEL, endorsed the "Final Push" strategy to eliminate leprosy, emphasizing the need to provide leprosy services to all communities through existing general health services.¹⁵ GAEL held its second meeting in Brazil in February 2002 and the third meeting in Myanmar in February 2003.

The Final Push strategy endorsed at the GAEL meeting in New Delhi assigned the strategic directions for three different groups of countries.¹⁶ Countries under *Group 1* have to intensify special efforts for elimination. India, Indonesia, Myanmar, Nepal and Timor Leste were in this group. Countries where the elimination strategies have to accelerate fall under *Group 2*. No country of the SEA Region is listed in this category. Countries under *Group 3* had to sustain the work already taken for elimination. Bangladesh, Bhutan, Maldives, Sri Lanka, and Thailand were included in this group.

After reviewing the leprosy situation at the National Programme Managers' meeting in Colombo, Sri Lanka in November 2002, and also at the Third GAEL meeting in February 2003 in Yangon, Myanmar, the leprosy endemic countries adopted several key strategies for successful elimination of leprosy by 2005, especially in the Region.

These included: a) simplification of diagnosis, treatment and reporting; b) intensification of community awareness campaigns through various communication and information strategies including leprosy days and weeks, as well as mass advocacy and media campaigns; c) integration of leprosy services into the general health services as well as increasing involvement of private practitioners; d) upgrading the capacity of basic health workers to manage leprosy control; e) effective implementation of special initiatives like LEC and SAPEL in difficult areas; f) ensuring uninterrupted supply of MDT blister packs with free of cost to Member Countries; g) strengthening monitoring and evaluation; and h) sustaining political commitment and mobilizing adequate resources.

It is envisaged that the Region as a whole would achieve the leprosy elimination goal at the national level by 2005. Most countries in the Region are trying to achieve this goal even at the sub-national (district) level. Elimination is only an intermediary goal. There is a possibility of identifying new leprosy cases even after 2005. An effective, strengthened surveillance and case management system needs to be in place and in order to trace and treat all possible cases.

The rapid progress in eliminating leprosy in the Region clearly demonstrates the decisive power of commitment and determination of Member Countries to achieve success, even under circumstances that are far from ideal. The support and commitment of governments, well-trained and motivated health staff, generous development partners, dedicated voluntary groups, and highly self-conscious

¹⁵ WHO, *First meeting of the Global Alliance for Elimination of Leprosy-GAEL*, January 2001, WHO/CDS/CPE/CEE/2001.27

¹⁶ WHO, *The final push towards elimination of leprosy, strategic plans, 2000-2005*, WHO/CDS/CEE/2000.1

communities, helped to effectively reduce the burden of leprosy to a very low level in shorter period, and, in the not too distant future, it is certain that all countries can totally eliminate the disease.

Challenges Ahead

Reaching the undetected cases: Most Member Countries achieved the dramatic reduction of leprosy cases during the last decade. Still, there is a wide difference in prevalence among districts and population groups within a country. Despite the massive efforts of the LEC and SAPEL in the highly endemic countries for the last half-decade, new cases are still being identified and many more remains to be detected in the future.

The theme of the Second International Conference on the Elimination of Leprosy, held in New Delhi, October 1996, "**Reaching every patient in every village**" is still valid. Reaching every corner of the country, however, has become much harder. Countries need to organize massive community education and village-to-village folk media campaigns, as well as routine school education programmes, to promote voluntary reporting of cases and also to reduce the social stigma. Detailed epidemiological mapping of the prevalence of leprosy by regions and districts, and even villages, would provide better direction for concentrated local efforts. A strategy of early detection and treatment will not only stop the transmission of leprosy, but also prevent disabilities and thereby halt the downward spiral towards social exclusion and destitution.

Planning, Monitoring and Logistics :

Leprosy elimination in the Region stands at a difficult juncture. While most countries have achieved the global target of reducing the prevalence below one case per 10 000 population, India, Nepal and Timor Leste need to take more time for achieving the goal. The reasons for these countries missing the global target date varied, of which the most important one is the limited geographical coverage with MDT regimen.

All these countries with a high prevalence rate in selected geographical areas face many constraints which include: highly centralized vertical disease control programme, poor coverage of MDT services, lack of involvement of community and local partners, insufficient financial resources, and inadequate health infrastructure leading to inaccessibility for MDT regimen by leprosy patients. In addition, the programme earlier had a high dependence on specialized NGO projects.

What is required for these countries is strategic planning for national leprosy elimination attacking the disease, district-by-district. The basic health services (BHS) of the respective countries need to move from vertical to horizontal, and implement effective simple elimination strategy, i.e., active case finding, early diagnosis and treatment with MDT regimen. Private health establishments (clinics and hospitals) organized by private practitioners, national and local NGOs, especially in high endemic states and districts, have to be involved in the programme implementation. Local health volunteers should be mobilized. The services should reach the door-steps of the patients, making them "patient-friendly" and

uncomplicated, so that every patient is able to complete the treatment with minimum disruption to their daily lives.

Health care workers need to provide health education on leprosy and leprosy control services simultaneously. Acceleration of horizontal integration of leprosy elimination activities is a key component for success. This could improve case finding, treatment coverage, and also reduce the stigmatization. Even after the global elimination goal is achieved, new cases could still be occurring every year, although in reduced numbers. Once the BHS infrastructure takes responsibility for leprosy control activities as part of their routine work, the BHS staff could easily diagnose new cases and provide early treatment.

Most endemic countries are currently using well-established leprosy information systems, and some countries have augmented this with geographical information systems. The essential indicators used for monitoring progress towards elimination are prevalence, case detection, and coverage with MDT treatment, patients cured with MDT, relapses, and newly-detected cases with Grade 2 disability. The main problem in understanding the epidemiology of leprosy is the lack of appropriate tool to measure leprosy infection and incidence. In the absence of this, prevalence and case detection are being used to monitor the progress of control programme. As far as possible, disaggregated data by geographical, sex and age distribution are necessary to strengthen the detailed plans at district and sub-district levels.

Novartis has committed to provide necessary logistics support and MDT drugs till 2005. The Nippon Foundation and other international NGOs would also augment these efforts by providing support to national programmes. Member Countries should maintain the achievements made and ensure that new cases occurring after elimination are properly diagnosed and treated.

Under the guidance of WHO-TDR and its scientific working groups, many countries conducted both basic and applied epidemiological and immunological studies on leprosy. While the studies are still ongoing with regard to the basic research of *M. leprae*, the clinical drug trials are continuing.

Conclusion

Only three countries (India, Nepal and Timor-Leste) in the Region have to accelerate leprosy elimination activities to achieve the goal. They are in the last lap and are in the most important phases in terms of getting the necessary resources and political commitment to reach the goal. They need to continue to create more awareness on elimination activities, especially at the grass-roots level. Other countries that already achieved the national goal need to continue the leprosy control activities in order to sustain the level of prevalence below the global target and also to reduce the leprosy burden at sub-national level. It is now universally accepted that the MDT regimen can cure leprosy, and also cut the chain of transmission. Governments, the community and development partners should work together in order to reach the global, national and sub-national elimination goals as soon as possible. It is the collective

responsibility of all to bring back a million smiles on the faces in the South-East Asia Region.

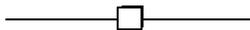
Acknowledgement

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U Mya Thein, Dr U Tin Shwe, Dr Kyaw Nyunt Sein) and leprosy specialists (Dr U Maung Maung Gyi, Dr Charles Pang, Dr U Kyaw Tin, Dr Than Win and many others), who committed their lives to the prevention and control of leprosy in Myanmar. This paper commemorates the 50th anniversary of the leprosy control programme and the establishment of the Department of Health in Myanmar.

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Polio Update - India

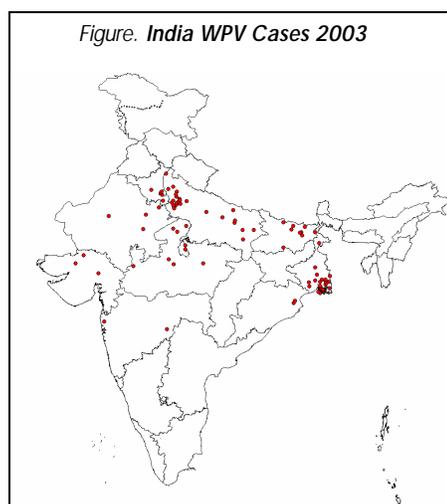
IVD Unit, SEARO

Not a single case of poliomyelitis has been found in the South-East Asia Region (with the exception of India) since November 2000. The regional poliomyelitis eradication initiative needs to ensure that the focus remains firmly on tackling transmission in India, the last source of poliovirus in the Region.

The total number of poliomyelitis paralysis cases for 2002 exceeded that of 2001 in India. Particularly, a major resurgence in the number of cases of poliomyelitis occurred in a few States, accounting for 84% of the total number of global polio cases identified in 2002. India is now the number one priority for the poliomyelitis eradication effort.

The upsurge in the number of cases in India should not be allowed to get the regional strategy off-track. Until transmission can be halted in some districts of Uttar Pradesh (UP) and Bihar, neither the other Indian states nor other countries in the Region can afford to become complacent.

As of 24 June 2003, 85 cases of poliomyelitis have been reported in 52 districts of India (See figure).



Although a majority of cases still occur in UP, there is a significant number of cases now in West Bengal; however, Bihar has only had eight cases thus far. Cases in states outside UP and Bihar are a result of exportation of wild poliovirus from these endemic areas.

The increased cases in 2002 have been mainly due to a major outbreak of type 1 poliovirus centred in central and eastern UP. This outbreak is the result of reintroduction of wild-type poliovirus from a persistent reservoir in Western UP into East and Central UP, where a large pool of susceptible

children had accumulated. This has resulted from insufficient quality of immunization activities in 2001 and 2002. Children in Western UP, particularly in the minority community, consistently missed both routine and supplementary immunization activities (SIA) such as National Immunization Days (NIDs) or Sub-National Immunization Days (SNIDs) and mopping up immunization. Put in simple terms, too many children in UP have been missed too many times.

Transmission of poliovirus in India could be stopped quickly, provided the barriers to effective immunization coverage and disease surveillance can be overcome

It was this immunity gap, across the State, which allowed the virus to move out of the reservoir and spread widely.

To their credit in Bihar, the combination of strong political support and oversight of health systems has resulted in systematically higher coverage than in UP. This has led to a lower proportion of missed children and thus some progress.

Major political, managerial and operational barriers remain to be overcome to achieve poliomyelitis eradication in India. These barriers are urgently being addressed by the national and state governments (especially in UP) in close cooperation with

the poliomyelitis eradication partner organizations in an effort to halt poliomyelitis transmission in the coming year. Poliomyelitis-free States in India, as well as other countries, however, continue to face a major risk of reintroduction of poliovirus from endemic areas of Northern India.

Transmission of poliovirus in India could be stopped quickly, provided the barriers to effective immunization coverage and disease surveillance can be overcome.

Action

To make rapid progress in 2003, WHO along with the Government of India, UNICEF, Rotary and the other poliomyelitis eradication partners will have to implement the recommendations of the India Experts Advisory Group.

It is recognized that promoting political ownership will be vital, so that the responsibility for poliomyelitis eradication at the national and state levels in India rests firmly with the central, state and local governments. Equally, the implementation of high quality and high intensity supplementary immunization activities in the period January 2003 to June 2004, including additional sub-national immunization rounds in high-risk states, could prove pivotal.



Medical Education

Role of Medical Schools in TB Control: An Experience from Nepal

Dr Nilambar Jha¹, Dr Suman Rijal², Prof. Shekhar Koirala³

Abstract

Medical schools must adopt and use their potential proactively in shaping the future of health systems. Medical schools have the unique opportunity to contribute significantly to a nation's health and demonstrate social accountability by introducing changes in medical education, research and delivery of care for TB control.

Medical schools should provide every medical graduate with the knowledge, skills and attitudes essential to the management of TB in the patient and in the community as a whole. They should develop an effective educational strategy to provide such an ability to their students.

The role of the future doctors extends beyond being care providers to being effective communicators, counsellors and managers to lead and mobilize the community in matters related to health. The role of medical schools within the context of TB should include teaching, service delivery, research and advocacy, as well as active participation in national programme planning, implementation, monitoring, supervision and evaluation.

Most importantly, medical schools must also practise the national policies and strategies for combating tuberculosis. BP Koirala Institute of Health Sciences at Dharan was the first institute in Nepal to set up a DOTS teaching centre. Concerted efforts have been made to orient training to the perceived needs of the community and to the principles of the national control programme.

