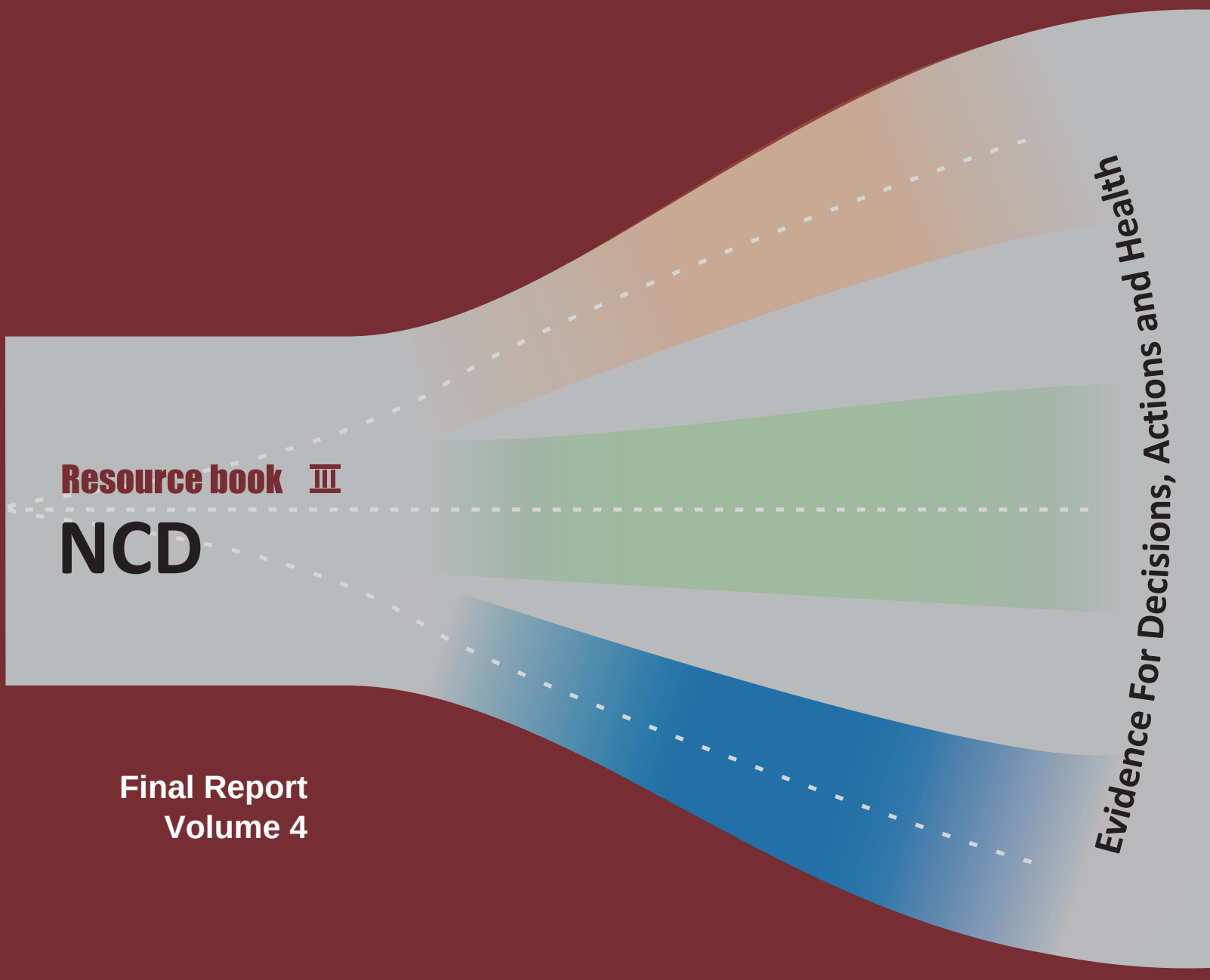
No.

Ministry of Healthcare and Nurtrition
Democratic Socialist Republic of Sri Lanka (MOH)
Japan International Cooperation Agency (JICA)

The Development Study on
Evidence-Based Management for the Health System in Sri Lanka



Resource book III
NCD

Final Report
Volume 4

September 2007
Global Link Management, Inc.

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The following Foreign Exchange Rates are applied in the Study (as of November 2007)

- USD 1 = 115.73 JPY
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Message From Japan International Cooperation Agency

In response to a request from the Democratic Socialist Republic of Sri Lanka, the Government of Japan decided to conduct "The Study on Evidence-Based Management for Health System" and entrusted to the study to the Japan International Cooperation Agency (JICA).

JICA selected and dispatched the study team headed by Ms. Akiko Shimooka of Global Link Management Co., LTD. from October, 2005 to September, 2007.

This report was developed from enormous efforts between the study team and the officials concerned of the Government of Sri Lanka after a series of field surveys and pilot studies. Upon returning to Japan, the team conducted further studies and prepared this final report.

I believe that this report will contribute to the promotion of Sri Lanka's effort in this field and to the enhancement of friendly relationship between two countries.

Finally, I wish to express my sincere appreciation to all the persons concerned for their close cooperation extended to the study.

September 2007

Yoshihisa Ueda,

Vice President

Japan International Cooperation Agency

September 2007

Mr. Yoshihisa Ueda,
Deputy Vice President
Japan International Cooperation Agency
Tokyo, Japan

Letter of Transmittal

Dear Sir,

We are pleased to forward herewith the Final Report for "The Development Study on Evidence-based Management for the Health System in Sri Lanka."

This report compiles the results of the study which was conducted from October 2005 through September 2007 by the Study Team organized by Global Link Management Inc. under a contractual agreement with the Japan International Cooperation Agency (JICA).

The Final Report consists of four separate volumes: one Main Report and three Resource Books. The Main Report titled "Roadmap for Implementation" presents the action plans and proposals of the Ministry of Health, Sri Lanka for the next 2 to 5 years, covering the three strategic programme areas identified in the Sri Lanka Health Master Plan. The Resource Books present the results of the technical surveys and case studies together with the survey tools and analysis. They contain the evidence based upon which the action plans were developed. The Resource Books will help stakeholders in Sri Lanka as well as interested parties in Japan in planning and programming future activities.

We would like to express our sincere gratitude and appreciation to the officials of your agency and the JICA Advisory Committee for guidance and advice provided during the execution of the study. Our appreciation would also go to the people in Sri Lanka who tirelessly worked with us, guided us and supported us for the last two years.

We are confident that the results of the Study, including the intangible knowledge and skills shared with our Sri Lankan counterparts, as well as the acknowledged change in mindset the study enabled will make a significant contribution to the Sri Lankan Health System in its future development.

Sincerely Yours,

Akiko Shimooka
Team Leader
The Development Study on Evidence-based Management
for the Health System in Sri Lanka
Global Link Management, Inc.

Preface

The Government of Sri Lanka and the JICA agreed to jointly undertake the development study on "Evidence-Based Management (EBM) for the Health System in Sri Lanka". The Study, referred to as "the EBM Study", commenced in October 2005. The EBM Study consists of three components. Overall, they contributed to meet the new challenges faced by the Sri Lankan health system: transition in epidemiological pattern; increased public expectations of healthcare services; and increasing demand for efficient use of health finances. The three programme areas of Quality Assurance, Health Sector Financial Information Management, and NCD Prevention and Management directly correspond to these three challenges.

The overall aim of the EBM Study was to initiate a pilot process that will give valuable feedback on standard good practices in managing change. It also helped identify the conditions that need to be in place for effective implementation. The conditions identified included policies, regulations, resource requirements as well as mechanisms and methodologies that need to be in place both at the ground level and at the regional and central level.

1. Structure of the Final Reports

The results of the EBM Study are presented in the “Main Report” and in three separate “Resource Books”.

Composition of the Final Reports	Title
Main Report	Roadmap for Implementation
Resource Book I	Resource Book I: Cost Accounting
Resource Book II	Resource Book II: 5S-TQM
Resource Book III	Resource Book III: NCD

A. Main Report

This document acts as the roadmap for the implementation of three key programme areas that were prioritised in the Health Master Plan (HMP): 1) Quality Assurance; 2) Health Sector Financial Information Management; and 3) NCD Prevention and Management. It discusses the intent and commitment of the Ministry of Healthcare and Nutrition (MoH) for the next 2 to 5 years.

The action plans and proposals contained in the Main Report were developed to support, refine, expand or update the project profiles that were originally drafted in 2005 as part of the HMP. They outline an implementation framework that was formulated based on evidences from past practices and from the EBM Study.

The Main Report, titled ‘Roadmap for Implementation’, is the lead document to three other documents entitled “Resource Book I: Cost Accounting”, “Resource Book II: 5S-TQM”, and “Resource Book III: NCD”.

The Main Report consists of 6 chapters:

Chapter 1 *Introduction*	Chapter 1 presents an overview of the health sector and its challenges, together with a brief introduction to the scope and contents of this report.
Chapter 2 *Costing for Hospital Management* **Chapter 3** *Hospital Quality & Safety* **Chapter 4** *Chronic NCD* **Chapter 5** *Trauma*	These four chapters set out the action plans and proposals for three key programme areas of the Health Master Plan. They also explain the basis upon which the action plans and proposals were developed. The chapters contain five sections: 1) Challenges; 2) Local Initiatives; 3) Pilot Interventions; 4) The Roadmap; and 5) Policy Considerations. The action plans or proposals are described in Section 4 of each chapter, and is titled `The Roadmap`.
Chapter 6 *Operationalising the Action Plans*	This chapter discusses key considerations for actual operationalisation of the intent and commitment as they are reflected in the action plans and proposals.
Annexure *Action Plans*	Action plans and proposals are presented in a template format, which summarises project profile, strategic framework and plan of actions.

