



The
MAURITIUS
RESEARCH COUNCIL

NEEDS ASSESSMENT ON NEUROLOGICAL
REHABILITATION SERVICES
IN MAURITIUS

Report

ACKNOWLEDGEMENTS

This study was carried out in collaboration with the following institutions:

- **Ministry of Health and Quality of Life**
- **Ministry of Social Security, National Solidarity and Reform Institutions**

TABLE OF CONTENTS

List of Tables	viii
List of Figures	ix
List of Pictures	ix
List of Boxes	ix
I) PREFACE	x
II) INTRODUCTORY NOTE FROM DRs SOOPRAMANIEN AND SOHUR	xi
III) EXECUTIVE SUMMARY.....	xiii
Chapter One: BACKGROUND, RATIONALE AND SCOPE OF STUDY	1
1.1 Background & Significance: A Summary	1
1.2 Rationale.....	1
1.3 Defining the neurological conditions and services investigated	2
1.3.1 Stroke: A definition.....	2
1.3.2 Traumatic Brain Injury: A definition.....	3
1.3.3 Spinal Cord Injury: A definition.....	3
1.3.4 Neurological Rehabilitation	3
1.4 Aims & Objectives of the Study	4
1.5 Medium to Long-Term Vision for Enhanced Neurological Rehabilitation in Mauritius	5
1.6 Research Questions for the Needs Assessment	5
1.7 Scope & Framework of the Needs Assessment	5
Chapter Two: METHODOLOGY.....	6
2.1 Study Type	6
2.2 Study Design.....	6
2.3 Target groups.....	7
2.3.1 Health Professionals.....	7
2.3.2 Patients (Stroke, TBI, SCI) & their relatives	7
2.3.3 Criteria for inclusion or exclusion of participants	7

2.4	Data Collection Instruments used	7
2.4.1	Data Collection for chapter on the Mauritian Context	8
2.4.2	Data Collection for chapter on Descriptive Statistics on Stroke, SCI and TBI	8
2.4.3	Data Collection for chapter on Hospital Service Providers	8
2.4.4	Data Collection for chapter on Human Resources & Training Opportunities	9
2.4.5	Data Collection for chapter on Residential & Home-Based Care	10
2.4.6	Data Collection for chapter on Patient Interviews	10
2.5	Ethical Issues.....	11
2.6	Strengths of the Study	11
2.7	Limitations of the Study	12
 Chapter Three: THE MAURITIAN CONTEXT		14
3.1	Organization and Management of Health Services	14
3.2	The Mauritian Health Care System	14
3.2.1	Health Sector (Public) Services	15
3.2.2	Private Sector Services.....	16
3.2.3	Human Resources for Health in Mauritius.....	16
3.3	The Mauritian Demographic Context.....	16
3.3.1	The Mauritian Epidemiological Context	17
3.4	The Mauritian Social Policy Context.....	18
3.4.1	Organization and Management of Welfare Services	18
3.4.2	The Disability Unit at the Ministry of Social Security.....	19
3.4.3	The Medical Unit at the Ministry of Social Security	19
3.4.4	Services offered by the Ministry of Social Security:	19
	3.4.4.1 Carer's allowance.....	19
	3.4.4.2 Assistive devices	19
	3.4.4.3 Other Financial Support.....	19
3.5	Mauritian Policy on Accessibility for the Disabled	20
3.5.1	The UN Convention on the Rights of Persons with Disabilities	20
3.5.2	Policy Implications for Stroke, TBI and SCI cases	22
 Chapter Four: DESCRIPTIVE STATISTICS ON STROKE, TBI AND SCI		23
4.1	Measuring Health: some definitions.....	23

4.2	Stroke.....	23
4.2.1	Comparing Stroke Prevalence, Incidence and Fatality Rates.....	25
4.3	Traumatic Brain Injury	25
4.3.1	Comparing TBI Prevalence, Incidence and Fatality Rates.....	26
4.4	Spinal Cord Injury	27
4.5	Information Gathering System	28
4.6	Classification Methodology used for TBI, SCI & Stroke in Mauritius	28
4.6.1	TBI Classification.....	29
4.6.2	SCI Classification.....	29
4.6.3	Stroke Classification.....	29
4.7	Data Gathering Systems in Medical Institutions.	30
4.7.1	Reliability and Validity of the Quantitative Data obtained.....	30
4.7.2	Human Error: Doctor's Diagnosis.....	31
4.7.3	Definition of Stroke by Medical Specialists.....	31
4.7.4	Definition of SCI by Medical Specialists	31
4.7.5	Definition of TBI by Medical Specialists.....	32
4.7.6	Coding Error and Bias: Application of the ICD 10 Classification System in Public Regional Hospitals	32
Chapter Five: HOSPITAL SERVICE PROVIDERS		34
5.1	Hospitals.....	34
5.1.1	Specialised Human Resources per hospital.....	34
5.1.2	Acute Care provided to Stroke, TBI and SCI patients	35
5.1.3	Neurological Rehabilitation Services provided	36
5.1.4	Post-Discharge Care	37
5.1.5	Comments and Recommendations on Rehabilitation Services offered in Regional Hospitals:.....	38
5.2	Medical Specialists.....	38
5.2.1	Involvement with Stroke, TBI and SCI Patients	39
5.2.2	Patient Journey Stroke, TBI and SCI cases in Public Regional Hospitals.....	39
5.2.3	Patient Journey for Stroke, TBI and SCI cases in one Private Institution.....	40
5.2.4	Post-Discharge Care & Follow-up in both the Public and Private Sector.....	41

5.2.5	Neurological Rehabilitation services offered in both Public and Private Institutions according to Medical Specialists	41
5.2.6	Issues identified and solutions suggested in the Provision of Neurological Rehabilitation Services	42
5.2.7	Additional Comments and Recommendations on Services Provided.....	43
5.3	Rehabilitation Nurses	44
5.3.1	Involvement with Stroke, TBI and SCI Patients	44
5.3.2	Comments and Recommendations on Services Provided	45
5.4	Physiotherapists	45
5.4.1	Involvement with Stroke, TBI and SCI Patients	46
5.4.2	Comments and Recommendations on Services Provided	48
5.5	Occupational Therapists.....	49
5.5.1	Involvement with Stroke, TBI and SCI Patients	49
5.5.2	Comments and Recommendations on Services Provided	51
5.6	Speech and Language Therapists	52
5.6.1	Involvement with Stroke & TBI Patients	52
5.6.2	Comments and Recommendations on Services Provided	53
5.7	Clinical Psychologists.....	54
5.7.1	Psychological services offered in the institution.....	54
5.7.2	Involvement with Stroke, TBI and SCI Patients	54
5.7.3	Comments and Recommendations on Services Provided	54
 Chapter Six: HUMAN RESOURCES AND TRAINING IN NEUROLOGICAL REHABILITATION		55
6.1	Human Resources available for Neurological Rehabilitation	55
6.2	Local Training Institutions	56
6.2.1	Mauritius Institute of Health	56
6.2.2	Past training offered in collaboration with MIH.....	57
6.2.3	Apollo-Bramwell Nursing School.....	57
6.2.4	The University of Mauritius	58
 Chapter Seven: HOME-BASED AND RESIDENTIAL CARE.....		59
7.1	Community Based Rehabilitation Programme (CBRp)	59
7.1.1	Scope of services offered by CBRp branches:	59

7.1.2	Services offered to Stroke, SCI & TBI Patients.....	59
7.1.3	Equipment found in patient homes	60
7.1.4	Unmet Needs of Patients	61
7.1.5	Services offered by Non-Governmental Organisations	61
7.1.6	Observations and Recommendations	61
7.2	Other Home Visits provided by the Government.....	62
7.3	Foyer Trochetia.....	62
7.3.1	Organisation and Management of services.....	63
7.3.2	Scope of services provided	63
7.3.3	Equipment.....	64
7.3.4	Human Resources.....	64
7.3.5	Profile of Residents.....	64
7.3.6	Observations.....	65
7.4	Leonard Cheshire Home in Pierrefonds.....	66
Chapter Eight: PATIENT INTERVIEWS		67
8.1	Traumatic Brain Injury patients.....	67
8.1.1	Scope and Quality of Medical Services Received.....	67
8.1.2	Scope and Quality of Post-Discharge Care Received.....	68
8.1.3	Observations and Recommendations	68
8.2	Spinal Cord Injury patients.....	68
8.2.1	Scope and Quality of Medical Services Received.....	69
8.2.2	Scope and Quality of Post-Discharge Care Received.....	69
8.2.3	Observations and Recommendations	69
8.3	Stroke patients	70
8.3.1	Scope and Quality of Medical Services Received.....	70
8.3.2	Scope and Quality of Post-Discharge Care Received.....	70
8.3.3	Observations and Recommendations	71
Chapter Nine: REFLECTIONS AND COMMENTS ON FINDINGS BY DR A SOOPRAMANIEN (AS)		73
9.1	Comments received on Chapter 3: “The Mauritian Context”	73
9.2	Comments received on Chapter 4: “Descriptive Statistics on Stroke, TBI and SCI”	73

9.3	Comments received on Chapter 5: “Hospital Service Providers”	74
9.4	Comments received on Chapter 6: “Human Resources and Training in Mauritius”	74
9.5	Comments received on Chapter 7: “Home-Based and Residential Care”	75
9.6	Comments received on Chapter 8: “Patient Interviews”	75
Chapter Ten: VALIDATION WORKSHOP & WAY FORWARD		76
10.1	Objectives of the Workshop.....	76
10.2	Issues discussed: A Summary.....	76
10.2.1	Some of the Institutions and individuals present:	77
10.3	Output of Workshop: Main Issues identified.....	77
10.3.1	Training in Neurological Rehabilitation.....	77
10.3.2	Infrastructure for post acute care	77
10.3.3	Removal of architectural barriers	77
10.4	Policy Recommendations by Drs Soopramanien and Sohur	77
10.4.1	In hospitals.....	78
10.4.2	In patients’ homes.....	78
10.4.3	For easier re-integration of disabled people into society.....	79
10.4.4	Encourage monitoring, evaluation and research in this particular area.....	79
10.5	Way Forward.....	79
10.6	Concluding Remarks by Drs Soopramanien and Sohur.....	80
References		81

LIST OF TABLES

Table 1	Road Accidents disaggregated by casualties, fatalities and serious injuries
Table 2	Specific Death Rate by year for Stroke
Table 3	Period Prevalence and Incidence by year for Stroke
Table 4	Specific Death Rate by year for TBI
Table 5	Period Prevalence and Incidence by year for TBI
Table 6	Specific Death Rate by year for SCI
Table 7	Period Prevalence and Incidence by year for SCI
Table 8	ICD 10 Codes used by Regional Hospitals
Table 9	ICD 10 Codes not used to compile information on SCI, TBI and Stroke
Table 10	Specialised Human Resources in Medical Institutions
Table 11	Institutions believed to provide Neurological Rehabilitation services according to Medical Specialists
Table 12	Issues found in Neurological Rehabilitation services and solutions put forward by Medical Specialists
Table 13	Equipment and facilities available to Physiotherapists for Neurological Rehabilitation
Table 14	Equipment and facilities available to Occupational Therapists for Neurological Rehabilitation
Table 15	Equipment and facilities available to Speech and Language Therapists for Neurological Rehabilitation
Table 16	Human resources available in Mauritius vs the UK/US model
Table 17	Training and further education courses offered by MIH (2010)
Table 18	Home Equipment and facilities available in Patient homes
Table 19	Medical Profile of Residents at Foyer Trochetia, in August 2010

LIST OF FIGURES

Figure 1	Scope of Needs Assessment on Neurological Rehabilitation Services
Figure 2	Deaths by ICD 10 Chapter
Figure 3	No. of Stroke Deaths recorded by year on the island of Mauritius, disaggregated by Age & Sex
Figure 4	Stroke Period Prevalence, Incidence and Fatality Rates for 2005-2009
Figure 5	No. of TBI Deaths recorded by year on the island of Mauritius, disaggregated by Age & Sex
Figure 6	TBI Period Prevalence, Incidence and Fatality Rates for 2005-2009
Figure 7	Health Data Gathering System
Figure 8	General Patient Journey for SCI, TBI and Stroke in Public Regional hospitals
Figure 9	Total Number of Neurological Conditions found in September 2010

LIST OF PICTURES

Picture 1	(Public) Health Care Services in Mauritius
Picture 2	Foyer Trochetia (seen from outside) in Petit Verger, Pointe-aux- Sables
Picture 3	Foyer Trochetia (seen from outside) in Petit Verger, Pointe-aux- Sables
Picture 4	Specially Adapted toilet
Picture 5	Specially Adapted shower
Picture 6	Washing Bed
Picture 7	Tilt bed & Ice Machine
Picture 8	Wheelchairs
Picture 9	CP Machine

LIST OF BOXES

Box 1	Formulae for Incidence, Prevalence and Fatality Rate
--------------	--

I) PREFACE

Further to the request by Drs Anbananden Soopramanien¹ and Shivraj Sohur², the Mauritius Research Council (MRC) conducted and funded a “Needs Assessment on Neurological Rehabilitation Services in Mauritius”.