Key Words: Tuberculosis, Medical School, Nepal

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Introduction

Tuberculosis (TB) is a major public health problem in Nepal with 45% of the country's population estimated to be infected with TB. Of those infected, 60% are in the productive age group. Every year 44 000 people develop active TB, of whom 20 000 have infectious pulmonary disease and are capable of spreading the disease to others. Introduction of Directly Observed Treatment Short Course (DOTS) has already reduced the number of deaths. However, 8 000 to 11 000 people still die every year from this disease.¹ DOTS has proved to be the health breakthrough for TB in Nepal. There has been no other single health related intervention with this great an impact on health status, so far.²

A key feature of DOTS Nepal is the National TB Programme (NTP) partnership with organizations at the national, regional and local levels.³ Successfully implementing the DOTS strategy requires that doctors be trained to manage TB properly. Obviously, the active participation of doctors in tuberculosis control will lead to a change in the attitude of other health care providers and their involvement will be achieved more easily⁴.

Medical schools must adopt and use their potential to contribute proactively in shaping the future of the health system. By introducing changes in medical education, research and delivery of care for TB control, medical schools have the unique opportunity to demonstrate social accountability.

Medical schools should provide every medical graduate with the knowledge, skills and attitudes essential to the management of

TB in the patient and in the community as a whole. They should have an effective educational strategy to provide such an ability to their students.⁴

Medical schools need to practise evidence-based medicine and thus contribute towards developing future guidelines for national control programmes. In order to improve their relevance, teaching medical institutions should redefine their mission statements and make necessary modifications to unify teaching and practice. Most important, medical schools must also practise the national policies and strategies recommended for combating tuberculosis. The BP Koirala Institute of Health Sciences at Dharan was the first institute in Nepal to set up a DOTS teaching centre. Concerted efforts have been made to orient training to the perceived needs of the community and to the principles of the national control programme.⁵

A major step to control tuberculosis is by providing assistance to the national programme in three main areas: (a) Teaching, (b) Service and (c) Research.

Teaching

The MBBS curriculum of BPKIHS is thoroughly integrated and community-oriented and partially problem-based, incorporating a need-based approach. During the first two years, emphasis is laid on the pre and para clinical sciences along with community medicine and professional skills; and in the next two and half years, the emphasis is on clinical sciences with a high degree of integration between clinical disciplines and community medicine; while

the foundation of pre and para clinical sciences continues to be strengthened. The curriculum incorporates early patient contact and emphasizes the importance of the study of community medicine and behavioural sciences from the beginning. Teaching through lectures has been restricted to a bare minimum while problem-based and hands-on learning experiences are encouraged. During the clinical posting, the students are regularly taken once a week to the District Health Office to orient them to the major local health problems and the various national health programmes.⁶

In view of the seriousness of the problem of tuberculosis in Nepal, the Institute has developed a module on tuberculosis for teaching undergraduate students of medicine.

BPKIHS Teaching Module for Tuberculosis

The module respects the need for imparting teaching in class, laboratory and field involving various teaching departments. The

aim is to provide students with a broad and comprehensive knowledge of tuberculosis and especially to develop in them skills in diagnosis and management of the disease, in compliance with the National TB Control Programme of Nepal.

During Phase I (first two years of MBBS course). TB is taught as problem-based learning.

The details are given below:

- (1) Tuberculosis – Problem Based Learning (PBL)
- (2) Duration: One Week Programme
- (3) Departments involved:
 - Community Medicine
 - Medicine
 - Microbiology
 - Pathology
 - Pharmacology

PBL – Time Table

Day	8:00 to 10:00 am	11:00 am to 1:00 pm	2:00 to 4:00 pm
Day-1	Tutorial – I	Self Study	Self Study
Day -2	Resource Session (Dept. of Medicine and Microbiology)	Self Study	Labex (Dept. of Microbiology)
Day -3	Tutorial – II	Self Study	Labex (Examination of Respiratory System - Dept. of Medicine)
Day -4	Resource Session (Dept. of Pathology and Pharmacology)	Self Study	Resource Session (Dept. of Community Medicine)
Day -5	Tutorial – III	Self Study	Self Study
Day -6	Presentation by Students	Feedback	-----

In phase II (next two and half years), over 13 hours of structured interactive sessions, are conducted by various

departments (given below) in addition to seminars and small group teachings in third year of MBBS course.

Teaching Module for Tuberculosis

Topics	Department	Duration
<i>Structured Interactive Session (SIS)</i>		
➤ Magnitude of TB problem and national tuberculosis programme.	Community Medicine	1 hour
➤ Laboratory diagnosis of tuberculosis	Microbiology	1 hour
➤ Pulmonary tuberculosis (Pathogenesis, clinical features, complications)	Medicine	1 hour
➤ Extra pulmonary tuberculosis (TB meningitis, Lymph node involvement, pleural effusion)	Medicine	1 hour
➤ Genital tract TB in females	Gynae/Obstetrics	1 hour
➤ Management of childhood tuberculosis and neonates born to mothers suffering from TB	Paediatrics	1 hour
➤ Treatment of tuberculosis including in special situations e.g. pregnancy, renal failure, elderly, liver disease, etc.	Medicine	1 hour
➤ Intestinal tuberculosis; abdominal tubercular lymphadenitis	Surgery	1 hour
➤ Bone and joint tuberculosis including hip and knee joint TB	Orthopaedics	1 hour
➤ Spinal tuberculosis including cold abscess	Orthopaedics	1 hour
➤ Urogenital tuberculosis in males	Surgery	1 hour
➤ TB with HIV & emergencies in tuberculosis	Medicine	1 hour
➤ Skin manifestations of TB	Dermatology	1 hour
<i>Student's seminar (SEM)</i>		
Tuberculosis with special reference to Nepal	Departments of Community Medicine, Medicine, Surgery, Paediatrics, Gyne/Obstetrics, Pharmacology	2 hours
➤ Epidemiology		
➤ National tuberculosis control programme		
➤ Multi-drug resistance tuberculosis		
➤ New advance in the diagnosis and management		
➤ Prevention of tuberculosis		
<i>Small Group Discussion (SGD)</i>		
➤ X-ray	Radiology (batch wise)	2 hours for each batch
<i>LABEX</i>		
➤ ZN staining and Mantoux testing	Microbiology (batch wise)	2 hours for each batch
<i>SLIDE SESSION</i>		
➤ Gross and microscopic lesions in tuberculosis of various organs	Pathology	2 hours for each batch
<i>Case Based Learning in Field (CBLF)</i>		
➤ Visit to NGO (Britain Nepal Medical Trust, Nepal Anti Tuberculosis Association)	Community Medicine	1 day
➤ Visit to Madhuban – DOTS Programme.	Community Medicine	1 day
<i>Case Based Learning (CBL)</i>		
➤ Hospital Wards	Medicine, Paediatrics, Surgery (batch wise)	2 hours for each batch

Salient Features of the Teaching Module

- (1) The teaching module is very broad and comprehensive.
- (2) It covers all the relevant topics in order to allow for comprehensive understanding of tuberculosis.
- (3) The students have enough time to interact among themselves and with the faculty through structured interactive sessions taken by various departments.
- (4) PBL on tuberculosis gives more opportunity to the students to learn about tuberculosis, both in theory and in practice, at an early stage of the MBBS course. Such teaching creates enormous interest among the students about tuberculosis.
- (5) Seminars and presentations give opportunities to students to learn about the various aspects of tuberculosis in detail and also to develop communication skills.
- (6) The students in small group discussions in the radiology department, learn to read x-rays of various types of tuberculosis.
- (7) Like wise, labex sessions in microbiology and pathology give them enough time to know about Ziehl-Neelson staining, Mantoux testing and gross and microscopic lesions of tuberculosis in various organs.
- (8) Case-based learning in field visits to DOTS Programme centre Madhuban, Nepal Anti-

Tuberculosis Association, Britain Nepal Medical Trust, Biratnagar give the students the real picture about all aspects of tuberculosis in the country.

- (9) Students (tomorrow's treating physicians) learn about the National Tuberculosis Control Programme, DOTS and the problems and their solutions in detail.
- (10) These activities help our students to make a correct diagnosis and treat patients according to the National Tuberculosis Control Programme.
- (11) Each teaching module takes one week.
- (12) The students feedback on this module was quite satisfactory.

In conclusion, this teaching module gives students a comprehensive and complete practical knowledge as well as skills on the diagnosis and management of tuberculosis with special reference to DOTS and its problems with solutions. This module makes them complete managers for the prevention and control of tuberculosis in Nepal. The use of a similar teaching module for tuberculosis in other developing countries like Nepal, where tuberculosis is a public health problem is recommended.

Teaching DOTS

The institute has adopted the Madhuban DOTS Centre as a teaching and demonstration centre for medical, dental and nursing students.

The Madhuban DOTS centre is located in Sunsari district of the eastern region. It covers six village development committees with an estimated population of more than 50 000. Madhuban, a primary health centre is the main centre and has five sub centres for DOTS. Students are taken to the centre at least twice during their course for a full day each time.

The DOTS programme at Madhuban was started in January 1996. The staff at the main centre consist of one senior health worker, one auxiliary nurse midwife, two auxiliary health workers and other supportive staff. There was no laboratory assistant and so the Institute trained one village health worker for sputum microscopy. He was also trained by the Britain-Nepal Medical Trust. The Nepal Anti-Tuberculosis Association Centre, Biratnagar checks slides for quality control at Madhuban. The quality control reports are very satisfactory.

Sailent Features of DOTS Centre

- (1) This centre is helped by a task force consisting of three partners, namely BP Koirala Institute of Health Sciences, Britain Nepal Medical Trust and District Health Office, Sunsari.
- (2) All three partners have well defined roles for the development of the DOTS centre.
- (3) The Britain Nepal Medical Trust was involved in training of all health staff.
- (4) The BP Koirala Institute of Health Sciences being an apex health institute, trained the staff for

sputum microscopy, provided technical support for case detection and treatment.

- (5) The District Health Office was the nodal centre for operational aspects of the programme.
- (6) The most important findings are that the sputum conversion rate after one year of DOTS was 68.8%, as opposed to 30.3% earlier.
- (7) The other indicators like treatment completion among sputum negatives and extra pulmonary cases were 75.8% and 80% in comparison to 65.7% and 50% respectively.
- (8) The centre at present has reached the target of more than 70% case detection rate and crossed the target of 85% cure rate. The cure rate is more than 95%.
- (9) This is the first DOTS teaching centre in Nepal.

Students visit the centre, interact with the staff and the patients. At the centre, they study reports and records to learn about various aspects of implementing DOTS programme. This visit has been judged very useful by students, developing in them the confidence to diagnose and treat tuberculosis cases using the DOTS strategy.⁷

Service

BPKIHS is committed to provide service not only to those coming to the hospital, but also to those who are not able to do so. This is done by reaching out to those in the

community who cannot reach the Institute's teaching hospital.⁸ While all attempts are made to provide a wide spectrum of service from primary to super-speciality based tertiary care, the Institute attaches great importance to inclusion of the entire population of the teaching district into its health security network in its pursuit of practice of population-based medicine.

At present, BPKHIS has more than 600 beds with 20 departments. The hospital is the main referral centre for the eastern region of Nepal. For tuberculosis, it is the referral centre for diagnosis and management. It also has its own DOTS centre for Dharan. This is the main centre with seven sub-centres located in the town. Five sub-centres are located at the Maternal and Child Health Clinics in various wards and one sub-centre each at Nepal Anti Tuberculosis Association (NATA) and Family Planning Association of Nepal (FPAN). Like any other main centre for the DOTS programme in Nepal, this centre also serves for diagnosis, treatment, recording and reporting, supervision and monitoring and defaulter tracing. There are more than 300 patients on DOTS at the hospital.

Research

The Institute has conducted research in the field of tuberculosis, which are as follows:

- (1) Problems of defaulters and its solution at Indo-Nepal border area.
- (2) Awareness about DOTS among the local leaders and school teachers.
- (3) BCG coverage survey among the school children of Dharan.

- (4) Active surveillance of tuberculosis in Sunsari district of Nepal.

The following studies are in planning phase:

- (1) Impact evaluation of teaching DOTS centre on medical graduates.
- (2) KAP among the private practitioners of Eastern Nepal about DOTS and corrective intervention.
- (3) Gender issues and DOTS.

Partnership for Tuberculosis Control

BPKIHS has developed partnerships with many other organizations (health and social service related) in the eastern region of Nepal to obtain support for total human development based on equity and social justice. The partners in this tuberculosis control endeavour are District Health Office, Dharan municipality and Britain Nepal Medical Trust (BNMT).

After various discussions and meetings the Institute constituted a partnership for tuberculosis control. BNMT is involved in training of all health staff. BPKIHS being an apex health institution, trained the staff for sputum microscopy, provided technical support for the case detection and treatment. The District Health Office is the nodal centre for operational aspects of the programme. At present, this partnership is responsible for the planning, programming, implementation, monitoring and supervision of DOTS in the district and the key player in the control of tuberculosis through DOTS in the Sunsari district.