Each chapter starts with a set of key messages in bullets. Each message gives concise descriptions of main issues, challenges, concepts, activities and the main results. In combination, they convey a snap-shot of the proposed programme areas.

B. Resource Books

The Resource Books served as the platform upon which the action plans and proposals were formulated. They also contain substantial evidence and management tools related to the three key programme areas. In contrast to the summary of information presented in the Main Report, the information carried in the Resource Books is more technical and detailed, giving both statistical data and descriptive information on the results of situational analysis, survey instruments, training manuals, case studies, etc.

The intended users of these books include stakeholders in the target areas of the action plans and proposals presented in the Main Report, potential planners and implementers of the similar projects, researchers and students who are interested in the subject areas, and the like.

B.1 Costing

Chapter 1 Key Issues & Challenges	The first chapter illustrates costing as an essential activity in the context of the current budgetary problems in Sri Lanka while highlighting the present status of inefficient costing information available at the institutional level. The chapter also provides the concepts of accounting.
Chapter 2 Overview of The Component	This chapter presents the study plan in detail, including listing the objectives, activities and planned outputs relating to improvement of hospital management through cost accounting.
Chapter 3 Literature Review & Case Studies	The third chapter focuses on the basis on which the costing exercises were carried out. The topics include: the literature survey (involving both hospital based and disease management-based studies); the management needs survey that highlights the shortcomings of the current reporting systems and the lack of skills in costing and financial management among hospital management; and the studies of the supply of pharmaceuticals and hospital costing in the private sector in Sri Lanka.
Chapter 4 Methodology Development	The costing system at Sri Jayawardenepura General Hospital (SJGH) was studied in detail in this Chapter. The methodology involved in the step-down cost accounting is presented, drawing on its operationalisation at SJGH and the results derived. Section 4.3 then uses the step down unit costs of the two pilot hospitals in Kurunegala district along with time studies carried out at the Colombo North Teaching Hospital, to derive disease management cost estimates for five selected conditions/treatment procedures.
Chapter 5 Pilot Implementation: Hospital-Based Costing	Chapter 5 presents the results of step-down cost accounting in the two pilot hospitals followed by comparisons of unit costs across medical specialities and units/wards.
Chapter 6 Way Forward	The final chapter summarises outcomes of the pilot implementation at two hospitals, and discusses policy concerns in the context of adopting managerial cost accounting in Sri Lanka.

B.2 5S-TQM

Chapter 1 Key Issues & Challenges	This chapter introduces key issues and challenges that the public hospitals in Sri Lanka face. It also summarises key concepts related to quality in particular in the context of the health sector. Finally the chapter provides an overview of principles that constitute hospital quality.
Chapter 2 Component Overview	This chapter provides an overview of this component, describing the study aim, objectives, strategies and outputs. It also briefs the North Western Province and five hospitals selected for pilot interventions. Working arrangements and implementation schedule were also presented in the end of this chapter.
Chapter 3 Situational Analysis	This chapter is devoted to describe local situations on the target province as well as profile of five pilot hospitals and their baseline information. Results of the studies on clinical pathway, patient/staff satisfaction, and best practices in the selected hospitals are also presented together with the stakeholder analysis.
Chapter 4 Methodology & Strategies	The chapter describes approaches and strategies to enhance hospital quality. The 5S technique is described as a basis for the total quality management and its operations are detailed in phases.
Chapter 5 Implementation & Assessment	Preliminary and final results of the pilot implementation at five selected hospitals are given. The chapter also documents the process and results of the final assessment of 5S implementation done by using two tools: KAP study and 5S audit. Analysis provides some common factors that contributed to the successful implementation of 5S at the selected hospitals. The chapter ends with a brief summary of activities carried out at the central level: development of 5S implementation guidelines and M&E quality tools.
Chapter 6 Way Forward	The last chapter describes the process and main features of the recently drafted national policy on Quality and Safety in Hospitals. It also summarises the challenges for sustaining the 5S-TQM programmes at the hospital levels.

B.3 NCD

- Part 1

  This part encompasses the concepts of Non-communicable Diseases, the government and other parties that are involved in the management of Non-communicable Diseases, the challenges they face, and the activities and outputs of the EBM Study.

Chapter 1 Conceptual Framework	This chapter describes why prevention and management of NCD was selected for EBM Study. It gives an overview of factors contributing to chronic NCDs as well as Trauma. Finally it describes strategies or approaches to prevent and control chronic NCD and Trauma.
Chapter 2 Stakeholders	Chapter 2 focuses on government stakeholders and other partners like professional organisations, unions, non-governmental organisations, research and academic institutions and media. It discusses the survey done to identify the roles of stakeholders in the management of non-communicable diseases in Sri Lanka and to explore the limitations for progress in their activities.
Chapter 3 Key Issues & Challenges	This chapter defines some of the key challenges the health system in Sri Lanka is facing. The discussion is mainly focused on issues that pertain to chronic NCD and trauma.
Chapter 4 EBM Study On NCD	This chapter presents the purpose and output of NCD component. Outputs are described by areas of interest. It also focused on activities to deliver the outputs by each subcomponent like evidence base, trauma system, healthy life system and information system.

- Part 2

  Part 2 is on chronic NCD and consists of 6 chapters. This part discusses extensively the chronic non- communicable diseases and the burden they impose on the world as well as Sri Lanka. It considers the actions that can be taken to address the chronic NCD burden, including what can be done about the early life factors. This part also describes the pilot implementations that were done in Kurunegala and Polonnaruwa.

Chapter 5 Chronic NCD Burden	This chapter focuses on the burden of chronic NCD. It describes the trend in morbidity and mortality of main chronic NCDs. It also gives an overview of biological risk factors, behavioural risk factors and other risk factors of chronic NCD.
Chapter 6 Chronic NCD Strategies & Programmes	The second chapter is about the strategies and programmes for the prevention and control of NCD. It describes the WHO global strategies and the recommendations to address the main risk factors for Chronic NCD as well as the interventions, programmes, projects started by the EBM Study to address these issues.
Chapter 7 Early Life Factors	This chapter is on the study undertaken to find out the relationship between early life factors and non-communicable diseases.
Chapter 8 Behavioural Risk Factors In Kurunegala	The fourth chapter describes the behavioural risk factors found in the Kurunegala district. Unhealthy diet, physical inactivity, tobacco and alcohol use and inability to cope with persistently high levels of stress have been identified as risk factors to develop chronic NCD. Options to address each of these risk factors, communication messages and finally the indicators to assess the progress is described in this chapter.
Chapter 9 Chronic NCD Prevention In Kurunegala	Chapter 5 is a detailed account of the pilot implementation of the Healthy Lifestyles Programme in Kurunegala. Advocacy and building a broad base of supporters, assessment of baseline status in 4 settings, training of trainers and finally review of t Healthy Lifestyle programme in Kurunegala are discussed.
Chapter 10 Chronic NCD Surveillance In Polonnaruwa	The final chapter presents the pilot implementation of the chronic NCD surveillance system in Polonnaruwa. It gives an overview of the disease surveillance activities in Sri Lanka and activities conducted in Polonnaruwa in relation to surveillance. Formulation of a minimum data set for chronic NCD, development of a surveillance system and training programmes for implementation of chronic NCD surveillance system are described.

- Part 3

  Part 3 is on Trauma and it has 6 chapters. This includes an insight into the actual burden of trauma in Sri Lanka, the actions that can be taken and that are already taken to address this burden, and the final conclusions including the new policies and plans derived from the pilot implementations.

Chapter 11 Trauma Burden	The first chapter presents the burden of trauma on the health system and economy of Sri Lanka. It describes the morbidity, mortality and the cost of trauma in Sri Lanka.
Chapter 12 Trauma-Strategies & Programmes	Strategies and programmes for prevention of trauma have been discussed in this chapter. It is explained in certain levels such as safety promotion, pre-hospital care, in-hospital care and rehabilitation.
Chapter 13 Development of a Coordinated and Sustainable Trauma System	The third chapter discusses the development of a coordinated and sustainable trauma system, establishment of the Trauma Secretariat, organisation of the Trauma System Development Committee and proposals to expand them.
Chapter 14 Safety Promotion: An Initial Step	This chapter discusses safety promotion. The activities undertaken in relation to the UN Road Safety Week including exhibitions, media seminars, video presentations, street dramas and school education programmes are described in this chapter in great detail.
Chapter 15 Trauma Surveillance In Pilot Hospitals	The fifth chapter describes the trauma surveillance in 4 pilot hospitals, namely Teaching Hospital Kalubowila, General Hospital Kalutara, Base Hospital Horana and Base Hospital Panadura. Under this study Trauma, a surveillance record was developed to collect data and software was designed to enter the collected data.
Chapter 16 Emergency Treatment Units: An Exploratory Review	The studies on Emergency Treatment Units and Primary Care Units are discussed in the sixth chapter.

2. Profile of the EBM Study

A. Study Objectives

A key aim of the EBM study was to set in motion of change that would act as a catalyst for future developments in the key programme areas identified by the Health Master Plan by initiating a first step in implementing some core aspects of the HMP on a pilot basis.