This study was carried out in close collaboration with the Director General of Health Services, Dr Neerunjun Gopee, from the Ministry of Health and Quality of Life and with the help of the Medical Unit within the Ministry of Social Security, National Solidarity and Reform Institutions, to whom we are most grateful for their support.

I would like to take this opportunity to also thank all the MRC staff for their contribution to this study, in particular Dr Nitin Gopaul, who coordinated our endeavours, Mr. Gareth White who wrote this report, Dr Harris Neeliah and Mr. Aveeraj Peedoly who provided important advice, as well as Mrs Mitzy Jean-Julie and Mrs Vanessa Patten-Ramen, who both provided administrative support.

We are pleased to submit our report which bears testimony to the fact that the future capacity of our country to innovate lies in cross-institutional collaboration.

Dr Arjoon Suddhoo
Executive Director

Mauritius Research Council

September 2011

¹ Dr Soopramanien is currently based at the Glenside Neuro-Rehabilitation Hospital, Salisbury, UK.

² Dr Sohur is based at the Department of Neurology, Massachusetts General Hospital – Harvard Medical School, Center for Nervous System Repair, Boston, US.

II) INTRODUCTORY NOTE FROM DRs SOOPRAMANIEN AND SOHUR

During private trips to Mauritius we separately came to the conclusion that facilities for neurological rehabilitation were not optimal. Our impression was that people who had had Stroke, Spinal Cord Injury and Traumatic Brain Injury, did not have access to appropriate rehabilitation care.

In Mauritius there have been notable advances in both diagnosis and treatment, with new diagnostic technologies such as MRI and CT scanners, and sophisticated new surgical techniques, such as cardiac surgery. However it appeared that there was a significant discrepancy between these advanced specialized health care services and the services available for long-term care including the facilities required to deal with the consequences of neurological insult.

It is a fact that Neurological insult often results in difficulties with a patient's motor power, sensation, continence, and/or speech. To deal with these issues in the most effective and coordinated way, a multi-disciplinary team is required where team members provide specialist input. Such care teams are usually led by a consultant physician (who is a neurological rehabilitation specialist), and would comprise: specialist physiotherapists, occupational therapists, speech and language therapists, clinical psychologists, and may also include non-clinical staff providing practical and logistical support. The methodology is highlighted in a film that Dr Soopramanien has produced on spinal cord injury rehabilitation that can be viewed online www.spinalinjurycentre.org.uk/outreachvideo.

As members of the Mauritian Diaspora and as part of our service back to our country, we have submitted a fact-finding proposal entitled "Needs Assessment for Neurological Rehabilitation" to the Mauritius Research Council (MRC) in June 2009. In a nutshell, this proposal set to establish the:

- Incidence and Prevalence of Stroke, Spinal Cord Injury, and Traumatic Brain Injury in Mauritius,
- Types of services and public infrastructure available for patients needing neurological rehabilitation,
- Typical patient journey through the system,
- Types of neurological rehabilitation professionals we have on the island,
- Existence of specific training programs available in this area.

We are grateful to Dr. A Suddhoo, Executive Director and Dr. N Gopaul, Research Coordinator, both from the Mauritius Research Council who helped by liaising with the Ministry of Health and Quality of Life (Dr. N Gopee). Together they appointed a researcher, Mr. G White, who wrote this report, and Dr. H Reesaul, who acted as project liaison with public hospitals. They also obtained the help of the Ministry of Social Security National Solidarity and Reform Institutions. Collectively, they helped us to answer many of our queries. We have incorporated our comments and recommendations to their report.

It is important to note that this report would be the first step in the direction of our Medium to Long-term vision for enhanced neurological rehabilitation in Mauritius and would include:

- the creation of a neurological rehabilitation care centre,
- funding research for implementation of the latter,
- training programs abroad for health professionals in neurological rehabilitation care
- visits from professionals from the Western hemisphere (or other countries) to Mauritius, for continued improvement in neurological rehabilitation care.

III) EXECUTIVE SUMMARY

During private trips to Mauritius, Drs Sohur and Soopramanien, two members of the Mauritian Diaspora, separately came to the conclusion that facilities for neurological rehabilitation were not optimal. Their shared impression was that people who had had a Stroke, Spinal Cord Injury (SCI) or Traumatic Brain Injury (TBI), did not have access to appropriate rehabilitation care.

Based on personal observations and anecdotal evidence, they devised a research proposal for a Needs Assessment on Neurological Rehabilitation Services which they shared with the Mauritius Research Council (MRC). The underlying hypothesis of this document was that there was an unmet need for such services in Mauritius.

The overall objective of this proposal was to obtain qualitative and quantitative information relating to the potential gaps in Neurological Rehabilitation Care in Mauritius. It focused on the following elements and themes:

- Incidence/Prevalence of Stroke, SCI and TBI,
- Types of services and infrastructure available for patients in need of Neurological Rehabilitation,
- Quality of long term care provided to patients with severe Neurological Disease,
- The Patient's Journey,
- Human Resources available in the country for provision of Neurological Rehabilitation,
- Specific training programmes available in this area,
- Architectural Barriers for persons with disabilities.

As per the proposal, it was agreed that the findings of this exercise would inform the basis for a medium to long-term vision of Mauritian Neurological Rehabilitation, in the years to come. The main elements of this vision include:

1. A focused effort towards the creation of a neurological rehabilitation care centre,
2. Funding search for implementation of the above,
3. Training programs abroad for local health professionals in neurological rehabilitation care,
4. Visiting professionals from the Western hemisphere (or other countries) visiting Mauritius for continued improvement in neurological rehabilitation care.

The MRC sought advice and support from the Ministry of Health and Quality of Life in this endeavour. It also enlisted the help of the Ministry of Social Security, National Solidarity and Reform Institutions. The result of this collaboration was a cross-sectoral effort which encompassed the following disciplines: Medicine, Epidemiology, Social Policy and Health Services Research. This effort also resulted in an innovative pooling of resources which greatly benefitted this project.

The chosen approach for the Needs Assessment on Neurological Rehabilitation Services in Mauritius is based on the established Health Needs Assessment (HNA) approach. The study was

thus designed as a fact finding exercise which would examine quantitative information on SCI, TBI and Stroke, and qualitative information from patients as well as providers of health care services in Mauritius.

The starting point for this research exercise was the desk review carried out on the neurological conditions mentioned previously, the actual field of neurological rehabilitation and the current Health and Social Policy contexts in Mauritius. Questionnaires were then designed and administered to patients and Hospital Service Providers which included Medical Specialists, Occupational Therapists, Physiotherapists, Clinical Psychologists, Speech and Language Therapists, Nurses, Hospital Administrators and Community Rehabilitation Programme Officers. Requests for data on TBI, SCI and Stroke and related services were also sent to the Medical and Dental Council, the Ministry of Health and Quality of Life, the Ministry of Social Security and National Solidarity and Reform Institutions, training institutions and the Private Sector. This overall process started in March 2010 ended in March 2011.

A major limitation encountered during the process was the lack of information obtained from the Private Sector. The only exceptions were Fortis Clinique Darné and the Apollo-Bramwell institutions, which did share some information with the MRC. The International Classification of Disease (ICD-10) coding system, universally used to compile data on diseases, was also found to be quite unreliable for TBI, SCI and Stroke data. As such, the figures for Incidence, Prevalence and Fatality rates discussed in this report can be viewed as official estimates rather than as completely accurate numbers.

Observations & Findings

The main findings of the Needs Assessment were as follows:

1. It was established that Mauritius has successfully discarded the burden of Communicable Diseases, but transitioned demographically and epidemiologically into an era of rising Chronic Non-Communicable Diseases (CNCDs) and the closely correlated health challenges of an ageing population. Brought about by rapid socio-economic changes, unhealthy life-styles and poor nutrition, these include Diabetes Mellitus, Cardiovascular conditions, Hypertension, Cerebrovascular diseases, Cancer (Malignant Neoplasms) and Mental Illnesses. In addition to diseases, the other main determinant of deaths, chronic and disabling conditions in Mauritius, are road traffic accidents. For the 2000–2009 period, the average number of car accidents per year was 19,725, resulting in 3054 casualties and 144 deaths per year.
2. It is important to note that the Mauritian government adopted the “UN Standard rules on the regulation on the Equalisation of Opportunities for the persons with disabilities” and ratified the UN Convention on the Rights of Persons with Disabilities, in early 2010.
3. A total of 4109 people died from a Stroke from 2005 to 2009. This represented 26.5% of all deaths recorded from diseases of the Circulatory System in Mauritius, during that same period. Men were slightly more likely to die from a Stroke than women. The total number of

individuals receiving inpatient treatment for a Stroke in public medical institutions from 2005 to 2009 (including re-admissions and deaths) was 9,502. The number of such inpatients during that period ranged from 1,992 to 2,029, a year. Those aged 60 and above represented 66.5% of such inpatients recorded, followed by those aged 40 to 59, with 30.2%. The fatality rate among such inpatients ranged from 9.4% to 27.23% and averaged 20% over these 5 years.

The Period Incidence rate for Stroke ranged from 300.6 to 622.9 per 100,000 while the Period Prevalence rate ranged from 352.1 to 882.6 per 100,000. The Period Prevalence and Incidence of Stroke peaked in 2005. Both were at their lowest in 2008. The reasons for such low rates during that year are unclear. However, it is important to note that the Fatality Rate was at its highest on that same year and appeared to be at its lowest in 2005. This would thus suggest that there is an inverse correlation between the Period Incidence & Prevalence and the Fatality rates observed from 2005 to 2009.

4. A total of 237 people died from TBI starting in 2005 to 2009. The number of deaths for this period ranged from 37 to 62. The average number of deaths per year was 43. Men were almost five times more likely to die of a TBI than women. Those aged 40 to 59 represented 29% of the total number of TBI deaths recorded and was the largest group within the total number of TBI deaths recorded. The total number of individuals receiving inpatient treatment for a TBI in public medical institutions from 2005 to 2009 (including re-admissions and deaths) was 1591. The number of such inpatients during that period ranged from 186 to 404 cases, a year. The proportion attributed to those aged 40 to 59 was 33.4% while 32.1% was attributed to those aged 20 to 39. The fatality rate among such inpatients ranged from 4% to 14.6% from 2005 to 2009.

The Period Incidence rate for TBI ranged from 95.3 to 216.8 per 100,000 while the Period Prevalence rate ranged from 98.8 to 233.7 per 100,000. The Period Prevalence and Incidence of Stroke peaked in 2006 and 2007. Both were at their lowest in 2008. The Fatality Rate for TBI was at its lowest in 2006 but increased steadily to reach its highest point in 2009. The reasons for such fluctuations in these rates are unclear since the underlying causes of TBI admissions were unavailable. However, one can assume that the increasing number of TBI fatalities is linked to the parallel increase in the degree of severity of road traffic accidents recorded during the 2005 to 2009 period, as seen in chapter three.