Conclusion

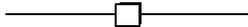
Medical schools have a crucial role to play in strengthening National TB Control Programmes. Vigorous follow-up actions are required urgently by the National TB Control Programme, WHO, SAARC TB Centre and other stakeholders to enable medical schools to play a full and active role in combating TB. There is an urgent need to focus on the DOTS strategy for effective management and control of TB. It is important to impart the appropriate knowledge and skills to bring about attitudinal changes among the future

doctors to enable them to manage TB at individual, family and community levels.

The role of the future doctors extends beyond being care providers to being effective communicators, counsellors and managers to lead and mobilize the community in matters related to health. The role of medical schools within the context of TB should include teaching, service delivery, research and advocacy as well as active participation in the national programme planning to implementation, monitoring, supervision and evaluation.

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Environmental Health

Healthy Public Settings: The Healthy Public Building Example

Robert J Kim-Farley, T Walia*, M M Datta**

In 1991, the International Conference on Health Promotion in Sundsvall called for creating supportive environments and “settings for health.” This “settings for health” concept was further elaborated in 1997 at the International Conference on Health Promotion in Jakarta. The World Health Organization (WHO) strongly supports and promotes the healthy settings approach – including healthy cities, healthy villages, healthy islands, healthy workplaces, healthy schools, healthy hospitals, healthy market places, and healthy districts.

As part of the healthy workplace settings concept, WHO advocates a Healthy Work Approach defined as “a continuous process for the enhancement of the quality of the working life, health and well-being of working populations through work environmental (physical, social, organizational) improvement, and personal empowerment and growth.”¹

A unique activity under the Healthy Work Approach pioneered by the ministries

of Health and Family Welfare, and Urban Development and Poverty Alleviation, Government of India, and the WHO Representative’s Office in New Delhi, India, was the “Healthy Public Building” initiative started in 1999. It provides an example of how different partners, working together for a common goal, can truly “make a difference” in improving the health and safety of the working environment.

Background

Nirman Bhawan is a Government of India building that houses the ministries of Health and Family Welfare, Urban Development and Poverty Alleviation, Rural Development, the Department of Small Scale Industries, the Office of the WHO Representative to India, and other departments. In 1999, it was observed that the building had serious health and safety concerns, including: abandoned furniture that obstructed hallways, staircases and fire-fighting equipment; discarded office papers and supplies that were potential fire hazards; toilets in an unsanitary condition;

* Office of the WHO Representative to India, New Delhi

¹ Department of Social Change and Noncommunicable Diseases. “Promoting Healthy Settings.” WWW link: <http://w3.whosea.org/hpromo/msettings.htm>. WHO South-East Asia Regional Office, New Delhi, 2002.

and uncontrolled monkey populations that took over the building at night and on weekends. There were also no clearly designated emergency escape routes or plans for instructing Government of India or WHO staff on such routes.

Recognizing these serious concerns, the two ministries and WHO resolved to take collective action on improving the condition of Nirman Bhawan and to help start it towards becoming a model of a "healthy public building." Nirman Bhawan was also seen to be an especially significant building, since the Ministry of Urban Development is responsible for the upkeep of all Government buildings in India and the Ministry of Health and Family Welfare is committed to promoting cleanliness and hygiene as a part of its health promotion programme. Both ministries recognized that they must practise what they preached and that the credibility of promoting programmes of health and hygiene would be seriously compromised if they could not establish and maintain a healthy public building in their own backyard. It would be like a doctor, who advises his patient not to smoke and himself smokes in front of his patient!

Initial Organization

After initial meetings at the ministerial and secretarial staff levels, and a commitment at the highest levels of the ministries to take collective action, it was decided that the vision of Nirman Bhawan as a healthy public building would mean a building that was "safe" and "reasonably clean." It was fully understood by everyone that the process was one that would not be done "overnight," that an analysis of constraints and opportunities

would need to be developed, and that the improvements would be carried out within the existing resources available. The goal was to reach a standard that other public buildings could reasonably achieve within their own operating resources.

Representatives of the stakeholders of the building started a series of monthly meetings that included a monthly "walk-about." During the "walk-about" the representatives physically walked around the building and observed items that were safety issues or unhygienic. During the discussions, the problems noted during the "walk-about" were prioritized, the possible reasons why they had arisen identified, and plans for action (including resources and persons responsible) made. It was agreed that such meetings and "walk-about" were to be "forward-looking" in their approach rather than "finger-pointing" on past actions or lack of action. In this way, it was possible for the group to maintain a harmonious method of work with everyone focused on the solutions rather than trying to affix "blame" for any current condition.

Examples of Problems, Analysis, and Solutions to Creating a Healthy Public Building

Abandoned furniture: One of the greatest problems identified at first by the monthly "walk-about" group was the large amount of abandoned furniture, papers, and office supplies that nearly filled corridors, common areas near elevators, and staircases. In some cases, these materials also obstructed fire-fighting equipment and made rapid evacuation of the building problematic.

Apparently, attempts had been made previously to clear these seemingly abandoned items, but had been met by resistance when some persons complained that their “valuable file cabinet” or other material had been taken from the hallway without their notice. A solution was developed within the “walk-about” group, whereby it was decided that a letter would be sent to all offices in the building noting that there would be a clean-up of all seemingly abandoned furniture and materials in the hallways and staircases. Everyone had two weeks in which to move any non-abandoned item into a room. Any item left out after two weeks would be removed and disposed of according to Government of India regulations. When the time came, all of the abandoned materials were removed from the building and it was suddenly immediately possible to walk, unobstructed, through the building. This was the first “success story” of the Healthy Public Building Initiative.

Unhygienic toilets: Another major problem was the stinking condition of the toilets. The “walk-about” group identified who was responsible for maintaining the toilets in the building. Many persons, for example, were under the impression that the Public Works Department was responsible for maintaining the toilets. However, it was clarified that the Public Works Department was only responsible for repairing any broken or non-functioning items in the toilets, and that the occupants of the building were responsible for organizing the cleaning of the toilets. This recognition of responsibility led to major improvements. The general sections of the ministries began to take responsibility for cleaning the toilets and the public works department identified toilets without working fans and either repaired or replaced them.

With general improvements in cleanliness and with working exhaust fans, soon the building no longer smelled as one entered the premises. It should also be noted that, as part of the healthy public buildings initiative, the provision for a clean and hygienic public conveniences facility was proposed to be built near the Nirman Bhawan Building. A possible site has recently been suggested for such a facility that would be built and managed by the private sector.

Monkey population: A decades-old problem that the “walk-about” group identified early on was that of large numbers of monkeys near or in the building. During working hours, they would often damage cars and motorcycles parked near the building by scratching them with their teeth or tearing off mirrors and license plates. After office hours, they became even more aggressive by entering the building where they were known to attack staff working late. They also would break or tear up any furniture or plants that were left in the hallways and presented the cleaners in the morning with a gigantic task of cleaning up their droppings and any materials they had destroyed during the night or weekend. The solution to this problem was conceived by one of the members of the “walk-about” group who remembered successfully solving a similar monkey problem in another building by hiring an animal trainer with a big *langur* monkey. This was tried at Nirman Bhawan with total success. Within one day of the *langur* being walked around the building, the monkey problem was solved! The smaller monkey population completely abandoned not only the inside of the building, but the surrounding area as well – even the parking lot was now free of the monkeys. The use of

the *langur* as “bio-control” of monkeys demonstrated one of the most successful accomplishments to date.

No, or low cost maintenance: The monthly “walk-about” facilitated “no or low cost” maintenance items such as cleanliness and replacement of broken windows, walls, corridors, toilets, repair of leaks in the roof, removal of hoardings, installation of billboards, and more frequent painting of walls using a higher quality, water-based paint that could be cleaned by wiping.

Upgrading of building: The “walk-about” had a catalytic role in the general upgradation of the building by placement of hinged boxes for concealing electrical wires, cable re-routing in the building, marbling of stairwells, tiling of corridors, development of design standards for photographs in stairways and hallways. Different departments were encouraged to place photographs and paintings in their hallways. The marking of the parking lot was improved to enable more efficient parking of cars.

Placement of “No-smoking” signs: Placement of “no-smoking” signs at appropriate locations in the building, together with other directives about not smoking in the building, paid dividends in reduced smoking and spitting in public areas.

Lessons Learned

The specific examples given above are illustrative of the diverse types of problems identified and the unique solutions found that suited the conditions to help make Nirman Bhawan a healthier public building. The experience provided many lessons that are

applicable, in general, to others who are working to create healthy settings – including healthy public buildings. They include:

Commitment at the highest levels: The members of the monthly “walk-about” group were empowered because the ministers and the secretary-levels of the organizations were publicly in favour of creating a healthy public building. Some senior level staff even themselves conducted “on-the-spot” unannounced visits to different parts of the building and point out areas for improvement as well. The Minister for Urban Development himself took a round of the building and instructed the concerned officials of his ministry to improve certain areas. A high level directive by the two ministries also resulted in a “Special Cleanliness Drive” that significantly accelerated progress on the healthy public building initiative.

Change is possible: There were many at the beginning who simply believed that change was not possible – that things had been this way for decades and were not amenable to change. Early success with highly visible improvements (clearing of abandoned furniture, eliminating the smell from the toilets and removing the menace of the monkeys) quickly disproved the arguments that change was not possible. Even early doubters became convinced that they might have been too quick in their judgement.

People appreciate improvement: We learned that people, who may not have said anything at first, noticed and appreciated changes that make their working environment safer, healthier and more pleasant. When members on the monthly “walk-about” group began to hear, directly or indirectly, how

others noticed and were pleased with the changes in the building, it was a great reinforcement in their desire to work towards a healthy public building.

Habits can also be changed: At first, when the “walk-about” group proposed cleaning and polishing the hallway floors, it was felt by some that it might be a useless exercise. Some predicted that the floors would soon be dirty again due to the spitting of *paan* and other substances onto the floors. What happened, however, was that very few people spit on the floors after they were cleaned. We learned that if the floors were dirty, there was little hesitancy for some to spit on the floors. However, if the floors were clean, most people would not spit on the floors. Similarly, with smoking, we found that placing no-smoking signs prominently in common areas markedly reduced the amount of smoking in the building. People hesitated to smoke standing in front of a sign that said “no smoking”. When the Minister of Health declared that the building was to be smoke-free and even announced it to the press, many of the remaining smokers also quit smoking in the building.

Prepare for setbacks: Not all improvements, once attained, stay that way. We learned that we needed to continue to be vigilant and “revisit” previous problems and their solutions. For example, abandoned furniture began to “creep” back into the hallways and reminders on the policy of abandoned furniture had to be sent out. On holidays, we began to notice monkeys around the building and once even inside the building. It turned out that the animal trainer also took holidays and so the *langur* was not on site. We therefore hired a “back-up *langur*” and even gave a pager to the trainer so we could reach him in a “monkey emergency.”

Morale and effectiveness of custodial staff: As the work of cleaning the building became less onerous due to the absence of the monkeys, markedly reduced spitting on the hallways, and removal of abandoned furniture, the morale and effectiveness of the custodial staff significantly improved.

High level visitors can accelerate progress: The visit of the Prime Minister of Norway, the first time a foreign Prime Minister visited Nirman Bhawan, provided an opportunity to showcase the healthy public building initiative and also helped to accelerate progress on the initiative in anticipation of his visit.

Long-term and short-term solutions: We learned that short-term, highly visible solutions are important for establishing momentum for change towards a healthy public building. We also learned that solutions do not always cost money, they often are simply clarifications of the roles and responsibilities of departments and individuals. We recognized, however, that one also needs long-term plans for the improvement of the building. To this end, for example, we established a two year long term plan for refurbishing the toilets in a phased manner within the resources allocated for building maintenance.

Future Considerations

It is anticipated that the momentum established by the healthy public building at Nirman Bhawan will be carried forward, because the process has been institutionalized and is not dependent only on personalities. Persons who participate in the process are, themselves, energized by seeing the small, daily incremental improvements that their work is bringing about. Expectations of the occupants of the building rise as they see change is possible and they start to care

more about their working environment and participate in its improvement.

Nor does the process stop with Nirman Bhawan. The press recently wrote an article on the healthy public building process taking place in the building. The resultant publicity will result in Nirman Bhawan being a catalyst for the occupants of other buildings to take up the challenge of transforming their own workplaces into healthy public buildings.

Conclusion

Protection, safety, cleanliness and maintenance are essential elements of a healthy public building.

Healthy settings, and examples such as the healthy public building initiative described in this paper, provide a platform for action and social change. The most powerful example of change happens when we take an active part in changing our own settings in which we live and work. When we take an active role in changing our surroundings, it is no longer an abstract, intangible idea – it takes on a concrete, real world shape.

There are also “macro” lessons to be learned from “micro” examples. If it is possible to transform and change a building to become a healthier place, is it not also possible to transform and change our health systems to be more responsive, more accountable, and have greater impact on the lives and health status of our citizens? The power to change is in our hands.