B. The Principle Approach

The principle approach adopted in this study was to develop an evidence-based management system for the healthcare sector in Sri Lanka. Evidence-based health care takes place when decisions that affect the care of patients are taken with due weight accorded to all valid and relevant information. The need for an evidence-based healthcare system for Sri Lanka was also highlighted in the HMP. While the evidence-based approach has already been practiced in clinical medicine, its application to healthcare management, particularly hospital management had been slow. Therefore, the approach of this study was relatively novel.

A system based on evidence is also transparent, and has numerous benefits. At the macro level, it helps in the identification of strategic priorities, as well as fund and other resource allocations. At the micro level, it helps in planning and prioritising activities. An evidence-based system also helps the donor community in formulating their assistance strategies. For this approach to work, managers need to have the necessary information to make decisions as well as possess the tools and techniques necessary to generate this information.

The EBM study consisted of 3 main components and the study attempted to adhere to this overall principle in undertaking each of the three components.

C. The Three Components

Component 1 dealt with improving healthcare service quality in public hospitals by reorienting the staff to implement a continuous quality improvement process. This process would ultimately lead to the establishment of Total Quality Management in public hospitals. As a first step, the EBM study, implemented the Japanese 5S quality improvement method on a pilot basis at 5 hospitals in the North Western province. This approach was not totally novel to Sri Lanka. The Castle Street Hospital for Women in Colombo has been well recognized for its successful implementation of the 5S approach and for transforming not only hospital operations, but also the mindset of workers. This bottom-up approach would lead to both increased employee satisfaction as well as patient satisfaction. This would then work in a self-reinforcing cycle resulting in the provision of improved healthcare services. With a view to sustain the 5S implementation and to proceed to Total Quality Management (TQM), the EBM Study introduced a continuous learning cycle (collaborative improvement approach).

Component 2 dealt with the provision of rationalized financial information for the management of the healthcare system in Sri Lanka. As a first step, Component 2 developed a detailed cost accounting methodology for public hospitals. It initially focused on the design of a data collection methodology based on cost centres, which formed the basis for cost accounting. This methodology drew upon the step-down methodology in general, and the Japanese experience in integrating clinical and financial costing systems in particular. Based on the data collection methodology, pilot implementation of the new costing system undertook at 2 hospitals in the North Western province. Furthermore, the department level costing system (based on cost centres) also formed the basis for further analysis of costs based on disease type. Component 2 also undertook this additional analysis at the same two pilot hospitals, as well as at the Colombo North Teaching Hospital at Ragama. These programmes could be replicated at other locations as well. Once the cost accounting methodologies are adopted at all hospitals, it would form the basis for a rationalized database of financial information for the healthcare sector.

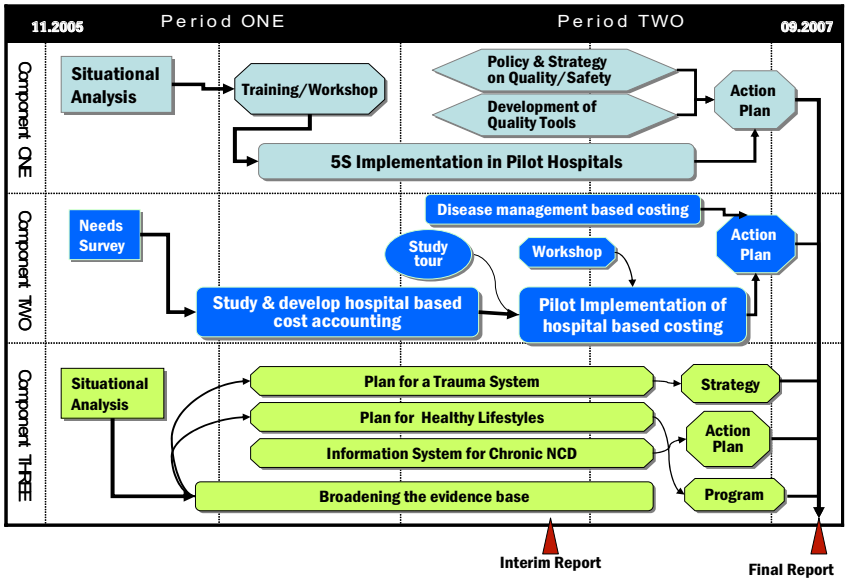
Component 3 dealt with strengthening the capacity of the health sector and communities in the prevention and management of non-communicable diseases (NCDs), both chronic and acute, throughout the course of life. It was designed to complement or supplement the existing programmes of the government as well as to support the implementation of existing policies or the formulation of new ones. This component undertook a number of activities aimed at broadening the evidence base required for the prevention and management of NCDs. It used this broadened evidence base to plan and implement lifestyle change programmes, including social marketing campaigns and behavioural change communications, aimed at targeted groups. Specifically, its four-pronged strategy consisted of the following:

- Broadening the evidence base through the following means: 1) Case studies and forums that highlight good practices in reducing the risk factors and underlying determinants; 2) Research on the influence of early life factors; 3) Focus group discussions on the knowledge, attitudes and practices of selected target groups (in the Kurunegala district); 4) Advisory groups in building consensus on technical issues; and 5) A symposiums on ensuring the effectiveness of policy processes and policies.
- Planning for safe communities and initial implementation of a trauma system, including an injury surveillance system in the Colombo South General Hospital (Teaching) Kalubowila, General Hospital Nagoda, Kalutara, and 2 base hospitals at Panadura and Horana.

- Pilot testing interventions to promote healthy lifestyles in Kuliyapitiya division, specifically in 5 hospitals, 10 schools, 18 workplaces and in a village with 483 residents.
- Strengthening the information system in Polonnaruwa district so that it can generate, manage and use information on priority chronic conditions.

D. Work Flow

Figure 1 illustrates the work schedule for the EBM study. It shows the major activities/ tasks undertaken as part of the EBM study.



Each component started with a situational analysis, which included discussions with key stakeholders, and was aimed at gaining a comprehensive understanding of the ground situation, and identified the immediate focus for the study. Once this was done, the study moved to the target hospitals and populations for pilot implementation. The final stage of the study consisted of formulating strategies and action plans for future expansion.

Map of Sri Lanka

Map No. 4172 UNITED NATIONS
August 2001

Department of Public Information
Cartographic Section

Key Messages

1. Conceptual Framework

- Communicable diseases and Non-communicable diseases are two broad classifications of health conditions. Non-communicable diseases are further sub classified into Acute NCDs (trauma) and Chronic NCDs (diabetes mellitus, cardiovascular diseases, cancer etc)
- Certain risk factors determine the probability of developing a Chronic NCD. These can be intermediate, modifiable and non modifiable. The life course approach states that certain insults during foetal life may result in high risk of chronic NCD in later life.
- The problem of chronic NCDs can be addressed at stages of health promotion, different levels of prevention and population wide and high risk approaches.
- The Haddons Matrix is a useful tool for analyzing injuries/ trauma and coming up with approaches for prevention and control.

2. Stakeholders

- Both governmental and non governmental organizations are essentially important stakeholders in the health sector, and their roles vary from promotion to primary, secondary and tertiary prevention of chronic NCD and trauma.
- The survey on stakeholders is mainly to explore the contribution of important stakeholders in the field of NCD.
- The NCD directorate will develop a national action plan while at the local level NCD programmes will be integrated in the district plans.
- Most of the external development partners directly or indirectly support the MoH to formulate plans or policies and implement programmes for the prevention and management.

3. Key Issues and Challenges

- Sri Lanka is in the midst of a health transition in an epidemiological point of view.
- Although in Sri Lanka there is the evidence base for the formulation of policies, plans and programmes there is still room for improving it.
- Rapidly increasing incidence trauma, increased pressure from the society for better care and commitment by international agencies provide better opportunities to uplift the health services.
- Sri Lanka still needs a model health community to recognize the most cost-effective way to combat the NCD.
- The challenges are to systemize the knowledge sharing and management as well as using information for concrete and concerted actions.

4. EBM Study on NCD

- The EBM Study aims to enhance the capacities of the health system and communities in the prevention and management of NCDs throughout the course of life. They worked to develop methods of generating evidence on NCDs, formulate action plans for pilot projects and build capacity by TOT programmes, forums , workshops symposiums etc.
- An initial implementation of a trauma system was formulated.

- Pilot implementation of a programme on healthy lifestyles tok place in the Kurunegala District.
- It is expected to strengthen the existing system for generating, managing and using NCD information.

5. Chronic NCD Burden

- Although Chronic NCD accounted for less than half (43%) of the total disease burden in 1998, they will exert a heavy burden (73%) by 2020.
- The common chronic NCDs under consideration are cardiovascular diseases, diabetes, mental disorders and cancers.
- The common risk factors for NCD are obesity, hypertension, protienuria, impaired glucose tolerance and stress response.
- Diet, physical activity, use of tobacco and misuse of alcohol are common behavioural risk factors.
- Tobacco and alcohol use are two silent killers with many health hazards that rob the lives of many.

6. Chronic NCD Strategies & Programmes

- Surveillance, management and prevention are the three components to achieve the objectives of the WHO Global Strategy for the prevention and control of NCD.
- In May 2004, the 57th World Health Assembly endorsed the WHO Global Strategy on Diet, Physical Activity and Health.
- Various interventions using school children, young adults, pregnant women etc have been done to promote healthy diet and physical activity.
- Tobacco consumption is currently the single leading preventable cause of death. ADIC and Mel Medura are two non governmental organizations who use various strategies to fight against tobacco and alcohol.
- Mental health is an essential component of a healthy lifestyle.

