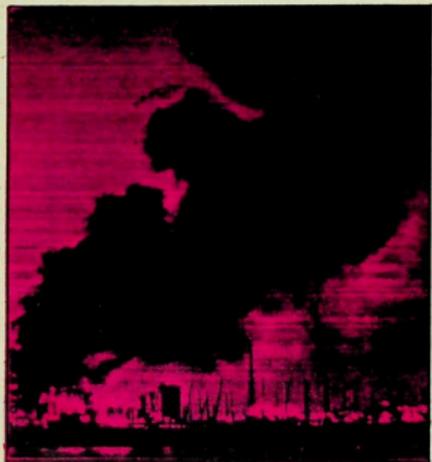
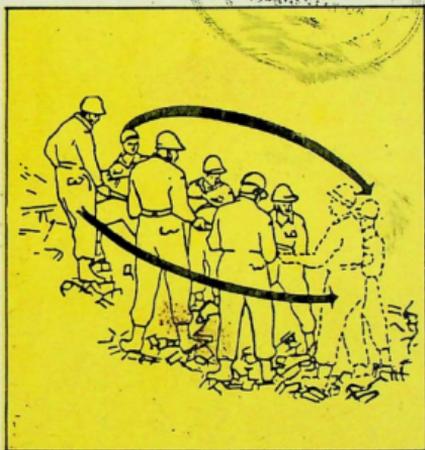
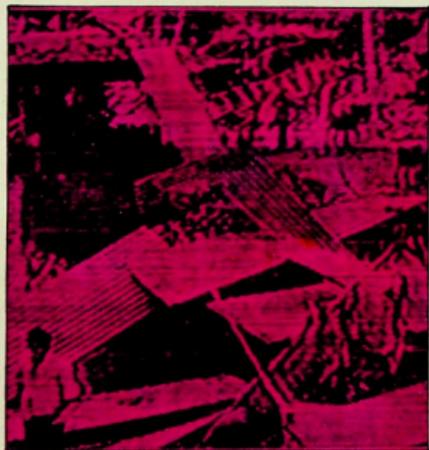


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STOP DISASTER

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OBJECTIVES

Swasth Hind (Healthy India) is a monthly journal published by the Central Health Education Bureau, Directorate General of Health Services, Ministry of Health and Family Welfare, Government of India, New Delhi. Some of its important objectives and aims are to:

REPORT and interpret the policies, plans, programmes and achievements of the Union Ministry of Health and Family Welfare.

ACT as a medium of exchange of information on health activities of the Central and State Health Organisations.

FOCUS attention on the major public health problems in India and to report on the latest trends in public health.

KEEP in touch with health and welfare workers and agencies in India and abroad.

REPORT on important seminars, conferences, discussions, etc. on health topics.

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Articles on health topics are invited for publication in this Journal.

State Health Directorates are requested to send in reports of their activities for publication.

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Disaster Reduction, Preparedness Planning and the Implications for Health of the People

DR M. MANGER CATS

Disaster preparedness planning is an intersectoral exercise. It is the responsibility of the health professionals to stimulate this coordination-exercise and to catalyse disaster preparedness planning. Health professionals can take a more pro-active approach. Their responsibility is not only post-disaster response, but also planning for an improved response and for prevention or mitigation of the disaster impact, to allow for a healthier and happier life for all.

WHO defines disaster as "any occurrence, that causes damage, ecological disruption, loss of human life, deterioration of health and health services, on a scale sufficient to warrant an extraordinary response from outside the affected community or area".

Disasters can be defined in different ways. The magnitude of the effects of the event will be viewed differently, whether from the perspective of the national, district or block level, village or city neighbourhood level, household level or the individual level.

Disasters are classified in various ways e.g. *natural* versus *man-made* disasters or *sudden* versus *slow onset* disasters. The dividing line between these types of disasters is imprecise.

For example: Activities related to man, may exacerbate natural disasters. Population pressure leads to deforestation and erosion in hill areas. The resulting landslides may cause temporary damming of

water in narrow valleys and when the natural dam bursts, flashfloods occur in the downstream area. The erosion also causes sedimentation and overflowing (flooding) of rivers in the plains. The same population pressure causes people to live on river banks or other areas known to be prone to flooding or to landslides. These people may not have alternatives due to their socio-economic situation.

A case of a slow and sudden onset disaster mix are environmental disasters. The health effects of inappropriate toxic waste disposal over a long period of time may suddenly become visible (symptomatic) because a toxic level is surpassed or because an aggravating factor is added to the situation. For example in Japan in 1956, cases of gait disturbance, speech disturbance and delirium were recorded. Outbreak investigation was done, but no cause was found. It took various years of investigation before it was determined that methylmercury was the

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RWJ

cause of this outbreak. Water pollution by different mercury compounds from a chemical factory led to a buildup of mercury in the sediments and in fish of Minamata bay. Retrospectively, congenital effects of the poisoning were also identified: cases of severe cerebral palsy were linked to prenatal exposure to methylmercury in fish.

Impact on Health

Impact of disasters on health is not measured by mortality rates alone, although it is an important first indicator. Morbidity including injuries, as well as disability rates will indicate the effects on health.

An indirect indicator for impact on health, is the economic loss to the household. Economic losses due to loss of economic activity (job) and/or loss of property after disasters, may be considerable. The long-term effects of a debilitated (micro-) economy may be immense on the vulnerable poorer section of the disaster affected population. This in turn will affect their health status very much (resources for basic needs; food availability, shelter, access to health care etc.).

Three Factors

"Disaster reduction" can be broken down into: (1) prevention of disasters, (2) reduction of the frequency or magnitude of disasters themselves; and (3) disaster mitigation.

Disaster mitigation involves measures to reduce the effects of disaster-causing phenomena. It consists of the technical, social, legal, and economic processes to develop appropriate measures and it involves administrative and political processes to apply those identified measures. Mitigation measures may be structured, e.g., flood-

resistant buildings or non-structured e.g. organisation and coordination aspects, training, education and public awareness, warning systems; legal aspects etc.

Which measures are most appropriate to decrease the mortality, morbidity and disability rates and reduce economic disruption following disasters? To start, it is necessary to study the effects of previous disasters and to identify which factors contributed most to producing negative effects on the affected population's health status. To apply disaster mitigation measures effectively, we must identify the possible hazards that can occur and identify the most vulnerable areas and most vulnerable population groups (physical, social and economic vulnerability). This is called risk assessment.

Prevention of disasters is most applicable to man-made disasters. These are technological disasters, including chemical accidents and environmental degradation as well as civil strife and war. Reduction of the frequency and magnitude as well as mitigation of man-made disasters is applicable.

In the case of technological disasters, many can be prevented by proper precautionary measures. For example, if proper on-site (factory) disaster preparedness plans are made, reviewed and rehearsed regularly, protection systems are built in, fire and gas-leakage detectors are controlled and dangerous on-site practices are prevented.

On-site preparedness training and regular simulation exercises for employees are important for prevention and mitigation purposes. It allows for quick evacuation, thus reducing death and injury in the near vicinity of the accident. The simulation exer-

cises will pinpoint weak areas of the on-site plan.

Off-site planning enhances coordination between the various sectors involved in the disaster: police, fire-brigade, hospitals, municipal authorities, emergency team of the plant, plant employees and especially the community living in the neighbouring area of the accident. The neighbouring community and on-site employees are most vulnerable. Industries must be actively involved in this planning. They know which chemicals are used, they often know case-management of toxic effects, they have a responsibility toward the community at risk, and they are interested to prevent or mitigate the effects of chemical accidents because they want to continue production and keep liability costs as low as possible. On- and off-site planning for technological disasters will improve the quality and efficiency of the response to be given.

Reduction of the frequency and magnitude of natural disasters is more difficult if not impossible. However, the impact of natural disasters on the health of the affected population can be reduced through different mitigation measures.

In earthquake-prone areas, structural mitigation measures; such as building of seismic resistant building and enforcement of building codes will greatly reduce deaths and injuries following earthquakes. Seismic proof construction may not be realistic, but appropriate technology to strengthen buildings so as to be more resistant to earthquakes and as a consequence to reduce the impact of heavy material crashing down, will reduce deaths, severe injuries and disability.

Prediction of disasters as earthquakes is difficult but in the case of

cyclones, an elaborate prediction system is in place in India, using satellite and radar technology. Populations at high risk can be warned and be evacuated to safer areas (e.g. cyclone shelters, less prone to high winds). This pre-disaster evacuation plays a major factor in reducing the impact of cyclones on affected population's health status.

Prepared Community

Mortality rates are highest during and directly following the occurrence of disasters. The first 24 hours are crucial, to reduce number of deaths, cases of lasting disability and to provide proper treatment reducing morbidity (e.g. treatment of poisoning). Direct activity by the affected community following such events can save more lives and cut morbidity/disability rates. Training of the community to know what appropriate action to take is imperative. Examples are: evacuation when warning is possible (cyclone, floods), rushing to safer areas when first trembling of earth warns for severe earthquakes, proper search and rescue (how to rescue a non-swimmer in a flooded area or a trapped person in a destroyed building) or first aid measures till medical personnel arrives to the spot or till transport can be arranged to health care facilities. Proper handling e.g. immobilisation of injured patients, is important in reducing disability. There are many ways in which a prepared community can contribute to the reduction of the health impact of disasters.

Due to displacement and concentration of population, disruption of water and sanitation systems, disruption of health care provision and disruption of the normally ongoing health programmes (such as immunisation, vector control etc.), the morbidity rates

HANDLING THE INJURED

In case you or any other fellow being have been injured due to an earthquake, you may follow some of the following simple instructions. This may save a precious life.

- * Keep the injured person lying down in a comfortable position—the head in level with his body.
- * Keep the injured person warm. This is necessary to prevent serious shock. Do not apply external heat, but maintain normal body temperature by using blanket or rugs.
- * Do not move the injured until it is absolutely necessary. Observe maximum precautions while lifting an injured person. Use large planks, charpois etc., covered with thick plastic/bed sheets for moving the injured.
- * Avoid jerks while transporting the injured. Carry the injured person with the head in the direction in which you are moving.
- * Look for serious bleeding, choking of windpipe, burn; fracture and dislocation. Approach the nearest medical centre/post, if you cannot give first aid.
- * Do not give water or other liquids if the injured person is unconscious. Water may enter the windpipe and choke the person. If the injured is conscious and if there are no signs of abdominal injury, give him water but slowly and in sips only.
- * Keep the on lookers/crowd away from the injured as they often interfere with the treatment. The injured needs fresh air also.
- * Do not let the patient see his own injury. But reassure him to lessen his anxiety.

—FIB

will increase. Communicable diseases, e.g. gastro-enteritis, viral hepatitis, respiratory infection, scabies and conjunctivitis become more prevalent. Malaria epidemics may occur. The infrastructure and the health services will need to be picked up as soon as possible after the event.

A proper preparedness plan will envision what priority action needs to be taken during the interim phase before rehabilitation takes place. Preparedness planning of the health sector can ensure an appropriate and timely response to disasters by the health sector. Strengthening the capacities of the health sector for disaster preparedness and response will reduce

the adverse effects of disaster on health services and programmes. Training to improve skills for case-management of poisoning or in mass-casualty management are examples.

Disaster preparedness planning includes planning beyond the relief period. Rehabilitation has to be planned in preparation for future disasters. Reconstruction or re-enforcement of weakened buildings, especially "life-line" buildings such as hospitals and schools, should be such that seismic resistance is improved. Rehabilitation should be interlinked with development programmes. For example,

(Continued on Page 45)

CHEMICAL DISASTERS

LT. COL. JASDEEP SINGH

1. Never before in the history of human race, mankind has ever faced a growing threat and ecological danger, that is being confronted now from numerous pollutants and Chemical Explosions. Chemistry is omnipresent, and there is no doubt that it is providing a great service for the betterment of human life. While counting dividends, we can not afford to omit its devastating effects, which may be accidental or intentional.

2. With rapid urbanisation and industrialisation, a huge quantity of pollutants is being pumped into the atmosphere with its enormous green house effect, and depletion of protective OZONE layer, that is enveloping us in the upper atmosphere. The release of Chloro Fluoro Carbons, used as coolants/refrigerants, has created a dent in the OZONE layer over the region of Antarctica thus exposing us to the cancerous effects of ultra violet rays of Sun. This needs an urgent action. Not so much to undo the harm, that has already been done, but to prevent its further damage to our Globe's Ecosystem.