Acknowledgements

The authors gratefully acknowledge the active support, guidance and leadership of the ministries of Health and Family Welfare and Urban Development and Poverty Alleviation, Government of India for conceptualization, planning and implementation of the healthy public building initiative in Nirman Bhawan. The authors also acknowledge the active involvement of staff of the WHO Representative's Office in New Delhi who joined hands with the two ministries to bring the vision of a healthy public building closer to reality.



Protecting Children from Diarrhoea and Acute Respiratory Infections: The Role of Hand Washing Promotion in Water and Sanitation Programmes

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Abstract

Diarrhoeal diseases and respiratory infections are amongst the top three killers of children in the world today. Handwashing with soap may be more effective than improved water supply and sanitation in preventing diarrhoeal diseases and may also offer the prospect of reductions in respiratory tract infections. Despite the protective effect of hand washing with soap, especially after contact with faeces and before handling food, globally this behaviour is practised with surprising irregularity, indicating the need for hand wash promotion programmes. Formative research in Kerala state in India and elsewhere suggests that people want to be hygienic for reasons of comfort, to remove smells, to demonstrate love for children and for social acceptability. This suggests that marketing approaches, built on people's positive motivations may be more effective in promoting behaviour change than traditional health education.

Introduction

In developing countries, in excess of 10 million children die before they reach their fifth birthday; diarrhoea (1.48 million) and acute respiratory infections (2.2 million) together account for nearly half of these deaths (www.who.int). The Millennium Development Goals aim to reduce under-five mortality by two-thirds by the year 2015, a goal that will be hard to achieve

(www.developmentgoals.org). Water, sanitation and hygiene interventions could, however, contribute significantly to this goal. Delegates to the World Summit on Environment and Development in Johannesburg in 2002 committed the world to halving the number of people without access to sanitation by the year 2015. This target is optimistic, but is an important milestone in the recognition of the importance of sanitation to world health.

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However, reaching this target alone will not improve child health (the under fives suffering the greatest burden from diarrhoeal diseases), as the installation of sanitation needs to be coupled with effective hygiene promotion.

Though usually thought to be of primary importance, improving the quality of water supplies only cuts diarrhoea by about 16% (though it has other benefits), while increasing water quantity reduces the risk by 20%, installing adequate excreta disposal cuts it by 36% (Esrey et al., 1991) and hygiene promotion by 35% (Huttley et al., 1997). Further, a recent systematic review of the impact of handwashing with soap suggests that focused hygiene promotion may be even more effective, cutting

diarrhoea risk by 47% (Curtis and Cairncross, 2003). Not only does hand washing with soap remove diarrhoeal pathogens from the hands after stool contact, but it reduces the risk of further environmental contamination through contact with hands carrying diarrhoea-causative agents. Further, there is also increasing evidence to suggest the protective power of hand washing with soap against a range of acute respiratory infections (ARIs), especially pneumonia through the prevention of the common cold (E.g. Ryan et al 2001). Thus, hand washing with soap could be a powerful agent in protecting children and their environment from diarrhoeal pathogens and organisms causing ARIs, the two great child killers.

Table 1 : Prevalence of hand washing in different settings

Setting	Practice	Prevalence	Method
Kerala state, India	Hands washed with soap after cleaning up a child	35%	Structured observation (our data)
	Hands washed with soap after using a toilet	34%	
Calcutta slums	Handwashing with soap after defecation	16%	Soap dimensions checked (Sircar et al 1987)
Rural Kyrgyzstan	Hands washed with soap after cleaning up a child	0%	Structured observation (Biran 1999)
	Hands washed with soap after using a toilet	18%	
Rural Nigeria	Hands washed with soap after cleaning a child	9.9%	Structured observation (Omotade, 1995)
Urban Burkina Faso	Hands washed with soap after cleaning up a child	Pre-intervention 13%	Structured observation (Curtis et al, 2001)
	Hands washed with soap after using a toilet	1%	
Childcare centres in Brazil	Handwashing after changing nappy	16%	Structured observation (Barros et al 1999)
Shanty town in Lima, Peru	Handwashing after defecation	12% (soap use 'rare')	Observation (Gilman et al 1993)
Rural North of England	Handwashing with soap after changing a nappy	47%	Structured observation (Curtis, <i>submitted</i>)

Despite the potential impact of hand washing with soap in reducing the rates of diarrhoea and ARIs, data from across the globe suggest that such behaviour is practised at surprisingly low rates, as shown in Table 1. This indicates the potential role of hand washing promotion in protecting children's health and their environment across the globe. However, research in Kerala State, India, where only 35% of women wash their hands with soap after defecation (direct observation), suggests that a traditional hygiene education approach to hand washing with soap may not have the desired positive impact on hand wash practice.

Motivating hand washing with soap in Kerala, India

As part of a programme to promote handwashing with soap in Kerala, India, we carried out formative research to elucidate what motivates hand washing. As the carers of children, who are at the greatest risk of diarrhoeal diseases, young mothers were chosen as the primary target audience.

In interviews, focus group discussions and behavioural trials, many women cited health preservation as a motivator for hand washing; however, mothers frequently believed children's faeces to be harmless (while in fact these are of course the most dangerous, children carrying the most diarrhoeal pathogens). Further, mothers cited factors such as a desire to remove bad odours and other sensory cues of dirt and contamination from their hands, rather than disease avoidance as the prime motivators for hand washing:

'I do not feel disgusted when I see my child's shit' *Kerala29(DI)SU*

'To get rid of the bad smell. We will have a feeling of disgust if we don't wash our hands with soap' *ker36(DI)SU*

This desire to remove bad smells from the hands appears to feed into a general desire to avoid dirt, contaminants or anything disgusting from the hands. The maintenance of a clean outward appearance further plays a key role in achieving status and being accepted within society:

'If we are clean others will have good opinion about us. Hearing that, we will feel happiness' *Ker2(DI)*

Nurture also strongly contributed to hand washing behaviours, mothers showing a strong concern for the welfare of their children:

'We have to handle small children, so we should be clean' *Ker18(DI)NU*

Not only does keeping clean and washing hands protect child health, but keeping children clean ensures their social acceptance:

'It [handwashing] will make my child walk about neatly' *Ker34(DI)BT*

While 97% of the survey respondents were able to state that dirty hands could cause disease, and 59% specified that unclean hands could spread diarrhoea, this knowledge is clearly not driving all such respondents to wash their hands with soap, hands only being washed on 36% of observed defecation occasions. Similar findings have been obtained in Ghana, where hand washing practice appears to be primarily driven by a disgust for public latrines and a desire to be neat and clean to both protect children's health and achieve status within society (in preparation). Studies among Western health care workers also suggest that the level of biomedical knowledge with regard to the role of hand washing with soap does not correlate to reported hand wash practice (Obika et al

2002). A number of reviews suggest that health education *per se* rarely has any significant impact on health-related behaviour (Loevinsohn 1991; Burgers & Boot 1988).

In addition to studying attitudes toward hand washing and the social and psychological factors influencing its practice, quantitative survey data allowed investigation into the impact of environmental constraints such as lack of water and affordability of soap. While it might be expected that socioeconomic status and water source influenced rates of hand washing with soap, no evidence was found for a statistically significant relationship. However, there is some indication that those in the highest

socioeconomic groups wash their hands with soap more frequently than those in the lowest socioeconomic groups (see table 2) and in interviews, a few women reported that economic constraints did prevent the use of soap in hand washing.

With regard to water source, though not statistically significant, data suggest that those with water taps in their houses wash their hands with soap with greater frequency than people with other water sources. No correlation was found between hand wash practice and other water sources, and in interviews, no women cited water scarcity as a hinderance to hand washing (see table 3).

Table 2: Richness scale and handwashing with soap

	R1	R2	R3	R4	R5	Total
Handwashing with soap after cleaning the child	13 (48)	15 (31)	5 (20)	10 (42)	1 (14)	44 (34)
	27	48	25	24	7	131
Handwashing with soap after mother's toilet	11 (44)	22 (37)	12 (32)	4 (21)	1 (25)	50 (35)
	25	59	37	19	4	144

Table 3: Water source and handwashing with soap

	Hand pump	Open well	Piped connection	Tap water	Tank / pond	River / canal	Bore well	Total
Handwashing with soap after cleaning the child	2 (50)	29 (30)	1 (25)	5 (63)	2 (33)	2 (50)	3 (43)	44 (34)
	4	98	4	8	6	4	7	131
Handwashing with soap after mother's toilet	0 (0)	35 (34)	3 (50)	7 (54)	1 (25)	0 (0)	4 (50)	50 (35)
	1	104	6	13	4	8	8	144

Despite these findings, the influence of socioeconomic status and water supply on hand wash practice appear to be lower than might be expected, and qualitative data suggest that among those already washing their hands with soap, women actually think that washing their hands with soap saves them money due to reduced healthcare costs for example. Thus, while physical barriers do provide obstacles to hand wash practice, it is likely that motivating good behaviour through people's hopes and desires might have a greater impact on people's hygiene behaviours, even in the absence of infrastructure improvements and economic development.

Some Implications

Such findings suggest that simply raising the level of people's knowledge about the link between particular hygiene practices and disease is insufficient to lead to substantial behaviour change. Hygiene promotion programmes might better concentrate on building on existing positive motivation to be clean, whether for comfort or social reasons. A marketing approach to motivating hand washing with soap, building on people's desires rather than on rational argument might be more effective at stimulating behaviour change in Kerala and beyond. Jenkins et al (2002) posit a similar scenario for sanitation; suggesting that toilets are

usually not acquired for health reasons. More important is a desire for comfort, security, reduction in odour and social status. Marketing sanitation on this basis might provide the greatest chance of reaching sanitation coverage targets by 2015.

We therefore suggest that while there clearly exists a niche for the installation of water supplies and sanitation infrastructure for promoting child health, hand washing promotion should also be a primary component of environmental health interventions in order to minimize potential contamination of the environment, especially after contact with faeces. Furthermore, we propose that the most effective means of getting people to adopt new behaviours, such as use of a latrine and handwashing with soap after stool contact are to pay attention to their existing motives. Whilst many people know about germs and disease transmission, this knowledge is rarely translated into rational disease avoidance action. However, people do want to be clean for reasons of comfort, disgust avoidance, social status and the protection of their children. While health might be in our hands, it is not necessarily in our heads. Programmes to market hand washing with soap and also sanitation might thus be more effective than traditional health education.

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Water Supply, Sanitation, and the Children of Thailand

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Abstract

Healthy Environments for Children, the focus of World Health Day 2003 is dedicated to ensuring that one of the most vulnerable sections of the population is protected from the environmental hazards that surround them. Thailand has recently completed a national water supply and sanitation assessment that details the history and current status of the sectors, and highlights some areas of concern that may affect the nation's children. The country has made remarkable strides in the provision of water and sanitary latrines to its people over the last century with coverage now nearly universal, and many of the water-borne diseases in retreat. Despite this progress, there are clouds on the horizon. Concerns are rising over the quality of the water supplied due to environmental contamination and from inadequate maintenance of facilities. Sanitation still faces the problem of disposal and management of excreta. The rising number of cases of acute diarrhoea and food poisoning provide evidence of this. In the case of food poisoning, this may be partly explained by changes in lifestyle towards the purchase of precooked food without adequate concern for hygiene practices during its preparation.

Having reached this level of health development, effort is now needed to raise awareness of basic hygiene practices, and encourage behavioural change to consolidate the gains made. Schools present an ideal opportunity both for the promotion of these activities and as examples to the students of the benefits of good habits.

Introduction

This article briefly reviews the impact of water supply and sanitation on the health of the children of Thailand. It examines the development of the sector, highlights some of the existing weaknesses, and outlines some future intervention plans to address these issues.

Children

World Health Day 2003 is dedicated to ensuring Healthy Environments for Children. Worldwide, the burden of environment related disease falls disproportionately on children and every year more than 5 million children under the age of 14 die, mainly in the developing world, from these diseases.¹

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Children are more vulnerable than adults to environmental exposure. In the womb, they are susceptible to the environment in which their mother lives, and at birth enter a new world of environmental dangers. Exposures extend over a longer period and children have more time to develop diseases with long latency periods. Children who suffer ill health cannot regularly attend school and so their social and intellectual development suffers, reflected in later life by a reduced contribution to society.

A child's world is its home, school, and local community, but these environments may also be unhealthy breeding grounds for disease. Children are naturally inquisitive, and much of their world finds its way into their mouths!

Key areas in breaking the "hand-to-mouth" transmission of disease are a safe and reliable water supply, adequate sanitation, and proper education in hygienic behaviour.