7. Early Life Factors

- Chronic diseases are now the major cause of death and disability worldwide.
- A study on Early Life Factors was done at CSHW to assess the relationship of it with NCD.
- The main effects of family history with diabetes and high blood pressure were significantly associated with the current diabetes status.
- Significant patterns of the probability of getting NCD have emerged from the study despite the fact that the sample size is low.
- The study clearly demonstrates a relationship between low birth weight and hypertension supporting the fetal origin hypothesis.

8. Behavioural Risk Factors in Kurunegala

- Lack of knowledge on the importance of physical activity is one of the determinants of physical inactivity.
- The determinants of healthy diet at the community and country levels are mainly dependent on cultural pattern and policies related to food and agriculture.
- People are initiated to using tobacco and alcohol by the aggressive strategies of the industry, which targets primarily the youngsters.

- The root cause for persistently high level of stress in general has been identified as the change of socio-cultural system following open economy in the country.

9. Chronic NCD Prevention in Kurunegala

- The provincial vision is a healthier population in the North Western Province that contributes to the nation.
- A programme was conducted to determine the status of Chronic NCD among the participants in the Healthy Life Style programme.
- Training of trainers (TOT) programmes was conducted on the aspects of healthy life styles.
- In June 2007, a review was conducted to identify the lessons learned in TOT programmes.

10. Chronic NCD Surveillance in Polonnaruwa

- 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.

11. Trauma – The Challenges

- 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.

12. Trauma – Strategies & Some Initiatives

- Motor cycle helmet is no doubt one of the most served safety devices in the transport field.
- “Safe bottle lamp foundation “has used a simple yet innovative technology in creating a safe bottle lamp to reduce the incidence of burn injuries.
- The concept of ‘Safe Community’ is an effective way of preventing injury that can easily be adopted in Sri Lanka learning from the experiences of other countries.

- Pre-hospital care is essential to ensure necessary medical attention until the patients are in the safe hands of doctors and nurses.
- Primary Care Unit improves the utilization of in patient services in the hospital while Emergency Treatment Unit provides rapid assessment and management.
- Uniform clinical guidelines are needed for the country while protocols should be formed according to the remaining facilities of the unit.

13. Development of a Coordinated & Sustainable Trauma System

- The launching of the Trauma Secretariat was a step forward to ensure the sustainability of Ministry of Healthcare and Nutrition initiatives targeted at winning the war against trauma.
- The matrix on "Sri Lanka Trauma Centre Designation Criteria" categorizes the level of trauma care at different levels of the healthcare system.
- Trauma surveillance and quality assurance strengthens the foundation of a trauma system.
- "Emergency Ambulance Service_110" in Sri Lanka is essentially an important stakeholder in pre-hospital care system.
- Trauma courses targeting both professionals and non professionals take a leading role in hospital care.
- Disaster preparedness minimizes suffering and to bring this about, the MoH has to collaborate with other ministries at national, provincial and district levels.

14. Safety Promotion – An Initial Step

- Through the First United Nations Global Road Safety Week a voice is given to young people.
- Media Seminar and the exhibition with the theme of "Help Reduce Accidents" at NHSL focused on the issues of prevention of road traffic injuries.
- Base Hospital Horana and General Hospital Kalutara organized an array of activities in parallel with the NHSL to celebrate the Road Safety Week.
- The UN Global Road Safety Week dedicated on young road users was commemorated at pilot hospitals.

15. Trauma Surveillance in Pilot Hospitals

- Injuries despite being easily preventable are the leading cause of hospital admissions.
- The Trauma Surveillance Record (TSR) was the initial step introduced in evaluating the trauma surveillance system.
- Colombo South Teaching Hospital, General Hospital Kalutara and Base Hospital Horana are the pilot hospitals of TSR programme.

16. Emergency Treatment Unit – An Exploratory Review

- An Emergency Treatment Unit (ETU) is a specialized unit in a hospital designed to handle trauma and other types of injuries; unfortunately, not many hospitals in Sri Lanka have this facility.
- A descriptive cross sectional study using self-administered questionnaires was done to assess the available physical and human resources and their quality in the ETUs in the country.

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Abbreviations

A	
A&E	Accident & Emergency
AA	Assistant Accountant
ADB	Asian Development Bank
ADIC	Alcohol and Drug Information Centre
AHF	Ageing and Health Programme
AMRO	Assistant Medical Record Officer
AOS	Accident and Orthopaedic Service
AOTS	Association for Overseas Technical Scholarship
ATLS	Advance Traumatic Life Support
B	
BCC	Behaviour Change Communication
BH	Base Hospital
BHK	Base Hospital Kuliyapitiya
BHT	Bed Head Ticket
BMI	Body Mass Index
C	
CAP	Cycle Action Plan
CD	Central Dispensory
CIDAS	Computerised, Integrated and Decentralised Accounting System
CIGAS	Computerized Integrated Government Accounting System
CMC	Colombo Municipal Council
CNTH	Colombo North Teaching Hospital
CPR	Cardio Pulmonary Resuscitation
CQI	Continuous Quality Improvement
CSHW	Castle Street Hospital for Women
CSTH	Colombo South Teaching Hospital
CSSD	Central Sterile and Supplies Division
CVD	Cardio-Vascular Diseases
D	
DALY	Daily Adjusted life Years
DDG	Deputy Director General
DDGMS	Deputy Director General Medical Services
DGH	District General Hospital
DH	District Hospital
DIG	Deputy Inspector General
DMO	District Medical Officer
DPC	Diagnosis Procedure Combination
DPDHS	Deputy Provincial Director of Health Services
E	
EBM	Evidence-Based Management
ECG	Electro Cardiograph
EEG	Electro Encephalography
EMS	Emergency Medical Services
EMT	Emergency Medical Technician
EPSC	Expanded Productivity Steering Committee
ER	Emergency Room
ET	Endo Tracheal
ETU	Emergency Treatment Unit

F

FBS	Fasting Blood Sugar
FCTC	Framework Convention on Tobacco Control
FGD	Focus Group Discussion
FHP	Foundation for Health Promotion

G

GDP	Gross Domestic Product
GH	General Hospital
GPS	Government Payroll System
GYN	Gynaecology

H

HMP	Health Master Plan
HLS	Healthy Lifestyle
HR	Human Resources
HSDP	Health Sector Development Project

I

ICU	Intensive Care Unit
IDD	In Door Dispensary
IMMR	Impatient Morbidity and Mortality Registry
IMR	Infant Mortality Rate
INGO	International Non-Governmental Organisation
INIH	Italian National Institute of Health
IPAQ	International Physical Activity Questionnaire
ISO	International Organisation for Standardisation
IUGR	Intra Uterine Growth Retardation
IV	Intra Venous

J

JASTECA	Japan Sri Lanka Technical & Cultural Association
JDC	Jewish Joint Distribution Committee
JICA	Japan International Cooperation Agency
JIT	Just in Time

K

KAP	Knowledge, Attitude, Practice

L

LBW	Low Birth Weight
LCA	Life Course Approach
LKR	Lanka Rupee
LRH	Lady Ridgeway Hospital
LSCS	Lower Segment Caesarean Section
LSRD	Lifestyle Related Diseases

M

MBNQA	Malcolm Baldridge National Quality Award
MCD	Ministry of Child Development
MDPU	Management Development and Planning Unit
MDS	Minimum Data Set
MH	Maternity Home
MO	Medical Officer
MoH	Ministry of Healthcare and Nutrition
MOH	Medical Officer of Health
MRA	Medical Research Assistant

MRI	Medical Research Institute
MRO	Medical Record Officer
MS	Medical Superintendent
MSD	Medical Supplies Division

N

NCCP	National Cancer Control Programme
NCD	Non-Communicable Disease
NCPI	National Committee for the Prevention of Injuries
NDDA	National Dangerous Drugs Authority
NG	Naso Gastric
NGO	Non-Governmental Organisation
NHP	National Health Policy
NHSL	National Hospital of Sri Lanka
NNP	National Nutritional Policy
NPS	National Productivity Secretariat
NWP	North Western Province

O

OBS	Obstetric
OD	Organizational Development
ODD	Out Door Dispensary
OPD	Out-Patient Department

P

PATH	Partnership Action on Tobacco and Health
PCU	Primary Care Unit
PDCA	Plan-Do-Check-Act
PDHS	Provincial Director of Health Services
PHI	Public Health Inspector
PHNS	Public Health Nursing Sister
PHM	Public Health Midwife
PO	Plan of Operations
PSDG	Provincial Specific Development Grant
PSU	Productivity Steering Committee
PU	Peripheral Unit

Q

QA	Quality Assurance
QC	Quality Circle
QMP	Quality Management Programme
QMT	Quality Management Team
QMU	Quality Management Unit
QMP	Quality Management Programme
QS	Quality Secretariat

R

RDHS	Reginal Director of Health Services
RG	Registrar General
RH	Rural Hospital
RMSD	Regional Medical Supplies Division
RTA	Road Traffic Accident
RTI	Road Traffic Injuries
RTIRN	Road Traffic Injuries Research Network

S

SCU	Stock Control Unit
SJGH	Sri Jayawardenapura General Hospital
SLANA	Sri Lanka Anti-Narcotic Association
SLIDA	Sri Lanka Institute of Development of

	Administration
SLSI	Sri Lanka Standard Institute
SLT	Sri Lanka Telecom
SPC	State Pharmaceutical Corporation
SPHI	Supervising Public Health Inspector
SPHM	Supervising Public Health Midwives
STD	Sexually Transmitted Diseases
STI	Sexually Transmitted Infections
SWOT	Strength, Weakness, Opportunity, Threat
T	
TH	Teaching Hospital
THK	Teaching Hospital Kurunegala
TOT	Training of Trainers
THP	Teaching Hospital Peradeniya
TQM	Total Quality Management
TSDC	Trauma System Development Committee
TS	Trauma Secretariat
U	
UN	United Nations
W	
WB	World Bank
WHA	World Health Assembly
WHO	World Health Organisation
WIT	Work Improvement Team
5S	Five Ss; Sorting, Set in Order, Shining, Standardisation, Self discipline

Chapter 1

CONCEPTUAL FRAMEWORK

Key Messages

- Communicable diseases and Non-communicable diseases are two broad classifications of health conditions. Non-communicable diseases are further sub classified into Acute NCDs (trauma) and Chronic NCDs (diabetes mellitus, cardiovascular diseases, cancer etc)
- Certain risk factors determine the probability of developing a Chronic NCD. These can be intermediate, modifiable and non modifiable. The life course approach states that certain insults during foetal life may result in high risk of chronic NCD in later life.
- The problem of chronic NCDs can be addressed at stages of health promotion, different levels of prevention and population wide and high risk approaches.
- The Haddons Matrix is a useful tool for analyzing injuries/ trauma and coming up with approaches for prevention and control.