3. In the past air pollution was regarded as an economic question rather than a health problem. As a result of that, most industries were discharging their wastes into the air, without realising its impact on surrounding communities. The situation is true even now in most of our cities and towns. In the towns and residential complexes, automobiles are contributing a major share towards air pollution. The situation gets worsened when vehicles are ill maintained and ply at snail's pace in the congested urban localities. Automobiles alongwith industries emit a large quantity of lead, carbon monoxide, oxides of nitrogen and sulphur, alongwith shoot and numerous harmful chemicals. They are to share the blame for aesthetic blackening of outsides of city dwellings and catastrophic blackening of insides of city dwellers. Effects are more pronounced in younger children, versatile smokers, pregnant women and fragile persons.

4. While talking about industries, we can not afford to forget the worst accidental disaster in the global history of chemical industry, that unfortunately has been witnessed by our country. On 3rd of December 1984, 8 lakh innocent residents of Bhopal were engulfed with deadly toxin, Methyl Iso

Cyanate (MIC), leaked accidentally from one of the storage tanks of Union Carbide, leaving over- 2500 dead, and many thousands disabled within a short span of time. The entire toxicology revolved around carbon monoxide, chlorine, phosgene and methyl iso cyanate. Early effects were manifested in respiratory and ocular systems culminating in pulmonary oedema, blindness and death; while delayed effects involved central nervous system and other vital organs causing their degeneration.

5. Among the most recent man made chemical disasters, human race will never be able to forget the long lasting and terrifying effects resulting from burning of enumerable oil wells in Kuwait and Iraq, and historical oil slick into Persian Gulf during Jan-Feb 91. The devastating environmental pollution resulting from release of huge quantity of crude petroleum, sulphurous gases, smoke and many other toxic agents has and will continue to have its pronounced ill effects on life on land, water and air. These agents have already resulted in black acid rain in adjoining regions including Iran and black snow fall in the regions of Himalayas. The marine life and aquatic avian life has already shown signs of sufferings. The effects on man would be more pronounced in people who happen to consume these affected Sea creatures. This may cause spinal cord disease culminating in paralytic episodes. It is feared that cumulative effects may lead to severe drought and cause the death "of more people than the population of Iraq, Kuwait and Saudi Arabia combined". Various detoxification measures are being employed for oil spill. These include pumping of oil from sea surface and use of "genetically manipulated bacteria". These bacteria are capable of degrading the crude oil. The process of exhausting the atmospheric pollutants from burning oil wells into space through the dent in the OZONE layer may be a great break through.

6. Global warming and depletion of OZONE layer could be worst calamities on our planet. And if the overall temperature rises, it would result in melting of polar ice. This will raise mean sea level. And if this happens, we can imagine the plight of cities lying in close vicinity of sea. □

India's Preparation for Disaster Reduction : An Overview

PROF. S. K. GANGULI

PROF. A. C. URMIL

PROF. P. K. DUTTA

DISASTER by definition involves disruption of human ecology which cannot be absorbed by the adjustment capacity of the affected community within its own resources.¹ According to their genesis, disasters fall into two broad groups, viz(a) Natural disasters consequent to the fury of nature and (b) man made disasters which may be intentional or non-intentional (accidental)². Although a determined human effort can totally, to a great extent prevent man-made disasters, the same does not hold good in respect of natural disasters which have a growing concern of mankind all over the world particularly during the last 3 decades or so. There is a growing awareness also that though it may not be possible to prevent natural disasters but these can be certainly tackled effectively through adequate preparedness to mitigate the loss of human life and property. It is against this background that on 11 Dec. 1989 the United Nations General Assembly proclaimed 1990s as the International Decade for Natural Disaster Reduction (IDNDR), beginning from 1st Jan. 1990, to initiate a concerted global effort to reduce the destructive impact of natural disasters which alone during the past two decades killed an estimated 3 million people.³

During the International Decade for Natural Disaster Reduction (IDNDR), the country will have to pay more attention towards public awareness and preparedness for the people living in known disaster-prone areas. Special training is required to medical, paramedical, voluntary workers in relief and rescue work.

India is supposed to demarcate the disaster prone areas and work out the details of their increasing impact in terms of loss of life, physical damage and effect on economic developments. The country is supposed to apply the scientific and technological progress to disaster mitigation³.

India's Proneness to Natural Disasters

On the basis of geographic and climatic considerations, India can be divided into 5 zones according to its disaster proneness to natural disasters as under:

1. *Northern Mountain Region including foot hills*: This region is prone to strong snow storms leading to land slides and strong cold waves. Besides this, the entire Northern part from Hindukush to Eastern Hima-

layas, lies in earthquake prone belt of violent Subterranean volcanic activity.

2. *Indo-Gangetic Plains*: Heavy rains during monsoon make these plains vulnerable to floods.
3. *Deccan Plateau*: A drought prone area.
4. *The Western Desert*: A drought prone area.
5. *Coastal Areas*: They are prone to sea erosion, cyclones and tidal waves.⁴

The disaster proneness varies widely from state to state. In 1990 alone, floods and cyclones claimed 1422 human lives in India; damaged about 2 million houses effecting 57.2 million people in 197 districts of 19 states/UTs: The crop area effected was 4.5 million hectares⁵.

Some of the worst natural disasters in India in the recent past, whose memory is still fresh in our mind, include (i) Tropical cyclone on Andhra Pradesh Coast in 1977 which claimed more than 10,000 deaths and again a severe cyclone causing vast devastation during 1989. (ii) Earthquake in Koyna Nagar, Maharashtra (1967), Kinnaur and Lahaul Spiti in Himachal (1975), Bihar (1988), Garwal Hills (1991) and Latur, Maharashtra (1993). The last one claimed a death toll of over 12,000 and many more injured.

India is located in the South-East Asia Region of WHO which ranked 4th amongst the most disaster prone regions in the world.

Progress in Tackling Natural Disasters

The progress made in tackling disasters since India's independence reveals some important achievements:—

1. India became member of the World Meteorological Organisation on 23 Mar, 1950.
2. Launching a National Flood Control Organisation in 1954.
3. Setting up Rastriya Bar Ayog in 1976.
4. Setting up of Brahmaputra Board in 1981.

The main activities since launching of National Flood Control Programme (1954) include—construction of embankments and drainage channels, town protection schemes, raising the level of flood prone villages, completion of reservoir projects, flood forecasting and warning for different river basins.

Indian Meteorological Dept. (IMD) also plays a key role in forecasting the disasters. It has 5 centres (Calcutta, Bhubaneswar, Vishakhapatnam, Madras and

Bombay) for detection and tracing of Cyclone Storms and Satellite Imagery facilities and cyclone warning Radars provided to various cyclone Warning Centres. In addition, it has 31 Special Observation Posts set up along East Coast of India. For all ships, out at sea, warnings are issued 6 times a day.

Insat Disaster Warning System (DWS) receivers have been installed during the first phase of 100 stations, primarily in the coastal areas of Tamil Nadu and Andhra Pradesh. This has been proved highly reliable form of communication system for cyclonic warnings during Chirale cyclone (1989) and Machalipatnam cyclone in 1990. The Snow and Avalanche Study Establishment (SASE) in Manali (H.P.) has been issuing warning to the people about avalanches 24 to 48 hours in advance.

For tracking any disaster, every state has a full fledged Secretariat Wing under Relief Commissioner/Secretary for proper co-ordination at district level. In case of need, the State Government can approach the Centre for help in respect of, finance, manpower and material. At the Centre, the Ministry of Agriculture is the model ministry for co-ordination of all activities during any natural disaster. Since health is an important part of disaster management, in the Directorate General of Health Services under Ministry of Health, there is a Special Wing called the Emergency Medical Relief Wing which co-ordinates all activities relating to health. At the district level, the Collector forms a small committee which assesses the degree of devastation and organises rescue and relief work and informs the State Govt. Relief Secretary/Commissioner Works directly under Chief Sec-

retary. The State Govt officials/Ministers concerned visit the affected area to oversee relief operation and releases funds required. Later, the Central Teams including the members and officials from Health Ministry also visit the area to assess the magnitude of the problem and recommend central assistance. The United Nations has a special body called UNDR (Office of the United Nations Disaster Relief co-ordinator) which can always be approached for extra help whenever needed. The WHO and UNDP and other voluntary Organisations help in all major disasters.

Areas of Special Concern During IDNDR

During IDNDR, the country will have to pay more attention towards public awareness and preparedness in respect of people residing in known disaster prone areas. Special training is required to medical, paramedical, voluntary workers in relief and rescue work.

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MENTAL HEALTH: AN AGENDA FOR ACTION IN DISASTER

Whenever disaster strikes, sociopsychological environment is disturbed alongwith disruption of physical environ. This change can bring about altered human behaviour. Such behavioural changes may vary in duration and intensity. These psychosocial changes can be dealt at three different levels:

1. **Primary Level:**
(Preventive and promotive care)

This operates at community level.
The main interventions are to promote and prepare the community for such events, mentally.
To identify probable type of disaster and focus activities as per the need.
2. **Secondary Level:**
(Early diagnosis and treatment).

This is a family based operation.
It consists of early diagnosis of mental illness.
Identify high risk areas and screen for mental health.
Help family members to cope with over-whelming stress and treat simple problems like social and individual maladjustment.
Seek help.
3. **Tertiary Level:**
(Rehabilitation)

Acts at both family and community level.
Interventions are to rehabilitate and reduce mental illness and prevent family and community stresses.

ACTION AT DIFFERENT LEVELS:

1. Create an enabling atmosphere or environment for households to improve health.

- Prevention of panic, despair, helplessness and hopelessness
- Regular drills in the community like schools, mahila mandals, etc.

- (a) Earthquake:
 - (1) Do not run hether-shetter.
 - (2) Go into an open space: under a beam under stircase
 - (3) Act only after quake is over.
 - (4) Take a frog position.
 - (5) children and old people to be led to identified safety area.
 - (6) Only identified nodal agencies to do rescue operation.
 - (7) Listen to the directives by nodal agencies.
- (b) Fire:
 - (1) Do not run hether-shetter.
 - (2) Keep to the ground
 - (3) Keep a wet cloth on your face.
 - (4) Breathe out into an open space like windows.
 - (5) Do not jump out of the window.
- (c) Cyclone:
 - (1) Look for warning signals in radio and television.
 - (2) Look for other signals in coastal areas.
 - (3) Learn to swim and save drowning.

2. Screening for early diagnosis:

Following are the indications who needs attentions:—

- (i) loss of appetite; excessive hunger; (ii) Sleeplessness; (iii) Crying; (iv) Speechlessness; (v) Excessive anger, getting on your nerve; (vi) Lack of concentration; (vii) Constant fear; (viii) Apathy;

Beside all the vulnerable population like orphen children, widows parents who have lost their children are special vulnerable group. All of them should be attended to and rehabilitated socially and individually. Some may require psychiatric care. Local NGO's and psychiatrists may be identified in advance and involved when required.

3. Moderate to severe mental illhealth often turned as gone around the bend. Seek professional help. —PIB

INDUSTRIAL POLLUTION : A Looming Disaster

DR REKHA THAKRE & DR A. L. AGGARWAL

Industrial pollution in India varies from city to city and State to State. However, there are certain industrial nuclei around which pockets of high pollution levels are persisting..... It is needless to say that pollution control is needed on war footing to fight back the looming industrial disaster and save the mankind on earth.

JUST before 1.00 a.m. on 3rd December 1984, the worst industrial accident in history began. Uncontrolled emission of lethal gas : methyl isocyanate from Union Carbide Pesticide Plant stalked the slummy streets of Bhopal killing thousands and maiming hundreds of thousands of people. That dreadful night and its aftermath scaled the already grim public image of the chemical industry as a threat to human health and environment.

It is argued that this is an accident. Yes, the industrial pollution in voluminous quantities killing instantly thousands of people is not routine. But it is also ascertained that smaller quantities of pollutants released constantly in the atmosphere do have cumulative effect in the long run to all living organisms though the emissions are well within the prescribed standard limits.

The cross sectional survey of Indian cities indicate that every city has an industrial area demarcated for the purpose. Politicians are racing for more and more industries in their constituencies as per their calculations, the industrial

growth only helps in the development of the area. To a certain limit this is true as the industries bring with them commercialization, urbanization and direct contacts are established with out-side world.

The Central Pollution Control Board (CPCB) New Delhi (1985) has categorised the industries based on pollution intensities as:

- Red industries : high polluting, prohibited in sensitive areas.
- Yellow industries: moderate polluting industries permissible in sensitive areas subject to stringent air quality impact assessment.
- Green industries : less polluting industries, permissible in sensitive area.

However, in practice this classification is very vague.

Industrial Pollution Status

Industrial pollution in India varies from city to city and state to state—highly industrialised like Maharashtra and least industrialized like Haryana. However, in India there are certain industrial

nuclei around which pockets of high pollution levels are persisting naming a few cities : Thane—Panvel—Belapur, Ahmedabad—Baroda—Ankleswar, Korba, Durgapur—Jamshedpur, Singh-rauli, Visakhapatnam, Kochi etc.