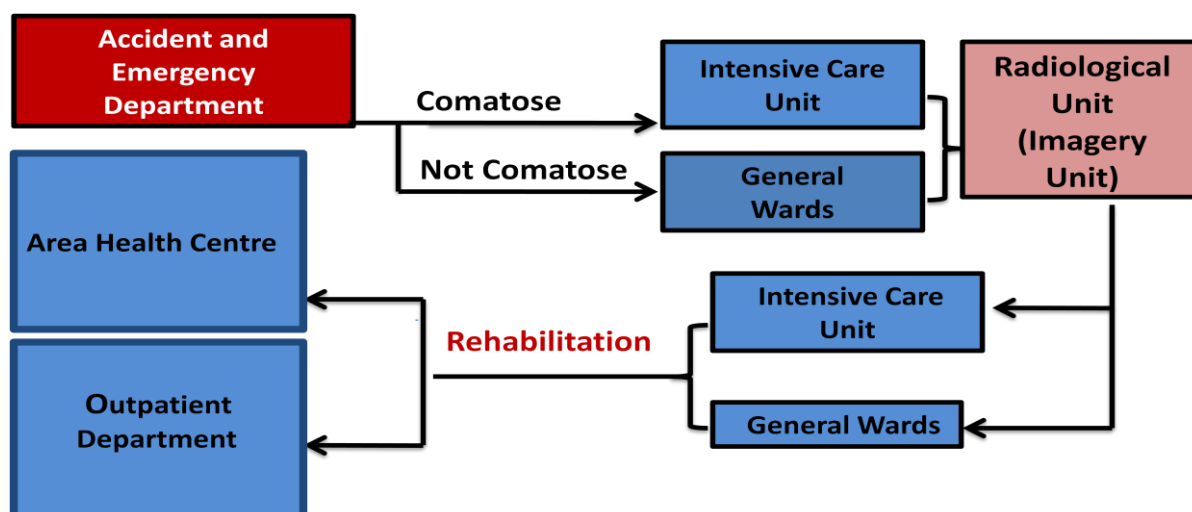
5. A total of 13 people died from SCI from 2005 to 2009. The total number of patients receiving inpatient treatment for a SCI in public medical institutions during that period (including re-admissions and deaths) was 125. The number of such inpatients during that same period ranged from 20 to 29, per year.

Men were almost two and half times more likely to be affected by this condition than women. Those aged 60 and above represented 27% of cases recorded while those aged 20 to 39 represented 29%. The most affected were those aged 40 to 59 with 37%. The Period Incidence rate ranged from 8.8 to 16.8, while the Prevalence rate ranged from 11.7 to 17.4, per 100,000 population, respectively. Table 9 from Chapter 6, below, shows the information obtained regarding the availability of relevant Human Resources and compares these results with the pre-requisites for a basic multi-disciplinary team in Neurological

Rehabilitation in more developed countries. The problems highlighted in this table are compounded by the scarcity of neuro-rehabilitation expertise. As of 2009, there were 1,500 doctors in the Republic of Mauritius (inclusive of other islands such as Rodrigues, St Brandon etc), working both in the public and private sectors. However, there are only 4 medical specialists in rehabilitation (and allegedly none who has specialised in neurological rehabilitation), 17 physiotherapists employed by the government and 33 assistants. Based on our interviews, the current Physiotherapists see on average 200 patients per day and thus have to delegate care to assistants. It is worth noting though, that there are some occupational groups present in Mauritius, but not in the UK/US model such as the Community Health Rehabilitation Programme Officers. These 75 trained professionals work indirectly in neurological rehabilitation.

UK/US model	HR available in Mauritius (Public Sector)	Comments
Neurologist	1	2 in the private sector + 2 visiting consultants
Neurosurgeon	5	+ 6 visiting consultants (foreign)
Physical and Rehabilitation Medical Specialist	4	None
Rehabilitation Nurses	Unknown	In general Specialist Nurses appear not to be acknowledged, except in the case of HIV
Dietician	16	Not involved directly
Physiotherapist	17	+33 assistants
Occupational Cadre	27	Includes OTs & their assistants
Speech Therapist/audiologist	4	+10 assistants
Clinical Psychologist	4	Patients not referred
Recreational therapist	0	Does not exist

6. A significant number of the above hospital service providers in addition to some from the private sector were interviewed regarding the scope and quality of care provided to patients in need of neurological rehabilitation. As seen in chapter five, the typical patient journey which they described can be summarized as follows:



While it was generally acknowledged that basic services were being offered in both the Public and Private Sectors, interviewees did convey that:

- Increased coordination among the different departments was required to provide a more holistic neurological rehabilitation service,
 - More adequate equipment had to be made available for quality care,
 - Many were in favour of a centralised Neurological Rehabilitation Unit where all the services could be provided under one roof,
 - Specialized training of staff was seen as an important issue,
 - Lack of Human Resources impacted on the quality of care dispensed.
7. While some modules dispensed by the University of Mauritius and the Mauritius Institute of Health (MIH) do touch upon Neurological Rehabilitation, albeit indirectly, no specialized training in this particular area is dispensed locally. The only such training provided dates back to 1991. It was provided by a member of the Royal Physiotherapist Association and was organised by the MIH, under the aegis of the Ministry of Health.
 8. The Medical Unit within the Ministry of Social Security does provide home visits to the elderly aged 75 and above, which indirectly benefits individuals who also suffer from Stroke, SCI or TBI. However the major initiative attempting to offer regular home care to the neurologically disabled is the Community Based Rehabilitation (CBRp) programme administered by the Ministry of Health. It was found during our interviews that the average proportion of the time spent by CBR staff, every week, with neurological cases ranged widely from 10 to 50 %. Unfortunately the programme does not focus exclusively on patients who need neurological rehabilitation and could use more staff. Residential homes for the elderly such as the Foyer Trochetia and the Leonard Chesire homes do have some infrastructure and provide some services which indirectly benefit the elderly suffering from Stroke, TBI and SCI.
 9. Provisions have been made by the government, through the Ministry of Social Security, that would allow the disabled to enjoy a range of benefits and aids, ranging from advocacy, counselling and guidance, to provision of assistive devices (e.g. wheelchairs, hearing aids,

etc), parking coupons, bus passes, concessionary air fares, liaising with NGOs, refunding of transport costs to disabled children (to their accompanying parents) attending schools and integration assistance. Disabled persons also benefit from exemption of customs duty on specially adapted cars. However, it emerged during our interviews that some progress still has to be made in terms of raising awareness for such policies as many patients and their relatives are unaware of such governmental provisions.

10. Patients in general gave an above average rating (6-7) to public hospitals on quality and treatment. However our interviews with patients, which were conducted in their homes, do highlight some areas of concern concerning post-acute care:

- the minimal service available providing an accessible system to take the injured to emergency care and patients to follow-up visits,
- few, if any, home visits by doctors, physiotherapists, or speech therapists,
- weak coordination in the management of neuro-rehabilitation means that often family members must care for the injured and thus attend to the rehabilitative needs of patients, without training. This may result in the occurrence of severe secondary diseases such as septicaemia, and pressure ulcers, as observed in a few cases,
- small allowances provided by the government, prevented them from benefitting from the full-time care required at home,
- lack of specialised home equipment was emphasized as it hampered the patients' rehabilitation. This includes equipment to lift patients from bed, bed and backrest, access rails for stairs, profiling beds, adapted chairs, toilet chairs, wall bars, adapted cutlery as well as equipment for physical therapy,
- interviewees also expressed a genuine wish to see more day-care centres, as such institutions would strengthen efforts to re-integrate patients in the community,
- the capacity of staff to provide high level of care was also flagged as an issue.

11. The gaps found in post-acute care, highlighted were discussed more extensively with major stakeholders during a workshop organised by the MRC, in April 2011. Discussions led to a collective agreement that such short-comings amplify the effects of disability on patients and their families, as well as on Mauritian society at large. Therefore, Mauritius needs to improve its long-term neuro-rehabilitation and social re-integration of disabled people.

In addition to promoting the rights and dignity of persons with disabilities, relevant institutions should now aim to accomplish goals such as providing disabled access to all new public buildings and free and reserved parking. Compared to other countries, Mauritius is overall not wheelchair friendly, yet. Pavements, public and private buildings, and other public spaces such as parks and beaches are mostly inaccessible to disabled people. It is however important to note that relevant authorities have started to take action to ensure compliance with the regulations pertaining to the use of parking bays for the handicapped.

Policy Recommendations

In light of these findings, the following comprehensive policy recommendations are suggested. The aim of these recommendations is to improve long-term neuro-rehabilitation received by

patients with the neurological conditions investigated and to better re-integrate them in their communities. For some of these, significant budget allocations at the national level are required. For others, efforts are already being made by the Ministry of Health to address the lack of multidisciplinary teams involved in Neurological Rehabilitation. However a lot of these issues can be addressed quickly and effectively with simple administrative re-alignments.

For a sustainable, long-term neuro-rehabilitation infrastructure we therefore strongly suggest:

1. In hospitals:

- Allocate more staff to meet patient needs in this clinical area;
- Develop expertise in Neurological Rehabilitation for medical doctors and Allied Health Professionals;
- Offer specialist training, refresher courses and workshops to staff on how to provide quality care to patients and cope with changing needs;
- Re-align multidisciplinary teams to include a Physiotherapist, OT, Speech and Language Therapist, Psychologist, Social Worker, Dietician, Orthopaedic workshop staff and NGO professionals;
- Develop specialist skills that include sensory rehabilitation and swallowing assessment;
- Set up a Neuro-Rehabilitation Unit. All services would be located under one area as currently departments are quite at a distance from each other. This Unit would include treatment facilities (medical and/or surgical, therapy like gymnasium and hydrotherapy pool, sensory room), diagnostic facilities (EMG, Radiology, swallowing clinic), outpatient and outreach services, and preventative medicine;
- Provide a rehabilitation programme in the community for less severe cases or as a follow-up, following acute admissions;
- Develop a good and reliable transport infrastructure, which should also be appropriately adapted to patient condition. Some ambulances should solely be used for Rehabilitation Services to make access easier and faster;
- Encourage communication and exchange programmes with institutions providing Neurological Rehabilitation services abroad;
- Enhance the communication infrastructure to include administrative equipment such as computers, telephones and fax machines;

2. In patients' homes:

- Introduce and increase the frequency of follow-up, where applicable, of home visits by doctors, therapists, Community Nurses and Carers;
- Customise programmes and leisure activities to highlight personal independence and skills;
- Educate patients and families about their rights, the services and benefits to which they are entitled;

- Subsidize in-cash or in-kind home adaptations for disabled individuals;
 - Supply equipment such as specialist beds, backrest, splint, neck collar, chairs with special head support, walking frames, waterproof and chairs, etc. These should be easily available and not subject to waiting lists;
 - The use of local technology should be encouraged;
 - Provide specialised training to carers as well as regular refreshers' courses.
3. For easier re-integration of disabled people into society:
- Encourage hospitals to work in close collaboration with relevant NGOs;
 - Raise awareness and educate the general public about the social and economic impact on people suffering from neurological accidents;
 - Make specially adapted vehicles more easily available;
 - Comply with UN standards such as provision of disabled access features to all new public buildings, public spaces and free and reserved parking.
4. Encourage monitoring, evaluation and research in this particular area:
- Encourage institutions to share data for more effective monitoring and planning for Neurological conditions in view of setting up a central database for Stroke, Spinal Cord Injury and Traumatic Brain Injury;
 - Provide controlled access to such information to researchers and university students with an interest in Neurological Rehabilitation;
 - Evaluate programmes systematically to ensure the effectiveness of the measures taken.

Way Forward

Based on these recommendations the following guiding principles and steps are suggested:

1. A Steering Committee is to be set up to prepare a Strategic Plan, focusing on formulating constructive ideas to shape the future, based on the above findings from the report;
2. The Steering Committee of 10 people should ideally be made up of a Ministry of Health representative, a Ministry of Social Security representative, rehabilitation professionals, MRC representative, patients and their advocates;
3. Goals to be set should be SMART (Specific, Measurable, Attainable, Relevant, Time-bound);
4. One view during the workshop was to start with simple projects, like the setting up of a SCI centre. The model could then be extended to TBI and Stroke;
5. The country should mobilise all its active forces (public, private sectors, individuals, charities) to deal with the huge challenges ahead, e.g. dealing with architectural barriers;
6. Draft Strategic Plan to be circulated by the Ministry of Health to relevant stakeholders involved for a wide, time-bound consultation exercise.

