

DEVELOPMENT OF EPIDEMIOLOGICAL SERVICES IN SRI LANKA AND FUTURE CHALLENGES

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Introduction

Epidemiology is the study of the distribution and determinants of health-related states or events in populations to control health problems.¹ This discipline deals with all aspects of health. While originally it dealt with infectious diseases, which led to the association with the term "epidemic", modern epidemiology is a wide science, covering the study not only of all diseases but of all health events in a population, as evinced by this definition.

Past developments

The public health services in Sri Lanka commenced with the establishment of the Sanitary Branch of the Civil Medical Department under a Sanitary Commissioner in 1913.² Sanitary Officers (later designated Field Medical Officers /Medical Officers of Health) were appointed to large "district" areas to carry out health work, which included some epidemiological activities like control of infectious diseases and epidemics. Whilst the general public health activities became the responsibility of Medical Officers of Health (MOHs), specialized campaigns for the control of diseases of major public health importance were established from time to time. The Anti-Malaria Campaign was established in 1922 and the Anti-Tuberculosis Campaign (now the Respiratory Disease Control Programme) was established in 1947.³

The Epidemiological Unit was established in 1959 with assistance from the World Health Organization (WHO) to strengthen the surveillance of communicable diseases. Initially, the unit functioned with a WHO consultant and a national counterpart, who, after further training in epidemiology, was appointed as the Epidemiologist of the Department of Health Services in 1961. Prior to this, the functions of epidemiological surveillance were under a Senior Medical Officer (Epidemiology) in the Department of Health Services. From its inception, the Epidemiological Unit worked very closely with the Public Health Veterinary Officer (now Director, Public Health Veterinary Services) and the Medical Statistician— all located at Chelsea Gardens, Colombo 3. In the early 1970s, all three units were shifted to the Anti-Tuberculosis Campaign building at Deans Road, presently occupied by the Ministry of Health. By 1967, the Unit had expanded and two Assistant Epidemiologists were appointed following specialized training in epidemiology.⁴

In 1970, the first two Regional Epidemiologists were appointed to the health regions of Kalutara and Kurunegala. These officers had undergone specialized training in epidemiology.

About this time, it was planned to appoint Regional Epidemiologists, on a phased basis, each to cover one or two health regions. This was based on the availability of twelve-month fellowships funded by WHO for postgraduate training (DPH/MPH) with special training in epidemiology. Due to the shortage of medical officers of health (MOHs) in the public health services, the trained medical officers were appointed as MOHs and not as Regional Epidemiologists. With the introduction of Cholera El Tor in late 1973, and the decision to strengthen the epidemiological

services, a Regional Epidemiologist was appointed in 1974 to cover the two northern districts (Jaffna and Vavuniya), while an Assistant Epidemiologist from the Epidemiology Unit covered the Colombo district. In addition to these three districts, Kurunegala and Kandy already had Regional Epidemiologists. In the same year, the services were further expanded by one of the Assistant Epidemiologists being assigned non-communicable disease epidemiology. With the establishment of a separate Cancer Control Programme in 1980, this officer was appointed as its first Director. The Cancer Control Programme functioned under a separate Unit in the Ministry of Health. A Public Health Bacteriologist with postgraduate qualifications in bacteriology, as well as in public health was appointed to the Unit in 1975. This officer, who was attached to the Infectious Diseases Hospital and the Lady Ridgeway Children's Hospital, worked as a member of the epidemiological team for outbreak investigations as well as for special studies. This post was not filled after the retirement of the officer in the early eighties.

In 1986 the Epidemiology Unit was shifted to the more spacious building at 231, De Saram Place, Colombo 10. In 1995, the cadre of the Epidemiology Unit was revised and the total cadre of medical officers was increased to 13 (2 Senior Administrative MOs, 8 Specialists and 3 Grade Medical Officers). From 1996, steps have been taken to fill the vacancies. However, due to the non-availability of qualified medical specialists in this field several vacancies continue to exist. With the devolution of administrative powers to the provincial councils in 1987 it was planned to appoint a Provincial Epidemiologist to cover each province, on a phased basis.