The major Indian cities have varying degrees of industrial activity. Nevertheless, the Indian megacities listed in the charter of World-watch Series for pollution status assessment have been extensively assessed for the last two decades. (NEERI Report 1991). The long-term air quality trends observed in these three Indian megacities, viz., Bombay, Calcutta and Delhi in the perspective of economic development and population dynamics highlight important environmental health issues which require immediate attention of environmental managers in the country.

The industrial pollution status in these three Indian metropolises shows that the contribution from this source is 900, 521 and 828 metric tonnes per day in Bombay, Delhi and Calcutta respectively. The number of registered industrial units in these cities has been indicated in Table 1. Nevertheless, there are large number of unregistered industries being operated in these cities and thus the estimated pollution status is highly conservative.

Air Quality trends for three criteria pollutants, viz., SPM, SO₂ and NO₂ have shown spatial and temporal variation in degree of industrialization of these cities. (NEERI Annual Report 1992). Comparison of WHO/CPCB guidelines for ambient air quality status (AAQS) with respect to major gaseous pollutants, viz., SO₂ and NO₂ shows that Calcutta and Delhi can be classified as high exposure risk cities. As regards

Table 1 : Major Pollution Intensive Industries: Bombay, Calcutta and Delhi

Industry	No. of Units		
	Bombay	Calcutta	Delhi
Chemical	171	277	220
Engg. & Foundry	328	350	454
Glass & Ceramics	65	87	58
Textile & Silk	248	116	7
Rubber	257	117	313
Power Plant	3	2	3
Paints	24	46	16
Plastics	718	50	82
Pharmaceuticals	88	68	118
Pulp & paper Ind. & its Products	181	293	110
Refineries/Oil exploration	3	—	—
Fertilizers	2	—	2
Miscellaneous (Bakeries, Confection veg. oil etc.)	1264	1558	1324

the SPM levels, the concentrations have shown high exceedances to threshold limits in all three metropolises (Fig 1).

Human Exposure to Pollutants & Risk Assessment

These air pollutants originate from various sources (Table 2). Their effects on man are varied depending on the chemical nature of the pollutant, exposure period and interaction of the exposed body part. (Table 3).

Human exposure to pollutants can be derived from the water we drink, the air we breathe, the food we eat, or from direct contact with our skin and also the total exposure of an individual is affected by life-style, culture and a whole range of personal activities. This variation in exposure arising from individual behaviour may place particular members of a community in greater danger of health effects.

Epidemiological Studies are concerned with the patterns of disease in human populations and the factors that influence these patterns. Well conducted epidemiological studies provide extremely valuable information from which to draw inferences about human health risk.

Risk assessment of human exposure to air pollution involves the information regarding source/release assessment, exposure assessment, dose response assessment and risk characterization. (William, 1991).

Source-Release assessment estimates the amounts, frequencies and locations of the introduction, release or escape of risk agents (e.g. toxic chemicals) from specific sources (e.g. manufacturing plants) into occupational residential or outdoor environments. Source/release assessment is applicable to

Table 2: Typical sources of some pollutants grouped by origin (adapted from NAS, 1981)

Pollutants	Sources
Sources predominantly outdoor	
Sulfur oxides (gases, with secondary production of particulate sulfates)	Fuel combustion, smelters
Ozone	Photochemical reactions
Lead, manganese	Automobiles, smelters
Calcium, chlorine, silicon, cadmium	Suspension of soils or industrial emission
Organic substances	Petrochemical solvents, natural sources, vaporization of unburned fuels
Sources both indoor and outdoor	
Nitric oxide, nitrogen dioxide	Fuel-burning
Carbon monoxide	Fuel-burning
Carbon dioxide	Metabolic activity, combustion
Suspended particulate matter	Resuspension, condensation of vapours and combustion products
Organic substances	Volatilization of petroleum products, combustion, paint, metabolic action, pesticides, insecticides, fungicides
Ammonia	Metabolic activity, cleaning products and agricultural activities
Sources predominantly indoor	
Radon	Building construction materials (concrete, stone) water and soil
Formaldehyde	Particleboard, insulation, furnishings, tobacco smoke
Asbestos, mineral, and synthetic fibres	Fire-retardant, acoustic, thermal, or electric insulation
Organic substances	Adhesives, solvents, cooking, cosmetics,
Aerosol containing nicotine and wide range of organic substances	Tobacco smoke
Mercury	Fungicides in paints, spills in dental-care facilities or laboratories, thermometer breakage
Aerosols of varying composition	Consumer products
Viable organisms	Infections
Allergens	House dust, animal dander

situations such as the incidental or accidental release of toxic chemicals or other hazardous materials.

Exposure assessment provides quantitative data on individuals, populations or ecosystems that are, or may be exposed to a risk agent, the concentrations of the risk agent, and the duration and other characteristics of exposures. Exposure assessment typically estimate concentrations of a risk agent at a particular point of contact with the exposed organism.

Dose-Response assessment provides quantitative data on the specific amounts of a risk agent that may reach the organs or tissues of exposed individuals or populations and attempts to estimate the percentage of the exposed populations that might be harmed or injured and, where relevant, the characteristics of such populations (for example, sensitive subgroups such as children or the elderly).

Risk Characterization integrates the results of the previous steps into

a risk statement that includes one or more quantitative estimates of risk. These comprise: individual life time risk, population or societal risk, relative risk, loss of life expectancy.

Air Pollution in India—Risk Assessment

Air pollutants pathways of nitrogen dioxide, heavy metals and organic chlorine pesticides in the human body have been indicated in Fig 2.

Table 3 : Effects and guidelines for major air pollutants

Pollutant	Effects	WHO Guidelines	
		Annual mean (ug/m ³)	98* percentile (ug/m ³)
Sulphur dioxide	Exacerbations of respiratory illness from short-term exposures Increased prevalence of respiratory symptoms, including chronic bronchitis from long-term exposures	40-60	100-150
Suspended particulate matter	As for SO ₂ Combined exposure to SO ₂ and SPM are associated with pulmonary effects	<u>Black smoke</u> 40-60 <u>Total Suspended</u> 60-90	100-150 <u>Particulates</u> 150-230
Lead	Blood enzyme changes Anacmia Hyperactivity and neurobehavioural effects	0.5-1	
Nitrogen dioxide	Effects on lung function in asthmatics from short-term exposures	<u>1 hr</u> 400	<u>24 hrs</u> 150
Carbon monoxide	Reduced oxygen-carrying capacity of blood	<u>15 min</u> (mg/m ³) 100 <u>1 hour</u> (mg/m ³) 30 COHb ₁	<u>30 min</u> (mg/m ³) 60 <u>8 hrs</u> (mg/m ³) 10 2.5-3%

*The 98 percentile (or P98) value stipulates that 98% of the daily averages must fall below a given concentration. This means that less than 2%, or less than 7 days per year, may exceed that concentration.

A study conducted by WHO for risk assessment of air pollution projects that the 24 hr average of 80 ppb NO₂ threshold in all the participating cities were well below the guidelines but these levels were approached occasionally in Bombay (Fig 3). Environmental NO₂ concentrations from fixed air quality monitoring stations only provide data on potential exposure and the study demonstrates very clearly that exposure varies considerably not only between the cities but also between individuals resident of the same city (Fig 4).

Though these results are based on a very small number of population exposed they clearly indicate that the assessment of human exposure to pollutants is a persistent risk in the urban air environment of India as the pollution levels are increasing. (William 1991).

Lead exposure may occur through the inhalation or ingestion pathways. Particulates suspended in the atmosphere may arise typically from a variety of industrial activities, e.g., metal smelters,

and from the combustion of fossil fuels. Particularly significant releases of lead have been shown to occur during the combustion of petroleum based motor fuels with lead additives. Ingestion may occur following the uptake of metals through vegetable or animal foods. Leaching of lead from water pipes or lead solder used in forming pipes or sealing tin cans can result in high lead levels. The lead concentration in Indian urban environment has been recorded highest in the capital city of Delhi. It is also documented that

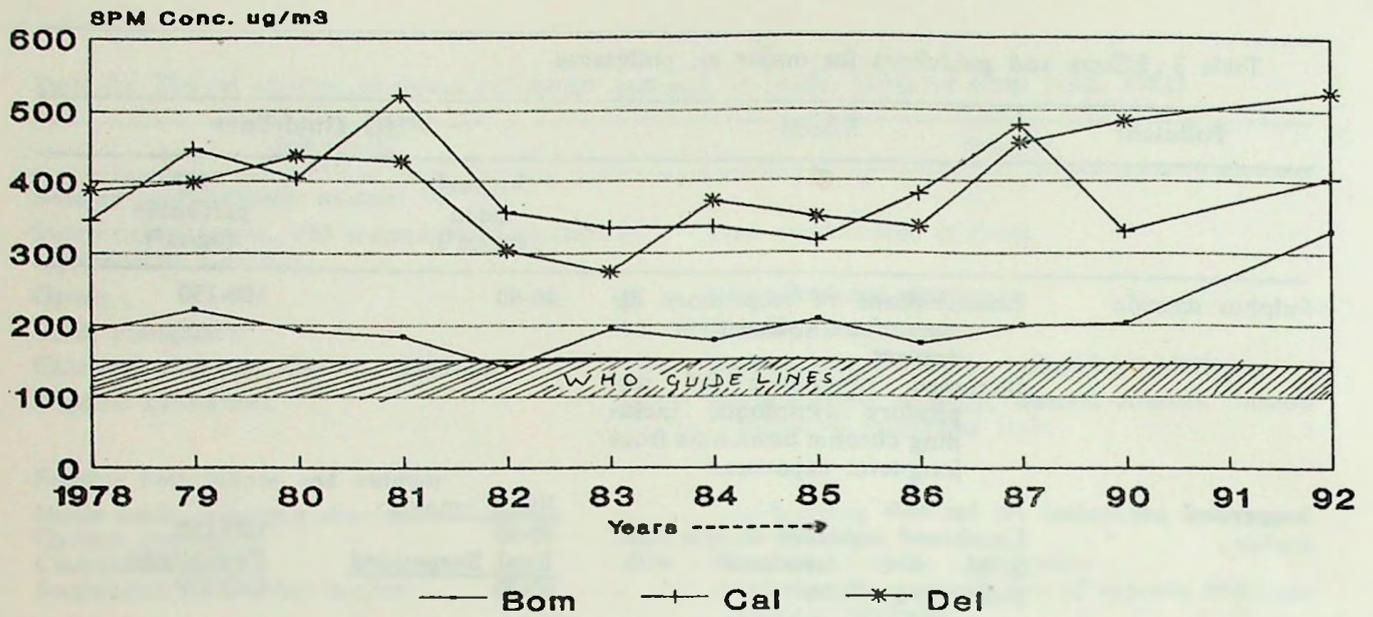
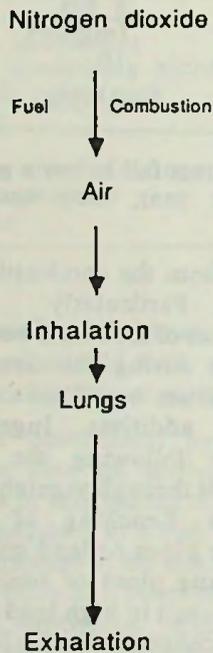
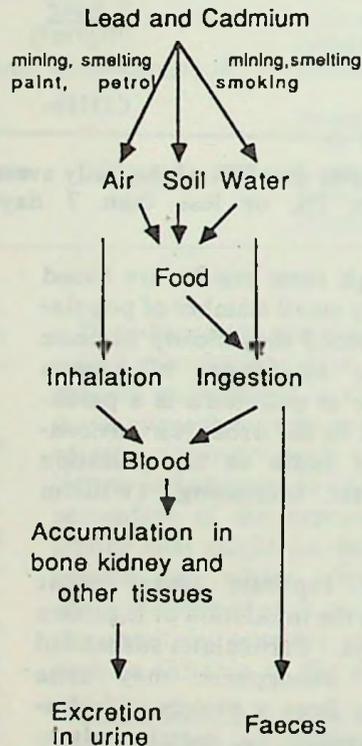


Fig. 1
**ANNUAL MEAN CONCENTRATION TRENDS FOR SPM
 : INDIAN MEGACITIES (1978-1992)**

Combustion Products



Heavy Metals



organochlorine Pesticides

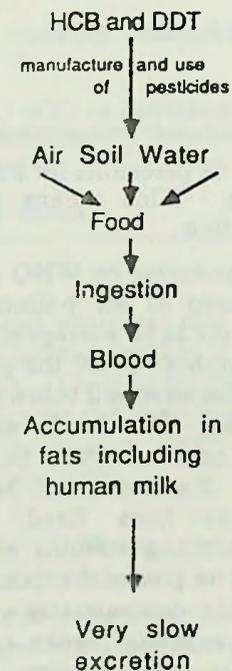


Fig. 2

the lead aerosols are concentrated in the fine particles of less than 10 micron size which incidentally fall in the range of respirable particulate matters. (Thakre & Aggarwal, 1992).