Since November 2005, the Ministry of Healthcare and Nutrition (MoH) and the JICA Evidence-Based Management (EBM) Study Team have been collaborating on the "Prevention and Management of Non-Communicable Diseases (NCD) throughout the Course of Life". The MoH has given priority to NCD because it has exerted a heavy toll epidemiologically on the people of Sri Lanka and is an increasing burden on the health system for the past 20 years. Like everywhere in the world, NCD afflict not only the rich but also the poor. In fact, the poor people are more likely than the wealthy to develop NCD and die from them. One of the objectives of the EBM Study is to strengthen the capacity of the health system and communities in the prevention and management of NCD.

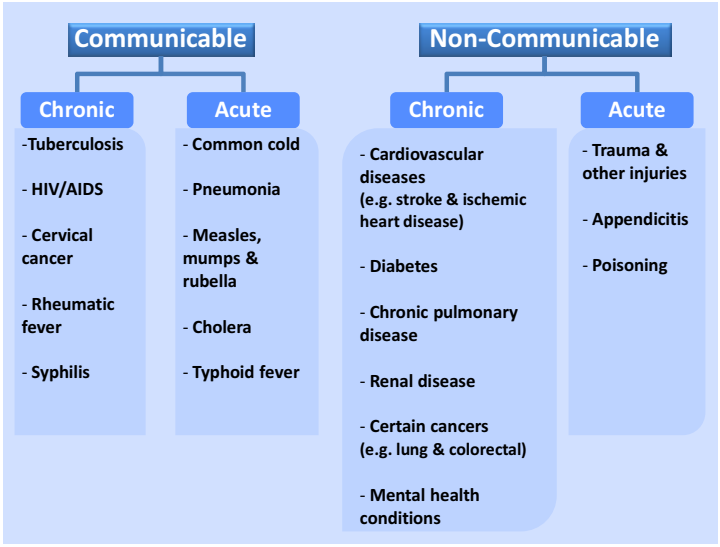

FIGURE 1- 1: HEALTH CONDITIONS – CLASSIFICATION AND EXAMPLES

Non-communicable diseases and communicable diseases – these are the two broad classifications of health conditions (**Figure 1- 1**). Communicable diseases are caused by pathogenic agents that can be transmitted from an infected host to a non-infected and susceptible one. On the contrary, NCDs are not contagious. NCDs can be further sub-classified into acute and chronic conditions. With acute diseases, the peak severity of symptoms occurs within three months of the onset of the illness while chronic diseases last longer than three months, and sometimes, for the remainder of one's life. Chronic diseases are generally characterised by uncertain aetiology, multiple risk factors, a long latency period, a prolonged course of illness, non-contagious origin, functional impairment or disability, and in most cases, incurability[1].

Chronic NCDs include diabetes mellitus, cardio-vascular diseases or CVD (e.g. coronary heart diseases, cerebro-vascular diseases), chronic obstructive pulmonary diseases, chronic renal failure and cancer. Trauma and other injuries, poisoning and appendicitis are examples of acute NCD. Injuries may then be further sub-categorised into unintentional (e.g. road traffic injuries or RTI, poisoning, falls, fires and drowning) and intentional (e.g. self-inflicted, interpersonal violence, and war).

[1] Center for Disease Control and Prevention, 1999

1.1 CHRONIC NCD

1.1.1 CAUSES OF CHRONIC NCD

A. RISK FACTORS & DETERMINANTS

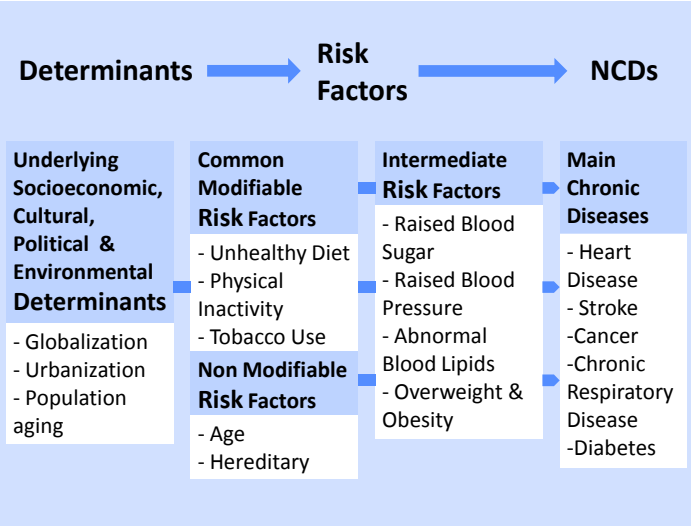

FIGURE 1- 2: NCD RISK FACTORS AND UNDERLYING DETERMINANTS[1]

In the absence of a known agent, the term risk factor is used to describe certain factors that make the likelihood of the condition/s more probable. Risk factors may be classified into intermediate, common modifiable and non-modifiable varieties **(Figure 1-2).** They are influenced by underlying determinants.
is a more detailed and comprehensive framework about the factors that influence chronic diseases. It illustrates the complex inter-linkages among the 5 clusters of risk factors and determinants. Most chronic diseases are the result of multiple causes.

A.1 NON-MODIFIABLE FACTORS

Age, sex, ethnicity, family history and genetic make up are the non-modifiable albeit significant factors.

A.2 INDIVIDUAL FACTORS

The intermediate risk factors in Figure 1-2 are also called biological risk factors or markers in **Figure 1-3**. Examples of biological risk factors are obesity, hypertension, dyslipidaemia, impaired glucose tolerance and proteinurea.
The common modifiable risk factors are sub-classified into behavioural, psychosocial and early life factors. Unhealthy behaviours such as smoking, bad dietary practices, physical inactivity and alcohol abuse are the most important factors responsible for the marked increase of chronic diseases worldwide. Health seeking behaviours may lead to early diagnosis and medication compliance may reduce premature mortality.
In addition, psychosocial factors play an important role in the development of chronic diseases. Lack of social support, social exclusion, resilience, being emotional and lack of a sense of control can contribute to this.

[1] Leowski, 2006

Low birth weight, childhood infections, fetal malnutrition, fetal alcohol syndrome, abuse, neglect and gestational diabetes can be important early life factors for the development of chronic diseases in the later life.

A.3 HEALTH SERVICES FACTORS

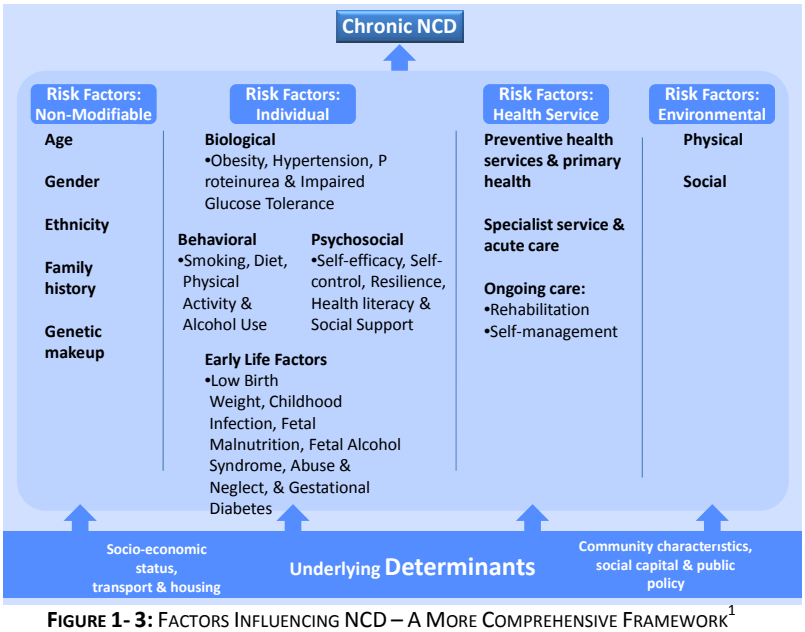

FIGURE 1- 3: FACTORS INFLUENCING NCD – A MORE COMPREHENSIVE FRAMEWORK[1]

The availability of, access to, affordability of, utilisation of, and coverage by a comprehensive and integrated health service, which includes prevention, treatment, rehabilitation or palliation, influences health outcomes. These factors are unique to the conceptual framework in **Figure 1-3**.