A secure and dependable water supply contributes greatly to a healthy population, particularly when supported by promotion of hygienic behaviours. If the water supply is contaminated chemically or micro-biologically, the result may be disease, of which the most important is diarrhoea, one of the greatest killers of young children in the world.^{2,3} Toxic chemicals such as arsenic and fluoride have been found in drinking water and the harmful effects may be seen in young children.

Sanitation, the safe disposal of human faeces and wastes is necessary to protect

health, as faecal pollution may transmit a number of diseases through the local community and environment.

An adequate and safe water supply, satisfactory sanitation, and continuing public health and hygiene education when coupled with sufficient investment in the sector have been shown to dramatically lower the incidence of water-borne diseases, particularly in infants and children.

Thailand

The importance of a good water supply and effective sanitation has been recognized in Thailand since King Rama V first foresaw the link with the prevention of disease in the early 19th century. Since that time, the country has achieved a good deal of success in the provision of safe drinking water and the sanitary disposal of excreta, particularly in rural areas.

The early methods of excreta disposal such as pit latrines and direct dumping into canals, rivers or the sea were not successful in preventing and controlling disease, but the situation improved in the early twentieth century when a water works operated for the first time in Bangkok, and rules were issued prohibiting defecation directly into rivers and canals.

Developments have continued, and water supply and sanitation have been part of national plans since the first in 1960. The government also assigned the period 1981 to 1990 as the "Decade of Water Supply and Sanitation in Thailand" in line with the United Nations declaration. During this time, there was a marked increase in the socioeconomic

development of the country, particularly in education and health. The Human Development Index has shown a continuous upward trend, despite occasional setbacks due to economic conditions.⁴

Traditionally, some 5% of the national budget is allocated to water supply and sanitation. This has resulted in sufficient quantities of water being available, although not always of a satisfactory quality. Many agencies are responsible for water supply and sanitation, but they often have overlapping responsibilities, resulting in a duplication of effort and a lack of collaboration. Over time, while the quality of urban water supplies have developed rapidly, those in rural areas have lagged behind.

Nationally, access to an improved water supply rose from a low 10% in 1973 to the current level of 98%. Surveys⁵ show that access has reached 98% of households in urban areas and 98.5% in rural areas. (See *Figure 1*)

Despite these levels of access, many water quality problems remain, particularly microbiological, and increasingly due to chemical contamination, affecting both ground and surface water sources.

Concerns

In the past, using data collected from households with water supply, coverage was evaluated in terms of adequacy based on the prevailing sanitary condition of water sources. However, those water sources have the potential to become contaminated by industrial and agricultural discharges from

human activities such as waste disposal and mining, and from natural geological conditions. Even when clean and protected sources are allocated for domestic use, contamination may still occur before it reaches the consumer, through non-hygienic maintenance or handling; for example, leakage of water pipes, dirty water containers and utensils used to collect the water. Samples of drinking water taken by the Department of Health between 1991-2000 from shallow wells, rainwater, and artesian wells showed that most samples were contaminated with bacteria.⁶

The household coverage of sanitary latrines has also undergone a remarkable increase; rising from 8.1% in the First National Socioeconomic Plan to a near total coverage of 98.2% by the Eighth Plan.⁷ This was backed by ongoing promotion of sanitary behaviours. Sanitation activities in the past have emphasized the promotion of latrine construction and use, wastewater treatment, and solid waste disposal, but problems remain that require improvement or the development of new modes of operation.

Existing treatment systems cannot handle all the wastewater from communities and most of it is disposed of untreated, into public water sources, rivers, and into the groundwater. Industrial and agricultural waste is similarly disposed of directly into the environment.

The greatest adverse impact results from the disposal of excreta from latrines, particularly from night soil pumping trucks that are discharged without proper treatment. These activities cause contamination of the soil, ground, and surface waters, resulting in

adverse health effects to the population from bacteriological contamination.

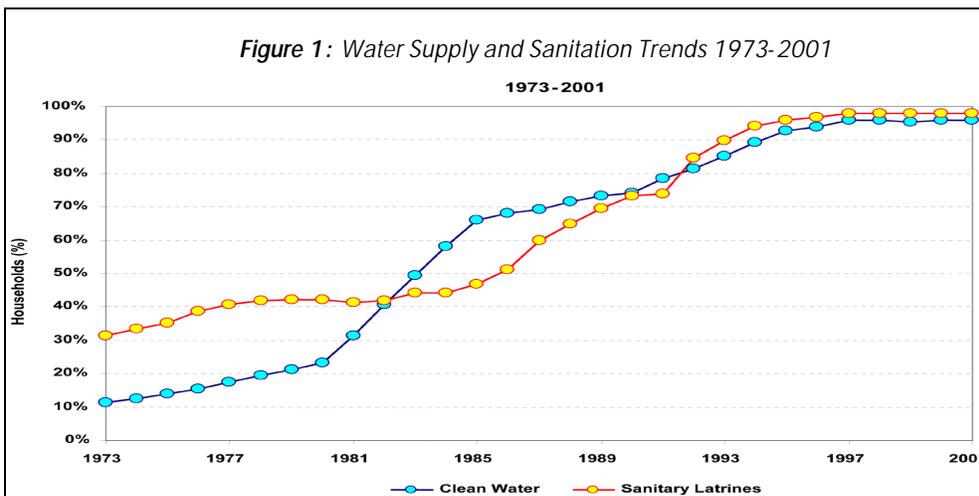
In urban areas, domestic solid waste consists of general refuse and some hazardous waste, only 30% of which is disposed of in a sanitary manner, while the remainder is dumped. Leachate from these wastes contains highly toxic chemicals and organic matter that contaminates ground and surface waters in nearby areas.

The major health problems confronting the country are food and water-borne diseases, especially acute diarrhoea, food poisoning, helminthic infections, dysentery, and the enteric fevers (typhoid and paratyphoid fever).⁸ Contaminated water supply, poor sanitation, and non-hygienic behaviours are the main source of these diseases that cause high morbidity and

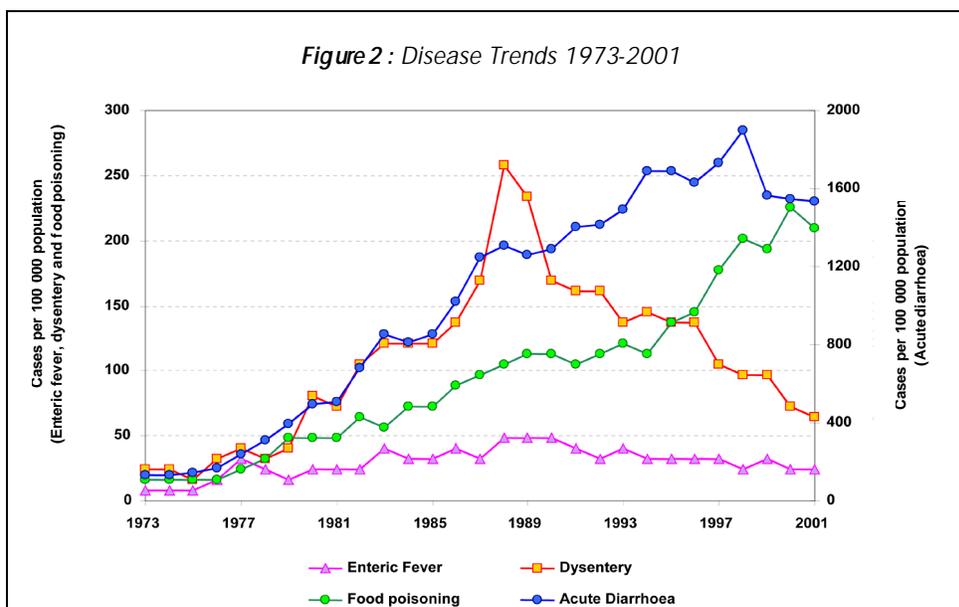
mortality among the Thai people. These pose a threat to children in particular.

Trends in water supply and sanitation are shown in *Figure 1*.

The rising coverage of water supply and sanitation had the expected outcome of reduction of some water-borne diseases. Since the end of the "Decade of Water Supply and Sanitation in Thailand", the incidence rate of dysentery has declined to one quarter of its previous level and that of enteric fevers to one-half. However, there are notable exceptions to this decreasing trend in the case of the increased incidences of food poisoning and of acute diarrhoea, both of which have risen ten-fold since the early 1970s. The trends in these diseases are shown in *Figure 2*.



Source: Population and Household Census for the year 2000, National Statistics Office 2001



Source: Summarized Diseases Surveillance report, 1973-2001, Epidemiological Division, Office of Permanent Secretary, MOPH

Cases of food poisoning have increased consistently over the past 30 years, a phenomenon brought about by changes in lifestyle, particularly in urban areas where people are more likely to purchase cooked food from street vendors, and good taste and low price have a higher priority than awareness of the hygiene, cleanliness and safety of their food. Food sanitation situation reports⁹ found that between 74% to 99% of food shops and 66% to 90% of food markets employed non-hygienic practices, presenting clear evidence of the most likely cause of the increase in the incidence of food poisoning.

Children too are directly affected, as parents, particularly in urban areas, are increasingly reliant on purchased food rather than home-cooked food. Poisoning has occurred not only from microorganisms, but

also from toxic substance contamination, which together with unhygienic food preparation practices have seen a tripling of the cases of food poisoning in the last 15 years.

Non-hygienic health behaviours related to food handling occur during production, cooking, storing, and selection for consumption and currently, people are more likely to purchase ready-cooked foods from stalls where non-hygienic practices are common.

Of greater concern however, is the dramatic increase in acute diarrhoea over the last 25 years much of which has been attributed to poor water quality. Despite the increasing water supply coverage, many supplies are contaminated by environmental

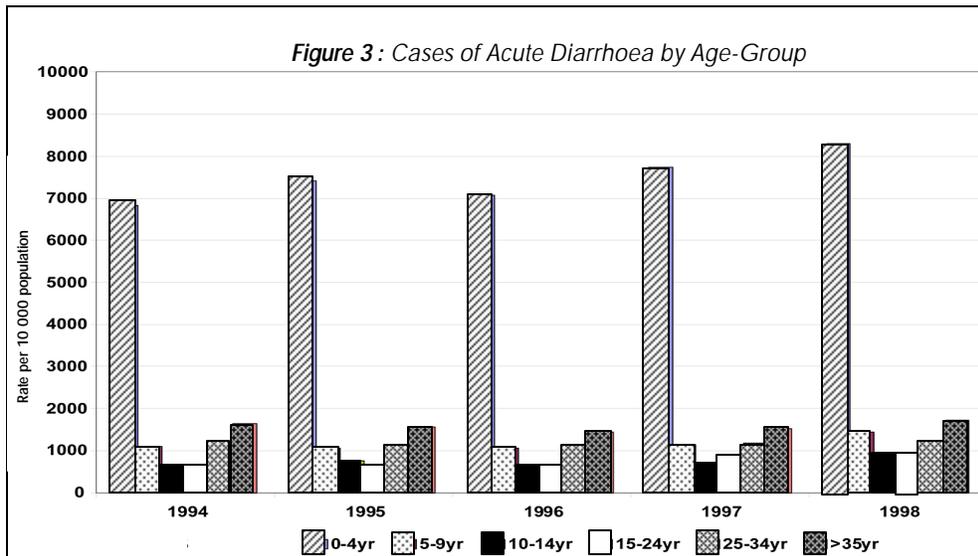
factors such as toxic chemicals from poor waste management practices, or poor maintenance such as the leakage of pipes, and the use of unclean storage containers and utensils.

Since 1973, the morbidity rate from acute diarrhoea has risen continuously, with a respite since 1998, and is now some ten times higher than it was 30 years ago. Diarrhoea can cause dehydration that leads to weight loss and abnormal absorption of nutrients, affecting the nutritional status of high-risk groups such as children under five, resulting in malnutrition. Children are disproportionately affected and from an age group analysis, it was found that 40% of all diarrhoea cases occurred in children under five years of age despite this age group representing only 9% of the total population. The high incidence of acute diarrhoea in the under-5 age group is shown in *Figure 3*.

Helminthic infections are diseases closely relating to environmental sanitation and personal hygiene. The prevalence rate of all helminths (roundworm, hookworm, whipworm, pinworm, liver fluke, and tapeworm) has decreased from 62.9% in 1957 to 22.5% in 2001.

Hookworm infection is an important cause of iron deficiency anaemia both in pregnant women and in children. Surveys of iron deficiency anaemia in pupils aged 6-14 years in primary schools conducted between 1991 and 2001 throughout the country¹⁰ showed a decrease from 19% to 6% over the intervening period.

Hookworm infections showed a decrease in the prevalence rate from 25% to 11% over the same period. The decreasing rates of helminthic infections reflect the relationship with the increase rate of latrine use.



Source: Division of Epidemiology, Ministry of Health, Thailand

Conclusion

To use a computer analogy, Thailand has achieved great success by investing in the "hardware" of water supply and sanitation, but work remains to be done on the "software".