The Needs Assessment has demonstrated that Neurological rehabilitation services in Mauritius do exist, but at a basic level. While there are gaps and unmet needs in the care provided to people suffering from Stroke, TBI and SCI, there is potential. We do believe that the weaknesses mentioned so far actually represent an opportunity for the health and social welfare sectors first, but also for Mauritian society at large, to re-examine their priorities in terms of people living with disabilities. We are confident that if there is a national will to improve the services provided, Mauritius could become an example to neighbouring countries in terms of rehabilitation and care provided to its citizens.

CHAPTER ONE: BACKGROUND, RATIONALE AND SCOPE OF STUDY

This section provides a general introduction to the Needs Assessment carried on Neurological Rehabilitation Services in Mauritius from March 2010 to March 2011. It provides a background for the study, the reason why it was undertaken, as well as its multidisciplinary nature.

1.1 Background & Significance: A Summary

Almost 600 million people in the world live with disabilities according to the World Health Organization (WHO) Secretariat's report on Disability & Rehabilitation which was presented at the 58th World Health Assembly in 2005. The major percentage of these individuals (80%) resides in low income countries, most of whom are poor, and few have access to rehabilitation. [1]

Stroke and other Cerebrovascular diseases are the second most common cause of death worldwide, with most of these deaths occurring in developing regions of the world such as sub-Saharan Africa. According to the WHO, Stroke is responsible for 5.71 million deaths per year. [2] The burden of Stroke does not only lie in high mortality but also in its high morbidity. It leaves many survivors chronically disabled, worldwide. It is the leading cause of admissions for neurological disorders in Middle income countries and is linked, as in most developing countries, to Hypertension, Diabetes and Age. [3]

Global estimates of the number of new cases for Spinal Cord Injury (SCI) annually range from 15 to 40 per million. [4] Leading causes of acute SCI and Traumatic Brain Injury (TBI) are road traffic injury, violence, and injuries sustained in sports or other recreational activities. For instance, injuries to the head and neck are the main cause of death, severe injury and disability among users of motorcycles and bicycles. In European countries, head injuries contribute to close to 75% of deaths among motorized two-wheeler users; in some low-income and middle-income countries head injuries are estimated to account for up to 88% of such fatalities. [5] The social costs of head injuries for survivors, their families and communities are high, as they result in much higher medical costs than any other type of injury, such that these injuries exert a high toll on a country's health care costs and its economy in general. [6] Conversely though, there is an upward global trend in the number and use of motorcycles and bicycles, both for transport and recreational purposes. This would suggest a growing number of individuals potentially at risk of such injuries. [7]

1.2 Rationale

As mentioned in Drs Soopramanien and Sohur's introductory note, many neurological diseases and injuries lead to long-term disability, i.e., impaired bladder, no bowel functions and mobility, for survivors. Management of the resulting disability is complex and has led to the establishment of the specialty of Rehabilitation Medicine, with the input from a multi-disciplinary team being required. Health Care Technology procurement in Mauritius has increased significantly for both diagnosis and treatment. Public and private hospitals have new

diagnostic technologies and sophisticated new surgical techniques, such as cardiac surgery. Nowadays patients even come to Mauritius from neighbouring countries to undergo cardiac surgery there. However, is it possible that these changes in acute care distracted from the equally important post-acute rehabilitation services? Inevitably, improvement in acute care leads to an increased survival rate in patients, who then require long-term general care.

It is important to note that the benefits of a good neurological rehabilitation infrastructure far exceed the financial and social investments needed to achieve it. This would be especially important following the costs incurred by individuals, their families, the Mauritian Health System, which when taken together, affect the whole of Mauritian Society as well. A holistic approach to Neurological Rehabilitation would therefore help in [8]:

- Preventing costly complications and avoidable hospital re-admissions,
- Reducing the duration of hospital admissions,
- Reducing costs of long-term care,
- Helping disabled people to return to the workforce and can thus lead fulfilling and productive lives as a result.

The experience and success of neurological rehabilitation in Europe and the US are well documented. However, there are anecdotal reports that such facilities are lacking in Mauritius. It is therefore important to establish what these gaps are and what priority areas should be addressed first.

1.3 Defining the neurological conditions and services investigated

The following section provides definitions for Stroke, SCI, TBI and Neuro-Rehabilitation, as used throughout the present Need Assessment.

1.3.1 Stroke: A definition

A Stroke, or Cerebrovascular Accident, is caused by the interruption of the blood supply to the brain, usually because a blood vessel bursts or is blocked by a clot. This sudden depletion in the supply of oxygen and nutrients, causes damage to brain tissue. The most common symptom of a stroke is sudden weakness or numbness of the face, arm or leg, most often on one side of the body. Other symptoms include: confusion, difficulty in speaking or in understanding speech; temporary blindness or difficulty seeing with one or both eyes; dizziness, loss of balance or coordination; severe headache; fainting or unconsciousness. The effects of a stroke depend on which part of the brain is injured and how severely it is affected. A very severe stroke can result in sudden death. [9] Research carried out to investigate Stroke shows that individuals suffering from Diabetes Mellitus and Hypertension are significantly more at risk of experiencing a Stroke. [10] This is important to note following the current Mauritian demographic and epidemiological context which is elaborated upon in Chapter three.

1.3.2 TBI: A definition

Traumatic Brain Injury or TBI is a non-degenerative, non-congenital insult to the brain from an external mechanical force, possibly leading to permanent or temporary impairment of cognitive, physical, and psychosocial functions, with an associated diminished or altered state of consciousness. [11] It is thus caused by a bump, blow or jolt to the head or a penetrating head injury that disrupts the normal function of the brain. The severity of a TBI may range from “mild,” i.e; a brief change in mental status or consciousness to “severe,” i.e.; an extended period of unconsciousness or amnesia after the injury. [12] The causes of SCI and TBI are rather similar as mentioned earlier in this chapter in the background and significance section.

1.3.3 SCI: A definition

Spinal Cord Injury or SCI is an insult to the spinal cord resulting in a change, either temporary or permanent, in its normal motor, sensory, or autonomic function. As a result individuals experience temporary, partial or complete paralysis in their limbs and body. The following terminology has developed around the classification of SCI:

- Tetraplegia - Injury to the spinal cord in the cervical region, with associated loss of muscle strength in all 4 extremities
- Paraplegia - Injury in the spinal cord in the thoracic, lumbar, or sacral segments, including the cauda equina and conus medullaris

The 3 most common abnormalities leading to tissue damage include: the destruction from direct trauma, compression by bone fragments, hematoma, or disk material and Ischemia from damage or impingement on the spinal arteries. [13]

1.3.4 Neurological Rehabilitation

According to DeLisa *et al.*, [14] “Rehabilitation is the process of helping a person to reach the fullest physical, psychological, social, vocational, and educational potential consistent with his or her physiologic or anatomic impairment, environmental limitations and desires and life plans”. [15] In this context, neurological rehabilitation is seen to be an ordered process aimed at improving independence and coping in order to bring about minimization of impairment, and enhancement of activities and participation, thereby offsetting disability and improving quality of life. Neurological rehabilitation programs can be conducted while a person is in hospital as an inpatient, or on an outpatient basis. The neurological rehabilitation team revolves around the patient and family. The team helps set short and long-term treatment goals for recovery and is made up of many skilled professionals, including the following:

- Neurologist/Neurosurgeon
- Orthopaedist/Orthopaedic Surgeon
- Physiotherapist
- Rehabilitation Nurse
- Dietician

- Physical Therapist
- Occupational Therapist (OT)
- Speech and Language Therapist (SALT)
- Clinical Psychologist/Psychiatrist
- Recreational Therapist
- Audiologist
- Vocational Therapist

The rehabilitation process equips patients and their families with the basic physical, functional, cognitive and emotional skills that will form the foundation on which they will be able to rebuild their lives after discharge. However, it is important to note that neurological rehabilitation cannot aim to ‘cure’ all patients and return them to the exact previous level of functioning. Rather, it attempts to obtain maximal function in patients following an initial injury/illness. Where ‘normal’ function cannot be regained, alternative and compensatory strategies are taught in order to be able to perform tasks previously achievable. When impairment is as severe as to lead to permanent disability, the aim is to reduce the burden of care for the family and caregivers, and to prevent secondary complications that could lead to further hospitalizations and life threatening conditions. Neurological rehabilitation is generally well- structured in the Western hemisphere, with Brain Injury Units, Spinal Cord Centres existing in the US, UK and France, amongst other places.

1.4 Aims & Objectives of the Study

As seen in the introductory notes of the present report, the aims of this project emanated from a proposal conceived by Dr Soopramanien and Dr Sohur. The purpose of this proposal was to test the hypothesis that there is an unmet need for specialized neurological rehabilitation in Mauritius which can be implemented without huge investments, and where the benefits of such a programme would be profound. The overall objective was therefore to obtain qualitative and quantitative information relating to the potential gaps in the Neurological Rehabilitation Care in Mauritius. It focused on the following elements and themes:

- Incidence/Prevalence of Stroke, SCI and TBI,
- Types of services and infrastructure available for patients in need of Neurological Rehabilitation,
- Quality of long term care provided to patients with severe Neurological Disease,
- The Patient’s Journey,
- Human Resources available in the country for provision of Neurological Rehabilitation,
- Specific training programmes available in this area,
- Architectural Barriers for persons with disabilities.

1.5 Medium to Long-Term Vision for Enhanced Neurological Rehabilitation in Mauritius

It was agreed as per the proposal, that the findings of this exercise would inform the basis for a medium to long-term vision of Neurological Rehabilitation, in Mauritius, in the years to come. The main elements of this vision include:

1. A focused effort towards the creation of a neurological rehabilitation care centre,
2. Funding search for implementation of the above,
3. Training programs abroad for local health professionals in neurological rehabilitation care,
4. Visiting professionals from Western hemisphere (or other countries) to Mauritius for continued improvement in neurological rehabilitation care.

1.6 Research Questions for the Needs Assessment

Following the input provided by the Research Proposal, the research questions which guided this exercise included, but were not limited to:

1. What is the burden of disease of Stroke, SCI, and TBI in Mauritius?
2. What types of services and infrastructure are available for patients in need of neurological rehabilitation?
3. What long-term care is provided for patients with Stroke, SCI, and TBI Injury?
4. What is the typical Patient Journey through the system from onset of disease to discharge back into the Community?
5. Does Mauritius have human resources specialised in neurological rehabilitation professionals and are there any specific training progress that are available in this area, locally?
6. What are the architectural barriers to persons with disabilities in the local context?

1.7 Scope & Framework of the Needs Assessment

Based on the research questions, the resulting scope of the Needs Assessment is summarized in Figure 1. This study was deemed to have a strong epidemiological component, elements of Medicine, Social Policy and Health Services delivery (in both the public and private sector).

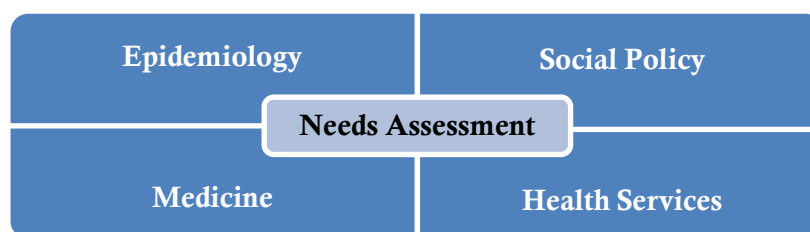


Figure 1: Scope of Needs Assessment on Neurological Rehabilitation Services

CHAPTER TWO: METHODOLOGY

The following section introduces the Study, the target groups and data collection methods used, before providing an overview of ethical considerations and the strengths and the limitations of the study.

2.1 Study Type

The chosen approach for the Needs Assessment on Neurological Rehabilitation Services in Mauritius is based on the established Health Needs Assessment (HNA) approach. HNA is defined as the “the systematic approach to ensuring the health service uses its resources to improve the health of the population in the most efficient way.”[15] As such, this approach involves epidemiological, qualitative and quantitative methods to describe the health problems of a population. In the present case, the health problems would refer to the neurological rehabilitation needs by individuals who suffered from a Stroke, Spinal Cord Injury and Traumatic Brain Injury. As for Health Needs, they refer to those who can benefit from health care and/or from wider social and environmental changes. [16] Thus, this approach tries to balance clinical, ethical and economic considerations of need in terms of what should be done and is generally guided by what could be done based on what can be afforded. [17]

2.2 Study Design

The starting point for this research exercise which subsequently guided its design, was the literature review carried out on the international experience of Stroke, TBI and SCI the present report, on the field of neurological rehabilitation (as both seen in chapter one) and on information obtained on the current Mauritian context as seen in chapter two.