In 1960, the Epidemiology Unit commenced the publication of the Quarterly Epidemiological Bulletin. In the latter part of 1973, the Unit commenced publication of a Weekly Epidemiological Report with the objective of providing information on the cholera epidemic. This was later modified to provide a statement on notifiable diseases based on information received from all Medical Officers of Health in the Weekly Report of Communicable Diseases. This system of a quick feedback, which was initially limited to medical officers in the Ministry of Health, was gradually extended to others such as general practitioners, academic staff members of Universities.⁴

In 1987, the Epidemiology Unit commenced the computerization of surveillance data with the assistance of WHO. The computer section was established in 1987 with the appointment of a Computer Programmer/System Analyst and Data Entry Operators. The necessary software and hardware were obtained with the assistance of WHO. The present computer system in the Epidemiology Unit has a file server with fifteen workstations. All medical officers have direct access to surveillance data in the file server. The Epidemiology Unit also has e-mail and Internet facilities.

Achievements

Resource Development

During the last two decades policy makers have given necessary support for the development of epidemiological services in the country. Additional resources to develop the services at the central level and regional level by way of human resources, material and funds have been provided. The regional epidemiological services have been strengthened and at present 17 Regional Epidemiologists are in place.

Disease Surveillance

Disease surveillance activities especially in respect of notifiable diseases have been improved. A list of notifiable diseases was first gazetted in the Ceylon Gazette in August 1925 under the Quarantine and Prevention of Disease Ordinance of 1897, in order to take prompt action for the prevention and control of communicable diseases. This was subsequently amended in 1947.⁵ This list has been revised from time to time in order to include new diseases, which needed additional monitoring for prevention and control activities. At present the Medical Officers of Health send weekly returns of communicable diseases to the Epidemiology Unit. With the computerization of disease surveillance data at the Epidemiological Unit it is possible to monitor the disease trends and recognize outbreaks early. The establishment of an early warning system and rapid response teams at central and regional levels has helped to control disease outbreaks early.⁶

Advisory Committee on Communicable Diseases

In mid-nineteen sixties a multidisciplinary Advisory Committee on Communicable Diseases was established under the chairmanship of the Director General of Health Services to review the situation of communicable diseases in the country regularly, and to make policy decisions on prevention and control measures. Members of this committee serve as experts in the rapid response team for the management of national level disease outbreaks/epidemics.

The WHO continues to support the manpower development programme in the epidemiological services by arranging placements for training abroad and awarding fellowships for epidemiologists.

National and international organizations like the World Health Organization (WHO), the United Nations Children's Fund (UNICEF), the Japanese International Co-operation Agency (JICA) and the Rotary International have provided necessary assistance to carry out special disease control programmes (in polio, dengue, diarrhoea and in cholera).

Prevention and control of major communicable diseases

Smallpox

Smallpox epidemics occurred in Sri Lanka with considerable frequency during the past few centuries. The surveillance and vaccination of the at risk population were the two main strategies used to eradicate this disease. Vaccination against smallpox was introduced to Sri Lanka in 1802 and in 1886 it was re-introduced under the Vaccination Ordinance. The last definitive case of smallpox in Sri Lanka was reported in 1967.³

Cholera

Cholera was rarely seen in Sri Lanka in the period immediately following independence. After a cholera free period of 22 years from 1951, the first major outbreak of cholera El Tor was reported in Sri Lanka in 1973.³ A fresh outbreak was reported in the Puttalam District in 1997 which spread to other districts, but the outbreak was controlled effectively.

Other Diarrhoeal Diseases

Over the years the death rate for diarrhoeal diseases has decreased markedly. Much of this reduction can be attributed to the successful implementation of oral rehydration therapy "Jeevanee" from 1983/84 as treatment for watery diarrhoea throughout the

country. The incidence of dysentery and other diarrhoeal diseases has declined during the last few years due to improved sanitation, better personal hygiene and reduction of other risk factors. The morbidity and mortality trends and case fatality in diarrhoea over the years is shown in Figure 1.

Dengue

Dengue fever has been endemic in Sri Lanka from the beginning of the century. Serological and virological evidence to this effect was first recorded in 1960.⁷ The virus was first isolated in Sri Lanka in 1965 at the Medical Research Institute (MRI). In 1989, there was a major outbreak of Dengue Haemorrhagic Fever (DHF) with 203 clinically diagnosed cases and 20 deaths. In 1990, the number rose sharply to 1,350. During the last few years over 1,000 suspected cases of DHF are reported every year. With the establishment of an early warning system it is now possible to avert large outbreaks. In addition the case fatality due to dengue has been reduced to less than 1 percent by proper management of cases.

