Chapter 10

CHRONIC NCD SURVEILLANCE IN POLONNARUWA

Key Messages

- Worldwide, NCD currently represent 43% of the burden of disease and are expected to be responsible for 60% of the disease burden and 73% of all deaths by 2020.
- The EBM Study pilot tested a mechanism of generating, managing and using information on selected Chronic NCD in Polonnaruwa District.
- A national MDS is to ensure that correct indicators are monitored by the stakeholders in a standardized manner that will allow comparison of data.
- In introducing a new surveillance system for NCD into this country, Polonnaruwa was chosen to pilot test and implement this system.
- The necessity of educating the general public on Chronic NCD is an important aspect in preventing them.

10.1 BACKGROUND

10.1.1 THE ORIGIN & DEVELOPMENT OF PUBLIC HEALTH SYSTEM IN SRI LANKA

The history of the health services in Sri Lanka dates back to the British era. The sanitary branch of the Civil Medical Department was established under a sanitary commissioner in 1913 as the beginning of the Public Health Services in Sri Lanka. Sanitary Officers (later designated as MOH) were appointed to large "Health Districts", to carry out health work which included the control of infectious diseases and epidemics, bazaar sanitation, and sanitation of urban, rural and estate areas. In 1925, the medical services and the sanitary services were amalgamated and brought under the control of a Director of Medical and Sanitary Services.

A landmark in the development of the community Health Services in Sri Lanka was the establishment of "Health Unit System" in Koholana, Kalutara in 1926. Thereafter similar Health Units were established to cover the extent of the whole country. Each Health Unit was designed to serve a population of 60 000 to 100 000. A MOH was made the head of the unit. The Health Unit system continued in operation, lending itself to modifications to suit the changing health needs of the country. Over the years, it proved to be a most efficient system fro delivery of health services at the grass root level. The main functions of the Public Health Services are promotion of health and prevention of diseases. Health Units headed by MOH/DDHS carry out these services in Sri Lanka.

PHI, PHNS, SPHM and PHM assist the Medical Officers of Health. The PHM / Family Health Worker is the health worker for family healthcare at the grass-root level and provides domiciliary service, mainly to mothers and infants and maintains the link between the clinic and the community. The PHNS and the SPHM supervise the work of the PHMs and also see to the care of the pre-school and school children. The PHI is primarily responsible for environmental sanitation, school health work and control of communicable diseases.

The programme for preventive work provides for the control of communicable diseases, sanitation, school health work, epidemiological surveillance, family health, health education and the enforcement of the Food Act. These services are delivered to the community through both, the general Community Health Services, as well as through the Specialized Services executed by separate agencies in liaison with the MOH/DDHS. Following the devolution of power, the local staff involved in the control of certain special diseases like malaria and filariasis comes under the direct administration of the MOH/DDHS, while those involved in the control of diseases like rabies, tuberculosis, STD and leprosy, come under the PDHS. The Directorate of the special control programmes at the central level, functions mainly in an advisory and supportive capacity.

10.1.2 DISEASE SURVEILLANCE ACTIVITIES IN SRI LANKA

Surveillance is often defined as the systematic collection, analysis and interpretation of health data and the timely dissemination of this data to policymakers and others. Good quality health information is essential for planning and implementing health policy in all countries. Surveillance provides health information in a timely manner so that countries have the information that they need to fight epidemics now or plan for the future. It is regarded as a fundamental tool of public health.

In Sri Lanka, epidemiological data is collected routinely through various mechanisms. The RG's Department provides data on births and deaths. The Medical Statistician's data includes information on indoor morbidity and mortality. However, morbidity data is not routinely received from the out-patient departments of both government and private sector institutions and on indoor patients treated in the private sector hospitals. Notifiable diseases are reported routinely from hospitals. In addition, sentinel, active and special surveillance systems function for selected notifiable diseases. At the central level the advisory committee on-communicable diseases functions as the main technical committee on control of communicable diseases. This committee also functions as the emergency action committee when an emergency situation occurs. Selected members of this committee also function as the Rapid Response Team.

In 2002 at the national level, quarterly meetings of the Advisory Committee on communicable diseases were conducted on schedule. Surveillance activities were discussed at the Regional Health Epidemiologist quarterly conference held at the Epidemiological Unit. Reviews of surveillance activities were conducted at regional level in RDHS divisions, attended by Regional Health Administrators, Paediatricians, Physicians and preventive health staff. Three consultative meetings were held in 2002 to formulate an early warning system and rapid respond teams to control selected communicable diseases. Quarterly Epidemiological Bulletins and Weekly-Epidemiological Reports were sent to central, regional and peripheral staff, as a feed back of the disease surveillance activities.

According to "Mahawansa", Sri Lanka has a known history of over 2500 years and it is generally believed that Malaria was one of the important factors leading to the decadence of the ancient civilization. After the invasion by the Portuguese in 1505, the Dutch in 1656 and by the British in 1796 epidemics of plague, small fox, yaws and cholera were recorded. There had been some rules and regulations on general sanitation since ancient times to control infections among the people. Under the present Roman-Dutch law prevailing in the country the first legal enactment relevant to health was "Public Health and suppression of nuisances' ordinance" no 15 of 1897. Later an epidemic in Bombay induced the British rulers in Sri Lanka to enact the "Quarantine and prevention of diseases ordinance" of 1897.

In 1948 a special unit was created under the medical statistician to process hospital morbidity and mortality data. The epidemiology unit of the MoH is responsible for all disease surveillance activities of the country. In 1959 the epidemiology unit was organized to take over the functions of

epidemiological surveillance which was earlier under the guidance of the senior medical officer (Epidemiology).
The "Quarantine and prevention of diseases ordinance" and its subsequent amendments provide the necessary legislation for the implementation of the notification system. According to the ordinance every practitioner treating a patient who has a notifiable disease, should notify such cases to the MOH of the area where the patient resides permanently. This notification has to be done within 24 hours of tentative diagnosis; and apart from the list of notifications, if there is any other disease occurring in epidemic proportions those diseases should also be notified.
The cases are notified using standard notification card H 544. The MOH maintains a notification register and the notifications are referred to the range PHI for investigation and confirmation. Once the PHI receives the notification he should go to the patient's house and trace the contacts; detect the source of infection and take the necessary actions to prevent further spread of the disease. The PHI should investigate the case and forward his report to the MOH within seven days of receiving the notification card. The MOH records these returns in the infectious disease register and submits a weekly return of the communicable diseases to the epidemiological unit indicating the cases notified and detailed information on the confirmed cases.

10.1.3 INFORMATION ON CHRONIC NCD

Worldwide, NCD currently represent 43% of the burden of disease and are expected to be responsible for 60% of the disease burden and 73% of all deaths by 2020. Most of this increase will be accounted for by emerging non-communicable disease epidemics in developing countries. Effective prevention strategies for NCDs do exist. However, they require specific data on risk factors so that priorities can appropriately be set and targeted interventions developed and monitored.
In Sri Lanka the data on NCDs are reported by the IMMR. But the data is not timely and incomplete and it does include data on risk factors.
As in many other countries, in Sri Lanka the national capacity and resources – human, financial, and material – are still insufficient to ensure availability of and access to essential preventive, curative and rehabilitative care for many chronic NCDs. On the other hand the incidence and prevalence of chronic NCDs. Proper information management of NCDs are needed to prevent the long-term consequences of the NCDs. The NCDs could produce death or disability. A disabled person is a burden to the family and also to the country.

10.1.4 MULTI-DISEASE SURVEILLANCE

In developing countries, information on mortality and morbidity is often missing, due to the incomplete collection of data as well as the delays in processing and publication. Sri Lanka has two main data collection activities carried out country-wide- notification of infectious disease cases and reports of morbidity and mortality in hospitals. Both are based on government hospital admissions.

There was a two year delay previously in the publication of the national statistics on morbidity and mortality. WHO, with partial funding from ECHO initiated a project where a system for multi-disease surveillance/ hospital information in the tsunami- affected districts was set up. A computerized system was designed to speed up this process of data capture and transition and to improve its completeness and accuracy, in eight districts- Ampara, Hambanthota, Matara, Jaffna, Galle, Kaluthara, Kalmunai, and Batticoloa. Initially the system was set up in the largest hospital in the district, RDHS Office, and some MOH Offices; but work has started to include the smaller hospitals as well. The precise notification of infectious diseases and the timely production of the IMMR are the expected benefits of this project.

10.1.5 INITIATIVES TOWARDS SETTING UP A SURVEILLANCE SYSTEM FOR CHRONIC NCD IN ANURADHAPURA

In October 2005, the PDHS Anuradhapura and the Epidemiological Unit designed a plan for reporting chronic kidney disease, which is one of the leading causes of mortality in the province ranking either first or second in last few years (Figure 3- 38). Late diagnosis has been pointed out as one of the reasons for high mortality rates in the province. With the aim of strengthening early detection of cases of chronic renal failure (CRF), a reporting system was planned to be introduced to within the province. The system will require the treating medical staff to report all suspected or diagnosed cases of CRF (irrespective of the stage of the disease) to the respective RDHS by residence. This has to be done from all levels of institutions. Towards this end, the PDHS was tasked to issue an internal circular on reporting of suspected or diagnoses cases of CRF, the physicians to develop minimum clinical and laboratory criteria for reporting and the Regional Epidemiologists to maintain a CRF register for cases reported and for follow-up.

As part of plan, all suspected cases reported to the MOH will be screened by a special team at a designated place in each MOH division. Confirmed cases will then be referred to a physician at the closest institution or renal clinic using a referral card, which will be developed by the MOH Planning or the Regional Epidemiologist. The criteria for the baseline assessment programme and the baseline assessment test kit will be developed by the physicians. It was agreed that the PDHS will deploy personnel and allocate resources to support the baseline assessment programme.

Follow up of CRF cases or risk groups will be performed at the renal clinics, which will be established in identified medical institutions. The database at the renal clinics has to be linked to the CRF database and the CRF Register at the RDHS whereas the two district database and the provincial database will be linked with one another. The linking of the provincial database with the website of the Epidemiology Unit is also part of the design. The contents of the database are the morbidity, mortality data, and case reporting from MOH as well as research data. Data collection forms for reporting, baseline assessment reporting system, a register for all information from reporting to follow-up will have to be developed by the Epidemiology Unit.

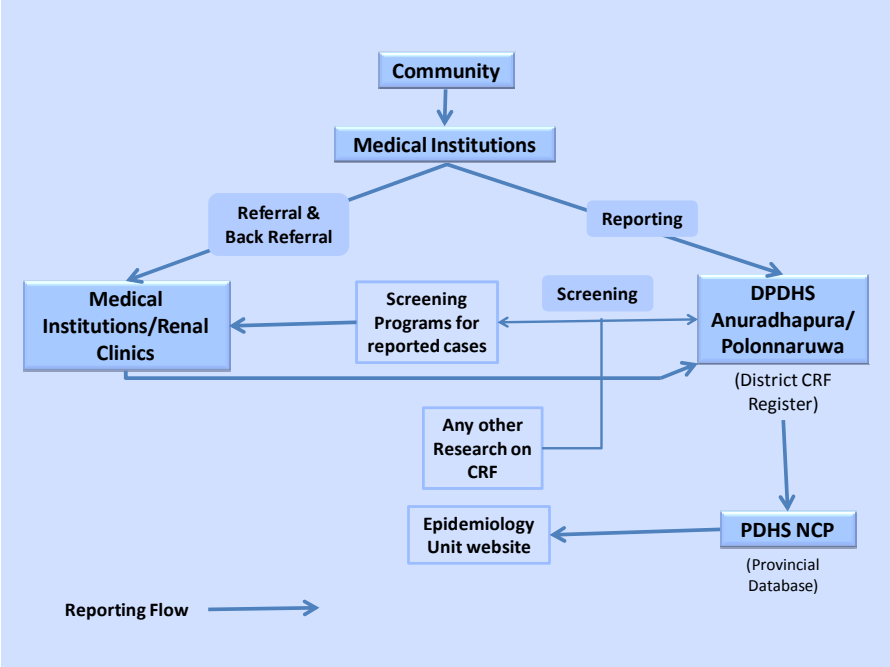


FIGURE 10- 1 : DATABASE & INFORMATION FLOW FOR CHRONIC RENAL FAILURE IN NORTH-CENTRAL PROVINCE (WORKING DRAFT)[1]

[1]RDHS Office Polonnaruwa, 2006 Sept 27

10.2 OBJECTIVE

The overall objective of the EBM Study is to pilot-test a mechanism of generating, managing and using information on selected chronic NCD in Polonnaruwa district.

The new surveillance system for chronic NCDs will bring many rewards to different aspects of healthcare. It can offer to uncover novel means of primodial and primary prevention to the preventive sector and means of secondary and tertiary prevention to the curative sector. For the health planners and administrators, it can offer to measure the trends and burdens of disease, provide guidance for resource allocation and policy formation.