Volatile organic carbon (VOC) compounds are the most threatening class of air pollutants gaining importance in recent decades. These are released mainly from the combustion processes and get absorbed/adsorbed on suspended particulate matter during dispersion in the atmosphere, both in troposphere and stratosphere. However, the ground level concentration of organic compounds, directly coming in contact with the humans of are of great concern from human health point of view. Polynuclear aromatic hydrocarbons (PAHs) contribute a major potentially hazardous group of carcinogenic pollutants originating from anthropogenic activities. The air quality status of PAHs concentration in 10 major Indian cities indicates that Bombay, Calcutta and Delhi air is rich in PAH levels than other Indian cities. (NEERI Report, 1990).

The stratospheric increase of VOC has given rise to new atmospheric disaster problems like green house effect and ozone depletion threatening the very survival of mankind inhabiting the planet Earth. From the start of industrial revolution humans have contributed towards increase of CO₂ by about 25% due to burning coal, oil and other fossil fuels and clearing forests.

Chlorofluorocarbons are building up in the stratosphere at unprecedented rates. There are now approximately 35 million tonnes of these gases growing at a rate of 1 million tonnes per year. Each atom of chlorine liberated from CFC can break up as many as 100,000 molecules of ozone.

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Ozone depletion results in percolation of excess of solar ultra violet radiation to the earth which will directly affect the mankind. It is estimated that more than 150 million people will suffer from skin cancer, cataract, blindness, and other dermal ailments over the next 80 years if no proper measures are taken to protect ozone layer.

Thus, it is needless to say that pollution control is needed on war footing to fight back the looming industrial disaster and save the mankind on this earth.

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Personal exposure to nitrogen dioxide per day obtained from badge monitors

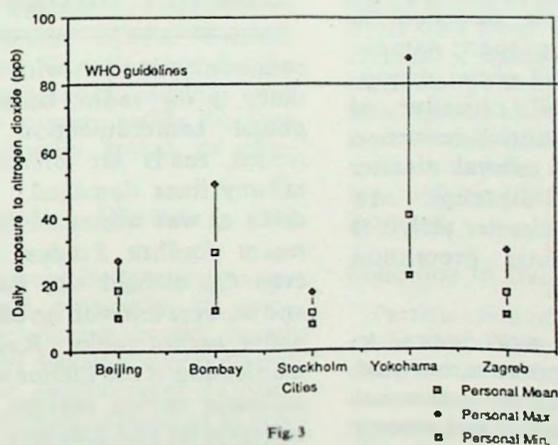


Fig. 3

A comparison of estimated exposure to nitrogen dioxide and levels at urban monitoring sites

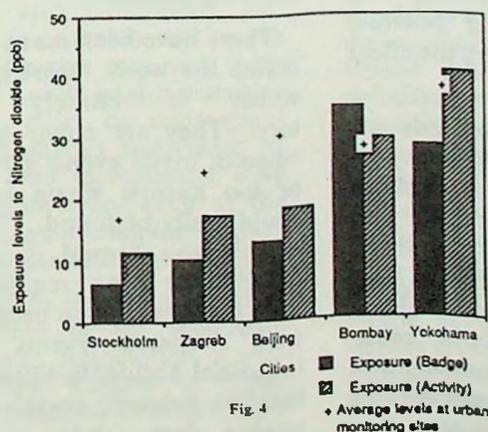
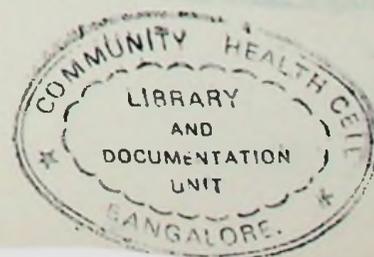


Fig. 4



DISASTER AND AFTER

Role of Radio in preventing epidemics

DR BRIJ BHUSHAN

ON December 22 1989, the United Nations General assembly unanimously proclaimed that 1990's as the international decade for natural disaster reduction. The UN resolution asked nations throughout the world to give special attention to programmes and projects designed to reduce loss of life, property damage and economic and social disruption. The overall objective of achieving a substantive reduction in the impact of natural disaster will be pursued through new emphasis on pre-disaster activities including planning, prevention and preparedness.

Therefore, it is most logical to take up various programmes and projects to build up awareness not only in general public but among the governmental agencies also.

Whatever the disaster may be, natural or man-made, it is the human population which ultimately suffers. Therefore, we have to do everything possible which helps in mitigating the effect of disaster.

Radio communication has assumed an important role in day-to-day life of modern society. Without it life seems to be incomplete and cut off from the surroundings. Our day begins with Radio or Television. We cannot communicate with each other without radio transmission and it becomes indispensable in cases of emergencies and disasters. We have seen that during disasters the only mode of

Voluntary agencies can play a vital role in natural disaster reduction. They can build up public awareness and public education system to disseminate the information about disaster mitigation.

communication left with us sometimes is the radio; because telephone communication is disrupted, roads are breached and railway lines damaged. In some cases, as was witnessed during the recent Andhra Pradesh cyclone, even the airfield was submerged and we were left with no other alternative except radio. Radio communication is the lifeline which we maintain during various types of emergencies and disasters. In fact we get the first information of disaster through radio transmission and before the warning is conveyed through it.

Defining disaster

There have been many efforts to define the word, disaster, none of which is entirely satisfactory. They are either too broad wherein trivial events get included or too narrow where exceptions could easily be found. Therefore, no effective formal definition is possible or even required. The term disaster is often used to cover such desperate events as war, industrial accidents, blizzards, avalanches, volcanic eruptions earthquakes, fires, famine and many types of windstorms and floods,

events which have little in common except for their destruction.

Disaster are often Classified into two groups: 1. Natural and 2. Man-made.

These are sometimes subdivided again into those of slow and sudden onset. These headings are descriptively convenient but do not form a satisfactory classification of either the immediate causes or the effect of different agents or communities.

Some types of disasters such as fire may be natural or man-made. According to the circumstances some sudden onset disasters such as floods may occur rather slowly under some conditions and the slow onset disasters of famine, or at least the abrupt termination of food supply to part of population may be very sudden.

As sociologists have often pointed out, natural events such as earthquakes and floods are not intrinsically dangerous; it is the relationship between the natural agents and the people that make them so.

Few definitions of disaster are given below:—

- (1) A disaster is an overwhelming ecological disruption occurring on a scale sufficient to require outside assistance.
- (2) A disaster is an event located in time and space which produces conditions whereby the continuity of the structure and process of social units become problematic.
- (3) An event or series of events which seriously disrupts normal activities.

Until about 1,850, or the onset of the era of science, administrators of the day were well aware of the triad of famine, epidemics and social disruptions and the consideration of their major cause of disaster was focused on famine and epidemics of quarantinable diseases. With improved sanitary conditions and demonstrations of natural catastrophes beyond Europe and North America brought about by the rapid communication and transportation, interest in Natural Disaster gradually grew. And the first mode of mass communication developed was radio.

In industrialized societies today, advances in economic conditions and in public health have virtually eliminated the problem of communicable diseases as disasters. In developing countries however, communicable diseases continue to cause primary disasters. This is frequently true of such diseases as measles, poliomyelitis, malaria, typhoid, orthopod borne viruses such as dengue and yellow fever.

The potential risk of communicable diseases after disaster is influenced by six types of adverse changes. These are inter-related and can be better controlled with

the help of improved radio communication and are as follows:

1. Changes in pre-existing level of disease.
2. Ecological Changes which are the result of disaster.
3. Population displacement.
4. Changes in population density.
5. Disruption of public utilities.
6. Interruption of basic public health services.

Historically, a variety of communicable diseases have reached epidemic proportions after disaster. Or patients being malnourished are more susceptible to many disease agents. Indeed, until World War II more deaths during wartime or famine were caused by communicable diseases than by hostile action or starvation.

Communicable Diseases after disaster

Even in poor developing countries serious outbreaks of communicable disease rarely occur after natural disasters which do not involve the encampment of population. Known exceptions to this include cases of leptospirosis which increased in Brazil after flooding, the aggravation of ongoing typhoid fever problem following hurricanes in Mauritius and cases of food poisoning in both Dominica and Dominican Republic. It is probably due to the diversion of scarce resources from the normal public health activities to disaster relief or subsequent economic problems aggravated by a disaster, lead to epidemic long after the acute event such as the resurgence and subsequent failure to eradicate malaria from Haiti.

With this in mind, in the thirteenth edition of the American Public Health Association Handbook entitled "Control of Communicable Diseases in Man", there is a consensus about the relative risk of individual communicable

disease after disaster. The consensus was reached by the specialists in communicable diseases, Liaison Representatives and Pan-American Health Organisation/WHO Officials.

Surveillance System

Disease Surveillance essentially concerns gathering information that is critical for rationally planning, operating and evaluating public health activities. Participants, of disease surveillance programmes receive reports from sources which are both official and unofficial. Information from the official source originates from the local health care providers who see patient passes from the local health officer to one of more intermediate levels and from their goes to the national epidemiology group. Member governments of WHO have agreed about procedures for international notification of selected diseases and the method of reporting and emergency measures to be taken.

Collection of Data

Participation of field health units in the surveillance system must be complete as early as possible after disaster. It is critical to motivate reporting units. The participation of predisaster units should be continued when possible, with emphasis in reporting placed upon the diseases or symptom complexes targeted for surveillance. Health teams mobilized for the relief effort should be adequately briefed about the importance of surveillance and should be given the case of definitions to be used and be amply provided supplies of reporting forms. The speed of reporting is always critical in communicable disease surveillance and is especially vital following disaster. Mail and telephone services are most likely to be interrupted or erratic at that time. In general, weekly reporting from all units by telephone, telegraph or short wave radio is preferable to reporting by mail. Immediate consultation about any unusual condition or

suspected epidemic, at any time during the week should be encouraged. Clear instructions about how to reach the central epidemiologist should be provided to workers in the field.

Innovative ways to facilitate the rapid reporting during the period of severe disruption in communication should be sought by the members of epidemiology unit. This will frequently involve utilizing other elements of the relief effort. Previous sensitivity of the relief coordinator and national authorities to the importance of adequate surveillance for an effective overall effort will pay dividends. Procedures used with success in previous disasters include daily or weekly radio reporting of selected diseases from the field, the distribution and retrieval or reporting forms by members of the drug and food distribution system gaining access to the national security forces communication network, incorporating disease surveillance into a more general regular report required by the chief coordinator and regular visits to field by the epidemiologist or a member of the surveillance team.

After a major disaster the need for search, rescue and first-aid is so great that organised relief services will be unable to meet more than small fraction of demand.

Effective management of health relief requires access to and control of adequate transport and communication. Health Sector resources are usually insufficient to meet such needs. The Health Relief Coordinator requires extensive support from the Public Works Ministry, Armed Forces and sometimes private sectors to carry out essential relief work. Responsibility for overall emergency government transport and communication should be centralized in a single office in the national emergency committee which can coordinate their use with defined relief needs.

Communication

Adequate telephone, teleprinter and emergency Radio facilities are necessary for maintaining contact with Health facilities and relief personnel in the field and with governmental agencies, and international organizations.

In most countries the governments have allocated specific radio frequencies and equipment to military, police, fire, ambulance and other public agencies which also have access to commercial telephones and teleprinter services that allow them to send messages internationally. Emergency communications are normally part of a disaster plan. In their absence, the health relief coordinator will need to ensure continuous access to them.

(a) *Telephone Services:* Even if telephone service is not damaged, lines will be jammed with unessential calls. Several measures may be used to alleviate this problem. Installation of additional lines will be necessary to ensure enough circuits for national and international calls, and will be crucial to advise all concerned overseas governments and agencies of new numbers as soon as they are in operation. The public must be asked through the broadcasts not to use the telephone system for non-essential calls.

(b) *Teleprinter Service:* Teleprinter should be used for international communication whenever possible. The written record they provide minimizes the possibility of misunderstanding.