There are 3 main approaches to conducting a HNA and assessing the population’s health status:

- **Epidemiological:** it combines epidemiological approaches with patient’s perspectives, assesses effectiveness of interventions and where possible, the cost-effectiveness of interventions
- **Corporate:** this approach is based on the demands, wishes and perspectives of interested parties
- **Comparative:** this particular approach compares levels of services between different populations

Based on the aims and objectives of the present exercise and the resources available, the current Needs Assessment for Neurological Rehabilitation Services in Mauritius has elements from each of these 3 main approaches:

- The **Epidemiological** component was examined with regard to quantitative information on SCI, TBI and Stroke. Patients were also interviewed.

- The **Corporate** element was investigated to by interviewing hospital service providers, training institutions as well as home-based and residential care providers.
- The **Comparative** element was directly taken into consideration during the workshop held in April when statistics for Neurological Rehabilitation in Mauritius were compared to those from the U.K. These comparisons also form the basis for the recommendations prepared by Drs Soopramanien and Sohur, who compared services offered in Mauritius to practices prevailing in countries faced with similar challenges.

The output of this study is a factual description of the state of neurological rehabilitation services in Mauritius.

2.3 Target groups

The study targeted 2 main groups:

2.3.1 *Health Professionals*

This group was made of individuals who were interviewed in wards, out-patient departments, Records counter, or selected by the respective administrative offices of their institution. It was made up of smaller sub-groups of Medical Specialists, Nurses, Physiotherapists, Occupational Therapists, Speech and Language Therapists, Psychotherapists/Clinical Psychologists, Community Based Rehabilitation Staff and Hospital Administrators.

2.3.2 *Patients (Stroke, TBI, SCI) & their relatives*

This group was encountered and interviewed in and around hospital precincts, either when walking in/ out of the hospital or in their homes. No hospital inpatients were interviewed.

2.3.3 *Criteria for inclusion or exclusion of participants*

This Needs Assessment was open to the staff of public regional hospitals, recognised private institutions, providers of home and residential medical care, TBI, SCI, Stroke patients and their relatives only.

2.4 Data Collection Instruments used

Following the multi-disciplinary nature of this Needs Assessment and its scope, the information obtained and presented in this report was obtained using different means. Secondary sources of information, Questionnaires and Structured interviews were used to collect data for the Needs Assessment. Documents were either obtained directly from stakeholders encountered or from the internet. 9 questionnaires were designed for direct interviews. 8 questionnaires were designed for health and social professionals and 1 for patients.

2.4.1 Data Collection for chapter on the Mauritian Context

The following information was obtained from carrying out a desk review and from documents shared with us by relevant Stakeholders from the Ministry of Health and Quality of Life as well as the Ministry of Social Security, National Solidarity and Reform Institutions.

2.4.2 Data Collection for chapter on Descriptive Statistics on Stroke, SCI and TBI

A formal request was sent to the Department of Health Statistics at the Ministry of Health and Quality of Life. The information obtained was then disaggregated in terms of Mortality (for the island of Mauritius), Morbidity (in public institutions except for Stroke), Age, Sex and Year, before the frequency of such neurological conditions was compiled and presented. This information was also used to calculate the Cause Specific Death Rates per year, for each condition. A second document was compiled and sent to us by the Department of Health Statistics on the total number of admissions recorded for the present neurological conditions in Government hospitals, disaggregated by number of re-admissions and deaths recorded. This information was used to estimate Period Incidence, Period Prevalence and Fatality rates, per year, for Stroke, TBI and SCI on the island of Mauritius. The calculations performed followed standard epidemiological practices and are presented in Box 1 below.

Cause-Specific Death Rate:

$$\frac{\text{No. of Cause-Specific Deaths}}{\text{Population during that period}} \times 100,000$$

Fatality Rate:

$$\frac{\text{No. of (Cause-Specific) Deaths Recorded}}{\text{Total No. of cause-specific treated in Public Regional Hospitals}} \times 100 \%$$

Incidence Rate:

$$\frac{\text{Total No. of (Cause-Specific) Cases Admitted} - \{\text{No. of Cause Specific Deaths} - \text{No. of Re-admissions}\}}{\text{Total No. of Cases treated in Public Regional Hospitals}} \times 100,000$$

Prevalence Rate:

$$\frac{\text{Total No. of Existing Cause Specific Cases} - \text{No. of (Cause-Specific) Deaths}}{\text{Total No. of Cases treated in (Public Regional) Hospitals}} \times 100,000$$

Box 1: Formulae for Incidence, Prevalence, Death and Fatality Rates

The validity and reliability of these statistics, as presented in that particular section, were investigated via the questionnaires administered and interviews carried with Medical Specialists, Hospital Administrators and Electronic Medical Records officers

2.4.3 Data Collection for chapter on Hospital Service Providers

A two stage selection process was used to identify these institutions. During the first stage, the main criterion for inclusion was: the provision of regionally or nationally significant inpatient and outpatient care by the medical institution. Hence CHCs, AHCs, small private clinics, Souillac and Mahebourg hospitals were not included. The institutions selected were thus SSRN, Jeetoo, Victoria, JN and Flacq hospitals. Fortis Clinique Darné and Apollo Bramwell hospital, two private medical institutions providing health services at national level, and sometimes beyond,

accepted to participate in this aspect of the present exercise. Questionnaires were used as a main data gathering tool to elicit primary qualitative data. The occupational groups to which they were sent were selected on the basis of their perceived involvement with SCI, Stroke and TBI cases. They included “Hospital Administrators”, “Medical Specialists”, “Nurses”, “Physiotherapists”, “Occupational Therapists”, “Psychotherapists” and “Speech and Language Therapists”. These groups included members from both the public and private sector, where applicable. The purpose of each questionnaire was to establish the nature, scope and quality of the inpatient and outpatient care offered by these occupational groups and their institutions. Special attention was also given to finding out how these services could be improved. The questionnaires for Nurses, Physiotherapists, Speech and Language Therapists and Occupational Therapists were thus sub-divided in the following sections: “Characteristics of respondents”, “Scope of Services offered”, “Type of Services and limitations offered to TBI and SCI patients”, “Comments on Quality and Recommendations”. A rating scale ranging from 1 (being the lowest level of satisfaction) to 10 (being the highest level of satisfaction) was used when asking respondents to rate a specific service. Members from all these groups were encouraged to liaise with their colleagues before filling their questionnaire to ensure some degree of consensus and therefore validity, of the information obtained from this exercise.

Questionnaires sent to Hospital Administrators and Medical Specialists differed from questionnaires sent to other occupational groups. For instance, Hospital Administrators were asked about some of the characteristics of their respective institution, the information gathering system and coding system used for gathering data on TBI, Stroke and SCI (their answers are discussed in Chapter 2), the time spent by patients in Acute Care, Rehabilitation, the professionals in charge of those phases, and about accessibility. On the other hand, Medical Specialists were asked to define Stroke, TBI and SCI, (their answers are also discussed in Chapter 2) about their knowledge of the services offered to such patients, as well as their professional views on the limitations of such services and the alternatives which they would suggest.

Some structured interviews were carried out with members of these occupational groups, where possible, by following the same structure of the questionnaire. Most questionnaires were returned by fax or by post. The qualitative data generated was then analysed using a qualitative approach called “Content Analysis”, for each occupational group.

2.4.4 Data Collection for chapter on Human Resources & Training Opportunities

The following information was obtained from carrying out a desk review of documents shared with us by relevant Stakeholders from the Ministry of Health and Quality of Life. Questionnaires were also sent to the Medical and Dental Council of Mauritius, the Nurses Council and the Nurses Association and to relevant Training Institutions such as the University of Mauritius, SSR Medical College, Patrick Sana Nursing School, Apollo-Bramwell Nursing School and the Mauritius Institute of Health (MIH). The remaining information was obtained from relevant institutional websites, where applicable and appropriate. Questionnaires were divided in the following sections: “Characteristics of the institution”, “Area of training for Neurological Rehabilitation Provided”, “Training Outcome”, “Observations and Recommendations”.

2.4.5 Data Collection for chapter on Residential & Home-Based Care

Questionnaires were sent to the branches of the Community Based Rehabilitation programme, which according to the information obtained, is the only initiative of its type to offer regular home care to the disabled, and at the community level. The purpose of the questionnaire was to establish the nature, scope and quality of the home-based care offered by the CBR programme. The questionnaire was thus sub-divided in the following sections: “Scope of services offered by branches”, “Type of services specifically offered to TBI and SCI patients”, “Observed patient needs”, “Comments on Quality and Recommendations”. A rating scale from 1 (being the lowest level of satisfaction) to 10 (being the highest level of satisfaction) was used when asking respondents to rate a specific service. The quantitative information presented on the proportion of neurological cases among those receiving medical home visits (for the aged 75 +), as well as access to Foyer Trochetia in Petit Verger, was provided by the Medical unit, from the Ministry of Social Security. A short survey form was sent by this department to Doctors and Nurses performing such visits throughout the island and asked them to state the number of Stroke, Spinal Cord Injury and Traumatic Brain Injury patients currently on their patient list. 58 forms were retrieved and shared with the MRC, which compiled the information. The information presented on Foyer Trochetia was obtained from observations made during visits and documents provided by the Foyer’s personnel. It was acknowledged by professionals in the field as offering state-of-the-art treatment, care and medical rehabilitation for the elderly.

2.4.6 Data Collection for chapter on Patient Interviews

Direct structured interviews were used to generate primary qualitative data. The purpose and the nature of the interview were explained to the patient before starting the interview process. Interviewees were hence asked about the nature, scope and quality of the services provided to them since suffering from their condition. Special care was also given to finding out more about the quality of such care, as perceived by them and how it could be improved. The questionnaire used was divided into sections which included: “Personal Information”, “Scope and Quality of Medical Care”, “Scope and Quality of Post-discharge services received” and “Comments and Recommendations on Services Received”. Questions were kept as basic and as straightforward as possible to allow interviewees to elaborate and share their views openly.

While a nationally representative sample could not be interviewed, following the resources available for this Needs Assessment, interviewees were selected and weights to these groups of patients given in relation to the number of people dying from Stroke, Traumatic Brain Injury and Spinal Cord Injury every year. Close to 6 times as many people die from Stroke than TBI and 14 times as many die from Stroke than SCI. This resulted in 12 patients suffering from Stroke being interviewed and 2 TBI patients. 2 patients were interviewed for SCI instead of 1, to ensure some validity. Content analysis was used to compile findings used per question in a systematic way with regards to ranges (where applicable) common themes, singularities and exceptions.

2.5 Ethical Issues

The information presented in this report has been shared with the relevant departments of the Ministry of Health. The purpose of the current information gathering exercise was explained to the respondents/interviewees before they were sent or given the questionnaire, either by an official letter from the MRC, in person or by phone. Participants were either asked to confirm that they were willing to participate, verbally, or were appointed by their respective administrative offices. Permission to visit public hospitals and interview health personnel was granted by the Ministry of Health. The latter appointed a focal point to facilitate the process and to provide us with the contact details of some potential respondents. Private medical institutions and their staff were approached separately. Permission and clearance to visit Foyer Trochetia was provided by the Medical Unit, within the Ministry of Social Security. The latter also sent an official request to its medical personnel who perform medical home visits, to fill in a form on the number of patients suffering from TBI, SCI and Stroke. This information was later compiled by the MRC. Interviews were carried out in the patient's homes or in the outpatient department of JN and Victoria hospital. These were performed with the express permission of the Ministry of Health and Quality of Life. As mentioned previously, no inpatient was interviewed in any public regional hospital. As far as possible, only information available in the public domain was used.

2.6 Strengths of the Study

This Needs Assessment is the first multi-disciplinary exercise of its kind in the field of neurological rehabilitation, in Mauritius. Its objectives are clear which eased its design and execution, despite the scope of the material to be covered.