10.3 FORMULATION OF A MINIMUM DATA SET FOR CHRONIC NCD

A National MDS is a core set of data elements agreed for mandatory collection and reporting at a national level. The importance of developing a national MDS is to ensure that correct indicators are monitored by the stakeholders in a standardized manner that will allow comparison of data. Having a consensus on the priority areas among partners will help in monitoring the diseases patterns and the preventive activities in an organized manner. Having an agreed upon MDS will ensure that the interventions for the disease control and prevention would be more focused. Since the number of indicators to monitor is less, the quality of the information collected would be higher.

Several approaches were considered in the selection of data for inclusion into the MDS. The first approach, similar to the WHO Steps, generates data through interview in step 1, physical measurement in step 2 and biochemical measurement in step 3. The second approach categorises data into three – core, expanded and desirable/optional. The third approach is a matrix of the first two approaches; as such, there will be core, expanded and desirable/optional for interview data, physical measurement and biochemical measurement. The fourth approach defines the priority users: health planners or administrators in central and peripheral levels; providers of curative care and the Colleges; MOHs and the other peripheral level staff. It considers the other users such as the universities, researchers, politicians, donors, and media. The fifth approach is based on the schema of causal pathways influencing chronic disease and health outcomes. Among the possible MDS domains, the ones that are routinely collected includes: 1) health outcomes such as morbidity & mortality; 2) service coverage/utilization, e.g. hospital beds & consultants; 3) non-modifiable factors, e.g. age, gender. The MDS domains that are not routinely collected are the risk factors and the underlying determinants.

10.3.1 SELECTION OF PRIORITY CHRONIC NCD

Because they are the leading causes of hospitalisation, leading causes of mortality, or are diseases of public health interest, the following chronic

NCD were selected as priority: cardio-vascular diseases; diabetes mellitus; mental health; and cancer.

TABLE 10- 1 : TRENDS IN HOSPITALIZATION, SRI LANKA 1990-2002[1]

Disease and ICD Code		Cases per 100 000 population				
		1990 [1]	1995 [2]	2000	2001	2002
Intestinal infectious diseases	(A00-A09)	837.5	676.1	747.4	827.3	744.3
Tuberculosis	(A15-A19)	80.8	54	60.7	45.8	41.2
Septicaemia	(A40, A41)	8.5	5.5	13.6	16.4	14.8
Viral hepatitis	(B15-B19)	40.9	38.7	26.3	30.8	27.7
Malaria	(B50-B54)	678.9	262.2	304.1	118.7	106.8
Diabetes mellitus	(E10-E14)	87.5	78.6	204.8	254.9	229.3
Hypertensive disease	(I10-I15)	200.7	326.7	428.3	514.1	462.5
Ischaemic heart disease	(I20-I25)	163.2	263.3	313.2	377.8	339.9
Asthma	(J45)	554.7	779.3	894.8	1033.3	929.6
Diseases of the liver	(K70-K76)	64.3	68.9	121.7	139.1	125.2
Abortions [4]	(O00-O08)	846.2	832.8	788.2	907.4	816.3

TABLE 10- 2: TRENDS IN HOSPITAL DEATHS OF SELECTED DISEASES, SRI LANKA[1].

Disease and ICD Code		Deaths per 100 000 population				
		1990 [1]	1995 [2]	2000	2001	2002
Intestinal infectious diseases	(A00-A09)	3	1	1	1	0.7
Tuberculosis	(A15-A19)	3.5	3.1	3	3.7	2
Septicaemia	(A40, A41)	4.7	1.4	6.3	5.9	5.8
Rabies	(A82)	0.3	0.5	0.5	0.3	0.3
Malaria	(B50-B54)	0.5	0.2	0.6	0.4	0.2
Diabetes mellitus	(E10-E14)	2	3.8	3.7	3.6	3.1
Hypertensive disease	(I10-I15)	3.6	3.1	3.3	3.2	2.6
Ischaemic heart disease	(I20-I25)	15.1	16.8	18.6	19	18.9
Asthma	(J45)	2	3.7	4.4	4.4	3.8
Diseases of the liver	(K70-K76)	6.4	8.2	14.1	15.3	15.2

[1]Annual Health Bulletin

10.3.2 REVIEW OF LITERATURE ON MDS FOR CHRONIC NCD

A. INTERNET SEARCH

The initial step in formulating a MDS for chronic NCD in Sri Lanka was carrying out an internet search to find out the methods adopted by various countries in developing MDS for their respective countries. Then some of the MDS available in internet on Chronic NCD were looked at to get an idea about the indicators used by other countries.

- WHO STEPS: A framework for Surveillance
- WHO Regional Office for the Western Pacific. Report on the regional evaluation of NCD prevention and control programme
- WHO Collaborating Centre on Surveillance of CVD-Canada;
- WHO Country Cooperation Strategy 2006-2011 for Sri Lanka
- WHO NCD Surveillance Strategy PATH – Scotland
- Policies and Managerial Guidelines for NCCP, Australian Institute of Health and Welfare
- School of Population Health, The University of Queensland, Brisbane, Australia
- Public Health Agency Canada- Centre for Chronic Disease Prevention and Control and surveillance Division
- Agency for Healthcare Research and Quality- U.S. Department of Health and Human Services
- County Health Indicator Profiles (1999 - 2003) New York State Department of Health
- Canadian Institute for Health Information
- Arizona Diabetes Indicators Annual Report May 2004 - Arizona Department of Health Services, Diabetes Prevention and Control Program.
- Partnership Action on Tobacco and Health (PATH)

B. REVIEW OF LITERATURE

Then literature review was done on the available local and international literature on the subject. The following publications in Sri Lanka define the important data that are being and should be generated:

- Annual Health Bulletin
- Advocacy Document for the prevention of type 2 Diabetes in Sri Lanka
- The Mental Health Policy of Sri Lanka

Two international publications were also reviewed: WHO Country Cooperation Strategy 2006-2011 for Sri Lanka; and STEP – WHO NCD Surveillance.

All the information gathered by the exercise was used in developing a provisional long list of indicators for the priority Chronic NCD of the country. The other objective of this exercise was to learn from the process that had already taken place in other countries.

It is important that the authorities who are directly involved in prevention and control of NCD be consulted for the development of the data set as they would be the actual users of the information generated

by the minimum data set. Towards this end, a consultative workshop was organized on the 20th of June 2006 to build consensus around the concept of a minimum data set for priority chronic NCD, their risk factors and their determinants. Several stakeholders were invited to ensure that the MDS will be sufficient in providing the evidence needed by priority groups of users.

10.3.3 BUILDING CONSENSUS THROUGH A WORKSHOP

The participants were divided into 4 groups (by priority chronic disease) and were presented with the provisional long list of indicators. The group identified important indicators which should be included in the MDS and added whatever the additional indicators they consider as important.
The output of the conference was then compiled together and was sent to the invitees of the conference for comments.

10.3.4 REVIEW BY THE CHRONIC NCD INFORMATION GROUP

The Chronic NCD Information Group (Info Group) was set up to provide the leadership and technical guidance in strengthening the existing health information system so that information related to chronic NCD can be generated, managed and used. The members of the Info Group are officials of the MoH and professional organizations.

10.4 DEVELOPMENT OF A SURVEILLANCE SYSTEM

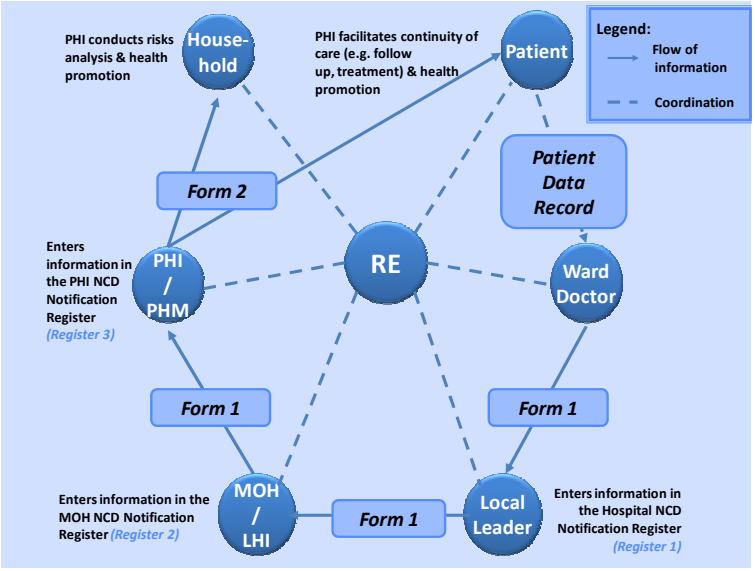
10.4.1 PROCESS

In introducing a new surveillance system for NCD into this country, Polonnaruwa was chosen to pilot test and implement this new system. There were several reasons why Polonnaruwa was chosen. Polonnaruwa had met with success already in pilot testing of information systems such as the hospital information system, drugs management information and public health information system. These positive previous experiences were indeed encouraging to work with Polonnaruwa again. Also, the officials and staff in the district are well motivated and cooperative; they have positive attitudes that make them ideal partners.

The health personnel in Polonnaruwa were consulted on a number of occasions to ensure the participatory nature of the development process so that the intended users will persistently demand for high quality data and information on chronic NCD. Once their consent and commitment to pilot testing a surveillance system were granted, they then worked closely with the MoH-JICA EBM Study Team in designing the forms, registers and record. They selected the following diseases as priority during the phase one of pilot-testing: CVD (ischemic heart disease, cerebro-vascular accidents, hypertension and congenital heart disease) and diabetes mellitus type 1 and type 2. Several rounds of revisions of these documents were undertaken so that the ideas and opinions of the data collectors, data and information managers, and the information users could be incorporated02. A training programme was then organised for the hospital and field staff. During the month of January 2007, the surveillance system was pre-tested in 3 hospitals, namely, GH Polonnaruwa, BH Medirigiriya and DH Hingurakgoda. The system was improved before it was pilot-tested throughout the district.

10.4.2 PASSIVE SURVEILLANCE SYSTEM

The surveillance system that is being pre-tested at the moment is a passive surveillance system **(Figure 10-2).** It is a notification system that was patterned after the existing communicable disease surveillance system. The Regional Epidemiologists plays a key role as coordinator and provider of technical support.



Key
RE: Regional Epidemiologist
PHI: Pub.ic Health Inspector
PHM: Public Health Midwife
MOH: Medical Officer of Health

FIGURE 10- 2: THE PROPOSED CHRONIC NCD SURVEILLANCE SYSTEM

The case definition for the proposed system is: "Any patient who is diagnosed of the selected disease for the first time and discharged alive from the selected hospitals after first of January 2007." Although this definition is not yet comprehensive and may be too limited for some stakeholders, nonetheless this was adopted for practical reasons. The main concern of the MoH and JICA is to try out a system first, have it operational and learn from it. Afterwards, the case definition may be expanded. After the system review of the pilot implementation during the first quarter, then the surveillance system will be adopted throughout the entire district of Polonnaruwa and, by then, for all new cases irrespective of outcome of the illness.

When a new case of the disease is diagnosed at the hospital it will be notified to the MOH of the area where the patient is permanently residing. The notification will be done using the NCD notification card and the details will be entered to the register maintained at the hospital. When the MOH receive a notification it will be entered to the MOH notification register and the notification card will be forwarded to the range PHI. The range PHI will go to the house of the patient and assess the condition of the patient and will do a risk assessment of the patient's relatives. The PHI will then do necessary referring of the persons at risk of NCDs. The report of the PHI will be sent back to the MOH using NCD field investigation form. The MOH will compile report on all the NCD patents reported to him/her during the month and will send a monthly report to the regional epidemiologist. The regional epidemiologist will compile a quarterly NCD surveillance report at the end of each quarter.

Surveillance is defined as ongoing systematic collection and analysis of data and the provision of information which leads to action being taken to prevent and control a disease. Therefore the chronic NCD surveillance system was also designed to be action oriented. When they visit the homes of the patients for field investigation, the PHI will give advice on proper management of the disease and control of risk factors. They will also assess

the risk of the NCDs among the family members and would do the necessary referrals.

10.4.3 FORMS AND REGISTERS

Two forms and three registers were designed to gather the information for the use in the Chronic NCD Surveillance System. They were pre-tested before the actual implementation.

- Hospital Chronic NCD Notification Form (Form 1) - This form is the starting point of the surveillance system. This used to notify the cases diagnosed at the hospital to the relevant MOH area.
- Field Investigation Form for Patients with Chronic NCDs (Form 2) - This form is used by the PHII to investigate the cases notified to them from the hospital. The PHI will visit the house of the patient and will assess the current state of the patient and the risk factors. The form also provides facilities to assess the risk status of the immediate family members.
- Hospital Chronic NCD Notification Register (Register 1)
- MOH Chronic NCD Notification Register (Register 2)
- PHII Chronic NCD Notification Register (Register 3)

The registers were designed to allow keeping of records of the patients notified/investigated in the relevant offices. This will ensure proper tracing back of patients if needed.