Despite the development of water supply and sanitation which aims to control food and water-borne diseases, morbidity rates remain high due to bacterial and chemical contamination of the water exacerbated by unhygienic behaviours.

The proper disposal of excreta from household latrines is often hampered by a lack of awareness in local administrators, a lack of skill and knowledge in local staff who operate the facilities, and budgetary limitations for construction of centralized treatment systems.

Management conflicts in local authority wastewater treatment systems often result in ineffective and noncontinuous operation. The major problems are insufficient finance for system operation and maintenance, and the development of an appropriate fee for the use of wastewater treatment facilities that is acceptable to everyone.

Inappropriate attitudes to food sanitation are apparent where the selection of delicious, appetizing, low-price food is made without adequate concern for the cleanliness and safety of the food and its preparation, particularly uncooked foods.

Forward Planning

While a great deal has been achieved, changes are being made to progress towards

a uniformly safe and accessible quality water supply and an effective and efficient sanitary system.

A major step towards this is the "Safe Tap Water Certification Programme"¹¹ a joint programme of the Department of Health and water supply agencies. Under this programme, entire water supply systems are assessed, and management structures put into place to ensure protection of sources, improvement and maintenance of infrastructure, and a regime of water quality surveillance to ensure a safe and reliable water supply to the population. As an indicator of the performance of the programme, studies are planned to examine the effects of water, sanitation, and hygiene on the health of Thai school children. The information derived from these studies will be used to refine the programme and for policy development. Another weakness highlighted is that there is still insufficient knowledge and utilization of hygienic health behaviours, particularly in the use and care of drinking water sources and food preparation. Having put into service the basic water supply infrastructure, it is now necessary to educate communities in the correct maintenance of these facilities and the promotion of the importance of good sanitary behaviours to the population at the national, provincial and village levels. This will require maintaining existing hygiene awareness programmes that evolve into behavioural change programmes through health education.

Future success is more likely if education begins at a young age in schools where the schools themselves should set an example of hygienic conditions and behaviours¹². After

the home, children spend most of their time at school, where the promotion of simple hygiene interventions such as hand washing and tooth brushing can yield not only health benefits, but also economic benefits to the individual, family, and community. Thailand has "Health Promoting Schools" and the "Child Care Centre" programmes that aim to recognize establishments as good practice models and "Learning by Doing" which

actively involves students in monitoring the health of the environment in and around their schools.

When a safe and reliable water supply, good sanitation, and a universal adoption of hygienic habits become the norm, they too like computers will invoke the response, "However did we manage without them?"

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Exposure to Indoor Air Pollution: Evidence from Andhra Pradesh, India

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Abstract

Over 80 per cent of rural households and 24 per cent of urban households use biomass fuels (wood, dung and crop residues) for cooking and heating in open fires or simple stoves, mostly indoors, and rarely with adequate ventilation or chimneys. This situation leads to some of the highest-ever recorded levels of air pollution to which young children and women are exposed daily for many hours. An exposure assessment study in Andhra Pradesh (AP), conducted as part of the World Bank programme, Household Energy, Indoor Air Pollution and Health in India, measured indoor concentrations of respirable particulate matter – the main air pollutant of public health concern – from biomass fuels in rural households of southern India in combination with time-activity patterns of household members. The study provides strengthened evidence that children under five years suffer from high levels of exposures to indoor air pollution (IAP) on a daily basis. The findings of the study call for greater policy attention and commitment to effective IAP mitigation strategies.

Keywords: Indoor air pollution, biomass fuels, household energy, exposure assessment, acute respiratory infection and child health.

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Background

According to the World Health Organization, indoor air pollution from solid fuels ranks fourth amongst risks to human health in developing countries and ranks higher still in India (third), just below malnutrition and lack of safe sanitation and drinking water ^[1]. There is a growing body of literature on the health impacts of indoor air pollution, especially in women and children ^[2-6]. Studies yield an estimated range of 400 000-2 million premature deaths annually attributable to IAP in India with a majority of deaths occurring in children under five due to acute respiratory infections (pneumonia). There is also strong evidence of impact on women, up to 34 000 deaths resulting from chronic obstructive disorders ^[7].

A study was piloted in three districts of Andhra Pradesh, a state in southern India to have better information on the exposure levels for population subgroups and assess the effectiveness of some interventions. The study involved (i) a household-level survey of house and fuel characteristics and behavioural factors (e.g., time to cook, infant protection measures); (ii) monitoring of indoor concentrations of respirable suspended particulate matter (RSPM; mean aerodynamic diameter of 4µm) and 24-hour time-activity patterns of the household members and (iii) statistical analysis to explore linkages between the RSPM concentrations and determinants of exposure ^[8].

Out of 412 sampled households, 270 households relied on wood as the primary cooking fuel and 97 used dung. Clean fuels such as kerosene and LPG, were used by 11

and 34 households respectively. Small farmers with low education levels inhabited 50 per cent of households. Smoking, mostly by male members, was prevalent in up to 45 per cent of the households. Use of improved stoves was negligible, with heavy reliance on traditional stoves without chimneys.

Study Findings

In households using solid fuel, average 24-hour exposures to RSPM were the highest amongst women cooks ($442 \pm 37 \mu\text{g}/\text{m}^3$) compared to all the other household members. Amongst non-cooks, older women (61-80 years) experienced the highest exposures ($337 \pm 57 \mu\text{g}/\text{m}^3$), followed by children under five ($262 \pm 55 \mu\text{g}/\text{m}^3$). This is presumably because older women remain indoors for larger periods of time. Exposures of female and male children were similar. Men of 16-60 years experienced the least exposures owing to greater likelihood of working outdoors ($148 \pm 5 \mu\text{g}/\text{m}^3$).

In households using solid fuels, kitchen configuration played an important role in affecting exposures of all household members, including children under five. Average living area RSPM concentrations were the highest in households having indoor kitchens without partitions ($280 \pm 17 \mu\text{g}/\text{m}^3$) followed by households with indoor kitchens with partitions ($264 \pm 17 \mu\text{g}/\text{m}^3$). Enclosed outdoor kitchens or simply outdoor cooking resulted in even lower levels of indoor exposure ($178 \pm 11 \mu\text{g}/\text{m}^3$ and $175 \pm 10 \mu\text{g}/\text{m}^3$, respectively) but still exceeded health guidelines for outdoor air pollution (24-hour Indian standard for particulate matter less than 10 µm is $100 \mu\text{g}/\text{m}^3$ for rural areas).

Thus, dispersion considerably affected indoor levels even during outdoor cooking.

In households using LPG, children were exposed to three to four times lesser RSPM levels ($76 \pm 6 \mu\text{g}/\text{m}^3$) compared to solid fuel using households and these levels were similar to all the other population subgroups.

Conclusions and Policy Implications

All members of the family were exposed on a daily basis to high levels of air pollution due to traditional use of biomass fuels. Even when cooking was done outside the house – in a separate kitchen or in the open air, a common practice of poor rural households – the resulting indoor levels of RSPM and exposure of all family members greatly exceeded health guidelines for ambient air.

The study highlights the important gender and age dimensions of the IAP problem. Women, in their traditional capacity as cooks, suffer from much greater average daily exposures than other family members. Among non-cooks, young children are most vulnerable to the health risks because IAP is likely to have the greatest detrimental impact during the early developmental phase. This finding lends support to the results of other studies in India linking household fuel use to child mortality rates^[9]. Therefore, IAP punishes young children twice – by making them ill and making their mothers ill, thus reducing the mother's ability to take care of the children.

Biomass will remain the principal cooking fuel for a large majority of rural households for many years ahead. Hence,

more attention should be paid to effective IAP mitigation strategies that employ a variety of options, from improvements in fuels and cooking technologies (e.g. improved stoves) to housing improvements (e.g. kitchen configuration, chimneys and ventilation improvements) to facilitating behavioural changes among women, children and other household members (e.g. keeping children away from smoke).

Health agencies have an important role to play in integrating indoor air pollution into existing maternal and child health programmes as well as to address IAP in other home-related health programmes (e.g. hygiene, water and sanitation). Further, agencies can raise awareness amongst rural families about the health impacts of household energy and provide specific information on the range and effectiveness of mitigation options. Various methods – from including IAP issues in basic hygiene education by primary schools and health centres to mass media – should be utilized. Improving knowledge of the IAP problem and possible solutions among major stakeholders, including the medical community, is as important.

While research gaps and uncertainties in exposure and specific health outcomes should not be used as an excuse to delay actions, there are some critical areas where better knowledge is needed to help design effective interventions. Exposure assessment studies can help to identify the most affected populations and household level determinants of exposure (e.g., kitchen ventilation) that can be modified to improve health impacts. Based on these studies, large-scale survey instruments, such as the Census, can be modified to include

additional household parameters that influence exposure. So far, two parameters – type of fuel used and ventilation – emerged as the key determinants of exposure in the study.

Finally, IAP is “cross-sectoral” in nature and requires increased collaboration and commitment between the agencies responsible for health, energy, environment, housing and rural development.

Acknowledgement

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Comment

Children: Hidden Population Under Threat

*Ravi Agarwal**

If you are under five years of age and less than three feet tall, it is most likely that you are below the eye-level of most policy-makers. However, it is a lesser known fact that over 40% of the global burden of diseases from environmental factors falls upon children below five years of age. More than 5 million children die each year from environmental-related diseases. Children are a highly exposed group, but often hidden from view.

It is not often recognized that children are not just 'little adults.' Not only do smaller exposures cause higher impacts on children's lesser body weights, but their physical selves, which are undergoing rapid change, are also more vulnerable to these exposures. Children's bodies are developing, and not able to excrete toxins in the same manner as adults can. They are also more active, undertaking a high amount of physical activity and thus absorbing higher amounts of air, water and food contaminants. In developing countries such as India, a majority of children live in poverty, compounding the burden. Poor nutrition, inadequate access to health care and poor hygiene make the situation far worse through the addition of 'traditional risks.' Overall, the risks are much more for children than for adults in similar circumstances. Even amongst them, it is probable that girl

children bear a higher burden, since there is gender-based nutritional and other discrimination which works against them, especially in India.

Children face health risks in the multiple setting environments they interact with. At school, in the workplace, at home, children are constantly exposed to health risks. Till recently, much of these risks were unrecognized, and not focused upon despite the fact that a Convention on the Rights of the Child was adopted by the UN General Assembly as early as 1989, and which came into force in September 1990.

In developing countries like India, the problems are more acute. Each year, in such contexts, over 3 million people die prematurely from water-related diseases and another 2 million succumb to indoor air pollution from smoky stoves¹. Infants and young children top the list followed by women from poor rural households. Lack of safe water, poor sanitation and the use of unclean fuels are some of the causes. Over 1 million people die annually from malaria while another million die from urban air pollution, again mainly from amongst the

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¹ *Ian Johnson and Kseniya Lvovsky*, World Bank Special: Double Burden.

poor². The urban poor live in shanty housing which are clustered together in dense neighbourhoods and sited near garbage dumps, where waste is often afire, making the impact severe all around. This burden from environmental risks accounts for one-fifth of the total disease burden in the developing world.

In addition, there are newly discovered chemical risks, which are proving to be more severe than earlier believed. Hundreds of thousands of chemicals are now being used in everyday environments. However, the health effects of only a very few are known. Many commonly used chemicals, for example, the type known as organochlorines, can cause grave harm to the unborn or newborn child. In some cases, the harm can be to the foetus itself, on being exposed through the mother's body. Exposures at this early stage can arise from pesticides, household chemicals as well as outdoor pollution, resulting in life-long effects. Some of these can impact the hormonal system and show up later during the teen years. Studies have shown that Indian mother's milk, a key food for infants, contains among the highest amount of the insecticide HCH anywhere in the world³. Other contaminants such as heavy metals like lead and mercury retard normal brain development and lead to permanent impairment. Studies have shown that vinyl teethers and plastic toys commonly used in India (and in other parts of the world) contain chemicals (such as DEHP), which

leach and hamper the development of the child's reproductive system. Many countries have banned the use of these chemicals. However, the challenge persists, owing to the large variety of chemicals still in use whose effects are unknown.

In countries such as India, a large number of children are part of the workforce. A 1991 estimate put this figure at over 14 million, while other estimates quote upto 100 million. They are estimated to contribute upto 20% of the country's GNP⁴. The types of workers include full time child workers as well as marginal workers. Child workers face a variety of hazards. Many jobs are physically taxing and stunt the child's physical growth. Mines, quarries, construction sites, brick kilns, head loading, exposure to furnaces, for example in the brassware industry, are some such work sites. Being engaged in such work leaves children little time for their essential development such as attending school. It can also cause outright fatigue. Children are also preferred domestic workers, engaging in long hours of work besides being 'used' for illegal activities like drug and sex trafficking. In the agricultural sector too, a significant part of the workforce comprises children. Estimates reveal that over 55 million children work as bonded labourers in India in various industries including housework, enslaved to fulfil some small debt owed by their parents⁵. Urban street children are another group who engage in scavenging, working in restaurants and hotels or as rickshaw pullers, and even in prostitution.