For the first time, this study gave the opportunity to representatives of various social and health professions (from both the public and private sector), providers of home and residential care as well as TBI, SCI, Stroke patients and their relatives, to share their views on the state of neurological rehabilitation services in Mauritius and to make recommendations, in a systematic manner. The national statistics and rates presented on Stroke, SCI and TBI, as seen in section 3, are also presented in these formats for the first time. Careful attention has been paid to presenting the information in an objective and factual manner with regard to its subject matter.

The information collected through various means was obtained with the expressed permission of the Stakeholders concerned. The data gathering process aimed to be highly inclusive and as consultative as possible, which resulted in a cross-sectoral collaboration between the Mauritius Research Council, the Ministry of Tertiary Education and Science, Research and Technology, the Ministry of Health and Quality of Life, the Ministry of Social Security, National Solidarity and Reform Institutions, Apollo Bramwell hospital and Fortis Clinique Darné.

While generalizations cannot be made at this stage, since the scope of this study did not allow for in-depth investigation of the phenomena encountered, it can still be used as a reliable basis for further studies in different fields, namely, Medicine, Health Services Research,

Epidemiology and Social Policy, with regard to Stroke, SCI, TBI, Neurological Rehabilitation and Disability, in Mauritius.

2.7 Limitations of the Study

The information contained in the section on the Mauritian context, is limited to documents that were only available in the public domain. Only 4 public regional hospitals out of 5 and 2 private medical institutions out of an estimated 18, responded to our questionnaires. No quantitative data was obtained from the private sector. No Occupational Therapists and Speech and Language Therapists were officially affiliated to the private institutions to which questionnaires were sent. Many reminders were sent to relevant private institutions, but these remained unanswered. The specialisation of Nurses is not widely acknowledged at the national level, except in the field of HIV as will be seen in Section 5. As a result the relevant questionnaire was forwarded to Nurses from public institutions who spent most of their working time in “Orthopaedic wards” and “General wards” and had worked with Spinal Cord Injury and Stroke cases. Information from such Nurses could not be obtained from the private institutions.

Information on Human Resources was obtained from the Mauritius Medical and Dental Council, Nurses Council, Nurses Association and from the MoHQL website only. Regarding local training opportunities, only the University of Mauritius, MIH and Apollo Bramwell Nursing School answered our questionnaire and were willing to share their documents, despite many requests and messages left to remaining institutions. For the remaining information, only that which was available in the public domain was used.

4 Community Rehabilitation Branches out 5 responded to our questionnaire. Mostly secondary data available in the public domain was used. Only 58 forms were retrieved by the Medical Unit from an estimated 80 health professionals performing home medical visits. Information presented on Foyer Trochetia only provides a snapshot of the services offered and of residents who were staying there, in August 2010. Neither other public nursing homes nor private residential institutions could be visited as initially planned, following time constraints and setbacks encountered in other aspects of this Needs Assessment. The Bel Ombre foundation was approached following the outreach services for the disabled that it provides in the South West region of the island. This service was provided by a team which included a psychologist, an occupational therapist and a social worker. However none of the cases whom they visited suffered from the specific neurological conditions under investigation in this study.

Questions had to be kept as basic as possible following difficulties in communicating with patients who often suffered from speech impediments. Thus this allowed for questions to be more easily translated in Creole and Bhojpuri, in some cases, without losing their initial meaning. Interviews were carried out in the presence of Community Based Rehabilitation Programme staff and the patient’s relatives (wife, daughter-in-law, and daughter) who often had to translate and interpret answers given by patients. This implies that some level of bias was introduced when discussing the scope and quality of post-discharge care received, especially when discussing home-based care. The overall level of education of interviewees was low, while some were simply too incapacitated to respond. In such cases family members

who had been close to the patient since the onset of their neurological condition were asked to help in answering questions. It is assumed that this had both a positive and a negative one on the quality of the information gathered. More time efficient methods such as focus groups were foregone in favour of face-to-face interviews. Group interviews scheduled at JN Hospital simply did not yield enough information. In the end the accessibility, availability, willingness to participate and capacity to communicate of patients played an important role in determining the size of the sample, albeit not its inner-structure. As a result, fewer patients than initially intended were interviewed. In addition to this, the subjective views of patients expressed in the following section are subject to personal experience and beliefs. Subsequently this particular section only contains basic indicators of the quality of services available to people suffering from Strokes, TBIs and SCIs.

CHAPTER THREE: THE MAURITIAN CONTEXT

The following section provides a brief overview of the Mauritian Health System, Mauritian Social Policy as well as the Epidemiological and Demographic context. Issues raised in this particular chapter are further explored throughout the report.

3.1 Organization and Management of Health Services

The Ministry of Health operates under the portfolio of the Minister of Health and Quality of Life. Some of its many functions include: developing comprehensive health care services to meet the population's Health Needs, to manage facilities for the treatment and prevention of diseases, including mental diseases, by maintenance of hospital, health centre and other health facilities. The Ministry regulates the practice of medicine, dentistry and pharmacy and conducts operational bio-medical health studies of diseases of major importance in the country. It also makes provisions for the rehabilitation of the disabled. [18] It is hence the organisation responsible for the formulation of Mauritian health policy and administers the country's health system through planning, resource allocation, monitoring and overall coordination. [19] It pays special attention to Social Equity and also has a droit de regard on Private Medical institutions.

3.2 The Mauritian Health Care System

According to the Health Systems Performance exercise carried out and published by the WHO in its Annual Report 2000, the Mauritian Health Care System was ranked as 56th in terms of responsiveness but only had an average ranking of 78th out of 191 countries when taking into account "health distribution", "performance", "overall health system attainment", "fairness of contribution to health system", "responsiveness", "health expenditure per capita" etc. [20] Based on data from 1997, the health per capita expenditure was estimated at \$152. [21] To this day 4 main sources of financing healthcare exist in Mauritius namely: tax funded; private household out-of-pocket payment; private firms and corporations, including health insurance and foreign aid.

However, there have been improvements in the past decade. In 2008 the health spending per capita was US \$502, public health expenditure as a per cent of GDP was 2% and private health expenditure as a per cent of GDP reached 2.1 %. [22] It is also important to note that in recent years, the public sector has undertaken efforts to acquire its own equipment for specialised diagnostic services such as renal dialysis, CT scanning and MRI services, which were previously provided mostly by the private sector. [23] At the end of 2009, there were 1,500 doctors in the Republic of Mauritius, representing 11.7 doctors per 10,000 population. Of those doctors, 887 (59.1%) were employed in the public sector. This shows an increase compared to the year 2000 when there was 1,080 doctors, that is, 9.1 per 10,000 population. [24] Private healthcare consists in the private practice of medical and dental care, private clinics with in-patient beds and facilities for examination, consultation and diagnostic procedures. [25] According to the WHO the Private Sector continues to provide quality care but at a lower volume of services. [26] The total number of beds in the public and private sectors as at the

end of 2009 was thus 4,281, that is, 290 inhabitants per bed. In 2000, the corresponding ratio was 264. [27]

3.2.1 Health Sector (Public) Services



Picture 1: (Public) Health Care Services in Mauritius, MoHQL, 2005, 2010 [28]

As seen in Picture 1, the type and scope of health care services in Mauritius can be classified according to the following [29]:

1. Primary health care services: There are currently 2 Mediclinics, 21 Area Health Centres (AHCs) and 113 Community Health Centres (CHCs). The basic services delivered at CHCs include the treatment of common diseases and injuries, maternal and child care, and family planning. In addition to these services, AHCs also provide dental care, antenatal services, NCDs prevention activities.
2. District health care services: Such services are provided by 2 district hospitals, namely Souillac and Mahebourg hospitals with a total bed-capacity of 87. These hospitals provide

primary inpatient and outpatient medical care, emergency services and supervise AHCs and CHCs.

3. **Regional health care services:** The main providers of such services are 5 regional hospitals, namely, Victoria Hospital, JNH Hospital, Jeetoo Hospital, Flacq Hospital and SSR hospital. The total bed capacity of these hospitals was estimated at 2,408. There are also 4 specialised hospitals: the Moka Eye Centre, ENT Centre, Brown Sequard Psychiatric Hospital and the Tuberculosis & Chest Diseases Centre. However such services also include facilities such as the 4 Ayurvedic Clinics, 13 Health Offices, a Chest clinic, a Social Hygiene clinic and a National Centre for the Immuno-suppressed. Taken together these services offer specialised inpatient and outpatient clinical care and may sometimes act as training centres for health personnel. Services provided include: *Paediatrics, General Surgery, Orthopaedics, Traumatology, Chest medicine, General Medicine, intensive care services, Accident and Emergency, Gynaecology & Obstetrics, Neurology and Rehabilitation* etc.
4. **Tertiary care services:** The Cardiac Centre at Pamplemousses conducts cardiac surgery, invasive Cardiology etc. In 2009, 2,972 cases were treated as in-patients at the Cardiac Centre for "*Angina pectoris*", "*Chronic Ischaemic heart diseases*", "*Mitral stenosis and other rheumatic mitral valve diseases*". A total of 802 operations were performed at the Centre.

Contact with government preventive and curative health services, including inpatient and outpatient care, for all levels of care, was estimated at 8.8 million in 2009.

3.2.2 Private Sector Services

At the end of 2009 there were 19 Nursing Homes (Private Clinics) with a total of 807 beds. These institutions however differ in the scope and specialisation of services which they offer. The total numbers of cases seen in these medical institutions were 111,012. Out of these 47,555 of these cases were seen for treatment and surgical operations and 63,457 for examinations, investigations or observations. 10 Sugar estate dispensaries were also recorded. [30]

3.2.3 Human Resources for Health in Mauritius

As seen earlier in section 0.2.1, there were 1,500 doctors in the Republic of Mauritius in 2009. 250 dentists were also noted, 59 among them worked in the public sector. On that same year, the number of pharmacists was 386. The number of qualified nurses and midwives in the public & private sectors was 3,500 of among whom, 313 were in the private sector. [31] There were officially only 7 specialist nurses: AIDS nurses.

3.3 The Mauritian Demographic Context

The estimated resident population of the Island of Mauritius at the end of 2009 was 1,239,788 (611,593 males and 628,195 females). 14,623 live births were registered, giving a crude birth rate of 11.8 per thousand mid-year resident population. Life Expectancy at birth was estimated

to be 69.3 for males and 76.5 for females that same year. The number of deaths registered in 2009 was 8,987, corresponding to a crude death rate of 7.3 per thousand mid-year resident population 2008. [32]

According to the WHO Regional Office for Africa, (2009) Mauritius is facing problems associated with an ageing population. The most vulnerable component of the elderly, or the Age-Group “75 years and above” is increasing. Whereas this group constituted 0.85% of the elderly in 1962, it increased to 2.39% 2001 and is projected to reach 6.9% by the year 2037. [33]

3.3.1 The Mauritian Epidemiological Context

Based on information readily available from the Ministry of Health, the decrease in birth rates in the past decades and the decrease in the incidence of communicable diseases, Mauritius has effectively reached an advanced stage in its demographic and epidemiological transition. As a result Communicable Diseases, Maternal and Child Health issues have declined. On the other hand, Chronic Non Communicable Diseases (CNCDs) are on the rise. They include Diabetes Mellitus, Hypertension, Cerebrovascular diseases, Cancer (Malignant Neoplasms), Mental Illness and Cardiovascular conditions.