Of the MDS related to ischemic heart disease and cerebrovascular accidents, information related to the number of new cases, mortality, number of live discharges, and length of stay can be obtained through the surveillance system. The information related to median delay between the onset of the symptoms and presentation at the hospital can not be collected through the surveillance system. As for the congenital heart disease information on the number of new cases can be generated but information on surgical correction cannot because cardiothoracic surgeries are not performed in the district of Polonnaruwa. Out of the indicators selected for hypertension, information on new cases diagnosed can be obtained but the information on prevalence of hypertension cannot be calculated.

With regards to diabetes mellitus, the information related to new cases and some of the complications due to diabetes can be collected through the surveillance system but information related to prevalence of the disease and the information on gestational diabetes cannot.

Moreover, the forms are designed so that it can gather information on risk factors for the selected diseases including obesity, alcohol and tobacco consumption, hypertension and diabetes mellitus. However, information on age of initiation and amount of alcohol/tobacco consumed, on food habits and low birth weight will not be generated through the system.

The forms also generate information on the risk factors among the immediate family members.

10.4.4 PATIENT DATA RECORD

The Patient's Data Record (PDR) was prepared in order to fulfil the requirement of having a continuous and complete data of patients with chronic NCD like diabetes, CVD and chronic kidney disease. This will replace the old clinic book used in clinics to record follow up notes. This will give comprehensive details about the patient's history, examination, investigations have been done, management plan at discharge, drugs prescribed and follow up notes since first clinic visit. PDR can also be used during readmissions and to refer a patient to another unit. Another purpose of introducing the PDR is to give an idea about chronic NCD to the patients. So the PDR will fulfil all the requirements previously filled by the diagnosis card, clinic book, drugs card and will benefit the patients as well as make the things easier for the medical officers.

PDR is issued to the patients with chronic NCD at the time of discharge and the house officers are supposed to fill it and give to the patients. Patients should be advised to bring it when they are coming for the clinic or during a readmission. In the clinic the medical officer uses it to write follow up notes, drugs prescribed and give it back to the patient. Medical officers can use it to refer the patients to another unit when necessary and notes for the General practitioner regarding the patient can be written in it. Public health inspectors are supposed to write visiting details and the actions taken during their visits to the patient.

The front cover of the PDR gives personal details of the patient, MOH area, PHI area, clinic number, consultants name and the date of admission to clinic. Next few pages give a brief introduction to chronic NCD like diabetes, CVD and chronic kidney disease and advices to patients with those diseases. It includes goal of treatment and management, dietary advice, importance of physical activity and importance of drugs. Thereafter comes the clinical details of the patient like history, examination and investigations, diagnosis, management and management plan. There are separate pages for notes for G.P. and readmission notes. More than twenty pages have been included for follow up notes. Then there are a few pages for PHI to write notes during his visits to the patient and the final two pages include patient's drug record and discharge summary. The back cover consists of two charts for the medical officer to mark patient's blood pressure and blood sugar in each visit.

10.5 TRAINING PROGRAMME FOR PUBLIC HEALTH INSPECTORS

The necessity of educating the general public on Chronic NCD is an important aspect in preventing those diseases. PHIs are a group of healthcare workers who work in the field and frequently deal with general public. So they can be used to deliver the key health messages on chronic NCD. In order to provide key knowledge to the PHI, a training programme was conducted in Polonnaruwa on the priority chronic NCD (i.e. diabetes, CVD, chronic kidney diseases) and their risk actors (Table 3-15). A training manual is being developed to assist PHIs in the performance of their role as health promoters. The manual has sections on the following:

- Healthy Diet
- Importance of Exercise
- Tobacco and Alcohol Prevention
- Diabetes Mellitus and Prevention
- CVD and Prevention
- Chronic Kidney Disease and prevention
- Mental Health

TABLE 10- 3 : BASIC INFORMATION ABOUT THE INITIAL TRAINING OF PUBLIC HEALTH INSPECTORS ON NCD AND HEALTHY LIFESTYLE

Objectives	▸ To Train and educate PHI of district of Polonnaruwa to make an active participation in proposed Chronic NCD surveillance system.
Date & Venue	▸ 11- 13 December 2006 ▸ RDHS Office Polonnaruwa and MOH Office Thamankaduwa
Participants	▸ 34 participants ▸ All Participants were PHIs from all areas of Polonnaruwa
Programme	▸ The programme was conducted by Dr. Palitha Bandara MO/PHC, North Central Province, Dr. Sharika Pieris MO/MoH and Dr.Rasika Rampitige MO/MoH. ▸ The programme consisted of the following: ▸ Introduction to Proposed NCD Surveillance System ▸ Defining NCD, Hygiene, Sanitation, Nutrition and Health ▸ Defining and education about Wellbeing(Physical, Mental and Social) ▸ Practical session which introduced 5-step model in exercise ▸ Practical and theoretical session on mental wellbeing and lecture on Social wellbeing ▸ Introduction of "GALTHER" method of counselling and its practical importance ▸ Introduction on Chronic Kidney Diseases (CKD) and identification of the risk factors and early symptoms of the disease ▸ Medical Check-up of participants (PHIs) and practical session on Exercise.(self monitoring of blood pressure and Body Fat Percentage) ▸ Post test Questionnaire to assess the knowledge on Chronic NCD among the PHIs ▸ Lecture on Aetiology, Management and Prevention of Diabetes Mellitus and CVD ▸ Brain Storming on advancing the Surveillance System
Outputs	▸ Potential problems were identified particularly on those that the PHI may encounter once the notification system is initiated

	▸ PHIs trained on their roles and responsibilities in implementing the chronic NCD Surveillance System ▸ PHIs trained on basic concepts and skills about NCD and HLS
Way forward	▸ PHIs will be strengthened further in their capacities in field investigations, in the implementation of the surveillance system and in promoting healthy lifestyles ▸ PHIs will act as resource persons in scaling up the chronic NCD Surveillance System to other districts ▸ PHIs will live as examples to the rest of the community members

10.6 REVIEW OF THE CHRONIC NCD SURVEILLANCE SYSTEM

10.6.1 INTRODUCTION

Chronic NCD surveillance programme was organized to survey NCDs, which are becoming a major health burden to the country. As a pilot project it was initially implemented in the Polonnaruwa District involving 3 hospitals and 7 MOH areas. At the completion of the pilot project a review was carried out to evaluate the strengths and the weaknesses of the programme and to identify the possibilities for further improvement. This will also assess the compact of the surveillance programme on the patient, with regard to their management in the community.

Specific objectives of the review;

1. To compare the agreed system of information flow and the actual system.
2. To assess the timeliness of information.
3. To assess the completeness of information.
4. To determine the accuracy of information obtained.
5. To describe the human resources involved, with regard to their contribution, impact on the usual responsibilities and attitudes on the project.
6. To describe the attitudes, opinions and benefits that patients have achieved from the project.

Pre-tested self-administered questionnaires were used to collect the data from hospital staff, MOHs and PHIs. In addition, Focus Group Discussions were held among them to further review their ideas on strengths and weaknesses of the programme. A stratified random sample of patients was selected from the records and their opinions, attitudes and benefits they had gained so far were assessed by using an interviewer administered questionnaire. The sample number was decided according to following formula.

$$n_i = (N_i / N) * n$$

n - Sample size for the whole district (46)
n_i - Sample size of stratum (This number of patients had taken from particular MOH division)
N_i - Population size of each stratum
N - Total number of patients notified in all 3 hospitals (542)
i - Stratum - MOH offices (7 Stratum; *i* = 1, 2,...7)

33 members of the hospital staff from 3 pilot hospitals, 9 MOHs, 29 PHI and 46 patients were participated for the review programme. Among the hospital staff there were 8 medical officers, 24 nurses and a medical records' assistant. 3 medical officers of health and 6 assistant medical officers of health were participated from 7 MOH areas in the district. Among the PHIs there were 4 SPHIs and 25 PHIs **(Figure 10- 3)**.

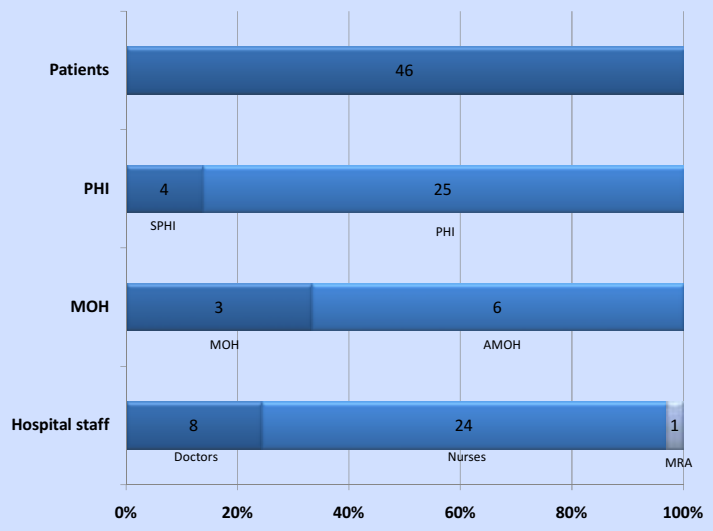


FIGURE 10- 3: PARTICIPATION FOR THE REVIEW PROGRAMME

10.6.2 STRENGTHS OF THE SURVEILLANCE PROGRAMME

A. ROLES AND RESPONSIBILITIES

The surveillance programme consisted of two parts - the notification was carried out at the hospital setup while investigations were carried out at the field setup involving MOHs and PHIs.

During the review, it was revealed that the information flow within each hospital was according to the agreed flow and in each hospital, an in-charge person (nurse/medical records assistant) was allocated to coordinate the programme. Almost all categories of hospital staff were involved in the programme in every hospital and it was revealed that 59% of the hospital staff involved in filling the notification forms while 41% of them were involved in entering the data to the registers **(Figure 10-4)**

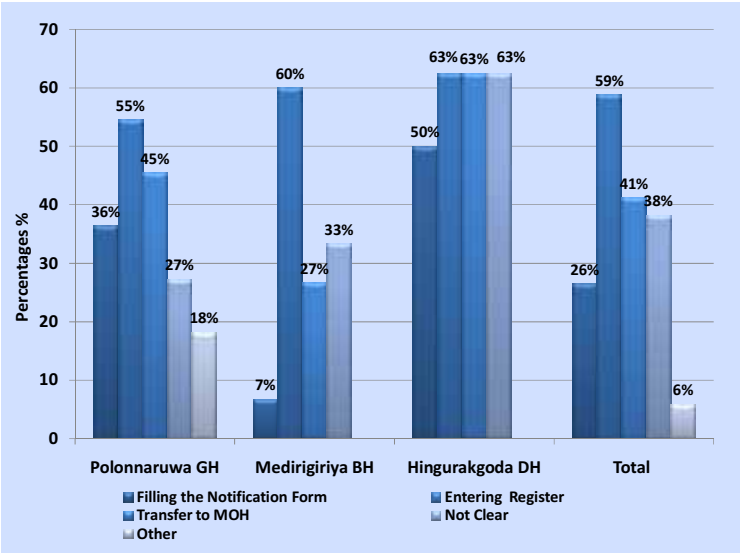


FIGURE 10- 4: ROLES AND RESPONSIBILITIES OF HOSPITAL STAFF AT THREE HOSPITALS

MOHs were supervising the investigation at the field setup. Majority (78%) of the MOHs were involved in transferring the notification forms to SPHI/PHI and 56% of them contributed through supervision and coordination of the programme **(Figure 10- 5).**

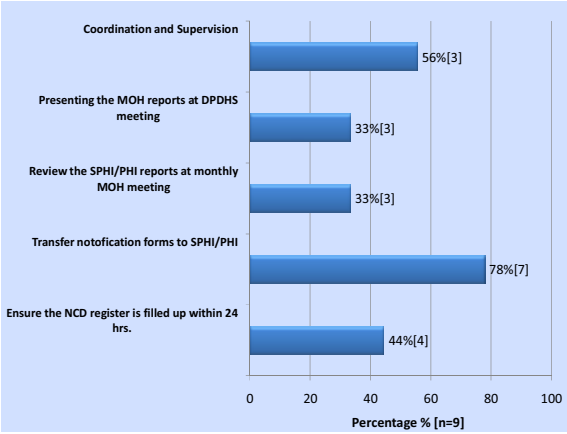


FIGURE 10- 5: ROLES AND RESPONSIBILITIES OF MOHS

Field investigations were carried out by PHIs and their role was supervised by the SPHI **(Figure 10-6)**. Among the SPHIs, most of them (75%) were involved in transferring forms and discussing with the PHIs regarding the reasons for delayed submission of field investigation forms, while 50% of them involved in filling up the NCD register within 24 hrs and entering the date upon return of the form.