(c) *Amateur Radio Service (ARS):* Amateur Radio operators are licensed by their governments in most countries and their network can be of great value in emergency communications. After some disasters they have been the only link with the outside world. Although most amateur operators display a great sense of discipline and responsibility, the accuracy of their report may vary greatly. ARS should therefore be warned

through the local press, radio and television that no independent statement should be broadcast and that they should stay off the air unless their services are needed as a part of governmental or a credited relief agencies' communications. Unless these measures are strictly enforced, ARS may add to the confusion. Amateur radio equipment provides short, intermediate and long range communication. But in India, the Amateur Radio Service is not as developed as it should be. We must encourage individuals and organisations to take up this hobby so that at least during emergencies it could develop into a dependable mode of communication.

(d) *Citizens' Band Radio (CB):* This radio service has been established in most countries under government regulation and allows communications for their business or personal activities. CB licensees can provide emergency communications over one to twenty miles with their personally owned base and mobile stations. CB equipment must be operated under the control of a licensee at all times. Operators can be recruited and instructed in the same way as ARS. Here is yet another type of radio service which is not only helpful for individuals and organisations in their personal business but at times it may prove to be a very reliable communication link.

(e) *Donated Radio Transceivers:* After a major disaster there may be an outpouring of assistance or donation offers from various countries, organizations and business houses. Supplemental radio equipment is occasionally included in these offers but often the radio units are delivered well after they are needed. To expedite purchase and shipment of radio units it is necessary for the donor to be advised of the type of radio units required, authorized transmitting and receiving frequencies, output requirements, the number of units

(Continued on Page 48)

SWASTH HIND

Role of Voluntary Agencies in Natural Disaster Reduction

Voluntary work perhaps is the only true measure of the inner strength of a Society because it embodies a certain degree of social commitment without which no society can sustain itself. A comprehensive body of knowledge and skill exists in voluntary work accomplished in normal time. But, not much is available on that score when needed in critical time. This gap proves immensely costly in terms of human efforts. To reduce this gap and also to strengthen voluntary work, it is, therefore, desirable to undertake scientific studies of emergency welfare whenever possible.

A nation and its individuals are tampered to the extent that they steadfastly face critical situation and triumph over them, The Bhopal Gas Tragedy was a crisis of this nature which happened to be as much cathartic in its effect as traumatic in its impact. It was an epic battle between worthy forces of human creation and the indomitable collective spirit of man.

A plethora of old and new strategies were tried to meet the multi-dimensional depredation of a chemical disaster. There was a mobilisation of human and non-human resources on a scale rarely witnessed before: The strategy of relief warranted the development of

resources in a certain way. Each relief programme involved several categories of actors, who each acted and perceived his situational role differently. If any authentic lessons were to be learnt from this chemical disaster relief it is essential to pool their experiences together with regard to the same. This disaster mercilessly exposed for the first time the vulnerable spots in the socio-economic milieu of the State. It lifted the veil off the ugly face of poverty and backwardness which was there since centuries. It spotlighted many a failure and fumbling on the part of the people and their government as builder of all progress and prosperity. It also brought home certain vivid realisation to the people and their mentors as to what should earnestly be done. If disaster was to be banished or fought out victoriously.

Coordinated effort

The importance of a coordinated and effective strategy for disaster relief and disaster mitigation of prime importance. The role of non-governmental organisations is no less important than governmental efforts. The understanding between non-governmental organisations and government is vital in delivering benefits to the disaster victims. Here we do not set up a new mechanism but we

want to refine, develop and improve the existing cooperation. We cannot fully accomplish our task without the collaboration of non-governmental organisations/voluntary organisations and governmental efforts and that of all those who are involved in disaster management. The systematic collaboration of non-governmental organisation/voluntary agencies in this field of disaster management is crucial for providing a complete picture of damages and the need.

In the Press, with a few exceptions, the prominence given to any disaster depends mainly upon the number of people killed or injured; much less upon the extent to which the state of an economy or society itself has been disrupted. Disaster relief agencies have also tended to reflect the same scale of values. This is sometimes done deliberately to elicit massive support from abroad in terms of medicines, equipment and medical personnel, but all this causes scare and lot of mental tension in the minds of local population.

This is the one vital field where voluntary organisations can play an important role. They can build up public awareness and public education system. They can, with their grass-root level contacts make it possible disseminate the information about disaster mitigation to the population in general. □

—Dr. Brij Bhushan

(Contd. from page 31)

new cyclone shelters may be used as community training centers during normal times. Experience gained by health workers in the aftermath of disasters, should be used in designing and improving training programmes on disaster management for health workers. Similarly, area development plans should incorporate a section on disaster preparedness.

Disaster preparedness planning is an intersectoral exercise. It is the

responsibility of the health professionals to stimulate this coordination-exercise and to catalyse disaster preparedness planning. Health professionals can take a more pro-active approach. Their responsibility is not only post-disaster response, but also planning for an improved response and for prevention or mitigation of the disaster impact, to allow for a healthier and happier life for all.

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A Greenhouse for Our Children

DR T.S. REDDY

The present environmental crisis, and the disastrous consequences it leads to indicate the need for urgent implementation of a world strategy for conservation as the only guarantee of lasting development. And the myth of indefinite quantitative growth based on a wastage of natural resources is completely defunct.

WE, the human beings, have lived for most of the time on this planet as one species among many, depending on the mother Nature for sustenance without any undue interference by us. With the advent of the so called civilization we have only started crossing the limit of "need" and "exploit" it with greed and vandalism. In the past, civilisations rose and died due to their own mistakes, often with disastrous consequences. Since those civilizations took their characters from their localities or regions, the consequences of their mistakes were local or regional. Today ours is a global civilization and our planet has shrunk to a neighbourhood around which a man-made satellite can patrol 16 times a day. It is a world community so much interdependent that often our mistakes are exaggerated on a global scale. We

have already caused many ecological boomerangs and one of the most catastrophic one to hit us now will be the "Greenhouse Effect". Our interference with the functioning of the Nature has reached to the extent of keeping us so imperilled along with most other species.

The Rising Temperature

The average global surface temperature could increase by 3°C by the year 2030, and this increase would be more marked in the high latitudes of the northern hemisphere where it could amount to as much as 8°C to 10°C. The fact that six of the seven warmest years on record have occurred since 1980 should be a serious warning for us. The combination of increases in the greenhouse effect and in the discharge of heat of technological origin could cause catastrophic climatic changes at a global level, and all such changes would be detrimental to the survival of man and many other species. According to a French Ecologist Fracois Ramade, the rise of even 1°C in global temperature would have dramatic effects on the agriculture of many third world countries.

The changes in the atmospheric concentration of certain gases popularly known as greenhouse gases, *i.e.*, carbon dioxide, chlorofluoro carbons, halons, methane, nitrous oxide, carbon monoxide and ozone, are the main causal factors in the climatic warming. Due to its abundance over other greenhouse gases, carbon dioxide produces major greenhouse effect. Agriculture animal husbandry, industrial expansion, continuous and large-scale combustion of fossil fuels in many activities

including power generation, and deforestation are the major human activities that generate greenhouse gases in a scale causing us serious concern.

Ecological Disasters

The global climatic warming will bring a number of ecological disasters and the kinds of disasters or their intensities vary from region to region depending on the geographical location and the land use patterns. In some regions desertification of hitherto productive lands will occur whereas in some other regions the already existing deserts will expand. The semi-arid areas in a country like ours may be converted into arid areas. The loss of agricultural land due to either desertification or inundation of fertile coastal areas as a result of a rise in sea level would be the most serious catastrophic event. This would on the one hand cause severe reduction or loss of food production and on the other hand leads to uprooting and migration of millions of environmental refugees. Floods at some places and droughts at other places will cause untold miseries. Some places will suffer from either extreme heat or extreme cold. Congestion and civil strife would add to the already existing burden of many poor and populous countries. With ever increasing number of people, even with the present rate of adding about a million people every year, the global scenario by the time our children take the burden of managing this planet will be unimaginable.

Incidence of malnutrition and famine will be aggravated due to loss of food production in many

SWASTH HIND

areas. There will be a shift in agroclimatic zones and changes in the productivity of crops and livestock. In many areas, water availability for agriculture will be adversely affected. Climatic change brings new varieties of plant pathogens in some areas. The regions which are already in precarious agroclimatic conditions due to marginal climate and over population will be miserably affected even due to small changes in global climate.

Already thousands of species of plants and animals are extinct and we are at present permanently losing about 140 species every day. Changes in climate, destruction of the forests particularly rain forests, and desertification will lead to the extinction of a lot of wildlife thus greatly reducing the biological diversity.

The increased temperature will aggravate the air-pollution related morbidity and mortality in many cities of the world.

It is likely that some of us and our children will experience a regular summer temperature of 50°C in Delhi. There may be even occasional heat waves and may be, a lot of desert dust suspended in the Delhi air.

Effects on Health

Prolonged heat stress in densely populated areas increases not only discomfort, but also social intolerance irritability and accidents. Severe heat stress is very detrimental for certain high risk groups such as the people with low adaptive capacity to heat stress, those with problems of cardiovascular, respiratory, renal, endocrine or immune systems, those with immature regulatory system such as infants and children and elderly. The incidence of tuberculosis, leprosy and skin infections, measles and other childhood diseases and ectoparasitic infections may increase due to overcrowding, malnutrition, poor access to health care in some areas, disturbed social

GREENHOUSE GASES

- | | |
|------------------------|--|
| 1. CARBON DIOXIDE | : 70% OF it is emitted by fossil fuel combustion and rest by deforestation and changing land use. Its contribution is most in greenhouse effect. |
| 2. CHLOROFLUOROCARBONS | : Used as refrigerants, blowing agents in the production of plastic foams, aerosol propellants, solvents in the manufacture and cleaning of electronic equipment. |
| 3. HALONS | : Used in fire-extinguishers for high technology, aircraft, and military applications. |
| 4. METHANE | : Major sources are wet lands, flood plains, peatlands, wild fires, rice paddies, termites and enteric fermentation in ruminant animals, such as cows and buffaloes, exploitation of natural gas, biomass and coal mining. |
| 5. NITROUS OXIDE | : Burning of fossil fuel and biomass, and the use of nitrogenous fertilizers (natural source is the nitrification in soil and water). |
| 6. CARBON MONOXIDE | : Major sources are burning of fossil fuels and biomass. |
| 7. OZONE | : Some is naturally formed and some is formed as a secondary pollutant in the atmosphere mainly as a result of use of motor vehicles. |

conditions and a very rapid urbanization.

The increased environmental heat will increase the incidence of heat oedema, skin rashes, prickly heat, muscle cramps, fatigue, salt depletion, dehydration, heat stroke, increased cardiovascular strain and disturbances in the central nervous system. Due to increased heat and humidity in certain areas, malaria will spread to new areas affecting many more millions. Other important vector borne diseases to spread include dengue, yellow fever, schistosomiasis and Japanese encephalitis. The incidence of diarrhoeal diseases, poliomyelitis and hepatitis-A will increase in areas where increased

rainfall causes floods and contamination of water bodies. In drought struck regions where poor access to water and poor sanitation occurs, the incidence of worm infestations and bacillary dysentery will increase.

Global Effort

The problem is global and all the world communities have to come together in the form of global partnership in averting the risk of world wide climatic disruption in the 21st century. otherwise, our children will inherit a huge greenhouse to live in. The most critical problem facing us today is an ecological one of relating our human societies harmoniously to

our environments. During the process of our growth, change, and development as civilized and technological societies, most of us most of the time are worried only about our immediate material gains and have failed to develop either self-knowledge or the appropriate social institutions needed to accommodate the abundance of people or to control their use of power. We have not done much to integrate the knowledge of humanities and behavioural sciences with natural sciences. We have not properly realized the necessity of integrating the human interests with the functions of the Nature.

Fortunately, there are some solutions for averting or at least abating the greenhouse effect. Only the international conventions

and conferences by a few experts or leaders would not suffice. An awareness and educational campaign should be launched on the war footing at the global level. More than ever, it is time for the world communities to come together. The Montreal Protocol and the Rio Earth summit were good efforts. Although the strategies to be adopted are common to all, the emphasis on the kinds of strategies would vary from region to region. For instance, certain developed countries will have to emphasise on reducing the generation and consumption of energy while some other countries will have to control or reduce the population growth. The reduction in the use of fossil fuels should be accompanied by development of natural energy sources particularly solar energy. Cessation of de-

forestation should be stringent and it should be accompanied by afforestation, social forestry, agroforestry, etc. wherever it is possible. The countries with alternate and new technologies have the moral obligation to share it with others. Conservation of whatever remained has to be given top priority in all our developmental programmes.