A.4 SOCIO-PHYSICAL ENVIRONMENTAL FACTORS

The air, water and soil pollution that occurs due to industrialization and motorization has a direct influence on chronic non-communicable diseases. Polluted air is a leading risk factor for chronic lung diseases like asthma. Various chemicals discharged by the industrial sector pollute water and soil and lead to chronic kidney disease. Work overload, lack of recreational and other facilities for the staff, lack of healthy interpersonal relationships and resources at work places cause stress and affect mental health.

A.5 UNDERLYING DETERMINANTS

Economic transition, forces of urbanization, industrialization and globalization often lead to alterations in lifestyles that promote chronic disease risk behaviours. A country with deprived or poor socio-economic conditions will certainly affect the health of pregnant mothers. Poor maternal health during pregnancy will give rise to low birth weight babies. Poor weight gain, growth retardation and childhood infections will be very common in these set ups. These

[1] National Public Health Partnership, 2001

children are more prone to arteriosclerosis and in adult life develop cardiovascular diseases. Their quality of life will be reduced with impaired function.

Advertising, marketing and food labelling are examples of commercial determinants that influence behavioural and psycho-social risk factors. On the other hand, legislation reducing the use of tobacco and alcohol is designed to protect individuals from these risk factors. For early detection, there are public policies on screening, case finding, and periodic health examinations of people at risk.

B. CUMULATIVE RISKS & LIFE COURSE APPROACH

Risk factors and determinants may lead to chronic NCD as a result of their direct influence during a specific stage of life (critical period model) or of their outcome that appears years later (critical period model with later effect modifiers). During the course of life, risk factors are amassed. Some of these factors interact with one another (accumulation of risk with correlated insults model) while others produce their own independent outcomes (accumulation of risk with independent and uncorrelated insults). These are the four conceptual models for the life course approach **(Figure 1-4).**

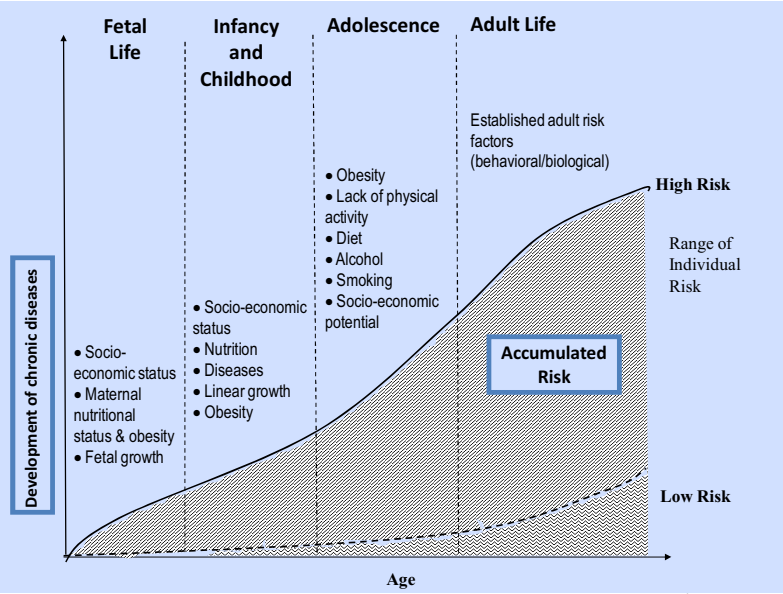

FIGURE 1- 4: LIFE COURSE APPROACH IN ANALYSING THE NCD RISK FACTORS[1]

In the 1960's chronic disease epidemiology came increasingly to focus on adult lifestyles, and interest in the childhood origins of disease waned with the identification among adults of smoking, hypertension and cholesterol as the major cardiovascular diseases risk factors. The revival of the life course approach (LCA) to chronic disease was stimulated by the work of Forsdahl who demonstrated that infancy and early childhood could increase the risk of arterioslcerotic heart diseases

[1] Adapted from Hawkes, 2004

in adult life1. He speculated that permanent damage may be caused by nutritional deficits in early life that rendered them vulnerable to chronic diseases in later life. The most influential replication of this work came from Barker and his colleagues in the United Kingdom. The Barker group interpreted their findings which resulted in the foetal origin hypothesis - prenatal influence results in the risk of chronic disease in later life.

The LCA emphasizes *social and temporal perspective*, looking back across an individual's or a cohort's life experiences or across generations for clues to current patterns of health and disease. At the same time it recognizes that both past and present experiences are shaped by the wider social, economic and cultural context. *Socio-economic conditions* throughout the life course shape adult health and disease risk. This is because health-damaging exposures or health-enhancing opportunities are socially patterned, and because an individual's response, which may modify their impact or alter the risk of future exposures, will be powerfully affected by their social and economic experience. The strength of the relationships between adult disease and socio-economic circumstances at different life stages can thus provide clues to the underlying aetiological processes.

A life course approach to health stresses the importance of *all ages and stages of life* and acknowledges the intergenerational context within which individuals exist. It recognizes temporal dimensions of health and ageing, rather than just distinct episodes of illness; it personalizes and humanizes ill health as part of a life process.

The LCA uses a multidisciplinary framework to understand the importance of time and timing in association between exposures and outcomes at the individual and population levels. Time lags between exposure, disease initiation and clinical recognition suggest that exposures early in life are involved in initiating disease processes prior to clinical manifestation.

In epidemiology, the LCA is used to study the physical and social hazards during gestation, childhood, adolescence, young adulthood and midlife that affects chronic disease risk and health outcomes in later life. It aims to identify the underlying biological, behavioral and psychological processes that operate across the life span[2]. In addition, a life course approach is being used in research on social inequalities in health, to investigate how experiences and exposures at different life stages accumulate and create the social inequalities in morbidity and mortality observed in middle and old age.

Life course epidemiology does not deny the importance of conventional chronic disease risk factors, such as smoking, diet and hypertension, which were successfully identified by the early post war adult cohort studies. Rather, its purpose is to bridge the perinatal and adult period by studying the contribution of early – life factors jointly with later life factors to identify risk and protective processes across the life course[3]**.**

[1] Waaler & Guldvog, 1999

[2] Kuh, Ben-Shlomo, Lynch, Hallquvist, & Power, 2003

[3] Fielding, Brownson, & Clark, 2005

The life course approach to NCD essentially considers NCD to result from the cumulative effect of many risk factors that act on a person since in utero.

The LCA offers an opportunity to focus on 'health' as well as specific disease processes. In terms of disease, it emphasizes health promotion, disease prevention, cure and disease management throughout life. The LCA emphasizes on primary interventions in addition to cure or palliation, which are best for a country undergoing an epidemiological transition from communicable to non-communicable diseases. It will promote a healthier nation ultimately and save on health expenditure.

Caution is required in extrapolating from the past to the present and from one place to another. However, the questions being raised are fundamental. A life course approach provides an essentially optimistic approach to health and raises questions for policy. It helps identify chains of risk that can be broken and times of intervention that may be especially effective. Particularly during key life transitions, e.g. late adolescence to early adulthood, there is a need to provide not just safety nets but springboards, which can alter life course trajectories with implications for subsequent health.

In brief, the advantages of using a life course model to study adult health are that it is interdisciplinary and integrates social and biological explanations. It also allows synthesis of other models of health and chronic disease such as the foetal origins and adult lifestyle models.

c. COMMON RISK FACTORS

There is ample evidence to demonstrate the links between the risk factors and NCD **(Figure 1-5)**. Behavioural factors like physical inactivity, unhealthy diet, tobacco use and alcohol misuse are found to be established risk factors for the development of heart diseases, strokes, diabetes and cancers. Tobacco has a direct effect on asthma while diet is taken as a possible risk factor. Mental health is mainly affected by diet, tobacco use and alcohol misuse. Injuries are directly related with physical activity and alcohol misuse.

Among the biological factors, obesity, hypertension and dyslipidemia are established risk factors for the development of heart disease and stroke. Stress is identified as a possible factor for chronic diseases and injuries, while it directly affects the mental health. Obesity and hypertension are strongly associated to mental health. Hypertension and dyslipidemia are co-morbidities of diabetes.

Other factors like social support, depression, low socio-economic status and early life factors also affect NCDs. Depression is a co- morbidity of chronic diseases while in heart disease and diabetes it is a possible risk factor as well. Early life factors and low socio economic status are established risk factors for heart disease, diabetes and mental health. On the other hand, early life factors are possible risk factors for cancers, asthma and injuries. Social support directly affects heart diseases and mental health. Low socio-economic status is a possible risk factor for asthma while it directly affects other diseases.

	Risk and Protective Factors	Chronic Diseases				Other	
		Heart Disease & Stroke	Diabetes	Cancers	Asthma	Mental Health	Injury
Behaviors	Physical Activity	•	•	•		•	•
	Diet	•	•	•	?	+	
	Tobacco use	•	•	•	•	+	
	Alcohol misuse	•		•		•+	•
Biological Risk Factors	Obesity	•	•	•		+	?
	Hypertension	•	+			+	
	Dyslipidemia	•	+				
	Chronic Stress	?	?	?	?	•	
Others	Early life factors (e.g. Low birth weight, infections, abuse and neglect)	•	•	?	?	•	?
	Social Support	•	?			•	
	Depression	?+	?+	+	+		•
	Low socio-economic status	•	•	•	?	•	•

Legend: • Established risk/protective factor ? Possible risk/protective factor
+ Association/co-morbidity

FIGURE 1- 5: INTER-RELATIONSHIPS AMONG NCDS AND RISK FACTORS[1]

1.1.2 STRATEGIES OR APPROACHES

A. LEVELS OF PREVENTION: 3+1

The 3+1 levels of prevention are primary, secondary, tertiary and primordial. The elements of a comprehensive programme are summarised in **Table 1- 1**.