Among the PHIs, more than 75% of them were able to visit the houses, examine and follow up patients, screen and refer the family members and to educate the family. Majority (68%) of the respondents were able to submit the investigation form within 2 weeks.

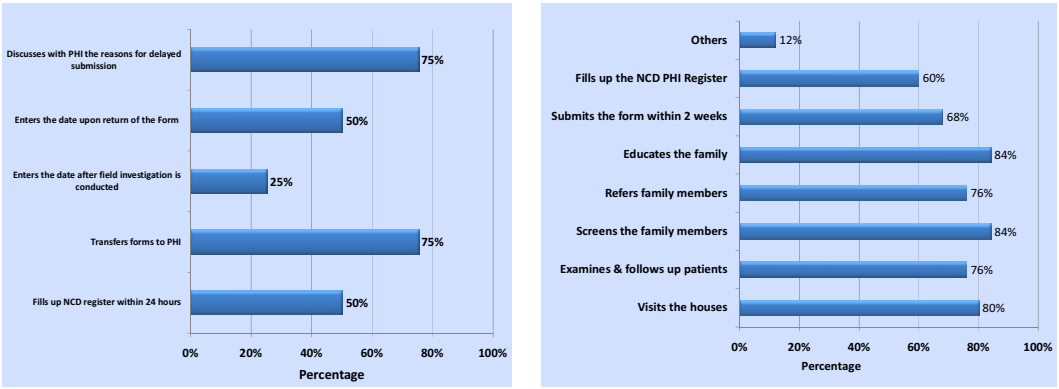


FIGURE 10- 6: ROLES AND RESPONSIBILITIES OF SPHIS ROLES AND RESPONSIBILITIES OF PHI

B. JOB PERFORMANCE

Majority (71%) of total respondents, who participated for the review programme, had a positive effect on their job performance while 18% of them had an extremely positive effect. Only 2% of them had a negative effect **(Figure 10-7)**.

Among the hospital staff, 68% had a positive effect on their overall job performance and 24% had an extremely positive effect. Majority of MOHs (71%) had a positive effect on their overall job performance and 29% had no effect. Among PHIs, Most of the respondents (92%) had a positive or extremely positive effect on their overall job performance. A negative effect was reported by only 1 respondent.

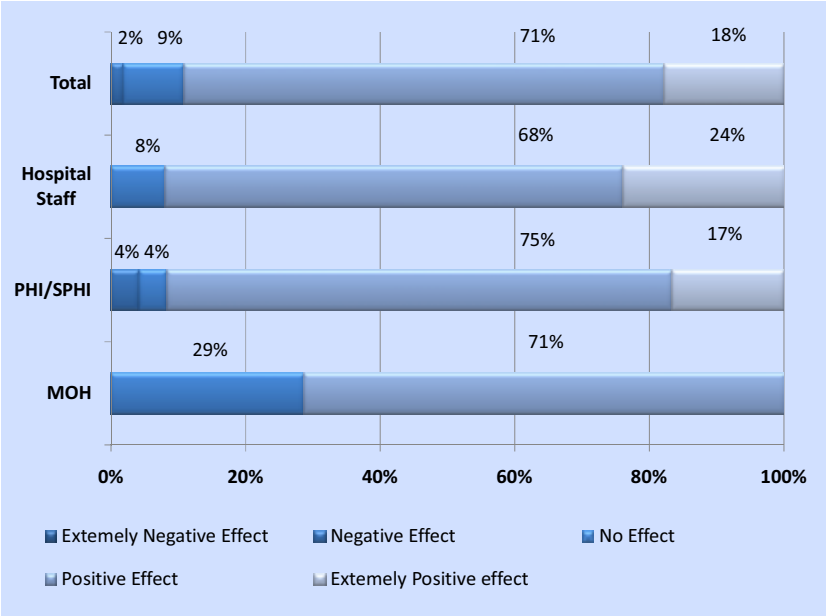


FIGURE 10- 7: EFFECT ON JOB PERFORMANCE

c. USEFULNESS OF THE DOCUMENTS USED IN THE SURVEILLANCE

At the hospital, the "notification form" is used to notify new cases of chronic NCD and the data is also entered to the "hospital notification register. When the notification form is transferred to the MOH office the data is entered in the "MOH NCD register" and the form is handed over to the relevant PHI for the investigation. The PHI uses the "investigation form" for field investigation and he also maintains the "PHI's NCD register".

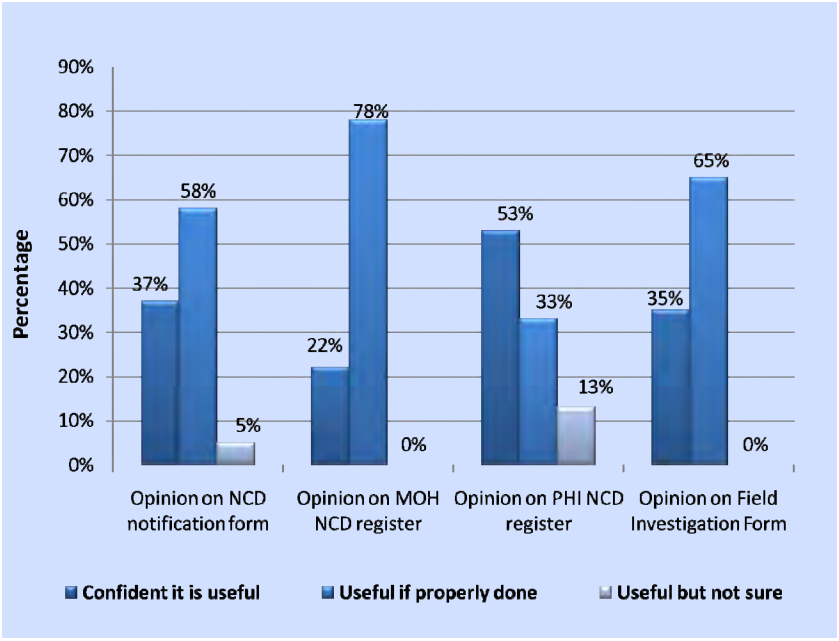


FIGURE 10- 8: USEFULNESS OF THE DOCUMENTS USED IN THE SURVEILLANCE

Regarding the NCD notification form, 37% of the hospital staff was confident about the usefulness while 58% of them expressed the opinion that the form would be useful if the documentation was properly done **(Figure 10-8)**. Regarding the MOH NCD Register, 22% of medical officers were confident about the usefulness and majority (78%) claimed that it would be useful if properly done. No one claimed that it was not useful. Among the PHIs, majority (53%) was confident about the usefulness of the PHI NCD register. 35% of PHIs were confident about the usefulness of the field investigation form while most of them (65%) claimed that it would be useful if it was properly done.

D. EXPERIENCE WITHIN THE HOSPITAL SETUP

The surveillance system was intended to include all newly diagnosed Chronic NCD cases during the pilot period. Most of the hospital staff (75%) had agreed that most of the cases were included in the surveillance programme **(Figure 10-9)**.

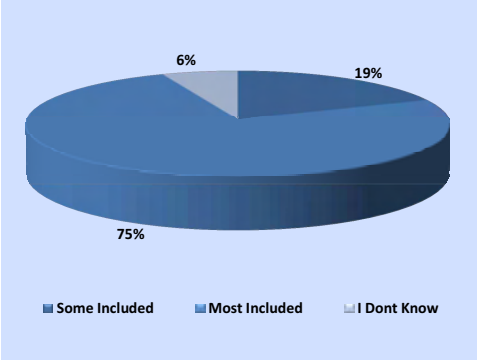


FIGURE 10- 9: NUMBER OF WARD ADMISSIONS INCLUDED IN THE SURVEILLANCE PROGRAMME

E. EXPERIENCE IN THE FIELD

The notification form is needed to transfer within 24 hours to the PHI for the field investigation. Majority (62%) of MOHs were able to transfer the form within 24 hours **(Figure 10-10)**.

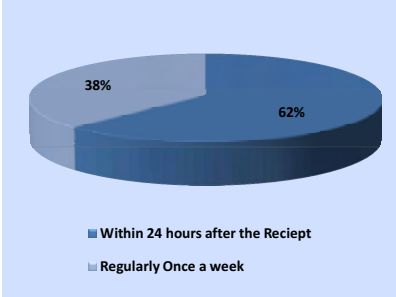


FIGURE 10- 10: TRANSFERRING OF NOTIFICATION FORM TO PHIS

Timeliness of the information was considered to be important. 91% of the PHIs had taken less than 5 minutes to fill up the NCD PHI register for one patient and the rest were able to fill up the register within 5-10 minutes **(Figure 10-11).**

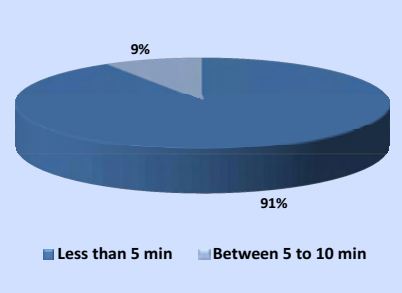


FIGURE 10- 11: TIME TAKEN TO FILL UP THE NCD REGISTER

Regarding the filling up of PHI register majority had no difficulty in filling up. Only 15% of them had moderate difficulty in filling up The notification form is needed to transfer within 24 hours to the PHI for the field investigation. Majority (62%) of MOHs were able to transfer the form within 24 hours **(Figure 10-12)**.

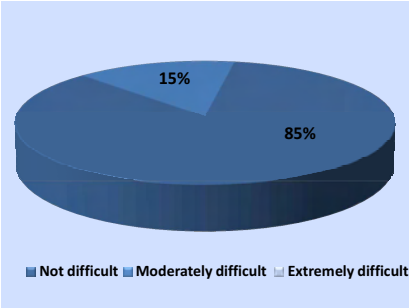


FIGURE 10- 12: EXPERIENCE IN FILLING UP THE NCD PHI REGISTER

F. PATIENTS' PERSPECTIVES ON THE PROGRAMME

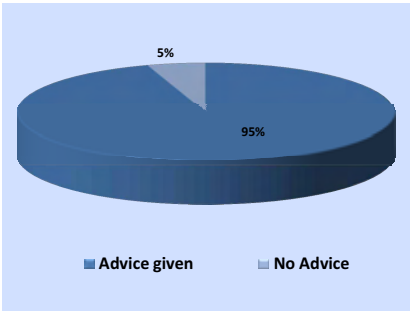


FIGURE 10- 13: ADVICES RECEIVED DURING PHIS' HOME VISITS

Most of the respondents (95%) had received advice from the PHIs during the home visits **(Figure 10-13)** The patients had received advice on the importance of clinic follow up, importance of treatment plan, diet, exercise, avoiding smoking and alcohol, and on the complications of the disease they were having. More than 75% of the patients had received advice regarding importance of treatment plan, the importance of clinic follow up and the diet.

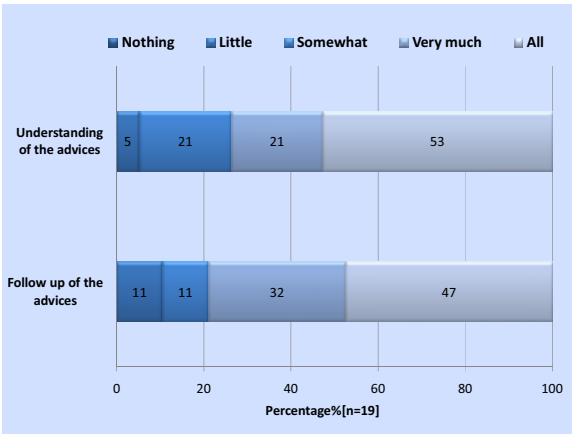
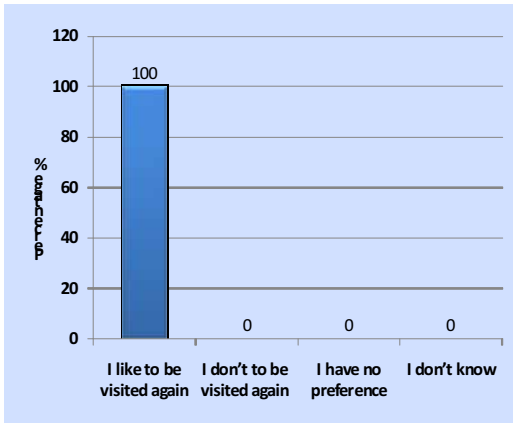


FIGURE 10- 14: UNDERSTANDING AND FOLLOW UP OF ADVICE

FIGURE 10- 15: OPINION ON FURTHER PHI VISITS



Among the patients who were visited by the PHI, majority (74%) of the patients was able to understand all or very much of the advices given by them and only 5% were able to understand little. Further, 47% of them were following all the advices given to them and 32% were following much of the advices **(Figure 10-14)**. Every patient was following at least little of the advices. The most important thing revealed during the review was that all of the patients liked to be visited by the PHI again **(Figure 10-15)**.