The extent of the present environmental crisis, and the disastrous consequences it leads us to expect and indicate the need for urgent implementation of a world strategy for conservation as the only guarantee of lasting development; and the myth of indefinite quantitative growth based on a wastage of natural resources is completely defunct. □

(Continued from Page 44)

needed and the type and number of antennas required. Effective communication after disaster does not depend exclusively on the nature and quality of equipment available but primarily on the willingness of authorities to exchange and communicate specific and detailed information to the public, other governmental agencies and international community.

General Public information

Information should be made available to the public about such things, as the location and kind of resources and environmental health services available, the location of settlement, sites for displaced persons and the names and titles of the authorities to contact

for reporting emergency situation. This helps the public understand the extent of the emergency, reduce confusion and improve the effectiveness of emergency health activities.

The horizons of disaster relief and rehabilitation should be broadened to allow multi-sectoral considerations in disaster assistance. It has been observed that in the immediate post-impact period of large scale disasters, external relief assistance arrives generally too late and is frequently inappropriate. Immediately, search and rescue evacuation is generally undertaken by community members mainly family, friends and neighbours. Post disaster assistance should focus on building up preparedness and coping mecha-

nism within the community and initiate activities that take into consideration the numerous and important post-emergency consequences of natural disasters.

Indeed, we cannot manage a disaster relief, and prevent epidemics without the help of radio communication. The role of radio starts from the warning stage, and this helps us to shift the population to the safer zone. We get first information of the disaster through it. The disaster relief work is monitored with the help of radio transmission, surveillance is maintained, data collected and health operations executed through radio transmission. These days the success of disaster relief work is directly proportional to the communication network at our disposal. □

ARRESTING OZONE DEPLETION

—An all-out strategy

HIMANK KOTHYAL

THE ozone layer found in the atmosphere between one and fifty kms. has been undergoing rapid depletion. This ominous phenomenon is caused not only by natural phenomena, but also by man-made gases—chlorofluorocarbons (CFCs) and halons. There is also greenhouse warming—the El Niño effect. This is a periodical warming of the Pacific West Coast of Peru, which occurred twice in 1980s. Evidence of fossilised beach levels near South Pole indicate a dramatic warming in the recent geological past.

Human activities have introduced additional absorptive molecules, which trap more heat and disturb the natural equilibrium, leading to greenhouse warming. In 1990, at the second world climate conference at Geneva, a forecast was made of a 2.5 degree increase in the warming by the end of the next century.

Ozone Formation

The ozone layer acts as a blanket, allowing the useful infrared radiation to enter the atmosphere and keeping out the harmful ultraviolet radiation. Continued depletion of the ozone layer would result in an increased exposure to light which is toxic to unicellular organisms and surface cells of higher plants and animals. Other disastrous impacts include frequent occurrences of skin cancer, eye diseases, loss of immunity, destruction of microorganisms and reduction in agricultural output.

Ozone was discovered in 1840 by Schonhein, who attributed its formation to an electric discharge passing through the oxygen of the air. It is formed when atomic and

molecular oxygen collide. Ozone survives this collision, only when a third element—nitrogen is available to take up the excess energy. At about 60 kms from the earth's surface, increasing concentration of molecular oxygen and nitrogen favour ozone formation.

At lower levels, ozone becomes the only form of oxygen and forms a layer in the region of 35 kms. There, it accumulates a concentration of about one per cent in the atmosphere. The formation of ozone layer extends the absorption of ultra violet light which fall on the earth. Ozone has a melting point of 93 degree celcius and a boiling point of 112 degrees celcius with a peculiar odour, detectable in rooms with photocopiers.

Depletion

Supersonic aircrafts operate at a height which interferes with the protective ozone layer. At the high temperature of engines, nitrogen and oxygen combine to produce nitric oxide, which damages the ozone level. Further chlorofluorocarbons, discovered by Thomas Midgley in 1920s found increased use as industrial solvents, blowing agents and refrigeration. Initially they were thought to be non toxic and non flammable. However, trifluorochloromethane or CFC-11, the most damage CFC and dichlorofluoromethane or CFC-12, tend to persist in the troposphere and become undesirable as greenhouse gases.

In 1974, Molina and Rowland showed that these gases diffuse upward in the stratosphere to be exposed to high frequency radiation, causing a reaction leading to

the destruction of ozone. Nitrogen oxide, released primarily by vehicles has a lifetime of about 100 years. Because of its low reactivity, it can survive to reach the atmosphere where it reacts with oxygen to reduce ozone formation. Another substance methyl bromide releases damaging bromine atoms. About 50 percent of methyl bromide comes from marine sources, but the rest is man-made. It is used for protection and storage of foods and grains.

Present global emissions of ozone depleting gases are estimated at 1.2 million MT per year. Over 28 per cent of these emissions are produced by the USA, 27 per cent by the European Economic Community (EEC) countries and 11 per cent by Japan. All the developing countries put together account for a meagre 5 per cent of the global emissions. A depletion of up to 30 per cent was observed over Antarctica between 1980-87. Similarly in 1991-92, 18 per cent depletion of the ozone layer was reported above Europe and the United States.

Strategy

The first attempts at evolving a strategy for arresting the depletion were initiated at Vienna Convention for protection of the ozone layer in 1985. The Montreal protocol of 1987 was comprehensively amended in 1990 to meet the concerns of the developing countries and to halve the present production levels of ozone by 1999. The protocol now guarantees financial cooperation to developing countries, to minimise adverse implications and facilitation of transfer

of technology through a multilateral funding mechanism. If this does not happen, developing countries can seek a revision of time table for reduction and elimination of CFCs and halons.

Suitable alternative compounds of CFCs are dichlorofluoroethane for blowing foam, tetrafluoroethane as a solvent in the electronics industry. Though there is no single substitute for methyl bromide, malathion for stored products and chloropicrin for soils are some alternatives.

India is far below the prescribed limit on CFC consumptions provided by the Montreal protocol—emitting annually less than .3 kg *per capita*. Therefore, Indian obligations do not start for another ten years.

Task Force

India's *per capita* level of consumption of ozone depleting substances at present is less than ten grams and not likely to cross 20 grams between 1995—97, as against 300 gms permitted under the protocol. India uses seven of the 20 substances controlled under the amended protocol. Still, India has constructed a task force to draft a strategy for reduction in CFC consumption and an ozone cell has also been set up.

To achieve the objective of complete phase out of ozone depleting substances voluntary agreements, legislations and regulations, fiscal incentives, educational programmes and information programmes are also proposed. Attempts are already afoot to release the ozone prepared in laboratories in the atmosphere to fill up the ozone hole. In the laboratory energising oxygen passed through a silent discharge of some 10,000 volts at 0 degrees centigrade, produces a gas stream of about 4 per cent ozone by volume. Truly therefore, it is being increasingly recognised that the ozone layer holds the key to our existence.—PIB.

EARTHQUAKE ACTIVITY

Food and Nutrition in relation to Disaster Situation

Disasters like earthquakes have many short-term effects and also inflict long-term liabilities on society. The basic requirement of food and nutrition assumes added importance in the contingency of a natural disaster. Initially, endeavour has to be made to provide sufficient calories to the population. Subsequently, strategies need to be developed for meeting the nutritional requirements on a long-term basis.

ISSUES FOR CONSIDERATION

- Availability of food.
- Food hygiene
- Accessibility for the needy, especially the vulnerable group

Food availability depends on local resources. Basically the local grains, rice, wheat and dals etc., can provide the carbohydrate, fats, and protein requirements. They may be readily available or can be made available by augmenting the local supplies. However, the other essential components of food like vitamins and minerals need to be added by consuming green leafy vegetables like methi and drum stick leaves etc. Supplementary prophylactic doses of vitamins A and B, B complex and minerals like iron and folic acid may be taken whenever available.

The effects of nutritional deficiencies manifest late and hence, may not attract attention of the relief organisers initially. However, this may cause long-term disability for the affected population. Hence, concerted efforts is required to guard against this eventuality. The following is suggested.

- Identify local sources of green leafy & red vegetables, and fruits
- Do not consume stale food
- Wash vegetable and fruits before consumption
- Inspect for infestation before taking raw food
- Food should be kept covered
- Prevent food from rodents and other insects
- Promote local innovative food preservation measures like sun drying

In case of paucity of food resources, the vulnerable group i.e. children, 0-1, 1-5, 6-12 years old, pregnant mothers and aged above 60 years, in this order, should be given priority.

SAFE DRINKING WATER

Use clean source of water for drinking purpose. If in doubt, strain in cloth, boil or use chlorine tablets. Keep drinking water in a clean and covered vessel. —PIB

Injury Prevention—Strategies and Future Prospects in India

DR G. GURURAJ

INJURIES are a leading cause of death, disability and suffering in India. The progress in the past two to three decades in the areas of infectious and communicable disease control and the emergence of noncommunicable diseases have changed the health scenario in the country. A sharp increase in human and vehicle population amidst adverse road conditions without corresponding inputs in safety and prevention has led to an increase of road accidents. The rapid urbanisation industrialisation, changing values of society contribute further. A host of social factors like increasing violence, increasing role of alcohol and drugs, lack of safety precautions at home, work site add further to an increase of injuries due to other external causes. The lack of adequate prehospital care along with a heavy burden on health care resources is a major contributing factor.

It is known that about 10-20% of hospital admissions are constituted by injuries. Apart from loss of lives at young and productive age groups, the survivors place huge burden on health care system. The injured also depend on health care services for acute and long-term rehabilitation needs. Along with the sudden loss of productive young individuals and damage to property, the hidden economic costs are staggering if proper

The epidemiological transition in India over the past few years has resulted in the emergence of Injuries as a major public health problem. The enormous loss to society and phenomenal burden on health care services need immediate attention, socio-epidemiologically based, scientifically designed and culturally relevant programmes with community participation is required to save precious human lives.

assessments are done by considering compensation claims and work/school absenteeism. Significant proportion of human lives are also hampered due to long-term neuro psychological disabilities. The amount of suffering, agony, anxiety and distress is an area difficult to quantify even with advanced research methods affecting the quality of life of injured persons.

Lack of systematic efforts

With such an enormous burden on developing societies, systematic efforts are lacking in India towards injury prevention. Disease control programmes are planned, implemented, monitored and evaluated for a range of illnesses affecting human beings. The available statistics on traffic injuries, violence and industrial accidents (total information is not

available due to other causes) warrant immediate attention of policy makers and programme managers. But still, comprehensive injury prevention programmes which are scientifically planned and implemented do not exist in many developing countries. The possible reasons for this situation could be several and few important ones are given below:

* Injuries are still considered as acts of God or due to 'Karma' by communities. Fatalistic opinions of the community is one of the prime reasons for this grim scenario. Epidemiological research from all over the world reveal that injuries are no more accidents (act occurring without a known cause or pattern) and precise injury mechanisms are clearly known.

* Injuries are still treated as transport-police-individual issues

rather than public health issues and only when an injured person reaches a hospital they are treated as health problems.

- * The lack of epidemiological research is one of the prime reasons. Large scale community based epidemiological research has not been undertaken and reliable hospital statistics are not available. Total information on injuries is not available and under reporting-missing information is a common observation with Police, Transport and Health records.

- * An analysis of injuries based on local injury patterns has not been carried out in totality and lack of communication of this information to the public is a known phenomena.

- * Compartmentalisation of sectors required to work in injury prevention is a notable characteristic in India. Multisectoral involvement between health, transport, police, judiciary, road engineering, etc. is a basic prerequisite for injury prevention and control.

- * Any injury prevention programme needs total community participation. The experience of several disease control programmes in the past has demonstrated that if communities do not perceive a problem as their problem, the participation will be of a lukewarm nature without significant impact.

Among the various causes of injuries, traffic injuries constitute a major problem. Recently NIMHANS completed a study on "Epidemiology of Head Injuries" in Bangalore. The major external causes of all types of injuries were traffic injuries (52%), assaults (27%), domestic falls (10.8%), burns (5.1%), industrial accidents (3.2%) and fall of objects (1.1%). Cause of injury could not be ascertained in 1.0% of patients as the attendants were unaware and patients

were unconscious. A total of 72% injuries occurred in the age group of 15-44 years with a male to female ratio of 1:0.2. Significantly it was observed that majority of the patients had not received any first-aid care and the interval between occurrence of injury and reaching a hospital was very crucial.

Known Strategies

Global experience in injury prevention has been stimulating and positive. With road accidents contributing for a major share of injuries, research and preventive inputs have offered promising results. Developed countries like Australia, Japan, United Kingdom and America have registered a gradual decline in traffic injuries. Further research and efforts are in progress to reduce the burden still further. Interventions of a different nature are in progress for other causes of injury prevention also.