Primary prevention is targeted at the population who are well. It deals with risk factors. The public health system and those providing primary healthcare are the main players in promoting healthy behaviours and environments across the life course. If the common risk factors were eliminated, it's been estimated that the following could be prevented: at least 80% of heart disease, stroke and diabetes type 2; and over 40% of cancer.

Secondary prevention is aimed at the population who are "at risk" or who are asymptomatic. It deals with the early stage of a disease. Screening of people, case finding, periodic health examinations, early interventions and controlling risk factors are examples of interventions that may be implemented by the public and primary healthcare workers to reduce the consequences in chronic disease.

Population by Stages of Disease Continuum

[1]National Public Health Partnership, 2001

TABLE 1- 1: COMPREHENSIVE MODEL OF CHRONIC NCD PREVENTION AND CONTROL[1]

	Well population	At risk	Established disease	Controlled chronic disease
Level of prevention	**Primary**	**Secondary** (Early detection & prompt treatment)	**Tertiary** (Disease management)	
Objective of interventions	Prevent movement to the "at risk" group	Prevent progression to established disease & hospitalisation	• Prevent/delay progression to complications • Prevent re-admissions	
Nature of interventions	• Promotion of healthy behaviours and environments across the life course • Universal and targeted approaches.	• Screening • Case finding • Periodic health examinations • Early intervention • Control risk factors – lifestyle and medication	• Treatment and acute care • Complications management	• Continuing Care • Maintenance • Rehabilitation • Self management
Responsible stakeholders (e.g. only)	• Public health • Primary health care • Other sectors	• Public health • Primary health care	• Primary health care • Specialist services • Hospital care	• Primary health care • Community care

Tertiary prevention is carried out for symptomatic patients to reduce disease complications and disability as well as to prevent re-admissions. Treatment and rehabilitation deal with the late stage of a disease. Patients with controlled chronic diseases should have continued care and they should be rehabilitated properly. Primary healthcare and community care are vital in this regard.

Primordial prevention is another level of prevention that is of significance to chronic NCD. It deals with risk factors beginning with change in social and environmental conditions in which these factors are observed to develop and continuing for high risk children, adolescents and young children. It also addresses underlying conditions leading to exposure to causative factors. This approach targets either the total population or a selected group.

[1]National Public Health Partnership, 2001

B. MIX OF POPULATION AND HIGH-RISK APPROACHES

Risk factors may be reduced through an appropriate combination of population wide and high risk strategies that has the potential to reduce NCD substantially within a relatively short period of time. The two approaches are complementary and synergistic, but have to be balanced to match available resources **(Figure 1-6).** Examples of population-based strategy include salt lowering, health education on blood pressure, cholesterol, overweight and individual risk reduction approach[1].

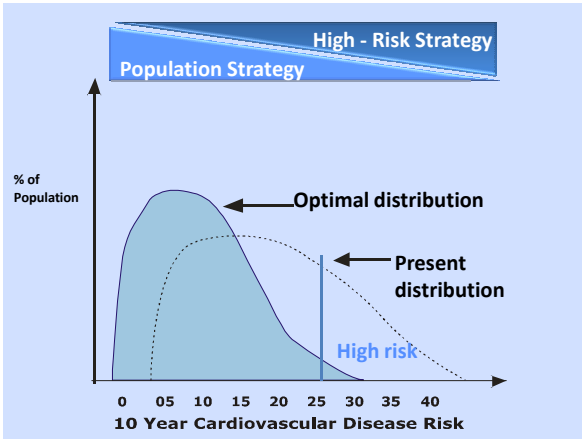

FIGURE 1- 6: MIX APPROACH TO REDUCE CARDIOVASCULAR DISEASES

In the high risk strategy, studies have shown that if all cases of hypertension (diastolic BP>=100mmHg) were detected and treated, the incidence of stroke could be reduced by 15%[2]. **Figure 1-7** shows the reduction in cardiovascular diseases by high risk approach and population approach in Scotland, New Zealand and Finland[3]. High risk approach includes secondary prevention whereas population based approach is primary prevention which includes prevention of risk factors. In Scotland from 1975 to 1994, populations based approach accounted for 60% reduction in CVD while high risk approach accounted for the rest. In New Zealand between 1982 and 1993, 54% of reduction in CVD was due to population based approach and 46% was due to high risk approach. Nearly 70% of CVD reduction in Finland between 1982 and 1997 was done through population based approach while the other 30% was through high risk approach. These results show that both population and high-risk strategies are essential for optimum results in reducing cardiovascular diseases.

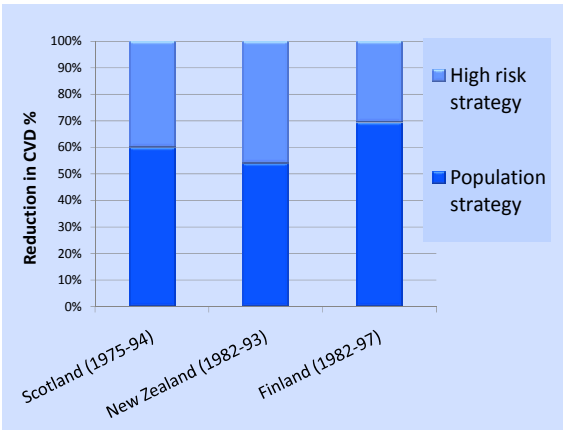

FIGURE 1- 7: POPULATION AND HIGH-RISK STRATEGY ARE COMPLEMENTARY[4]

[1] WHO,Global Strategy on Diet, Physical Activity and Health, 2004
[2] Emberson, Whincup, Morris, Walker, & Ebrahim, 2004
[3] World Bank
[4] WHO,CVD Prevention and Control, 2005

C. HEALTH PROMOTION

Health promotion is defined as "the process of enabling people to increase control over and to improve their health". The Ottawa Charter for Health Promotion identified five major strategies:

5 Major Strategies in the Ottawa Charter
- Re-orienting health services
- Community empowerment

- Re-orienting health services so that the role of the health sector would move beyond providing clinical and curative services and support the needs of individuals and communities for a healthy life and open channels between health sector and the broader social, political, economic and physical environmental components.
- Strengthening the community action focuses on community empowerment. It draws existing human and material resources in the community to enhance self-help and social support and to develop flexible systems for strengthening public participation in and direction of health matters.
- Developing personal skills so that people will have options to exercise more control over their own health and over their environment and make choices conducive to health.
- Building a healthy public policy is aimed at making the choices easier for the policy makers.
- Creating a supportive environment emphasizes on the reciprocal care of each other, communities and environment.

D. SOCIAL MARKETING

Social marketing is not entirely new to Sri Lanka as it has been applied for the control of leprosy and tuberculosis. The origin of social marketing dates back to 1969. Social marketing encompasses efforts to change public behaviour in directions that are deemed desirable by the society. It is the application of marketing techniques to increase adoption of high consensus ideas and causes. Social marketers influence positive change through the use of incentives, facilitation and promotion.

Social marketing is similar to commercial marketing as far as principles go. The four Ps- product, price, place and promotion are central to its concepts. Also, the four Cs of customer value, customer costs, customer convenience and customer communication are needed to set the four Ps. STP strategic thinking that is segmentation, targeting and positioning should precede the four Ps.

As mentioned above, 'promotion' is regarded as only one of the key concepts of Social Marketing. Therefore social marketing is a different and much broader concept than 'health promotion' and the importance of the other three Ps need to be highlighted.

1.2 TRAUMA

1.2.1 FACTORS CONTRIBUTING TO TRAUMA

A. EPIDEMIOLOGICAL MODEL TO ANALYSE TRAUMA

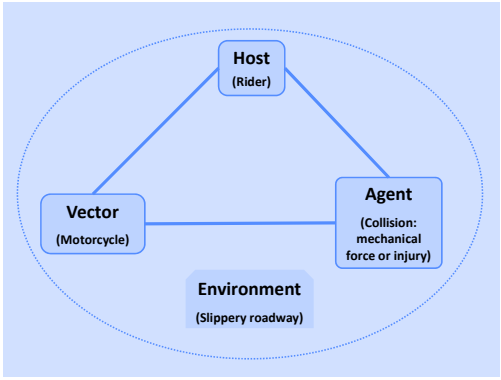

FIGURE 1- 8: FACTORS CONTRIBUTING TO TRAUMA & OTHER TYPES OF INJURIES[1]

The epidemiological model of an injury consists of a host, vector and agent **(Figure 1-8).** The host is the victim or the individual succumbing to the injury whereby the vector is the injury causing factor. In case of a road traffic accident this would be the vehicle. Agent is the mechanical force or energy by which means the injury is caused. Using a model of this sort helps to identify all the factors involved in an injury. For example, in a motorcycle collision, the host would be the rider, the vector would be the motorcycle and the agent would be collision for that was the mechanical force which brought about the injuries. A model of this sort could help think and identify where one could intervene to prevent such injuries from happening.