Regarding a Patients' Society, most of them (86%) claimed that it was a good idea and most of them liked to be a member of such a society. Minority (2%) opposed the idea and that they would not be a member.

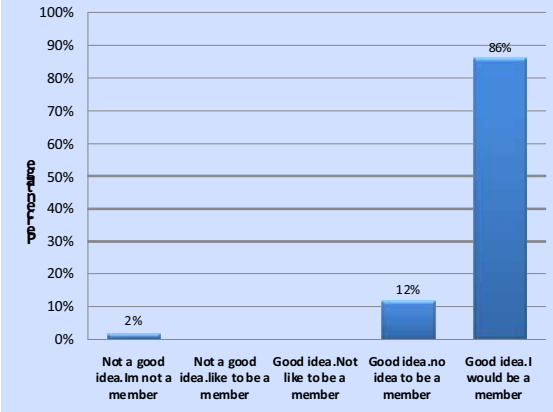


FIGURE 10- 16: OPINION ON BEING A MEMBER OF A PATIENT'S SOCIETY

G. FUTURE OF THE PROGRAMME

Majority (95%) of total respondents of the review programme wanted to continue the surveillance programme further and among them 38% of them wanted to continue the programme with changes for better outcome. Only 2% of total respondents wanted to stop the programme and 3% had no opinion about the continuity **(Figure 5-17).**

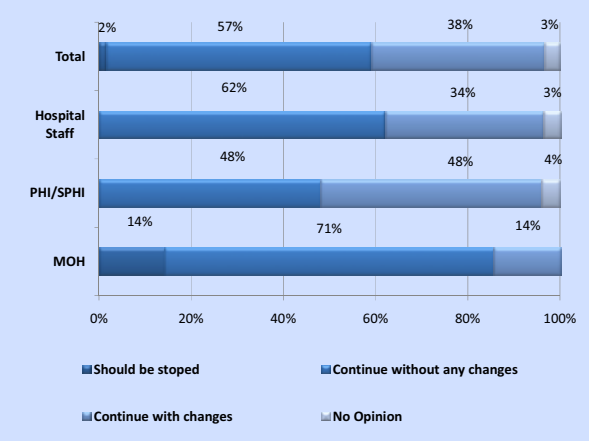


FIGURE 10- 17: OPINION ON BEING A MEMBER OF A PATIENT'S SOCIETY

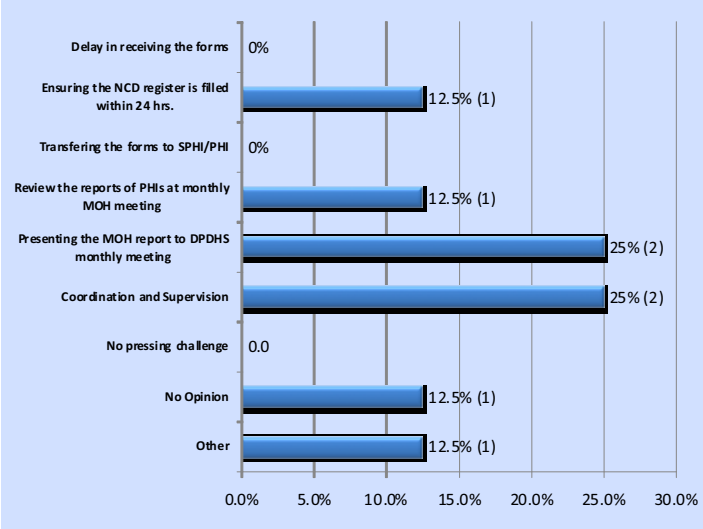
Majority (97%) of the hospital staff wanted to continue the programme. 63% of the hospital staff wanted to continue without any changes and 34% of them wanted to continue with changes. All of the medical officers of health (MOH) wanted to continue the programme. 71% of the hospital staff wanted to continue the programme without any changes and 14.5% of them wanted to continue with changes. 14.5% of the participants claimed that the programme should be supported. Most of the PHIs (96%) wanted to continue the programme. 48% of PHIs wanted to continue the programme without any changes and 48% of them wanted to continue with changes. 4% of the participants had no idea about the future.

10.6.3 AREAS TO BE IMPROVED

A. ROLES AND RESPONSIBILITIES

The medical officers were not involved in the programme at DH Hingurakgoda while MRAs were not involved at general hospital Polonnaruwa and BH Medirigiriya. Therefore these staff members need to be involved in the programme. Only 26% of staff members of the hospital were involved in filling the notification form and this has to be improved.

FIGURE 10- 18: MOST PRESSING CHALLENGES FOR MOH



Among the MOHs, less than 50% of them were carrying out the review of PHI reports at monthly MOH meetings (33%), presentation of reports at RDHS (33%) and ensuring the NCD registers filled up within 24hrs of the notification. The most pressing challenges encountered during the pilot period were reviewed **(Figure 10-18)**. It revealed that they were the need to present the reports at monthly RDHS meeting and the need to supervise and coordinate the programme.

Regarding the roles and responsibilities of the PHI, only 25% of them were entering the date after field investigation was conducted **(Figure 5-19)**. During field investigations the PHIs had encountered different issues. The most affecting (59%) issue was lack of necessary equipments for the programme (e.g. measuring patients' blood pressure) and 44% of them pointed out transport problems. In addition to that other major issues included the difficulty in locating houses (33%) and unavailability of patients / family members during field visits (30%).

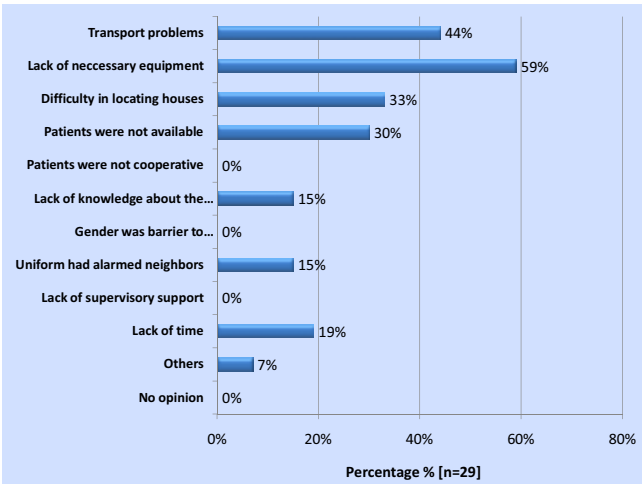


FIGURE 10- 19: ISSUES ENCOUNTERED BY PHIS

B. FLOW OF INFORMATION WITHIN THE HOSPITAL SETUP

All newly diagnosed Chronic NCD cases needed to be included in the surveillance. The reasons for not including all the cases were reviewed and it revealed that 55% of times it is due to not confirming the diagnosis and 18% of times it is due to lack of time. Therefore the facilities required for proper diagnosis of the diseases needed to be provide and the availability of human resources needed to be increased to minimize the time factor.

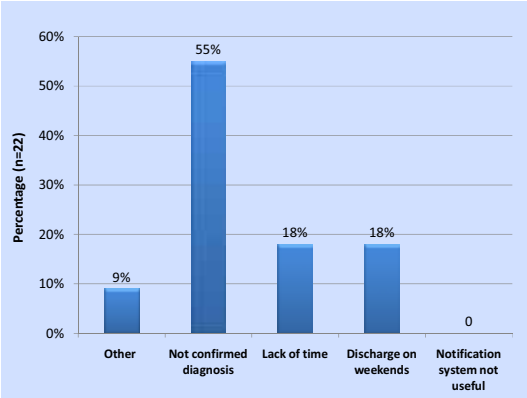


FIGURE 10- 20: REASONS FOR NOT INCLUDING ALL NEWLY DIAGNOSED CHRONIC NCD CASES

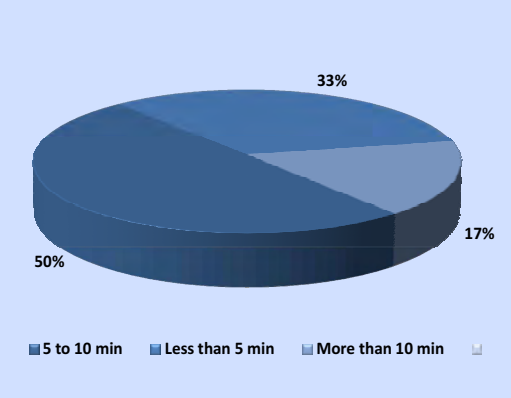


FIGURE 10- 21: TIME TAKEN TO FILL UP NOTIFICATION FORM

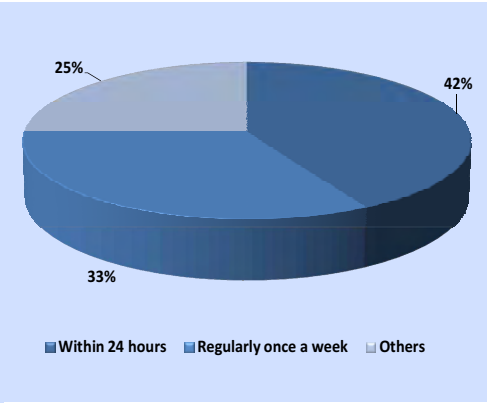


FIGURE 10- 22: SCHEDULE OF TRANSFERRING NOTIFICATION FORMS

Only 33% of members, who are involved with filling up of notification forms, were able to fill up the forms within 5 minutes and majority had taken 5 to 10 minutes. Significant number (17%) had taken more than 10 minutes to fill up.

The notification form was expected to be transferred within 24 hours after the notification made. Less than half (42%) of the respondents claimed that it was being transferred within 24 hours and 33% of them claimed that it was transferred regularly once a week.

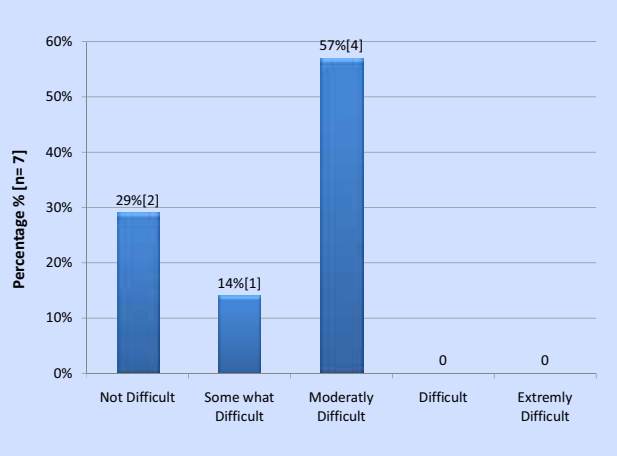


FIGURE 10- 23: TRANSFERRING OF NOTIFICATION FORMS TO PHI

C. FLOW OF INFORMATION IN THE FIELD

MOHs were responsible for transferring the notification form to PHI within 24 hours after the notification was done. Only 29% of medical officers had no difficulty in transferring the notification form to PHIs but 57% of the participants claimed that it was moderately difficult to transfer the forms. The main reason for this was lack of transport facilities for PHIs and usually they visited the MOH office once a week.