The basic principles of injury prevention are Education, Enforcement, Engineering and prehospital care, the fifth component of major importance being Evaluation. These approaches have been tried out in combination and in isolation. The application of these strategies often depends upon a number of vital factors like level of technological progress of society, nature and pattern of local causes of injuries, commitment of intervention teams, availability of resources and others. Combined and integrated measures have yielded better results as compared to individual strategies.

Educational Measures

Educational measures need to be integrated, focussed, target oriented, long term planned and should aim at changing attitude rather than mere provision of knowledge. Education program-

mes are required to all sections of society from policy makers to public. The role of educational programmes can be summarised as attempts to modify the behaviour of individual consumers and policy makers to decrease risks in the environment. Education in injury prevention is an area where education, training and behaviour modification are interlinked and depend on many factors. Individual strategies need to be developed depending upon the cause and socio-cultural environment of communities. Education also helps in preparing public to accept accompanying legislative efforts.

Enforcement Measures

Enforcement measures are required in a variety of injury prevention strategies. With the growing realisation that education alone is not effective due to problems in behaviour modification, many industrialised societies have evolved series of measures from traffic safety rules to drunken driving laws with vigorous punishment of violators. For enforcement to be effective, public must be adequately prepared to accept and adhere to the same. The laws must be visibly enforced, implemented in totality, sustaining and uniform in a given situation. Frequent changes in legislation as in the case of helmet wearing laws in India are often detrimental rather than beneficial. Difficulties are experienced by enforcing authorities in developing countries due to different set of operating factors which needs to be overcome. The recent modification in Indian Motor Vehicles Act has many important and useful components like compulsory wearing of helmets by motorised riders, safety standards for vehicles, rigorous punishment for drunken driving, strict compensation mechanisms

for drivers causing injury and better licensing regulations etc. There is also a need for better legislative measures for other causes of injuries. Other areas requiring immediate attention are standard housing safety standards, safety standards to avoid burns and industrial safety procedures and community enforcement measures to prevent violence. Restriction of firearms in developed countries through enforcement measures has been a shift in thinking of communities to prevent violence.

The recent changes in product design have revolutionised injury prevention in many countries. Since majority of road traffic is constituted by cars and heavy vehicles, technological measures have provided immediate results. The changes in car and road technology have been a major successful factor in developed societies. In countries like Australia, UK and USA, the vehicle occupants constitute 60-70% of road users while in countries like India 70-80% of road users are constituted by pedestrians, motor cycle occupants and pedal cyclists. Keeping this in mind, it would be more technologically appropriate to concentrate on this group of vulnerable road users in India to achieve favourable results. Better product design, safer construction of houses with elevated guarding to prevent falls in domestic dwellings, fire proof synthetic textiles, leakproof containers to avoid poisonings by children, safety standards in playground equipments etc. are some of the other areas deserving attention of safety technologists. Simple measures like compulsory barricades on roof tops and windows have resulted in severe reduction of falls among children.

FEBRUARY 1994

LATTUR-OSMANABAD-EARTHQUAKE ACTIVITY

TIPS ON HEALTH PRECAUTION

Many thousands have been rendered homeless as a result of the Lattur earthquake on 30 September, 1993 in Maharashtra.

In such acute situations, people are likely to suffer from diarrhoea, conjunctivitis, scabies, malaria etc. Besides observing general health precautions, the following preventive measures need special attention :

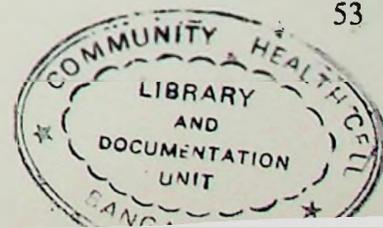
- Avoid use of water from stagnant pools.
- Make water safe for drinking by boiling or by using chlorine tablets. Chlorine tablets can be procured free of charge from the nearest Health Centre/Relief Camp.
- The area around the water sources like open wells and hand pumps should be kept clean to avoid pollution of the ground water.
- Get the children vaccinated/immunised.
- Use sanitary latrines. If these are not provided, dig pits and cover them after use.
- Wash your hands before handling food.
- Wash your eyes and face with clean water frequently, particularly before going to bed. If eyes become red and swollen then report to nearest medical centre.
- Avoid use of handkerchiefs, towels and other clothing of persons affected by scabies and/or conjunctivitis.
- Mosquitoes breed on stagnant water and spread malaria. Do not allow water to stagnate in your surroundings.
- Dump garbage in pits and keep your surroundings clean.
- Keep your body clean by having daily bath. —PIB

Pre-hospital Care

A major factor affecting survival of injury patients is the availability and affordability of prehospital care. Research during the past few decades has demonstrated that early management of victims is a crucial factor in survival and the extent of consequent disability. Even though controversies remain about the ideal pattern of prehospital care, certain measures like immediate first-aid, early transportation and

proper referral to a care giving centre are vital elements in this chain of events. Relevant health care policies need to be established in India in this direction

With much of the progress occurring in preventing traffic injuries large scale efforts have been limited in other areas focusing on other causes. The epidemiology and injury pattern of falls, violence, disasters, burns



need to be understood in greater detail in our developing societies. Simple indigenous technological solutions need to be identified rather than importing from developed societies, as it would be culturally irrelevant, expensive and not based on local injury mechanisms.

Future Prospects

India is yet to realise the growing impact of injuries on our developing societies. The direct and indirect or hidden costs of injuries needs to be clearly established. Some of the issues that need to be taken into account have been mentioned below:

- Injuries have to be examined as a priority public health problem. The available information clearly demonstrates the need for evolving immediate measures and information systems need to be established.
- There is need for a co-ordinating body with inputs from different sectors at central, state and local levels to initiate, implement, monitor and evaluate interventions on a scientific basis.
- The need for multisectoral involvement in injury prevention is being felt all over the world. The sectors of

Health, Transport, Police, Education, Judiciary, Housing and urban planning, Information and Broadcasting, Excise, Petroleum and Chemicals and others need to participate actively in an integrated manner for reducing injuries.

- There is an immediate need to develop epidemiological surveillance on injuries. The information available at present has its own limitations. A surveillance system will help in identifying priorities, allocating resources, initiating action and establish a feedback system.
- Government and non-governmental agencies need to work together, share responsibilities and formulate strategies towards clearly defined objectives and goals.
- Socio-culturally relevant technology developed on local injury information and mechanism will be more acceptable to the communities and would yield longterm results.
- Greater efforts towards community participation are vital as success of injury prevention rests predominantly on this issue.

- Health professionals need to take greater initiatives in advocacy, planning, education, developing health information, strengthening pre-hospital care and develop community based rehabilitation strategies by moving from care giving roles to preventive planners and strategists.
- Training for injury control practitioners are vital at this stage. Training encompasses all range of activities from sensitisation to rehabilitation and is required for all categories of personnel from public to professionals in different sectors.

Policy makers in this vast country have paid greater attention during the past few years to nutritional and infectious disease control. It is time that safer environment, be it on roads, at home/school/work place deserves its place in our day to day thinking and living towards improving quality of life in this era of urbanisation. Immediate efforts are required to reduce and prevent the occurrence of injuries during the coming years. A reorientation from "Floor mopping" to "Tap turning" is urgently required in the area of Injury Prevention and Control. □

“First of all our young men must be strong. Religion will come afterwards. Be strong my young friends, that is my advice to you. You will be nearer to heaven through football than through the study of Gita. You will understand the Gita better with your biceps, your muscles a little stronger”.

—Swami Vivekanand

HIROSHIMA DAY (06 Aug.) AND NAGASAKI DAY (09 Aug.)

DR P. A. SOMAIYA DR R. V. AWATE DR A. C. URMIL

IT was 47 years back, during the flag end of the second World War in 1945 when USA resorted to use of nuclear weapons and dropped atom bombs on these two cities resulting into mass destruction, devastation and deaths, unprecedented and never heard of before, unimaginable, unbelievable and grossly horrifying. Of course, it immediately resulted in the termination of the second world war but not in the termination of agony and phobia with which the mankind is still afflicted today. These are more noticeable among the survivors of the target country Japan, now suffering from the long term effects of exposure to radiation. Even in the aggressor country of USA the scientists have recently come out with their concern regarding possible long term radiation hazards among infants who were living near a nuclear weapons production site in the US northwest in the 1940s. It is suspected that some of these infants might have received very high doses (2900 RADs) of radioactive iodine during that period. A RAD which is a measure of radiation exposure of human tissue, roughly equals to the radiation in 12 chest X-rays. The phobia is also in respect of possible genetic defects in the future generations. The phobia in respect of unpredictable widespread consequences following nuclear warfare has however prevented the possessors of these weapons from their use

subsequently. The reason for this, probably lies in the realization of the fact that "In nuclear warfare there would be no victory or defeat but only shared annihilation" as rightly mentioned by J S Mehta, former Foreign Secretary, in one of his publications "Lessons from Hiroshima". The stock piling of nuclear weapons is therefore nothing but a sheer act of madness therefore the super armouries rightly carry the appropriate acronym MAD (Mutual Assured Destruction).

Effects of Nuclear Holocaust

On this occasion, it is worthwhile to recollect the effects of nuclear holocaust resulting into blast, heat, secondary fires, ionizing radiation and fall outs. These effects fall into 3 categories—immediate, short term and long term effects. The immediate effects include blast effects, heat effects, electro-magnetic pulse (EMP) effects and radiation effects. The blast effect results in falling of buildings, increase in wind velocity, causing hurricanes sufficient to kill people in open due to injuries caused by flying debris and other objects. During negative pressure wave phase "fire storms" occur which burn out everything completely even in adjoining areas untouched by the blast. About one third of total energy released goes towards production of heat effects. Heat effects produce a ball of fire, fire storms and superfires within the

Hiroshima Day (06 August) and Nagasaki Day (09 August) are the grim reminders of the worst man-made "International" disaster in human history.

affected area. Temperature approaching that of the centre of the sun are generated. Besides causing "flash burns", direct exposure of retina to flash results in permanent eye injuries. Electro-magnetic pulse (EMP), an extremely intensive radio wave disrupts functioning of many electronic devices and systems eg. radios, televisions, telephones, computers etc. Radiation from neutrons and gamma rays not only causes "flash burns" but also produces specific morphological, functional and genetic effects on body cells. The primary pathological effects include capillary haemorrhages in various organs and tissues followed by necrosis and secondary infections. Primitive cells undergoing mitosis are more susceptible to secondary effects generally due to delayed irradiation eg. bone marrow cells, germ cells, malignant skin cells and cells of secretory glands.

Radiation Fall Out

The radiation fall out is described as (a) Local fall out (50 percent of the total fall out during first

24 hours). (b) Intermediate fall out (may continue for weeks; produces areas of local concentration of radio-activity or "hot spots" which are more dangerous) and (c) Global fall out (may continue for months to years; covers vast area depending upon meteorological conditions).

Radiation Effects

The short term effects include problems connected with water supply, sanitation and food, disposal of excreta and dead bodies, break down of vector control measures and outbreaks of gastrointestinal and respiratory infections. Radio-active contamination of water and food are of major concern. The affected area creates lot of other problems for the survivors and the rescue teams. No person should enter the contaminated area without a respirator and should not touch even, food, water, fruits, milk and vegetables etc unless declared "safe" by a radiation Monitoring Team. First-aid treatment mostly covers cases of multiple injuries, burns and radiation injuries. Prevention of delayed effects requires constant vigilance. Involvement of nervous system and gastro-intestinal system usually, results in death within two weeks. Major problem among survivors is of bone marrow depression which results within 10 to 30 days and for which there is no specific treatment. Leucopacnia (decrease in number of white blood cells) increases their susceptibility to various infections. Our knowledge about long term effects is still incomplete. Some well known effects however include radiation injuries due to radiation fall out, suppression of body immunity, persistent radiation hazard due to longer lived radio-isotopes such as strontium-90 (half life 29 years) and Caesium-137 (half life 30 years), prolonged contamination of water

Earthquake Activity in Latur-Osmanabad Area

You may be hearing many rumours about the earthquakes likely to hit this area again. These rumours have no scientific basis. No method has been developed so far anywhere in the world for predicting time, location and size of an earthquake. The astrological forecasts being given out by some people also cannot be borne out by scientific facts. You are, therefore, advised not to believe in such rumours.

The earthquakes which have been occurring after the major shock of 30-9-1993 are called aftershocks. They signify the gradual release of accumulated strain in the earth and may last for some more time. The magnitude and frequency of aftershocks generally decrease with time.

During an earthquake, a majority of casualties result from falling debris, bricks and timber from collapsed buildings and structures. Always remember that an open space away from the buildings is the safest.