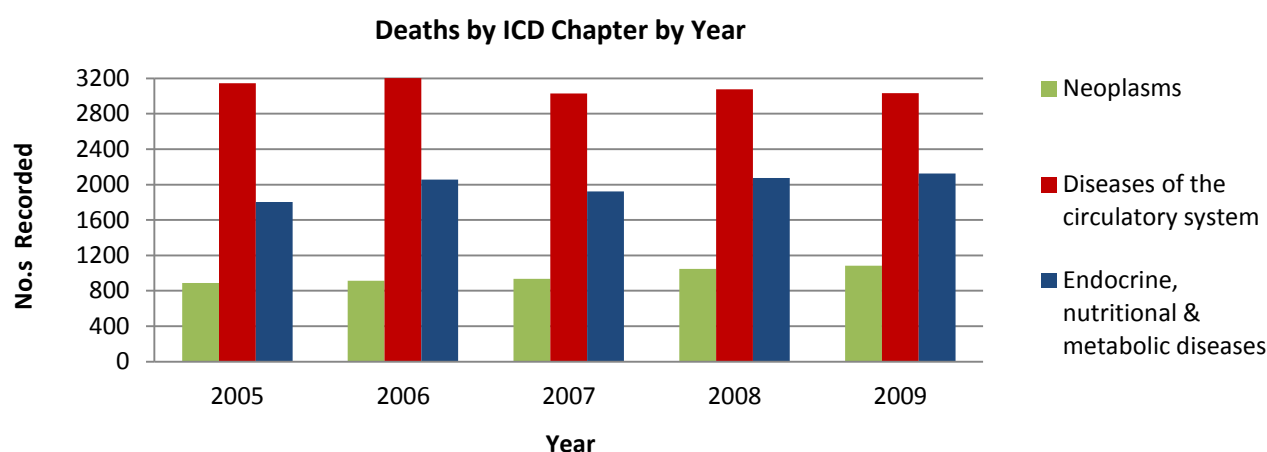


Figure 2: Deaths by ICD 10 Chapter, adapted from Health Statistics 2005, 2006, 2007, 2008, 2009, MoHQL 2010[34]

It is generally acknowledged that such health problems are the result of unhealthy lifestyles observed at the global level, spearheaded by poor eating habits. This in turn results in an increase in the risks of transmission of the CNCDs mentioned. [35] Figure 2 shows the 3 main causes of mortality according to ICD 10 Chapter (the International Classification of Diseases or “ICD 10” will be elaborated upon further in Chapter 4) which are “Neoplasms” (malignant), “Diseases of the circulatory system” which include Cerebrovascular diseases such as Stroke, Heart and Hypertensive diseases, among many others, and “Endocrine, nutritional & metabolic diseases” which include Diabetes Mellitus and Obesity. Neoplasms (malignant) have caused the deaths of a total of 4873 persons or 975 on average, a year. The chapter called “Diseases of the circulatory system” is the greatest killer among these 3. Such diseases have caused the death of a total of 15,485 people or 3097, on average per year, for the past five years.

Endocrine, nutritional and metabolic diseases killed on average 1996 people and a total of 9980 individuals during that same period.

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Road Traffic Accidents	18278	18517	18022	19178	19495	22554	20242	20519	20873	19571
Casualties	3291	3264	2904	2698	2951	2760	2522	3055	3435	3655
Fatal	163	126	158	131	144	136	134	140	168	140
Seriously Injured	266	288	216	291	245	358	348	500	512	479

Table 1: Road Accidents disaggregated by casualties, fatalities and serious injuries, adapted from CSO 2010 [36]

As seen in table 1, the determinants of deaths, chronic and disabling conditions, in Mauritius, are not limited to diseases. Fatalities due to accidents and resulting injuries have been surprisingly high for a small island and rather stable on average, for the 2000 to 2009 period. There was an average of 19724.9 road accidents, and 3053.5 casualties resulting in 144 deaths per year, respectively, during that particular time period. 2008 and 2009 were the years when the most road traffic accidents, resulting in fatalities and seriously injured cases, were recorded.

3.4 The Mauritian Social Policy Context

The welfare of persons living with disabilities is under the responsibility of the Ministry of Social Security, but their treatment and health care needs are met by the Ministry of Health and Quality of Life. As acknowledged in the “National Policy Paper and Action Plan on Disability” [37] although the welfare system has worked well so far, as far as health is concerned, it does not give enough weight to specific disability needs. This document reports that “The Action Plan for the Health Sector (2005-2010)” mentions that equity in access and care in proportion to needs are essential but does not stress the disabled person’s needs. It also observes that “most people with disabilities have greater health care needs than the rest of the population” [38] and that “unfortunately the follow-up of disabled persons is not being carried out by a multi-disciplinary team involving all stakeholders”. [39] The service itself is not deemed as being readily accessible to persons with disabilities.

3.4.1 Organization and Management of Welfare Services

The objectives of the Ministry of Social Security, National Solidarity and Reform Institutions include, but are not limited to paying Non-Contributory basic pensions and social aid and assistance, to enhance the welfare of the vulnerable groups and to provide assistance, empower and integrate persons with disabilities, the elderly and other vulnerable groups. It also aims to provide financial assistance for medical treatment locally and overseas. [40]

3.4.2 The Disability Unit at the Ministry of Social Security

The Disability unit is a department within the Ministry of Social Security which was set up in 1987 as the “Rehabilitation Unit”. [41] It is the implementing arm of the Ministry of Social Security on disability policy issues. It provides services ranging from advocacy, counselling and guidance to provision of assistive devices, parking coupons, bus passes, concessionary air fares, liaising with NGOs, refunding of transport costs to disabled children (and accompanying parents) attending schools, promoting integration of disabled persons, removing barriers and organizing activities. [42]

3.4.3 The Medical Unit at the Ministry of Social Security

The medical unit within the ministry of Social Security primarily provides medical assistance to the elderly and disabled. The medical home visits scheme which entitled those aged 90 years and above, was extended in recent years to include those aged 75 and above, as well as some special cases aged 60 and above, suffering from a chronic condition. It also oversees the Foyer Trochetia, a residential centre for the elderly and severely disabled, in Petit Verger, Pointe-aux-Sables. [43]

3.4.4 Services offered by the Ministry of Social Security:

According to the information available the Ministry offers the following services to people with disabilities:

3.4.4.1 Carer's allowance

A disabled person aged 15 to 60, who requires constant care, receives in addition, to his or her Basic Invalidity Pension, a carer's allowance of **Rs 1606**.³ Children below the age of 15, who are disabled, receive a carer's allowance subject to the family members' annual income not exceeding Rs 150 000. [44]

3.4.4.2 Assistive devices

Wheelchairs are provided free of charge on universal basis. Hearing aids are also provided to people with hearing impairment, free of charge on the basis of their annual income not exceeding Rs 150 000. Special equipment such as special pads wheelchairs, hearing aids and prostheses for disabled persons are all exempted from customs duty, sales tax and import levy. Disabled persons also benefit from exemption of customs duty on specially adapted cars. [45]

3.4.4.3 Other Financial Support

The Ministry also gives other special pensions/allowances to the disabled and supports some nursing homes and NGOs financially. [46] For instance they offer:

- an “Industrial Injury Allowance” for employees suffering an industrial injury resulting in a total temporary incapacity, subject to medical evidence

³ Approximately \$52 as at September 1st 2010 according to <http://www.exchangerates.org.uk>

- a “Disablement Pension” payable to an employee who has suffered an industrial injury resulting in a permanent incapacity (partial or total)
- a “Constant Attendance Allowance” payable to an employee who suffers from a total temporary incapacity or a 100% disability and who requires the constant attendance of another person subject to medical recommendation-through medical board

3.5 Mauritian Policy on Accessibility for the Disabled

According to the “National Policy Paper and Action Plan on Disability” document, adopting the “UN Standard rules on the regulation on the Equalisation of Opportunities for the persons with disabilities”, has led the Mauritian government to pay more attention to the issue of accessibility. The government set up a High-Powered Steering Committee in 1993 in order to protect and promote the rights and dignity of persons with disabilities. The latter recommended the amendment of the building Act which finally came to pass in August 2005. [47] Mandatory inclusion of access features to all new public buildings to reduce architectural barriers is now provided by the law. The “Road Traffic Act” was amended to include free and reserved parking for persons with disabilities. [48]

3.5.1 The UN Convention on the Rights of Persons with Disabilities

It is most important to note that in January 2010 Mauritius became the 77th country to ratify the UN Convention on the Rights of Persons with Disabilities. The articles within this convention include, but are not limited to [49]:

Article 9: Accessibility

“To enable persons with disabilities to live independently and participate fully, in all aspects of life, States Parties shall take appropriate measures to ensure to persons with disabilities access on all equal grounds with others, to the physical environment, to transportation, to information and communication technologies and systems, and to other facilities and services open or provided to the public, both in urban and in rural areas. These measures, which shall include the identification and elimination of obstacles and barriers to accessibility....”

Article 19: Living independently and being included in the community

“State Parties to this convention recognize the equal rights of all persons with disabilities to live in the community, with choices equal to others, and shall take effective and appropriate measures to facilitate full enjoyment by persons with disabilities of this right and their full inclusion and participation in the community, including by ensuring that”:

- (a) Persons with disabilities have the opportunity to choose their place of residence and where and with whom they live on an equal basis with others and are not obliged to live in a particular arrangement;
- (b) Persons with disabilities have access to a range of in-home, residential and other community support services, including personal assistance necessary to support living and inclusion in the community, and to prevent isolation or segregation from the community;

- (c) Community services and facilities for the general population are available on an equal basis to persons with disabilities and are responsive to their needs”

Article 20: Personal Mobility

“States Parties take effective measures to ensure personal mobility with the greatest possible independence for persons with disabilities, including by:

- (a) Facilitating the personal mobility of persons with disabilities in the manner and at the time of their choice at affordable cost;
- (b) Facilitating access by persons with disabilities to quality mobility aids, devices, assistive technologies and forms of live assistance and intermediaries, including by making them available at affordable;
- (c) Providing training in mobility skills to persons with disabilities and to specialist staff working with persons with disabilities;
- (d) Encouraging entities that produce mobility aids, devices and assistive technologies to take into account all aspects of mobility for persons with disabilities”

Article 25: Health

“State Parties recognize that persons with disabilities have the right to the enjoyment of the highest attainable standard of health without discrimination on the basis of disability. State parties shall take all appropriate measures to ensure access for persons with disabilities to health services that are gender-sensitive, including health related rehabilitation. In particular, States Parties shall:

- (a) Provide persons with disabilities with the same range, quality and standard of free or affordable health care and programmes provided to other persons, including in the area of sexual and reproductive health and population-based public health programmes;
- (b) Provide those health services needed by the persons with disabilities specifically because of their disabilities, including early identification and intervention as appropriate, and services designed to minimize and prevent further disabilities, including among children and older persons;
- (c) Provide these health services as close as possible to people’s own communities, including in rural areas;
- (d) Require health professionals to provide care of the same quality to persons with disabilities as to others, including on the basis of free and informed consent by, inter alia, raising awareness of the human rights, dignity, autonomy and needs of persons with disabilities through training and the promulgation of ethical standards for public and private care;”

Article 26: Habilitation and Rehabilitation

1. State Parties shall take effective and appropriate measures including through peer support, to enable persons with disabilities to attain and maintain maximum independence, full physical, mental, social and vocational ability and full inclusion and participation in all aspects of life. To that end state parties shall organize, strengthen and extend comprehensive habilitation services and programmes, particularly in the areas of

health, employment, education and social services, in such a way that these services and programmes:

- (a) Begin at the earliest possible stage, and are based on the multi-disciplinary assessment of individual needs and strengths;
 - (b) Support participation and inclusion in the community and all aspects of society; are voluntary, and are available to persons with disabilities as close as possible to their own communities, including rural areas.
2. State Parties shall promote the development of initial and continuing training for professionals and staff working in habilitation and rehabilitation services.
 3. State Parties shall promote the availability, knowledge and use of assistive devices and technologies, designed for persons with disabilities, as they relate to habilitation and rehabilitation”

Article 28: Adequate standard of living and social protection

“1. State Parties recognize the right of persons with disabilities to an adequate standard of living for themselves and their families, including adequate food, clothing and housing, and to the continuous improvement of living conditions, and shall take appropriate steps to safeguard and promote the realization of this right without discrimination on the basis of disability.....”

3.5.2 Policy Implications for Stroke, TBI and SCI cases

While the need for the above policies appear to have made itself felt for quite a while, as pointed out by major stakeholders in the field, it would appear that Mauritius has set the bar quite high for itself with regards to disability issues. This might come as a surprise considering the existence of some major limitations regarding the scope of the care received by Stroke, SCI, and TBI patients, especially in terms of Accessibility, Inclusion in the community, Health services received, Rehabilitation and level of financial aid received, as it will be seen in the next sections.