D. PATIENTS' PERSPECTIVES

PHIs were supposed to visit the patient's home after the notification and they were supposed to provide the report within 2 weeks duration. According to patients' perspectives, only in 48% instances the PHI has visited the patient's home whereas in 52% they had not. Possible reasons included transport problems, difficulty to locating the houses and unavailability of patients at their home when the PHI visited the home **(Figure 10-24).**

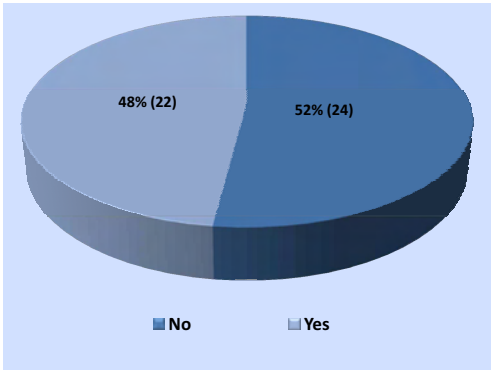


FIGURE 10-24: PATIENTS' PERSPECTIVE ON PHI HOME VISITS

Patients had received advice on clinic follow up, treatment plan, diet, exercise, avoiding smoking, avoiding alcohol, and complications according to diseases they were having, but they had remembered advice only on clinic follow up, treatment plan, diet and exercise. All of them remembered advice on diet but only half of them remembered advice on treatment plan and nearly one third of them remembered advice on clinic follow up. No one remembered advice given on smoking, alcohol and complications. Therefore measures should be taken to improve remembering the advice **(Figure 10-25).**

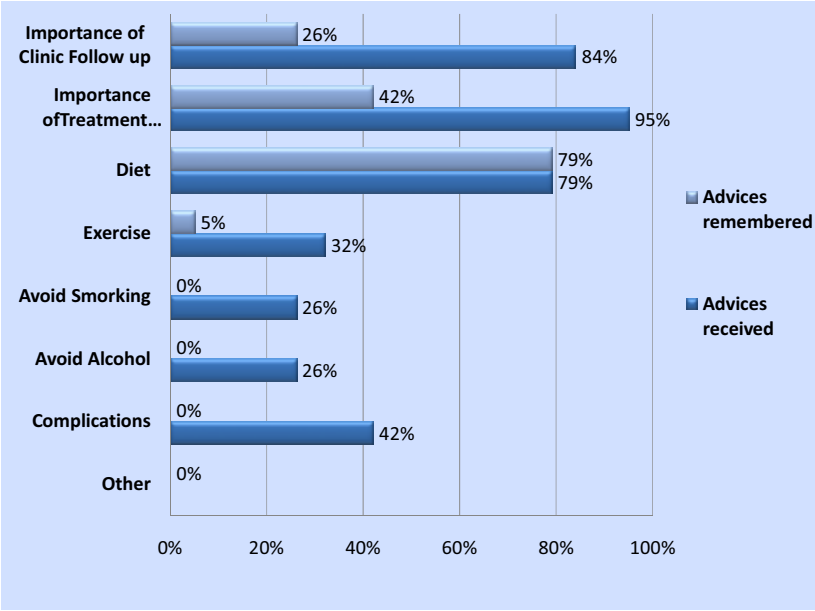


FIGURE 10-25: ADVICES RECEIVED AND ADVICES REMEMBERED

10.6.4 RECOMMENDATIONS

A. RECOMMENDATIONS TO IMPROVE THE SURVEILLANCE SYSTEM

1. Getting the private sector also involved in to the surveillance programme (Development of a notification form for private medical institutions)
2. Awareness and training programmes for medical staff
3. Improving the facilities
4. Human resources
5. Equipments to measure and monitor parameters of the disease conditions (e.g. giving sphygmomanometers to PHIs)
6. Transport allowances
7. Specific training programme for PHIs
8. Establishment of a back referral system
9. Establishment of a proper feedback system
10. Regular review meetings
11. Consider the involvement of the PHM to the system
12. Consider Involvement of volunteer workers

B. RECOMMENDATIONS FOR EFFICIENT FOLLOW UP ACTION

1. Implement monthly follow up at the clinic in the hospitals while three monthly follow up visits by the PHI
2. Maintain a follow up register to be kept at the hospital and checked up regularly. If a failure of follow up visits is detected it should be informed to the MOH to investigate
3. A feedback report from the hospital to the MOH regarding follow up visits
4. Regular field visits to check compliance, default visits, risk factors
5. One day baseline assessment programmes at villages
6. Volunteer training
7. Enabling basic investigations (Blood Pressure) at ground level
8. Improving the knowledge of the people through health education programmes
9. Minimize the social norms and stigmas

C. STRATEGIES FOR UTILIZING DATA

1. Planning and implementing effective programmes for NCD prevention
2. Resource allocation
3. Identifying the non-communicabledisease pattern in the region
4. Identifying the patients at early stages to minimize complications
5. Improving follow up visits and compliance

6. Improving the awareness and the knowledge

Chapter 11

TRAUMA - THE CHALLENGES

Key Messages

- Globally, road traffic injuries cause 22.8% of the deaths due to injuries and, on average, more than one thousand young people over the age of 25 are killed everyday on the roads.
- In Sri Lanka:
  - Trauma and other injuries have remained the No. 1 leading cause of hospitalization since 1995.
  - From 1996 to 2000, the number of RTI associated with drunk driving doubled despite the increment of total accidents by 12%.
  - The total cost for accidents for the year 2005 reached 14 billion rupees compared to 12 billion rupees in 2002.
  - Young adult males are the commonest victims while buses are the commonest vehicles involved in accidents.
  - Most of the injuries among children occur at home.

This chapter focuses on the burden of trauma on the health system and economy of Sri Lanka. It describes the morbidity, mortality and cost of trauma care. The increasing economic burden of injuries is a clear indication to the fact that prevention needs immediate attention.

11.1 GLOBAL AND REGIONAL

The global mortality data on injuries are made up of several causes. Road traffic injuries cause 22.8% of the deaths due to injuries **(Figure 11-1)**. Various unintentional causes take the second place in causing deaths (18.1%). Suicide comes in third, being responsible for 16.9% of deaths due to injuries. Drowning, fires, falls, poisoning, war related injuries, violence and other intentional injuries make up the rest of the mortality data. These implies from this data is that road traffic injuries made up more than one fifth of the total global mortalities due to injury in 2002. Road traffic injuries made up the second leading cause of death in the age group 5 -29 years in 2002 **(Table 11-1)**. In people between 30 and 44 years, it was the third leading cause of death. When we consider all age groups, road traffic injuries was in the 11th place. Between the ages 5 and 59, road traffic injuries remained within the first 10 leading causes of death globally in 2002. These statistics reveal the massive impact added to the global health burden by road traffic trauma.

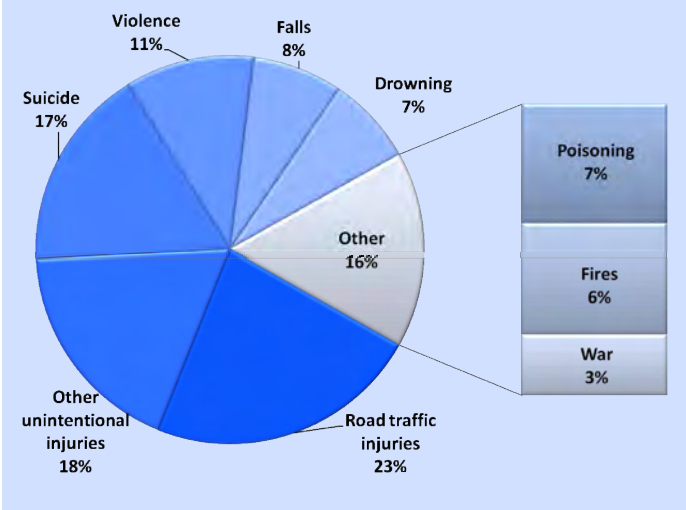


FIGURE 11- 1: GLOBAL MORTALITY DUE TO INJURIES, 2002[1]

TABLE 11- 1: GLOBAL RANK OF RTI AS A CAUSE OF DEATH BY AGE GROUP, 2002[2]

Age	Rank
0-4	13
5-14	2
15-29	2
30-44	3
45-59	8

On average, more than one thousand young people over the age of 25 are killed everyday on the roads. Many more are permanently injured or disabled. Road traffic collisions cause an estimated 1.2 million deaths a year worldwide. Every year, a further 50 million people are injured on the world's roads. Many will require costly emergency care and rehabilitation. Others may be permanently disabled. When we consider the global road traffic injury mortality rates according to region and economic status, one vital point is noted. A greater part of the burden of road traffic injuries are born in low and middle income countries **(Figure 11-2).** These countries,

[1] WHO, Global Burden of Disease, 2002
[2] Ibid

already shackled by the double burden of infectious and chronic diseases, can ill-afford yet another cause of high morbidity and mortality.

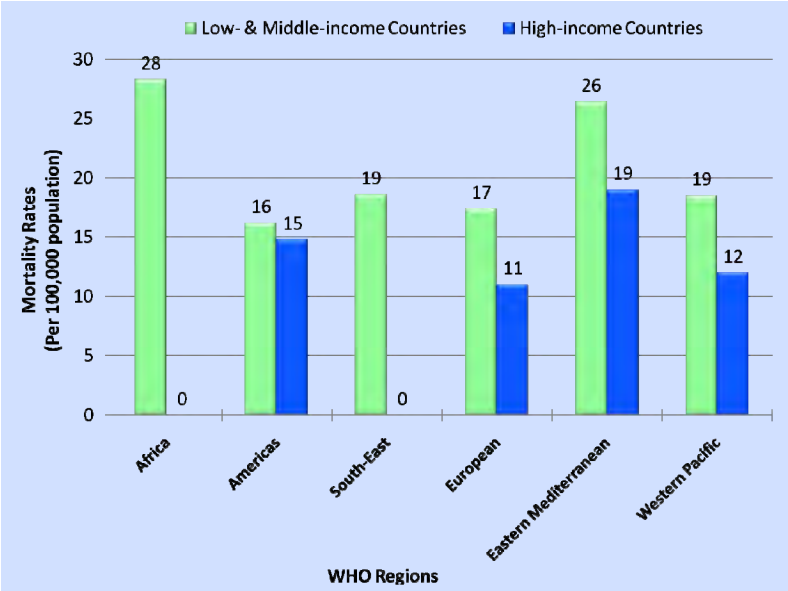


FIGURE 11- 2: ROAD TRAFFIC INJURY MORTALITY RATES IN WHO REGIONS, 2002[1] ("0" MEANS DATA IS NOT AVAILABLE)

For example, the road traffic injury mortality rate in the African region is 28.3 per 100 000 population, whereas in the high income countries in the European region, it is 11.0. In the South East Asian region, this value is as high as 18.6. Moreover, in regions where you have more than 1 economic class such as high income, middle income and low income countries, the mortality rates for the low- & middle-income countries are always higher than those for the high-income countries.

With 90% of deaths from road collisions now occurring in low- and middle income countries, travellers also need to be aware. The greatest risk to health may not come from vaccine-preventable diseases or microbes in the food and water. It may be on the roads, and it is deadlier.

Another indicator used to measure the burden of disease other than mortality is Disability Adjusted Life Years (DALY). It is a health- gap measure that combines information on the number of years lost from premature death with the loss of health from disability. In 1990, road traffic injuries held the ninth place in the rank order of DALYs for the leading causes of the global burden of disease **(Figure 11-2 & Table 11-2).** However it is believed that by 2020, this will rise to the third place.

[1] WHO 2002 : Global Burden of Disease Project,version1

TABLE 11- 2: CHANGE IN RANK ORDER OF DALYS FOR THE 10 LEADING CAUSES OF THE GLOBAL BURDEN OF DISEASE[1]

Rank	1990 Disease or Injury	Rank	2020 Disease or Injury
1	Lower respiratory infections	1	Ischemic heart disease
2	Diarrhoeal diseases	2	Unipolar major depression
3	Perinatal comditions	3	Road traffic injuries
4	Unipolar major depression	4	Cerebrovascular disease
5	Ischemic heart disease	5	Chronic obstructive pulmonary disease
6	Cerebrovascular disease	6	Lower respiratory infections
7	Tuberculosis	7	Tuberculosis
8	Measles	8	war
9	Road traffic injuries	9	Diarrhoeal diseases
10	Congenital abnormalities	10	HIV

One might superficially attribute the rising road traffic injury fatality rates to the increasing global population, widespread urbanization, motorization and industrialization etc. But this is hardly the case. The burden of road traffic injury can be reduced in spite of the above mentioned changes, which is proved by compelling evidence. From 1975 to 1998, many countries including Canada, China, Sweden, Israel and France have actually succeeded in reducing their road traffic fatality rates **(Figure 11- 3)**. This indicates the existence of proven strategies to reduce the burden of road traffic injuries.

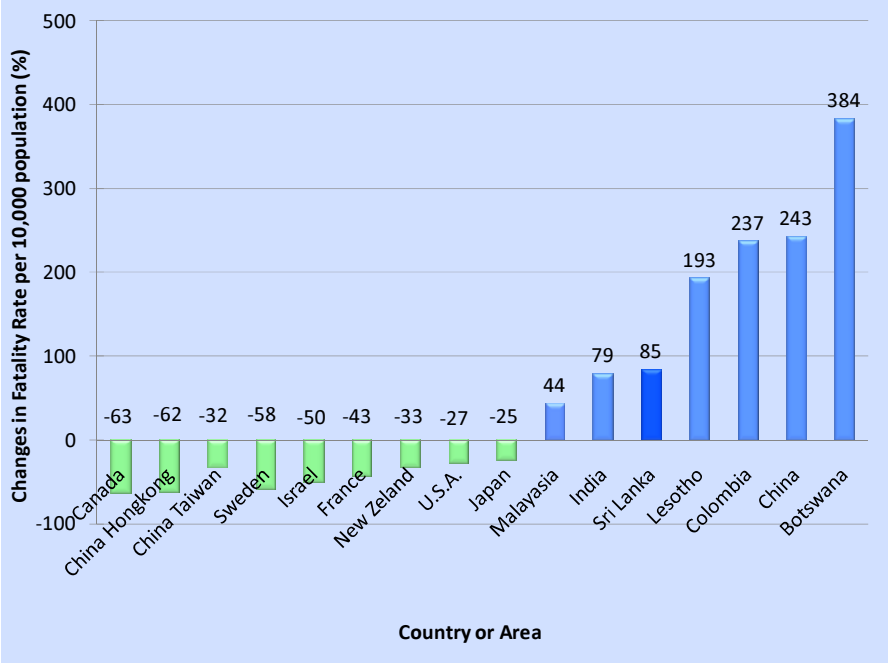


FIGURE 11- 3: CHANGES IN ROAD TRAFFIC FATALITY RATES, 1975-1998[1]

[1]WHO,2004: World report on road traffic injury prevention

11.2 BURDEN ON THE HEALTH SYSTEM

11.2.1 INJURIES ARE THE HEAVIEST HEALTH BURDEN

Health Burden of Injuries in Sri Lanka:
- No. 1 cause of hospitalisation since 1995
- 1 of 6 admissions in government hospitals (in 2003)
- 1 of 9 deaths in government hospitals (in 2003)

In Sri Lanka, trauma and other injuries have remained the No. 1 leading cause of hospitalisation since 1995 **(Figure 11-4)**. In 2003, 16.7% of total admissions and 11% of deaths in government health institutions were due to injuries. Road Traffic Injury (RTI) represents a major fraction of these injuries followed by home accidents. With regard to work place accidents, textile and garment factories report the highest number of accidents. With regard to injuries due to poisoning, majority of it are intentional; and organophosphates and carbonates are the commonest groups of causative agents.