- So if you are near an exit, run outside and avoid collapsing walls.
- Once outside, do not go near a building, boundary wall etc.
- If you get caught indoors:—
 - Take cover—
 - Under a door frame
 - A study table
 - A bed
 - If none of these are available, stand near a corner where two walls meet.
 - In Latur area, it was observed that the door frames remained intact even when the structures collapsed. They, therefore, offer necessary protection for safeguard.
 - Do not go out on to balconies, terraces or projections. They are most vulnerable to damage.
 - When an earthquake happens, stay calm, observe suitable precautions and do not spread rumours. If possible rescue those who have been injured or affected by earthquake.
 - Avoid panic and do not create confusion.

—PIB

supply, increased ultra-violet radiation, climate and ecological disturbances, psychological disturbances and genetic abnormalities.

Hiroshima and Nagasaki accounted for 1,20,000 and 75,000 casualties respectively although the power of the atom bomb used was a mere fraction of the present day

nuclear weapons. No immediate medical treatment, even first-aid, could be provided to the injured in Hiroshima since all hospitals located within a kilometer of the hypocentre got totally destroyed. More than 90 percent of the medical staff and nurses got killed or injured. In Nagasaki, the main hospital with 75 percent of its beds and medical facilities got

totally destroyed with 90 percent of its occupants killed or injured.

Current World Concern

In the light of above, the current world wide concern about use of nuclear weapons is justified, particularly when it is realized that by 1987, the world already possessed an estimated total of 15,000 mega tons of nuclear weapons with their total explosive power 25-50 times greater than that of all the explosives used during the Second World War. The present mankind must remember that even if one percent of the nuclear weapons, now possessed, are used on urban populations, they can cause more

deaths in a few hours than during the entire period of the second world war. Observance of Hiroshima and Nagasaki Days is therefore a much wanted perpetual reminder to the mankind and particularly to those in possession of these weapons to desist from their use and give up their manufacture and stockpiling otherwise "Some day science may have the existence of mankind in its power and the human race commit suicide by blowing up the world" in the words of Henry Brooks Adams, written in 1862, but still valid today. It was on past two occasions when the threat of nuclear warfare became almost imminent. The first occasion was when Khrushchev installed nuclear missiles in Cuba and the

Second occasion was when during the Gulf War, Saddam Hussain threatened to use biological/chemical weapons which would have forced Bush to use the nuclear weapons. Thanks God, it did not happen and let us hope does not happen in future too.

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EARTHQUAKES—SOCIAL STRESS

An earthquake causes physical injuries and other losses which result in the development of stress. These problems can be mitigated by following some of the points given below:

- The injured person may be reassured about his recovery.
- To divert the attention of the person from his injuries, he may be encouraged to take up any interesting activity like reading or listening to radio and watching TV.
- Engage him in morale boosting activities.
- Talk or listen to the survivors patiently. Spend time with them.
- Generate a sense of oneness among the survivors.
- Keep the injured with his family as far as possible.
- Lend a helping hand in rehabilitating them.
- Help survivors to resume the normal activity like farming, business, etc.
- Show love and affection to orphaned children. Take care of them and encourage them to take to outdoor sports etc.
- Help and support pregnant women and old people.
- Share information with people to help reduce the sense of insecurity and apprehensions.

—PIB

Conquering Thalassemia —A few essentials

DR A. K. MUKHERJEE

Thalassemia—a genetic disease—is not a problem of a very few people. About 240 million people in the world and 30 million people in India are carriers of Thalassemia. Nearly 0.1 million cases are being added every year. Many nations have almost conquered it by creating awareness and by following the right schedule.

HEALTH is a state of homeostasis and it is maintained in face of a changing and shifting environment. The poly-peptide mediators of homeostasis, such as enzymes, transporters, channels and receptors are encoded by genes, descended to man through the evolutionary process. As individuals, we retain health if experience does not overwhelm homeostasis, or mutation does not undermine it. The biologic basis of disease is important and the health care system must accommodate the genetic basis of disease. As environmental causes of disease and death decline such as for infant mortality, genetic causes assume more prominence. In recent years, we have increasingly realised the public health implications of these genetic causes of disease.

Thalassemia is one such common inherited group of haematological disorders with variable presentation. Estimates show that 240 million people in the world and 30 million people in India are carriers of the gene for beta-thalassemia: Nearly 0.1 million cases are being added every year.

Beta-thalassemia gene occurs commonly in countries along the Mediterranean sea with highest frequency of 5 to 15% among Italian and Greek populations. There is a 'Thalassemia belt' that extends from the Mediterranean through West and Central Asian countries like Turkey, Iran, Afganistan and Pakistan, and passes on to the South East Asian countries like India, Indonesia, Burma and Thailand.

In our country, the thalassemia trait is seen mainly north of the Vindhya and varies between 1 to 15% with an average of 3 per cent. Approximately, 7,000—10,000 babies with thalassemia major are born in India every year, and it is quite likely that large number of them die even before a diagnosis is made. Available data shows the carrier rates to be high in Gujarat, Maharashtra, Rajasthan, Punjab, Delhi, West Bengal and Orissa.

The distribution of thalassemia carriers is not uniform, and certain communities and castes have a higher prevalence of carrier rate. The prevalence is higher in com-

munities like Sindhis, Punjabis, Gujaratis, Bengalis, Kutchis, Lohanas, Maharas, Gond Saraswats and Gowdas. The rates have been found to be 4.2% among Chitrapur Saraswats and as high as 13.6% in Lohana communities. Among the Bhanushali community of Bombay rates as high as 14.9% have been reported. Prevalence varying from 3 to 7.9% exists in the *bhils* and other tribal population of Rajasthan. It is also a matter of interest that migrants to Rajasthan specially Sindhis have retained their high carrier rates. *Large community based epidemiological studies need to be conducted* to identify the people who are at high risk. So long as intra-caste and intra-community marriages continue and a wide-based screening programme is not available, children with thalassemia major will continue to be born.

Thalassemia is not a problem of a very few people. Carrier rate is very high and the actual disorder is increasing day by day. It is not something that will disappear and fade away however hard we pray for that to happen but with collective efforts it can be controlled and

the thalassemics can live a normal honourable life. We should strive hard to eradicate the stigma attached to such genetic diseases. Each one of us is genetically unique and each has weaknesses and strengths. Only such a realisation can break down the wrong tendency to discriminate those with genetic diseases. We should perceive that everyone is vulnerable in his or her own way.

Principles of Treatment

Currently the management of thalassemia offers them a near normal life and even thalassemic patients can have normal family life and have children of their own. Principles of treatment include repeated blood transfusion to maintain near normal hemoglobin (over 10 grams/decilitre), removal of iron with iron-chelating agents, treatment of complications of disease, prevention of disease by antenatal diagnosis and genetic counselling. Though it used to be expensive, cumbersome and time consuming, often leading to frustration in the family, now the facility is available free in many centres.

In Delhi, for instance, apart from the All India Institute of Medical Sciences, the Charak Palika Hospital of NDMC runs one of the biggest centres for thalassemia with 12 beds and 200 patients on the rolls. It provides 3,000 to 4,200 transfusions annually. A 3 bedded thalassemia cell for paediatric patients has been functioning for the last one year in the DDU Hospital. More such special medical centres for properly monitored treatment of thalassemics need to be developed and manned with trained staff.

Facilities for Diagnosis

Adequate facilities for antenatal diagnosis of thalassemia

should be developed at the identified centres for chronic virus sampling using DNA technology with the help of Polymerase Chain Reaction, and carrying out alpha and beta chain synthesis ratio in early pregnancy.

Repeated packed cells transfusions continues to remain the main pillar of treatment. Use of washed red cells minimises the blood transfusion reactions. Under the National AIDS Control Programme, measures have been taken for strengthening Blood Banks and making them adhere to certain standards for ensuring safety of blood. All the blood we transfuse is now screened for Hepatitis B and HIV.

A major complication in thalassemia management is iron overload secondary to repeated blood transfusions and iron absorption from the gut, which in turn could cause cardiac, hepatic and endocrinal damage. In the absence of adequate chelation therapy aimed at achieving a negative iron balance, most of thalassemic children would succumb to the disease by second decade. Desferrioxamine, introduced in early 1960's, needs to be administered daily for effective chelation. Therapy for a child weighing 20 kg varies between 6 to 9 thousand rupees per month. Transfusion pump which costs between 15,000—20,000 Rupees need to be imported. We should intensify medical research for a cheap and safe oral iron chelator and for *indigenous manufacture* of equipment including transfusion pump so as to reduce the cost and ensure ready availability.

Bone Marrow Transplantation is now a reality on the Indian scene. Those parents who had written off BMT due to very high

costs abroad can now get it done in India at Tata Memorial Cancer Hospital, Bombay, at AIIMS, New Delhi or at CMC, Vellore. It offers a permanent cure for thalassemic children. However it is only possible if HLA matched donor is available. With improved socio-economic status and better adoption of family planning, many families have one or two children, thus it may be difficult to have HLA matched sibling. The only other recourse is to have HLA matched non-sibling donor, for which the possibility is one in a million. Such a HLA matched donor can be located easily, once we have computerised data base on HLA studies on millions of people willing to donate bone marrow. The need of the hour is for starting a *bone marrow registry*, if we want bone marrow transplant to be effective as a cure modality for the thalassemic children.

Genetic consultation and counselling including *pre-marital counselling* have an important role to play in prevention of thalassemia. If the rapidly escalating insights into genetics are to be brought to practical use, we may well need a separate cadre of trained individuals to deliver these services in the coming decades. For the present, we need to increasingly integrate counselling services in our clinical practice.

The *research studies* on thalassemia have helped further our understanding of genetics, molecular biology and haematology. The cloning of DNA, use of complementary DNA, cutting DNA with Restriction Endonucleases and use of Southern Blot Technique have contributed much in this quest. Research projects should be undertaken in India to study the *molecular basis of disease* and

develop newer chelating agents. Genetic engineering, which is still at experimental level, may provide us a means of controlling the disorder by replacement of a defective gene.

There is widespread ignorance among the general public of the high prevalence of Thalassaemia

gene in certain communities. *Health Education* to raise awareness about the disease and to change attitudes is important. Many nations of the world have almost conquered thalassaemia by creating awareness and following the right schedule. Our medical professionals also need to be well

informed of the latest development in the field, which have revolutionised the treatment.

—Based on the inaugural address delivered at the National Thalassaemia Conference on 5 February, 1994 held in Madras.

DR UTON M. RAFEL : New WHO Regional Director for South-East Asia

Dr Uton Muchtar Rafel, of Indonesia, has been appointed Regional Director of the World Health Organization's (WHO) South-East Asia Region. His appointment took place on 20 January, 1994 in Geneva, Switzerland, during the 93rd session of the WHO's Executive Board.

In September 1993, at its 46th session, the Regional Committee for South-East Asia nominated Dr Uton as Regional Director for South-East Asia and requested the Director General to propose to the Executive Board the appointment of Dr Uton for a period of five years from 1 March 1994. The decision was taken by the Board members in private session in accordance with Article 52 of the WHO Constitution.

Dr Uton was born in 1935 in Bandung, Indonesia. He was educated in Indonesia, United States of America and Great Britain. Before joining WHO in 1981 as Regional Advisor in Primary Health Care, he held for a number of years two senior governmental posts: Director of Health Services and Executive Director of the Regional Planning and Development Board in the West Java Province, Indonesia.

Dr Uton will succeed Dr U Ko Ko, Regional Director since 1981.

—W.H.O.

DO YOU KNOW ?

Age is no safeguard. People of any age can have high blood pressure, but if you are over 25 you are doubly at risk. For most, 3 simple ways to reduce high b.p. are—

- * a balanced diet,
- * salt reduction, and
- * weight reduction.

CENTRAL HEALTH EDUCATION BUREAU

CALENDAR OF TRAINING ACTIVITIES 1994-95

S. No.	Training Programmes	Duration	No. of Seats	DATES	
				From	To
1.	DHE	2 years	20	July, 1994	May-June, 96
2.	Key Trainers	4 weeks	20	16-5-1994	10-6-1994
3.	CHE ISM	5 days	20	13-6-1994	17-6-1994
4.	CHE PSM	5 days	20	22-6-1994	28-6-1994
5.	Distt. Level M.O.	5 days	20	4-7-1994	8-7-1994
6.	HFW TC (Med.)	2 weeks	20	11-7-1994	22-7-1994
7.	CHE (Para-medical)	8 weeks	20	25-7-1994	16-9-1994
8.	MOS Course	4 weeks	20	19-9-1994	14-10-1994
9.	Media Personnel course	8 weeks	20	17-10-1994	9-12-1994
10.	CHE (Para-medical, teachers)	8 weeks	20	12-12-1994	3-2-1995
11.	Social Science Research methods	4 weeks	20	6-2-1995	3-3-1995

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