B. INJURY SPECTRUM

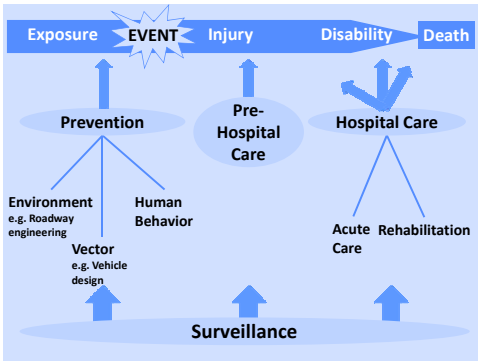

FIGURE 1- 9: USING THE INJURY SPECTRUM TO ANALYSE THE FACTORS CONTRIBUTING TO TRAUMA[2]

The injury spectrum is a useful device for analyzing injuries **(Figure 1-9)**. The injury spectrum maps an injury over time, starting with the host's exposure to hazard, followed by the event, through to the occurrence of the injury and finally the possible resultant disability and /or death. The injury spectrum helps people to think about what happened in a particular case and how interventions might have prevented the injury from happening or reduced the damage.

C. HADDON'S MATRIX

The Haddon's Matrix was designed by William Haddon, Jr. in 1970 as a tool for analyzing an injury event. It combines the features of the injury model and injury spectrum and allows simultaneous consideration of both the factors (i.e. host, vector, and environment) and the stages, over time, of an event.

[1] Holder, Peden, Krug, Lund, Gururaj, & Kobusingye, 2004
[2] Ibid

As shown in the Haddon's Matrix **(Table 1- 2**), there are three phases of the time sequence of a crash event- pre crash, crash and post crash. Crashes can be prevented by interventions on the human factor, vehicles and equipment, and environment. The injuries that occur during the crash can also be prevented by intervening on the same three factors. Finally, the post-crash events can be prevented by intervening similarly. The matrix can be used to analyze any type of injury event and to identify interventions that might prevent such an event from happening again or that might reduce the harm done.

TABLE 1- 2: USING THE HADDON'S MATRIX TO ANALYSE THE FACTORS CONTRIBUTING TO A MOTOR VEHICLE COLLISION[1]

	Human (host)	Vector	Physical environment	Socio-economic environment
Pre-event	Substance misuse, poor driving habits	Faulty brakes, bald tyres	Slippery road due to rain	Social acceptance of high levels of alcohol use by males
Event	Not wearing seat belt	No airbag	Tree too close to the road	Ineffective enforcement of offences against driving under the influence of alcohol
Post-event	Elderly man, pre-existing medical condition		Slow emergency response, poor rehabilitation programme	Little help for reintegrating rehabilitation patients into society

1.2.2 APPROACHES TO TRAUMA PREVENTION & CONTROL

A. SYSTEMS APPROACH

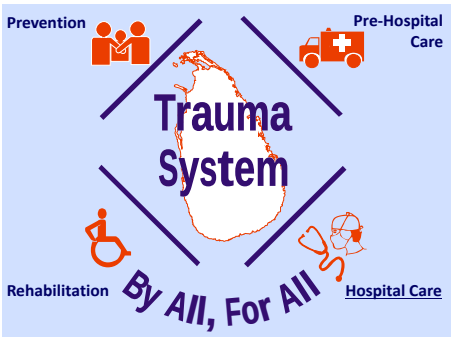

FIGURE 1- 10: LOGO OF THE TRAUMA SECRETARIAT

A trauma system is an organized system which has the essential components of an integrated and comprehensive trauma care. It is set up by integrating Prevention, Pre-hospital care, Hospital care and rehabilitation into one system **(Figure 1-10)**. Such a system, if functioning well would be able to provide optimal care to injured patients as it includes all the services in the continuum of injury care. In order to achieve the maximum benefits there should be co-ordination at all levels of the system. This would ensure high standards along with guarantee of sustainability of the system. Effective trauma systems improve both the

[1]Holder, Peden, Krug, Lund, Gururaj, & Kobusingye, *op. cit.*

process and outcome of care as well as bringing down injury occurrence through organized surveillance and prevention efforts.

B. SAFE COMMUNITY APPROACH

A safe community is a community that promotes injury prevention activities at the local level to solve local highway and traffic safety and other injury problems. It is a WHO concept that recognizes safety as a "universal concern and a responsibility for all".

Safe communities have the following elements:

- Incorporation of the essentials of prevention, acute care, and rehabilitation systems into a comprehensive injury control system;
- A coalition/task force that is comprehensive and community based comprising of representatives from various lines of profession;
- Comprehensive problem identification and estimation techniques to determine the economic cost associated with traffic related fatalities and injuries within the context of the total injury problem;
- Program assessments from a "best practice" and prevention perspective to determine gaps in highway and traffic safety and other injury activity;
- Implementation of a plan with specific strategies which address the problems and program deficiencies through prevention and countermeasure activities; and
- Evaluation to determine the impact and cost benefit, where possible.

The Safe Community programme was initiated in Sweden by the WHO Collaborating Centre on Community Safety Promotion at the Karolinska Institute of Social Medicine[1]. The first Safe Community programme came into reality in 1983-1984 at "Lidkoping", Sweden, with 37,000 residents. Several activities were carried out to promote safety among the following population subgroups:

- Children (0-14 years);
- Youth (15-24 years);
- Adults (25-64 years); and
- Elderly (65+ years).

Objectives of the Community Safety Promotion in Sweden

- Promotion of safety/prevention of home & traffic accidents
- Safety promotion in sports
- Violence prevention

The programme in Sweden was evaluated for its efficacy and cost effectiveness through a surveillance programme, and the data was collected in the hospital of the area, three local care centres and two dental care centres.

Safe Community model was tried at Macleay Hastings, Gundagai and Kiama - all located in North South Wales, Australia. At the local community level in each of the three trial safe communities, a "Program Advisory Coalition" which consisted of a variety of stakeholders was formed. Some of the priority areas identified by all

[1] Karolinska Institute, 2006

three trial communities were road safety, work safety, fall injury prevention in older people, sports safety, burns and scalds prevention, farm safety and home safety.

In most instances, non-fatal injuries are far greater in number and represent greater overall costs than fatalities. Using and linking data from multiple sources helps a community in fully understanding the extent of its injury problems. Having a systems approach and providing accessible and appropriate care to all patients regardless of the nature and severity of the injury is important. One must ensure that all three system components continually work with each other. Citizen involvement and input is crucial. Safe communities control their programs and associated budgets; they are not dependent upon a federal budget and receive a portion of their funds from within the community itself. This type of model has been proved to be very successful due to the following reasons:

- A community is able to define its own problems and work towards solutions;
- Efforts towards injury prevention and safety promotion are coordinated at a regional level;
- Raises public awareness;
- Ensures the participation of community interest groups; and
- Creatively mobilizes local community members to action.

1.3 SURVEILLANCE

Surveillance is an ongoing systematic collection, analysis, and interpretation of health data that are essential to identify clusters of diseases or health conditions for planning, implementation, and evaluation. It is a chain of events that includes gathering information, reasoning, decision making and action **(Figure 1-11)**. Information has to be gathered first, using the appropriate methods to establish a proper surveillance system. Through investigations and research programmes, the collected data could be analysed to identify the reasons. Afterwards the decisions are made on the final outcome and are put into action to obtain the objectives of the surveillance. But that is end of the system. During the surveillance, the modifiable factors are identified and additional data may then be re-gathered.

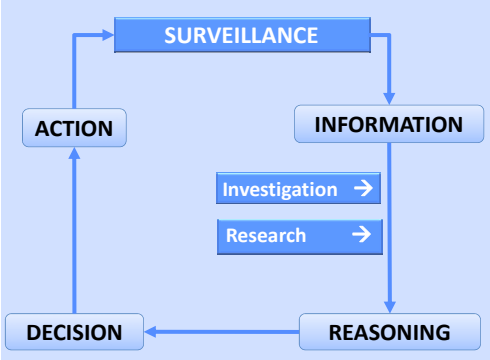

FIGURE 1- 11: SURVEILLANCE IS INFORMATION FOR DECISIONS & ACTIONS[1]

Surveillance must be closely integrated with the timely dissemination of these data to the appropriate audiences. The final link in the surveillance chain is the application of surveillance findings to the disease prevention and health promotion programme. Hence, surveillance is for action and not merely for data collection or information generation.

There are at least 3 types of surveillance. In passive surveillance, data is collected solely from unsolicited source reports, and are used to detect a change or trend in the health of a population**.** Active surveillance involves direct solicitation of data from others. The data is used for the same purpose as the passive surveillance. Sentinel surveillance is a monitoring method that employs a surrogate indicator from a "sentinel site" for a public health problem, thus, allowing estimation of the magnitude of the problem in the general population.

The characteristics of a good surveillance system:

- Addresses health events of public importance;
- Are amenable (responsible, answerable) to practical control and prevention;
- Identifies and classifies a large proportion of target health events;
- Reflects the distribution of events over time (hour, day, month, year of occurrence), place (home, street, district, province of occurrence), and person (age, gender, occupation);
- Clearly defines the health events;
- Has a clear path of data flow;
- Is based on adequate knowledge of the population under surveillance;
- Employs appropriate methods for information handling;

[1] Santikarn, 2006

- Leads to meaningful & effective actions;
- Uncomplicated;
- Adaptable;
- Engenders participation;
- Rapid; and
- Requires minimal resources.

A surveillance system is not entirely a new field to Sri Lanka. There is already an example of a well-established surveillance system for communicable diseases. In this system there is a list of the communicable diseases that are notifiable. When doctors encounter patients with these diseases, the MOH offices are notified. These patients are investigated by PHIs in the field and the findings are reported back to the MOH. Weekly returns are sent to the Epidemiology Unit.