The trauma burden is felt across all districts **(Figure 11-5)**. It was ranked as the number one reason for admissions in 18 of the 23 districts[2]. In the five other districts, it was always among the top 5.

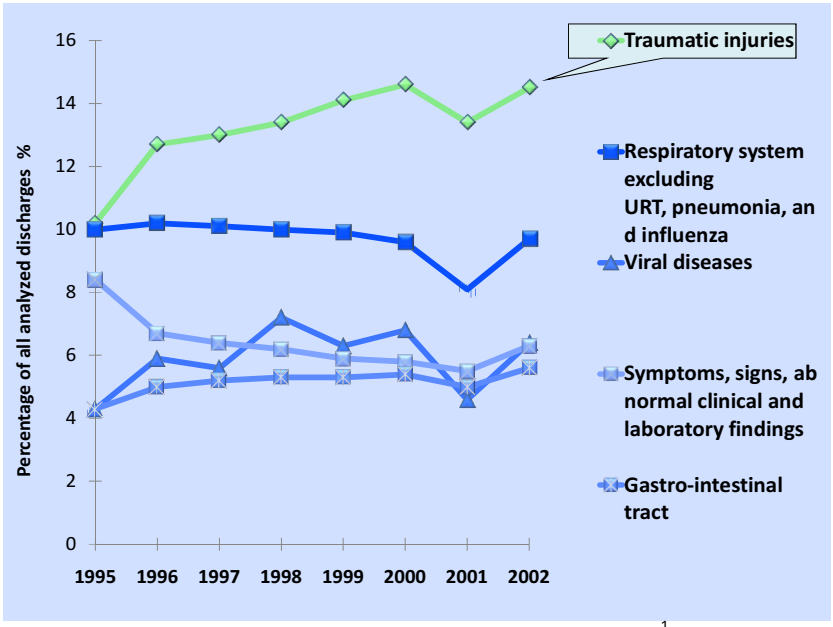


FIGURE 11- 4: TOP 5 CAUSES OF HOSPITALISATION, 1995-2002[1]

[1] Annual Health Bulletin, 2002
[2] Ibid

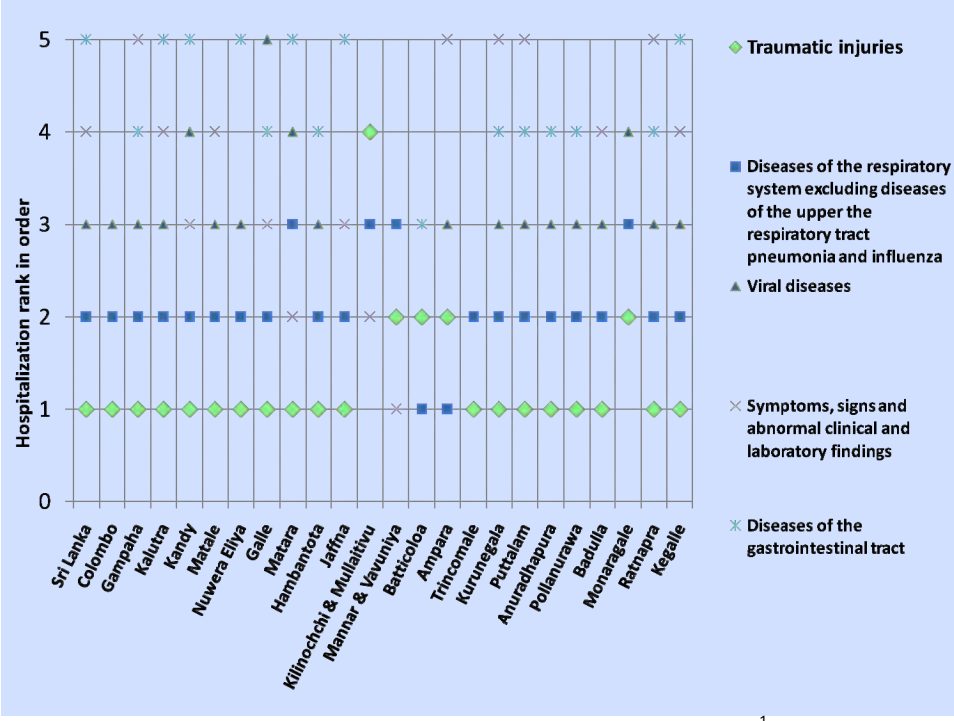


FIGURE 11- 5: TOP 5 CAUSES OF HOSPITALISATION IN 23 DISTRICTS, 2002[1]

11.2.2 ROAD TRAFFIC INJURIES (RTI)

Road Traffic Injuries (RTI) represents a major fraction of the injuries followed by home accidents. Half of the traffic accidents were due to factors attributable to the driver such as overtaking, speeding, or turning without signals[2]. Furthermore, 7 of 10 accidents occurred between noon and midnight **(Figure 11-6)**; while 40% of all the accidents transpired between 6 pm and midnight, half of the fatal accidents transpired during this period. Time of Road Traffic Accidents in Liyanagemulla and Dalugama, 2001-2003[3]

A. COMMON VICTIMS: YOUNG ADULT MALE PEDESTRIANS

In 1992, a study was conducted among 225 RTI victims admitted to the Accident Service Unit at the Colombo South General Hospital (De Lanerolle, 1992). The interview conducted revealed that 44% of all accidents were in the age group between 21-40 years and most of them were males. The EBM Study among patients at the Accident Service of the National Hospital Sri Lanka revealed a male preponderance (79.5%) in all aspects of road traffic accidents. The commonest age group affected was 20-35 years of age and next group affected was 36 to 50 years. The results of these two studies are consistent with the global trends - children and young people in the age group of 10-24 years account for nearly 400,000- or one third- of annual number of road

[1] Annual Health Bulletin, 200
[2] Peiris, 2006
[3] Swedish National Road Consulting AB; Ministry of Transport Highways and Civil Aviation, 2004

traffic deaths. This means that injuries received on the roads are causing more than 1000 young deaths every day.

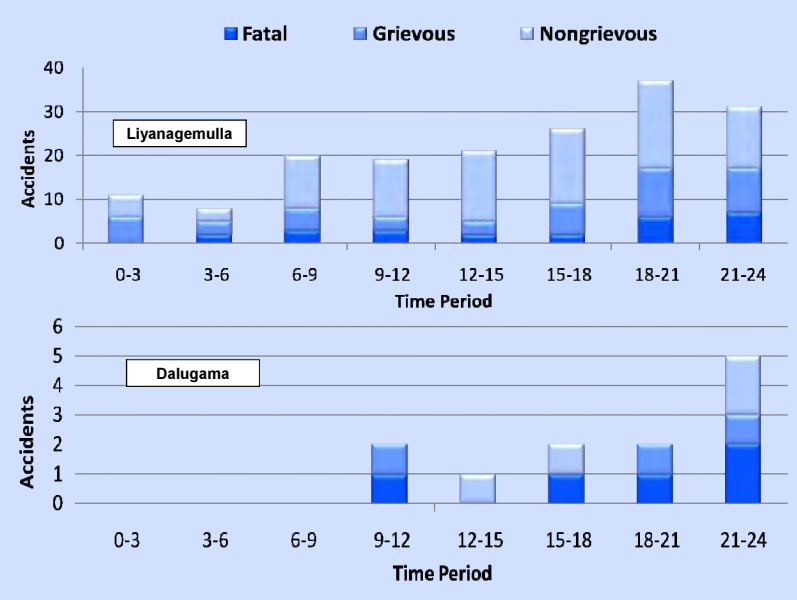


FIGURE 11- 6: TIME OF ROAD TRAFFIC ACCIDENTS IN LIYANAGEMULLA & DALUGAMA, 2001-2003[1]

The De Lanerolle's study and the EBM study on RTI showed that the pedestrians were the commonest group of road users who were involved. Data from the Police Department also point to the pedestrians as the most common victims of RTI **(Figure 11-7)**: one-third are pedestrians; both pedestrians and passengers were half (55%) of the total number of victims; about half were between the ages of 21 and 55.

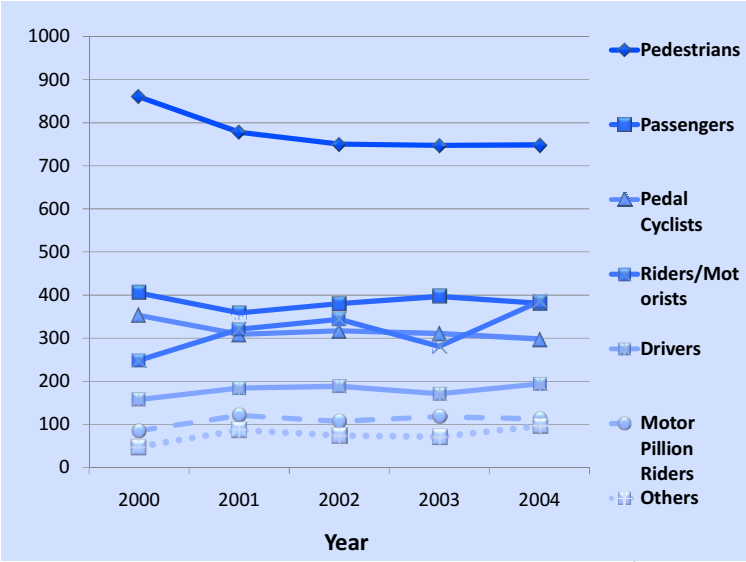


FIGURE 11- 7: DEATHS BY CATEGORY OF ROAD USERS, 2000-2003[2]

[1] Swedish National Road Consulting AB; Ministry of Transport Highways and Civil Aviation, 2004

[2] Peiris, *op. cit.*

About 50% of the pedestrians were hit while crossing the road while the other half were simply on the sidewalk (Interview: JICA Urban Transport Study Team, 2006). In 31.8% instances in the 1992 study, they were at fault due to lack of care.

While many of the RTI victims in Sri Lanka are pedestrians, this is not the case in Thailand where pedestrians account for only a little above 10% of the RTI victims. In Thailand, majority (70%) of the RTI fatalities were using motorized two-wheelers; in Sri Lanka less than 35% of the deaths were on board this type of vehicle. Cyclists make up a smaller proportion in both these countries, the Thailand figure being much lower. The same is true for motorized four- wheelers, with regards to these two countries.

B. BUSES – COMMONEST VEHICLE INVOLVED

Most of the RTIs were due to buses; the rest were due to dual purpose vehicles, lorries, containers, three-wheelers and motor car/jeeps.

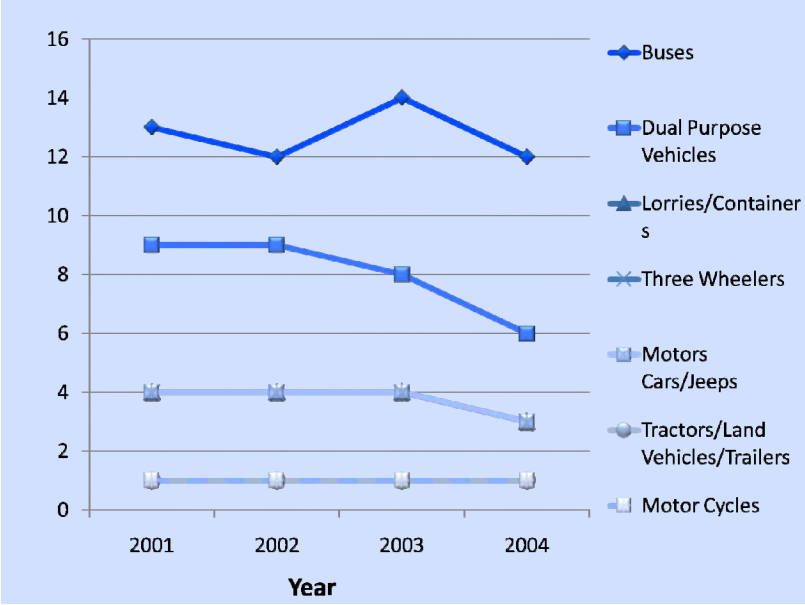


FIGURE 11- 8: VEHICLES RESPONSIBLE FOR ROAD ACCIDENTS (PER 100 VEHICLES REGISTERED), 2001-2004[1]

[1]Peiris, 2006

C. DRUNK DRIVING RTI DOUBLED IN 5 YEARS

In Sri Lanka, driving under the influence of alcohol is one of the main factors that account for road traffic injuries. From 1996 to 2000, the number of RTI associated with drunk driving doubled even if the number of total accidents increased only by 12% **(Figure 11- 9)**.