² Ibid

³ Maricar S. Prudente, Shinsuke Tanabe, Mafumi Watanabe and Annamalai Subramanian, *De La Salle University-Manila, Philippines Center for Marine Environmental Studies, Ehime University, Japan Annamalai University, India, Persistent Organochlorine Residues in Human Breast Milk from Cambodia, India, Japan and the Philippines*

⁴ Clarence James Coonghe, *Introducing Child Labour in India, with special reference to the hazards child labourers face.* and <http://www.childrendatabank.org/india/labour/labour2.html>.

⁵ Ibid

Children also bear the brunt of violence and disasters of all sorts. UNICEF estimated that over 5 million children under the age of 14 were affected by the Gujarat earthquake, while over 3 million children lost family members or friends. Over 9 600 elementary schools and over 800 early child development centres were destroyed⁶.

In urban areas, a lack of access to safe drinking water and sanitation leads to illness and death, particularly among poorer children. The disease most frequently caused is diarrhoea, which leads to deaths of over 2.2 million children under five. Intestinal worms, trachoma and cholera are some of the other diseases encountered⁷. Often, the water is not safe. Overextraction has led to the lowering of water tables, with arsenic and fluoride poisoning becoming widespread in parts of India and Bangladesh.

In terms of air pollution exposures, in a survey carried out by UNICEF, 19.3% of under five children in India were found to be suffering from acute respiratory infections, and only 64% of them were taken to a health provider.⁸

Clearly, the issue of children's health as a consequence of degrading environmental conditions needs special attention. It is not an issue which is adequately addressed through existing health policies. The range of the impact on children as well as the nature of the impact implies higher disease rates and mortality, besides stunting various aspects of their potential. A special emphasis also needs to be laid on the impact on the girl children, since many social practices discriminate against them. Overall, many of the effects have not even been studied adequately, and children continue to be the hidden population under threat.

⁶ <http://www.unicefusa.org/alert/emergency/indiaeq/>

⁷ Global water supply and Sanitation Assessment. 2000 Report; UNICEF, WHO, Water Supply and Sanitation Collaborative Council

⁸ <http://childinfo.org/eddb/ARI/database.htm>



Video-instruction for Blood Pressure Measurement

M. Mostafa Zaman¹, Nobuo Yoshiike²

Blood pressure measurement is one of the most commonly used medical procedures in both clinical and population settings. However, errors in its measurement are fairly common ^[1, 2]. Most of the studies related to methods on blood pressure measurement were done among nurses. In population-based studies, employment of health workers as blood pressure observers becomes necessary to avoid so called 'white-coat' hypertension and to reduce the cost of surveys without compromising the accuracy. Accuracy in blood pressure measurement is important ^[3] because hypertension is common, clinically silent, and leads to serious complications, e.g., stroke, heart attack. Various methods are used to train blood pressure observers. A videotape approach is one of them ^[4]. It is not clearly known whether videotape instructions can be used as an efficient method for training health assistants. This study evaluates the effectiveness of a videotape training course for health assistants on blood pressure measurement at the field level.

This study was done on 219 randomly selected 'healthy' subjects aged 18 years or older (mean 36 ys.) in Rajghat village in Tetuljhora union of Savar, Dhaka, as a part of a coronary heart disease risk factors survey.

Two male health assistants (with 12 years of schooling but unacquainted with blood pressure measurement) who work for primary health care and two male doctors (MBBS) were trained under the protocol of our study prior to data collection. The training included a lecture, videotape (developed by the Emory University, Atlanta, USA) exercise, live practice and testing components. The videotape presented a series of scenes displaying the fall of mercury in the sphygmomanometer column, accompanied by the simultaneously recorded Korotkoff sounds ^[5]. The observer was to record the manometer readings at the first sound sequence indicating systolic and the

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last sound in sequence indicating diastolic pressure. Known values were practised repeatedly until proficiency was attained in terms of agreement with the reference values determined by an experienced reference observer (Darwin R Labarthe). Finally, live practice was done on 10 patients admitted in Savar Health Complex. Observer readings were compared to an experienced standard (NY) for evaluation.

Blood pressure was measured at the subject's home or at a nearby home with a comfortable sitting arrangement. All subjects were made to urinate before blood pressure measurement. This was possible because there was a urinalysis component in the survey. At the beginning of each examination, appropriate cuff was selected depending on the arm circumference. For each participant, blood pressure was measured on the left arm, in sitting position after at least five minutes' rest by using a standard mercury sphygmomanometer (Baumanometer®, Desk Model 0320). Initially, the cuff was inflated rapidly approximately 20 mm above the level at which the radial pulse became palpable. Then the cuff was deflated at a constant rate of 2 mm/sec to the point 10 mm below the point of disappearance of sounds. Two measurements were taken at least one minute apart, but their mean was used for this analysis. For each subject, readings by one health assistant and one doctor were obtained on two different occasions (cross-over design applied for a block of 10 subjects). The two readings were considered as a pair, and the doctor's reading minus the

health assistant's reading was considered as the paired difference. Its mean and 95% confidence interval were used for evaluating the performance of the health assistants.

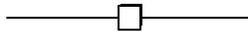
Table 1: Mean paired difference (doctor minus health assistant) of blood pressure readings

Blood pressure	Observed by doctors Mean (standard error)	Mean paired difference (95% confidence interval)
Systolic, mmHg	117.2 (1.2)	0.3 (-2.0 to 1.4)
Diastolic, mmHg	74.7 (0.9)	0.6 (-0.8 to 2.0)

The results are presented in Table 1. The mean of systolic and diastolic pressure recorded by the doctors were 117.2 and 74.7 mm Hg respectively. The means of paired differences between observers were very small and not statistically significant: 0.3 for systolic and 0.6 for diastolic pressure. The correlation coefficients (Pearsons) between readings by doctors and health assistants were moderately large: 0.72 (P=0.0001) for systolic and 0.65 (P= 0.0001) for diastolic pressure. Our data show an acceptably large agreement of blood pressure readings taken by doctors with health assistants. Therefore, a videotape training could be used as an effective means of training health assistants as reliable blood pressure observers for population studies.

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SEARO Notes and News

Regional Meeting on Global Fund to Fight AIDS, TB and Malaria, SEARO

A Regional Meeting was convened on 16-17 January on the Global Fund to fight AIDS, TB and Malaria. The objectives of the meeting were: (1) To discuss issues and inputs needed for countries planning to attend the Board Meeting in January 2003; (2) To review progress made in the preparation/review of the Global Fund proposals in the second round and to share country experiences; (3) To provide an update on the Fund disbursement procedures, monitoring and evaluation, and procurement systems as being prepared by various committees established by the Global Fund, and (4) To propose actions needed at country level for implementation of Global Fund -related activities, as well as the issues relating to technical monitoring and evaluation.

Representatives of all the Member Countries as well as two observers from NACO, India participated in the meeting. Dr Mazuwa Banda, Technical Officer, HIV/AIDS from WHO/HQ, Geneva and Ms Vidya Ganesh, Project Manager (South Asia Political Advocacy Project), UNAIDS, Intercountry Team for South Asia, also attended.

Noting that nine proposals were recommended for funding in the second round including four on HIV, three on malaria and two on TB, the participants appreciated the technical assistance provided by WHO (Regional and Country Offices) and UNAIDS in preparing the proposals for the first and second rounds and the comments and suggestions provided by the Regional Review Committee in September 2002, which were incorporated in the final country submissions to the Global Fund.

Participants then discussed ways and means to improve the technical quality of proposals and identified seven tips for writing successful proposals for funding. These were: (1) articulating situation analysis and intervention gaps; (2) clarity on the goal, objectives and broad activities; (3) clarity on indicators and targets; (4) consistency with national/international policies and strategies; (5) demonstrating additionality and complementarity; (6) identifying resource gaps, providing detailed budget with allocations to various implementing partners, and (7) ensuring feasibility and sustainability.

Action points were drawn up for WHO and UNAIDS, the Global Fund and the WHO Secretariat, as well as for the countries

and bilateral and multilateral partners. The meeting ended on an optimistic note.

Third Meeting of Global Alliance for Elimination of Leprosy (GAEL)

The third annual meeting of leprosy endemic countries and partners sponsored by the World Health Organization was held in Yangon, Myanmar from 6-8 February.

The Global Alliance to Eliminate Leprosy (GAEL) was created in 1999 with the target of eliminating leprosy as a public health problem by 2005. Elimination has been defined as less than one case per 10 000 people. Much progress has already been made towards this goal, and almost all the countries where leprosy was a major public health problem at the end of the 20th century are now on track to reach the elimination goal.

Among the 122 countries where the disease was considered endemic in 1985, 108 have now reached the goal of elimination. Today, 90% of leprosy cases are found in India, Brazil, Nepal, Madagascar, Mozambique and Myanmar (in order of importance).

GAEL brings together key partners working to detect and treat all persons affected by leprosy and thereby eliminate the disease from all countries by 2005. The diagnosis and treatment of leprosy just like any other disease, without stigma or isolation is key to reaching this goal. In recent years, access to leprosy diagnosis and treatment within general health services has been greatly improved. Mass media campaigns have also helped create awareness of the availability of free and effective treatment as well as to dispel fear about the disease.

Since 1995, leprosy patients in all countries have had access to free drug treatment, first through a donation by the Nippon Foundation and now through the Novartis Foundation for Sustainable Development. This highly effective multi-drug treatment has contributed greatly to the success of bringing down the rates of leprosy infection around the world.

The Nippon Foundation, which has been supporting the programme for the last 28 years, reaffirmed its commitment to support this global effort to eliminate leprosy.

As Mr Yohei Sasakawa, President of The Nippon Foundation and Special Ambassador for the Global Alliance said: "This is an honourable mission that calls for a united effort by all the stakeholders. We have reached the last mile of our 100-mile journey. But this last mile will be the most difficult to travel. We must keep moving and not falter".

Intercountry Meeting for Networking of Public Health Institutions

An Intercountry Meeting for Networking of Public Health Institutions was held in SEARO from 11-14 February to (1) review recent developments in public health educational programmes; (2) identify challenges, issues and emerging areas in public health training, education and research; (3) formulate a framework for a regional network and areas of collaboration and (4) discuss an outline for a common regional curriculum for high level courses in public health. The meeting was attended by heads of prominent public health institutions in the Region as well as

public health experts. Dr Samlee Plianbangchang, former DPM and Dr Palitha Abeykoon, former HSD, Dr B Jayaweera, former RFH/SEARO as well as Dr Mario Dalpoz, Coordinator, OSD/HQ participated in the meeting. Prof Ascobat Gani (Indonesia) was nominated as Chairperson, and Dr Chalermchai Chaikittiporn (Thailand) Co-Chairperson, while Dr Sulochana Abraham (India) and Dr PHG Fonseka (Sri Lanka) were nominated Rapporteurs.

In his inaugural address, the Regional Director recalled the Calcutta Declaration of 1999 which emphasized the need for strengthening and reforming public health education, training and research by networking with institutions for improving human resources development. In this context, he stressed the need for networking of public health institutions since there are several common problems in public health that countries share.

At the end of the meeting, a time-bound activity plan for promoting a Network of Public Health Schools in the South-East Asia Region was developed.

WHO/FAO Expert Report on Diet and Chronic Disease

An independent report by a team of global experts to study the link between diet and chronic disease, commissioned by the World Health Organization (WHO) and the Food and Agriculture Organization (FAO), aims to identify new recommendations for governments on diet and exercise to tackle the ever increasing number of people who die each year from chronic diseases. The burden of chronic diseases – which includes cardiovascular diseases, cancers, diabetes and obesity – is rapidly increasing worldwide.

The Report recommends that a diet low in energy-dense foods that are high in saturated fats and sugars, and abundant in fruit and vegetables, together with an active lifestyle are among the key measures to combat chronic disease. It emphasizes that energy consumed each day must match energy expenditure. It advises ways of changing daily nutritional intake and increasing energy expenditure by: (1) reducing energy-rich foods high in saturated fat and sugar; (2) cutting the amount of salt in the diet; (3) increasing the amount of fresh fruit and vegetables in the diet, and (4) undertaking moderate-intensity physical activity for at least an hour a day.

The Report calls for a limit in the consumption of saturated fats, sugars and salt in the diet, noting that they are often found in snacks, processed foods and drinks and can also have an influence on cardiovascular diseases such as strokes and heart attacks.

The Report will form the basis for national and regional bodies to develop specific guidelines on diet and exercise for their local communities.