Japanese Encephalitis (JE)

The JE virus was first isolated in Sri Lanka in 1968 by the MRI and since then cases have been reported from different parts of the country.⁸ The first major outbreak was reported in 1985 in the Anuradhapura district. In 1987, 766 cases of Japanese Encephalitis (JE) were reported with 38 deaths. Later it spread to other areas in the North Central province, North Western province, Western province and Southern province. Immunization of children aged 1-10 years against JE commenced in 1988 as the main strategy to control the disease. The Department of Health Services spends over 100 million Sri Lankan rupees each year to import JE vaccine and administer over 800,000 doses to children annually. In 1999, only 100 cases of Japanese Encephalitis were reported in Sri Lanka.

Vaccine-preventable diseases

Sri Lanka has a history of immunization against vaccine-preventable diseases that dates back to the nineteenth century. The success story of immunization in Sri Lanka started in 1886 and continues to this day.³

The history of immunization activities over the years is given below:

Year	Milestone
1886	Vaccination against smallpox introduced under the Vaccination Ordinance
1949	BCG vaccination introduced against tuberculosis
1961	'Triple' vaccination introduced against diphtheria, whooping cough and tetanus
1962	Oral Polio Vaccine introduced
1963	BCG vaccination of new born introduced
1969	Tetanus Toxoid administration to pregnant mothers introduced
1978	Launching of the Expanded Programme on Immunization (EPI)
1981	Revision of the immunization schedule and the introduction of a modified list of contraindications
1984	Measles vaccination introduced

1985	Strengthening of cold chain and logistics in EPI
1989/1990	Achievement of Universal Childhood Immunization (UCI) with 80% coverage of all infants with the vaccines in the EPI.
1991	Revision of Tetanus Toxoid schedule
1995	First National Immunization Days (NIDs) 4 th November 1995 and 9 th December 1995
1996	Immunization against Rubella commenced in August 1996
2000/2001	Revision of immunization schedule and introduction of Measles Rubella vaccine.

It is interesting to note that all activities leading to the present high level of immunization commenced after the declaration of independence. A streamlined, organized programme was set into motion only in 1978 with the introduction of the Expanded Programme on Immunization (EPI). This programme has received assistance from the World Health Organization and the United Nations Children's Fund, as well as from other non-governmental organizations. With the increase in the immunization coverage of infants and pregnant mothers over the years there has been a marked decline in incidence of vaccine-preventable diseases.

In 1999, over 90 percent of children under 1 year of age was protected against tuberculosis, diphtheria, pertussis, tetanus, polio and measles.

From 1988, strategies to achieve the twin goals of eradication of poliomyelitis and the elimination of neonatal tetanus were developed. The last virologically positive, confirmed case of poliomyelitis was reported in 1993. The country achieved neonatal tetanus elimination status (less than one case per 1000 live births) in 1995. Activities to achieve zero incidence are being implemented.

Setbacks

Surveillance

Existence of vacancies of medical officers in the specialist grade and other staff at the central Epidemiology Unit and the regions are a major setback. Absence or shortage of Epidemiologists at the central and regional levels hampers effective disease surveillance and control. Most of the qualified medical officers in this field are not willing to accept these posts due to lack of incentives and other infrastructure facilities including official transport and accommodation.⁹ The establishment of the proposed provincial epidemiological units has not been implemented.

The establishment of an early warning system and rapid response teams at regional level for containment of disease outbreaks, emerging and re-emerging diseases are taking place at a very slow pace due to lack of co-operation from the regional staff.

A Public Health Bacteriologist qualified in bacteriology, as well as in public health, worked as a member of the epidemiological team for outbreak investigations and for special studies. This post was not filled after the retirement of the officer in the early eighties. At present the public health laboratory services are met by the Medical Research Institute situated in Colombo and other laboratories in some major hospitals

in the regions. The public health laboratory services for disease control needs to be re-established at the centre and in the regions.