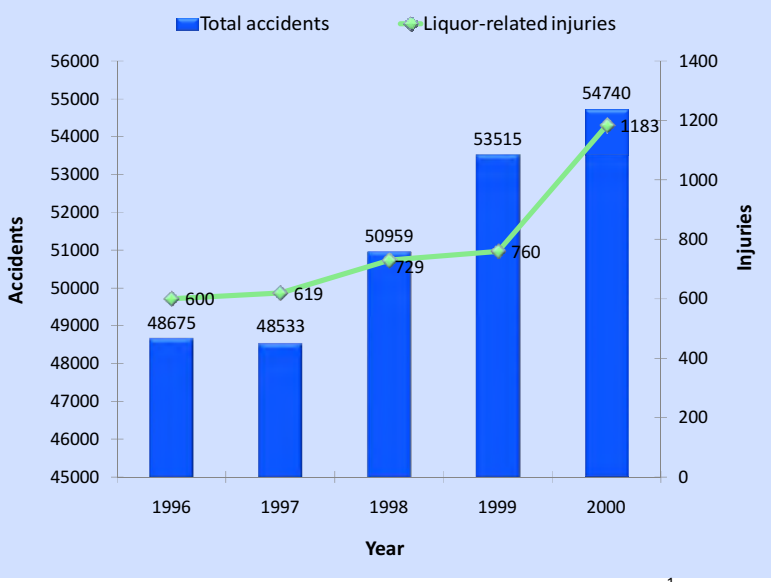


FIGURE 11- 9: LIQUOR-RELATED ROAD TRAFFIC INJURIES, 1996-2000[1]

11.2.3 INJURIES AMONG CHILDREN

A. HOME ACCIDENTS – NO. 1 TYPE OF INJURY AMONG CHILDREN

A study on accidents was undertaken in a rural area in the Kegalle district[2]. The descriptive part of the study, which covered a cluster sample of 4450 rural individuals, revealed a prevalence of 8.2% for home accidents. The rate was slightly higher for males than females. More than 80% of the home accidents took place between 6.00 am and 4.00 pm. In terms of age, home accidents were higher among the under 5 age group and tended to decline with increasing age up to 60 years. More than six of ten (64%) resulted in mild injuries, 13.1% resulted in moderate and only one led to serious injury. The common accidents among the less educated people were falls from height, cuts and objects being fallen on the body. The common accidents among the educated were cut injuries and getting stuck between objects. Not all accidents resulted to injuries. One of four (23%) cases had no injury; about 6 of ten (64%) had mild injury; 1 of ten (13%) had moderate injury; and less than 1% had severe injury.

The prospective part of the study of Kumarasiri (1992) in the Kegalle district was conducted among a random sample of 586 children from 1-14 years of age. The results showed that the incidence of home accidents was 827.6 for 1000 children over a period of three months

[1] Peiris, 2006 : Age of Fatalities Due to road Traffic Accidents 2001-2005
[2] Kumarasiri P.V.R. 1992

where girls had more accidents than boys and smaller children had more than the older. The socio-economic and demographic risk factors identified were age, sex, birth order, number of less than 15year olds living at home, age of the mother, monthly per capita income of the family, mode of household lighting, social class and the condition of the house.

The last part of the study used a case-control approach to determine the relationship between behaviour of children and the risk of home accidents. Amongst a hundred and five pairs of children between the ages of 5 and 10 years old, children with behavioural problems had a 3.9 times higher risk of home accidents than those with normal behaviour.

In Colombo, a study of two hundred children admitted to the Lady Ridgeway hospital after a home accident were compared with a control group of 200 children who were admitted for a cause other than an injury[1]. The most common method of injury was falls (43.5%). Increased risk due to the physical environment was not found. In terms of the psychosocial environment, more accident cases occurred when the father had serious physical illness ($p<0.01$) whereas the most important risk factors were negative attitudes of the mother towards the child ($p<0.05$), inadequate birth spacing and insufficient time spent by the mother at home ($p<0.0001$). Abnormal behaviour was observed more among the cases. The importance of the quality of childcare is highlighted by these factors.

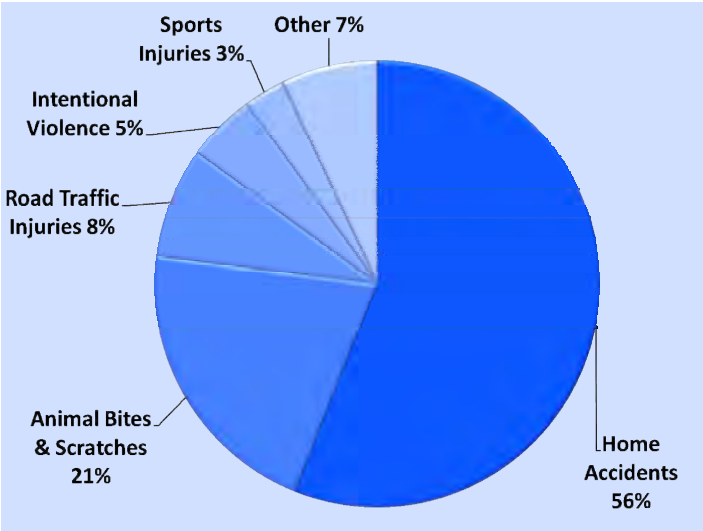


FIGURE 11- 10: TYPES OF INJURIES AT A CHILDREN'S HOSPITAL[2]

In 2001 an injury survey was done at the Lady Ridgeway Hospital for Children in 2001 using 171 children under 13 years seeking treatment at the accident service on four days using an interviewer administered questionnaire **(Figure 11-10)**. This survey revealed that home accidents accounted for 56% of injuries. Animal bites and scratches came in

[1] Athauda G.A.T.K., 1991
[2] Ibid

second being 21%. Road traffic accidents were the third cause of injuries (8%). Intentional violence, sports injuries and other injuries made up the rest of the causes. With regards to road traffic injuries, most of the time, the child was either on or hit by a bicycle/ motorcycle (43% and 36% respectively). Half of the time the child was a pedestrian; 29% were passengers on a bicycle; and 14% were passengers on a motorcycle. Out of the intentional injuries, 64% were inflicted by a friend. 12% were inflicted by a sibling and 12% were self inflicted. Some interesting trends in gender were noticed in this survey. Between 6 and 10 of 10 (64%) of injuries to female children were home accidents. Male children were twice as likely to sustain injury from animals and were more likely to sustain intentional injuries.

B. BURNS IN CHILDREN

A study done in the Eastern Province revealed that children between the ages one to four were most at risk of accidental burns[1]. Also, it is the leading cause of death in surgical wards. The commonest causes for accidental burns are kerosene lamps, scalding water and intentional acts.

Another study was done at National Hospital of Sri Lanka and Lady Ridgeway Hospital for Children to uncover the characteristics of patients with burn injuries[2]. It involved 193 patients with a male to female ratio of 56:44. Most burns occurred in a domestic setting (88.6%), and most of the burns were accidental (84.4%). Interestingly, kerosene oil lamps were the culprit in 56.8% of the burns, out of which 87.3%of lamps had lose wick carriers. Out of these patients, only 22% had received proper first aid before reaching hospital.

C. COMMON OCCUPATIONAL INJURIES

According to data from International Labour Organization, about 500 000 to 900 000 children between the ages 5 and 17 in Sri Lanka work for wages. Out of these, 10% are exposed to health and safety hazards everyday. Two most common causes for these occupational injuries are Accidents related to agriculture and domestic accidents.

D. SUICIDE

Sri Lanka is known to have one of the highest suicide rates in the world, being 40 per 100 000 population. In a study of suicides by organophosphate poisoning, suicide among children seems higher compared to the normal population. The rate in children between ages 5 and 14 revealed to be 5 per 100 000 population. The rate in children between the ages 14 and 19 this value is 17 per population.

[1] Athauda G.A.T.K., 1991
[2] Ariyaratne, 1995

E. PHYSICAL ABUSE

Physical abuse in children was first reported in medical case studies published in 1980's. Although numerous case studies continue to be published everyday, the figures for Sri Lanka are unclear.

F. CONFLICT CASUALTIES

Children are often victims of various conflicts. Child soldiers are one category of these victimizations. Out of all the rebel casualties encountered in hospitals, 20% to 40% are under the age 18 years. Enrolment of children, either voluntary or forced, into the rebel military continues.

11.3 BURDEN OF INJURIES ON SRI LANKAN ECONOMY

11.3.1 TOTAL COST

The economic burden of injuries had shown a definite increasing trend from 1997 to 2002, in which the total cost for accidents reached almost 12 billion rupees **(Figure 11-11)**. The data regarding the cost of accidents for the years 2003 to 2005 also show an increasing trend. The total cost for the year 2005 is 14 billion rupees. These figures indicate an alarming truth- that the economic burden of injuries is increasing day by day and quick intervention is needed.

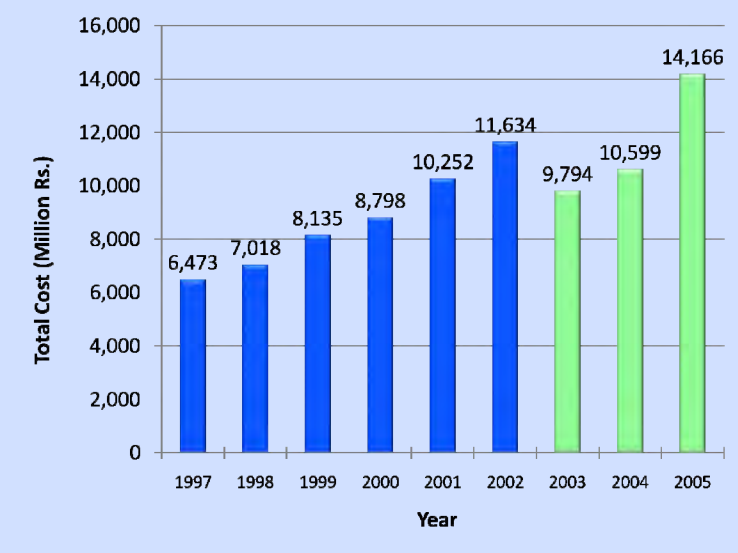


FIGURE 11- 11: TOTAL COST OF ACCIDENTS, 1997-2002[1] AND 2003-2005[2]

11.3.2 COST PER DAY

A study carried out at Colombo South Teaching Hospital[3] revealed that the average cost per day of hospitalization per patient was Rs. 290 **(Table 11-1)**. Of the total treatment cost, 30.11% was on drugs and -dressings while 25.85% accounted for the accident service staff salaries. The highest cost was incurred for treating pedestrian victims. Among fractures, the fractures of the tibia/fibula were the most costly.

[1]Ratnayake and Jayasinghe,2002
[2]Kumarage and Jayaratna, 2007
[3]De Lanarolle, 1992

TABLE 11- 3: AVERAGE HOSPITALISATION COST PER DAY OF AN INJURED PATIENT, 1992 AND 2001

Studies	Hospital	Average cost per day of hospitalisation per patient (Rs.)
De Lanerolle[1], 1992	Colombo South General Hospital	290.00
Dharmaratne[2] S.D., 2001	General Hospital Kandy and Teaching Hospital Peradeniya	3,415.55

A similar study in 2001 which was conducted at the General Hospital Kandy and the Teaching Hospital Peradeniya showed that the average cost per day for hospitalizing a patient is Rs. 3,415/55. These figures illustrate the startling increase in the cost of injuries at an individual level. Moreover, a patient-day cost was higher at the General Hospital Kandy than at the Teaching Hospital Peradeniya (THP). A day in the intensive care unit in the THP was estimated to cost Rs 3728.21 while an operation theatre hour was estimated to cost Rs 2872.96. In terms of the cost of investigations the costs for an X-Ray and an ECG were rather high amounting to values of Rs 179.51 and Rs 86.77 respectively. Including the cost due to loss in output of the victims, the total resource loss amounted to Rs.27, 289,829.00 or about Rs.74, 766.65 per day as a result of RTIs. The total estimated cost of the 949 accidents in the study was Rs. 35,987,336.61 with the fatal ones being most costly (Rs 18,155,250.82).

[1]Lanerolle,1992
[2]Dharmaratne, 2001