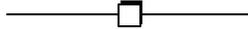
Intercountry Consultation on Regional Strategies for Strengthening Occupational Health, SEARO

An Intercountry Consultation on Regional Strategies for Strengthening Occupational Health in SEAR Countries was held in SEARO from 28-29 April 2003. The objective of the consultation was to identify priority areas in occupational health for consideration in the SEA Region and formulation of a national plan to strengthen occupational health in Member Countries. Experts in occupational health from several countries of the Region participated. Dr Gerry Eijkemans, OHP/HQ

and Dr Nida Besbelli, PEH/PCS/HQ from Geneva, Dr Shamsul Huda from WR Indonesia and Dr Cherian Varghese from WR India also attended the consultation.

In his inaugural speech, the Regional Director, Dr Uton Muchtar Rafei, expressed concern at the large number of fatalities in the Region due to occupational accidents and prevalence of occupational diseases, which had a severe health impact. The importance of occupational health had been stressed by the World Health Assembly, SEA/ACHR and the Jakarta Declaration on Health Promotion. Recent surveys on occupational health hazards revealed that there was considerable under-reporting of occupational diseases and injuries. He called for establishment of a regional network on occupational health to tackle the problems confronting the Region in this area.

After detailed discussions, the participants identified three regional priorities in occupational health: (1) organization of medical surveillance in workplaces; (2) strengthening of capacity in ergonomics, and (3) occupational health and safety management. In addition, capacity building in terms of infrastructure, surveillance, engineering control, medical control, analytical support and equipments and curriculum development to focus on problem-based learning for various industrial settings, taking into consideration epidemiological and other public health issues also emerged as important issues to be addressed.



Book Review

Alcohol in Developing Societies: A Public Health Approach

[ISBN 951-9192-63-8; Sw.fr.23. -/US\$ 20.00]

This book reflects the rates, patterns and trends in drinking and alcohol-related problems in developing societies. It is therefore, targeted at those dealing with alcohol problems in developing societies, including health workers, policy-makers and others involved in health, social work, law enforcement, and public administration. Besides these, it is hoped that scholars, public health workers and students would also find interesting perspectives in this book.

Helminth Control in School-age Children

[ISBN 92 4 154556 9; Sw.fr.22. -/US\$19.80]

This book is a guide for planners and programme managers in the health and education sectors responsible for implementing community-based programmes for control of soil-transmitted helminth and schistosome infections in school-age children.

In school-age populations in developing countries, intestinal helminth infections rank first among the causes of all communicable and noncommunicable diseases. This book describes an approach to the control of infections that is based on the periodic treatment of school-age children - a

particularly high-risk group. Parasitological surveys of school population samples, allied to treatment programmes, can then be used as a basis for selecting an appropriate control strategy for the whole community.

The WHO Manual of Diagnostic Imaging

[ISBN 92 4 154555 0; Sw.fr.65. -/US\$ 58.50]

WHO is creating a series of 'Manuals of Diagnostic Imaging' in collaboration with the International Society of Radiology and the International Commission for Radiological Education. The full series will primarily cover examination techniques and interpretation of conventional diagnostic X-ray procedures.

The present volume in this series, *Radiographic Anatomy and Interpretation of the Musculoskeletal System*, provides an exhaustive description of radiographic normal anatomy as well as pathologic changes most frequently seen including trauma, infections in the bone and joints, metabolic, endocrine and toxic disorders, tumours congenital and developmental disorders etc. The manual contains high-quality reproduction of radiographs and will prove essential reading to general practitioners, medical specialists, radiographers and radiologists in any medical settings.

**WHO Monographs on Selected Medicinal Plants,
Volume 2**

[ISBN 92 4 154537 2; Sw.fr.100.-/US\$ 90.00]

Volume 2 of the WHO Monographs on Selected Medicinal Plants provides an additional collection of 30 monographs covering the quality control and traditional and clinical uses of selected medicinal plants. The monographs are intended to promote international harmonization in the quality control and use of herbal medicines and to serve as models for the development of national formularies. They are a comprehensive scientific reference for drug regulatory authorities, physicians, traditional practitioners, pharmacists, manufacturers and research scientists.

Terrorist Threats to Food

[ISBN 92 4 154584 4; Sw.fr.18.-/US\$ 16.20]

This book responds to increasing concern in WHO's Member States on the possible deliberate use of chemical, biological or radionuclear agents to harm civilian populations and that food might be a vehicle for disseminating such agents. Prevention and response, including preparedness are the two major strategies to counter the threat of food sabotage.

Chapter 1 introduces the problem and places it in the context of other food safety emergencies. Chapter 2 outlines the preventive aspects that could be incorporated into food safety programmes to meet the new threat of food sabotage. Chapter 3 addresses the surveillance, preparedness and response elements specific to food safety, while Chapter 4, the current activities of

WHO and a proposal for strengthening collaboration in this regard to assure more effective alert and response systems for food terrorism are presented. Establishment and strengthening of food safety programmes will increase the capacity of Member States to address the real and current threat of deliberate contamination of food and reduce the increasing burden of food-borne illnesses.

Summary Measures of Population Health:

Concepts, Ethics, Measurement and Applications

[ISBN 92 4 154551 8; Sw.fr.50.-/US\$ 45/-]

This book addresses a wide array of critical issues regarding the measurement of population health using comprehensive indices combining information on mortality and ill-health. The various uses of such summary measures of population health are described and the appropriate measurement framework and specific ethical and social value choices are discussed and debated. Leading experts in epidemiological methods, ethics, health economics, health status measurement and the valuation of health states have contributed to the book.

Summary measures of population health are used by WHO to report on levels of health and inequalities in health for its Member States and to report on the causes of loss of health in terms of diseases, injuries and risk factors and in the analysis of the efficiency of health systems around the globe. They are likely to become increasingly topical and debated as the international community invests large amounts of funds in tackling global problems such as HIV/AIDS, malaria, tuberculosis and poverty. This book will serve as the fundamental reference for the use of scholars across all public health disciplines.

New International Pharmacopoeia

[ISBN 92 4 154536 4; Sw.fr.95.-/US\$ 85.50]

The third edition of the International Pharmacopoeia (IntPh) has been released by WHO to improve the quality and efficacy of medicines, facilitate control of counterfeit and sub-standard drugs and address problems of drug resistance.

The IntPh provides specifications for the content, purity and quality of active ingredients and pharmaceutical products according to internationally approved standards. It is especially aimed at those countries where national regulatory authorities may not have enough funds or staff to function effectively.

The IntPH will be useful particularly in identifying counterfeit and sub-standard medicines. These are growing concerns world-wide, and especially affect developing countries.

Poor quality medicines may cause death, serious harm to health or, at best, have no therapeutic effect. Counterfeit and poor quality antimalarial medicines for example also contribute to the dramatic growth in resistance to antimalarials, which has serious health and economic impacts.

"The consequences of sub-standard or counterfeit medicines are extremely serious and detrimental to all efforts to control disease and save lives," says Dr Gro Harlem Brundtland, Director-General of WHO. "This is a critical aspect of the struggle for access to medicines, and a fundamental feature of WHO's work on this issue."

Concerned especially with increasing access to effective treatment, the IntPh gives priority to medicines for illnesses affecting developing country populations disproportionately, such as HIV/AIDS, tuberculosis, malaria and diseases neglected by conventional pharmaceutical markets.

World Cancer Report

[ISBN 92 832 0411 5; Sw.fr.28.-/US\$ 25.00]

With more than 10 million new cases every year, cancer has become one of the most devastating diseases worldwide. The causes and types of cancer vary in different geographical regions, but in most countries there is hardly a family without a cancer victim. The disease burden is immense, not only for affected individuals but also for their families and friends. At the community level, cancer poses considerable challenges for the health care systems in poor and rich countries alike.

World Cancer Report provides a unique global view of cancer. It documents the frequency of cancer in different countries and trends in cancer incidence and mortality as well as describes the known causes of human cancer. The molecular and cellular basis of the multi-step process of malignant transformation is succinctly summarized. The report contains an overview of cancer prevention, including screening programmes for early diagnosis, as well as advances in surgical and medical oncology, including novel drugs targeting tumour-specific signalling pathways. WHO's efforts in against cancer are detailed, together with strategies for cancer control.

This Report provides a comprehensive overview of cancer for all health care professionals and the general reader. Information is presented concisely, with more than 500 colour photographs, diagrams and tables. Cancer is a devastating disease - but largely preventable. Its impact can be reduced through basic research and improvements in treatment and care. World Cancer Report presents opportunities for action at the individual, community and national levels.

Evaluation of Certain Food Additives and Contaminants

[ISBN 92 4 120909 7; US\$31.50/Sw.fr.35.-/]

This report represents the conclusions of a Joint FAO/WHO Expert Committee convened to evaluate the safety of various food additives, with a view to recommending acceptable daily intakes (ADIs) and to prepare specifications for the identity and purity of food additives.

The first part of the report contains a general discussion of the principles governing the toxicological evaluation of food additives (including flavouring agents), and the establishment and revision of specifications. A summary of the Committee's evaluations of toxicological data on various specific food additives (alitime, cross-linked sodium carboxymethyl cellulose, mineral oils [low- and medium-viscosity], nitrate, nitrite, and salatrim and six groups of flavouring agents) follows. Tables summarizing the Committee's recommendations for ADIs of the food additives and on the flavouring agents considered, changes in the status of specifications, further information required or desired, and a summary of conclusions on flavouring agents with minimum assay values of 95% or less are annexed to the report.

Integrated Management of Cardiovascular Risk:

Report of a WHO Meeting

[ISBN 92 4 156224 2; Sw.fr.7.-/US\$ 9]

The health outcomes of millions of individuals with cardiovascular risk factors, who are vulnerable to strokes and heart attacks, can only be improved through an integrated approach that addresses overall cardiovascular risk. There are many barriers to implementing such an approach, particularly in low-resource settings.

The WHO CVD-Risk Management package has been developed in order to facilitate integrated care of cardiovascular risk despite these barriers. It informs policy-makers of the need and feasibility of managing cardiovascular risk in less well-resourced settings and enables cardiovascular risk management through affordable approaches and rational resource allocation. It also facilitates a paradigm shift from single risk factor management to comprehensive cardiovascular risk management through simplified clinical pathways and promotes evidence-based non-pharmacological treatment of cardiovascular risk and operationalization of clinical prevention aided by counselling protocols. Finally, it promotes the use of cost-effective generic drugs for management of cardiovascular risk and empowers patients and their families to cope with a long-term illness.

The Blood Cold Chain: Guide to the Selection and Procurement of Equipment and Accessories

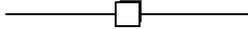
[ISBN 92 4 154579 8; Sw.fr.20.-/US\$ 18.00]

This publication aims to provide practical guidance to all those involved in the management of blood programmes. Following an introduction to the blood cold chain management process, seven chapters provide a detailed description of blood bank refrigerators, plasma freezers, platelet agitators, plasma thawing equipment, blood

Comment

transport boxes and coolants, temperature monitoring devices, as well as other blood cold chain accessories. Each chapter provides WHO minimum performance specifications for the equipment, and selected product information on equipment evaluated by WHO. A specific chapter is dedicated to preventive maintenance and repair of equipment in recognition of a growing problem in developing countries. A final chapter contains practical information, including advice on selecting manufacturers, preparing tender specifications, calculating needs, as well as a series of simple checklists for procuring each item of equipment for the blood cold chain.

A pull-out Self Assessment Questionnaire will assist in the development of a standardized inventory of blood cold chain equipment in use at all levels of the health system, which should lead to improved management of procurement, replacement and maintenance of the equipment. The ultimate objective of the WHO Blood Cold Chain Project is to increase the availability of a safe blood supply to all populations, especially those in greatest need.



Guidelines for Contributors

THE 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 engaged 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.

Every year, the May-June issue of the Forum is dedicated to the World Health Day theme of the year, which is mentioned in the December issue. Readers may send contributions relating to the theme for inclusion in the special issue.

Papers for submission should be forwarded to the Editor, Regional Health Forum, World Health Organization, Regional Office for South-East Asia, World Health House, Indraprastha Estate, Mahatma Gandhi Road, New Delhi 110002, India (e.mail address: editor@whosea.org).

Contributions should:

- be in English;
- be written in an anecdotal, informal, lively and readable style (so that sophisticated technologies, for example, may be easily understood);
- be in MS Word and sent with a diskette and a printout in double space, and
- not normally exceed 3000 words with an abstract (approx. 250 words) and a maximum of 30 references.

Letters to the editor should normally be between 500-1000 words with a maximum of six references.

Responsibility of the Authors

Authors are responsible for:

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- obtaining permission to use copyrighted material (if used). The letter granting such permission should be attached to the manuscript when submitted;
- obtaining permission from appropriate governmental authorities if the contribution pertains to a government programme/projet and contains material/statistics/data derived from government sources;
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Tables and Illustrations

- 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 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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