Disease control

Measles

Though the general immunization coverage for EPI vaccines is good, immunization coverage for measles vaccine is not satisfactory in some areas. This un-immunized susceptible population built up during the last 7-8 years, causing a large outbreak of measles, in the last quarter of 1999. Outbreaks of measles occur when a critical mass of susceptibles builds up. This occurs due to many other reasons. In Sri Lanka immunization with measles vaccine commenced in August 1984 and the coverage improved over the years. The unimmunized children over the years contributed to the susceptible mass. The vaccine efficacy is in the region of 85-90 percent. This results in the collection of 10-15 percent of unprotected children yearly, adding to the susceptible mass. Moreover, there are some primary and secondary vaccine failures. All these children contribute to the susceptible mass and when a critical mass is built up an outbreak occurs. In order to prevent this build up, a decision was taken to introduce a second dose of measles vaccine in the form of measles-rubella (MR) vaccine at the age of 3 years. "Catch up" immunization campaigns will also be conducted at suitable intervals.

Polio Eradication

The Acute Flaccid Paralysis surveillance for the Polio Eradication Initiative and vaccination coverage has not been at an optimal level in the war-torn Northern and Eastern Provinces of Sri Lanka. In addition the continued threat of the re-introduction of the virus from the neighbouring countries also exists.

Pertussis

A 'whooping cough' outbreak reported in 1997 caused confusion among medical professionals, politicians and the public and ended up with the appointment of a presidential committee for investigation.

The management of this outbreak showed the importance of obtaining good quality vaccine. Vaccine will now be obtained only from sources approved by WHO. It also showed that the maintenance of the cold chain and maintaining a high coverage is important to prevent outbreaks. This outbreak also showed the necessity to strengthen laboratory confirmation of the diagnosis.

Present scenario and the future challenges

With the epidemiological transition in the country during the last four decades, the role of the Epidemiology Unit has changed. Accordingly the new Epidemiology Unit undertakes surveillance of all communicable and non-communicable diseases, except malaria, filariasis, tuberculosis, leprosy, STD/AIDS and cancer, which are undertaken by the respective specialized control programme. The Unit also undertakes surveys and studies in the country on epidemiologically important health problems and issues. In addition, the Epidemiology Unit is responsible for the control of vaccine preventable diseases, diarrhoeal diseases, acute respiratory infections, dengue fever, dengue haemorrhagic fever, Japanese encephalitis and other emerging and re-emerging diseases which are not controlled by any of the existing specialized campaigns.

With the demographic transition, the aged population over 60 years will increase to about 20 percent in three decades. Older persons may need institutional as well as community care. To meet the problem of an aged population, social and medical expenditure will have to be increased. Non-communicable diseases like cardiovascular and cerebrovascular diseases, cancer, mental illness and other debilitating conditions will demand additional services in terms of medicine, specialized institutions, technology and special professionals.¹⁰ The epidemiological activities in Sri Lanka should also be improved to face these additional demands with skilled epidemiologists to conduct research activities and provide services related to existing and emerging health problems.

There is also a likelihood of the occurrence of new, emerging and re-emerging diseases. The country has to address the problem of importation of new or nearly eradicated diseases like plague, yellow fever, ebola, some types of influenza, and even polio. Surveillance, prevention and control of these diseases will be a real challenge to the health sector and to the epidemiological services.

Both developing and industrialized nations have begun to implement innovative measles immunization and surveillance strategies to eliminate indigenous transmission of the measles virus. These measles elimination strategies include implementation of catch up campaigns, keep up campaigns and follow-up campaigns. Because of the continued threat of virus re-introduction, vaccination needs to be continued until measles eradication is achieved.

Most of the developed countries now use modern methods and tools in epidemiology. Some of these modern methods like epidemiological modelling, genetic epidemiology and epidemiological fingerprinting will be useful for the epidemiologists to understand the spread of diseases and to implement preventive and control measures in the future.^{11,12,13} Epidemiologists and other relevant staff in the system will require training in these aspects to face the new health problems.

“No matter what the future may hold, epidemiology will have much to contribute. Epidemiologists will track the cause and origin of both new and older diseases, evaluate therapies and public health programs, investigate and solve outbreaks of disease, and record the history of the rise and fall of disease in populations. And epidemiologists will serve to remind both health professionals and politicians of the primary mission of medical science: better health for all peoples” – Paul Stolley and Tamar Lasky.¹⁴

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