CHAPTER FOUR: DESCRIPTIVE STATISTICS ON STROKE, TBI AND SCI

The following section provides an overview of the epidemiological observations made at the national level. These findings are based on the secondary epidemiological data obtained on TBI, SCI and Stroke for the island of Mauritius. The information presented relates to the following years: 2005, 2006, 2007, 2008 and 2009. As mentioned in chapter two, the data presented on Cause-Specific Deaths relates to the whole island of Mauritius. On the other hand, Period Incidence, Prevalence and Fatality incidence rates are based on the number of inpatients attending Public Hospitals only.

4.1 Measuring Health: some definitions

For the purpose of this report, Mortality here refers to deaths observed at the community or population level. Typical measures of mortality in Demography and Epidemiology include Adults, Infant and Child Mortality Rates. It also includes Cause-Specific Death Rates and Fatality Rates. The former can be defined as the Mortality Rate from a specified cause, within a population. The latter on the other hand, is usually expressed as the ratio of deaths within a designated population of people with a particular condition, over a specific period of time. Fatality Rates can be used to determine the risk of dying from a particular condition when this condition becomes apparent. Morbidity here refers to the spread of disease within a group of people, community or population. Morbidity measures include period or point incidence and prevalence rates. The Period Incidence is defined as the proportion of *new cases* within a population, over a specific *period* of time. The Period Prevalence is defined as the *proportion of the population with a given disease or condition*, over a specific period of time.

4.2 Stroke

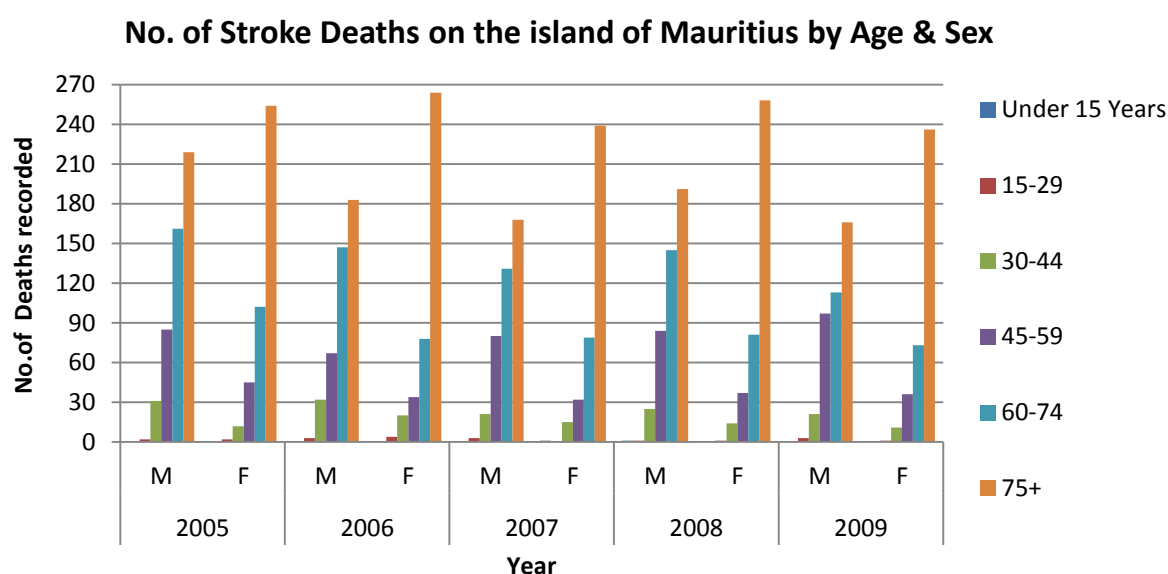


Figure 3: No. of Stroke Deaths recorded by year on the island of Mauritius, disaggregated by Age & Sex, adapted from MoHQL, 2010 [50]

A total of 4109 people died from Stroke from 2005 to 2009. *This represented 26.5% of all deaths recorded from diseases of the Circulatory System during that same period.* The number of deaths for this period ranged from 757 in 2009 to 913 in 2005. The average number of deaths per year was 822. The greatest number of deaths was recorded in 2005 and the lowest number was in 2009. 53.1% of the deaths recorded during these 5 years were attributed to males and 46.9 % to females. Women in the “75+” Age-Group appear to have been the most affected group. The “75+” Age-Group represented 49% of the total deaths recorded, followed by the “60-74” Age-Group with 28.3%. The “45-59” Age-Group represented 14.9%. According to data obtained from both the public and private sector, 43.2% of patients admitted (including re-admissions) died. As seen below in Table 2, the Stroke specific Death Rate ranged from 61 to 75.7 per 100,000.

Year	Stroke Specific Death Rate per 10 ⁵
2005	75.7
2006	68.2
2007	62.7
2008	67.9
2009	61

Table 2: Specific Death Rate by year for Stroke

The total number of patients receiving inpatient treatment for Stroke in public medical institutions from 2005 to 2009 (including re-admissions and deaths) was 9502. The number of such inpatients during that period ranged from 1992 to 2029 per year. The greatest number of such inpatients was recorded in 2006. 58% of those receiving inpatient treatments for Stroke, from 2005 to 2009, were male, while 42% were females. The “60 +” Age-Group represented 66.5% of such inpatients recorded, followed by the “40-59” Age-Group with 30.2%. The “20-39” Age-Group represented 3.2 %. The fatality rate among such inpatients ranged from 9.4% to 27.2% and averaged 20% over these 5 years. Period Incidence and Period Prevalence for Stroke were calculated based on the information available from public hospitals and did not include information from private hospitals as it could not be obtained. The results are shown in Table 3 below.

Year	Period Prevalence for Stroke per 10 ⁵	Period Incidence for Stroke per 10 ⁵
2005	882.6	622.9
2006	768.9	450.6
2007	754.1	386.7
2008	352.1	300.6
2009	691.7	432.1

Table 3: Period Prevalence and Incidence by year for Stroke

4.2.1 Comparing Stroke Prevalence, Incidence and Fatality Rates

Hence as seen below in Figure 4, below, the Period Incidence rate for Stroke ranged from 300.6 to 622.9, while the Prevalence rate ranged from 352.1 to 882.6. Both rates are given per 100,000 population. Figure 4 also shows that the period prevalence and incidence of Stroke peaked in 2005. Both were at their lowest in 2008. The reasons for such low rates during that year are unclear. However, it is important to note that the Fatality Rate was at its highest on that same year and appeared to be at its lowest in 2005. This would thus suggest that there is a negative, or inverse, correlation between the Period Incidence and Fatality Rates observed from 2005 to 2009.

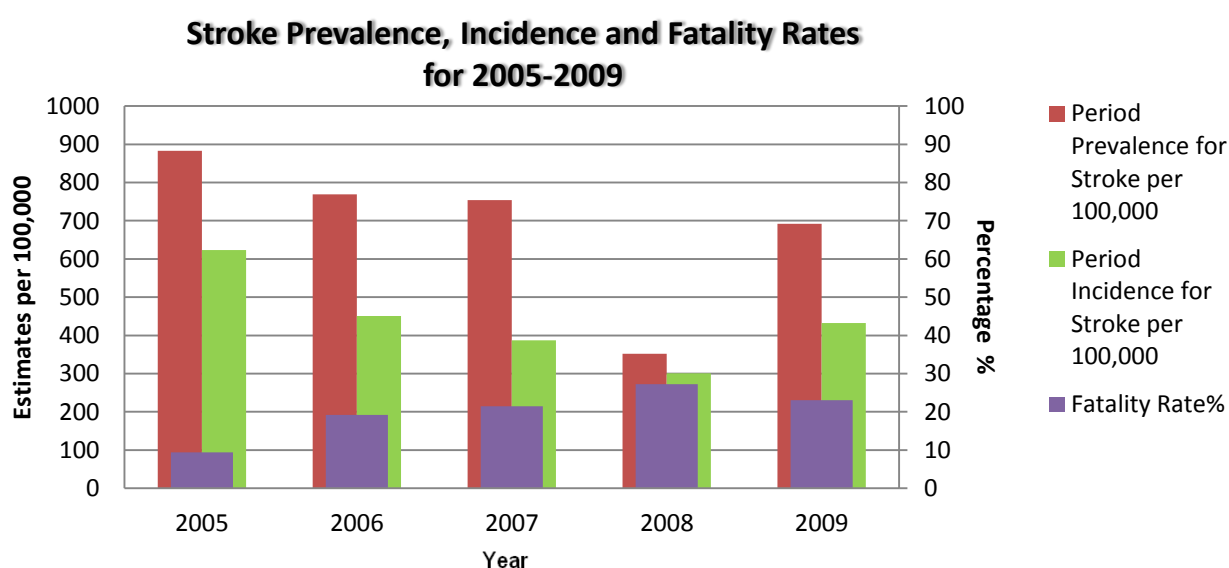


Figure 4: Comparing Stroke Prevalence, Incidence and Fatality Rates for 2005-2009

4.3 Traumatic Brain Injury

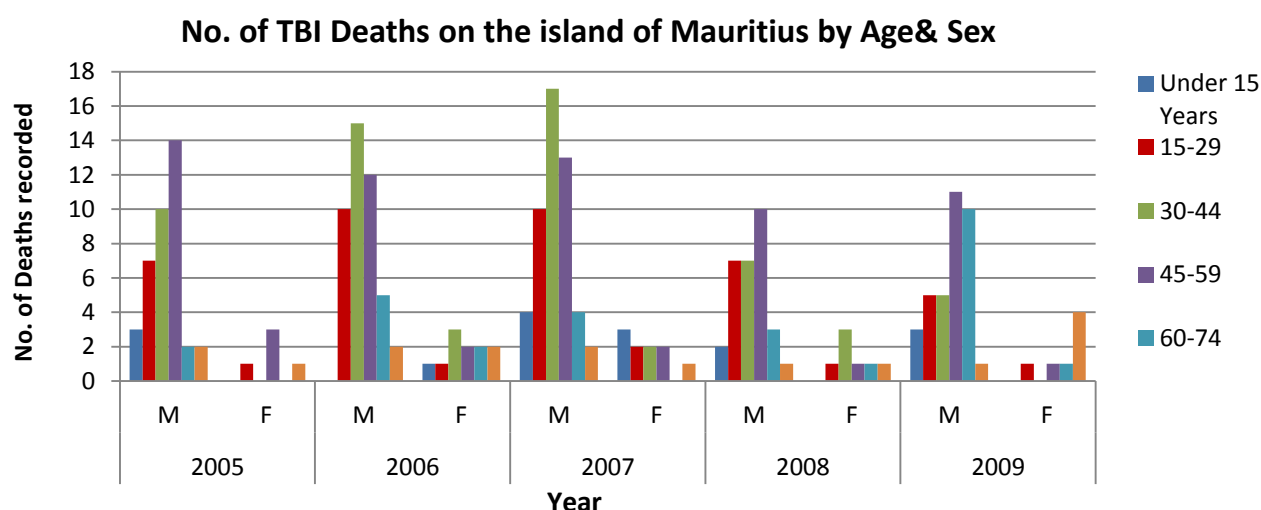


Figure 5: No. of Stroke Deaths recorded by year on the island of Mauritius, disaggregated by Age & Sex, adapted from MoHQL, 2010 [51]

A total of 237 people died from TBI from 2005 to 2009. The number of deaths for this period ranged from 37 to 62. The average number of deaths per year was 43. The greatest number of deaths was recorded in 2007 and the lowest number in 2008. 8% of the deaths recorded during these 5 years were attributed to males and 17% to females. The “45-59” Age-Group represented 29% of the total deaths recorded, followed by the “30-44” Age-Group with 14%. The “60-74” Age-Group represented 12% while the “15-29” and “75+” Age-Groups represented 19% and 7%, respectively. According to the data obtained from the public sector, 6.6% (the case fatality rate) of patients admitted (including re-admissions) died. As seen below in Table 4, the TBI Specific Death Rate ranged from 3.0 to 4.9 per 100,000.

Year	TBI Specific Death Rate per 10 ⁵
2005	3.6
2006	4.5
2007	4.9
2008	3.0
2009	3.4

Table 4: Specific Death Rate by year for TBI

The total number of patients receiving inpatient treatment for TBI in public medical institutions from 2005 to 2009 (including re-admissions and deaths) was 1591. The number of such inpatients during that same time period ranged from 186 to 404, per year. The greatest count of such inpatients was recorded in 2005 and 2006. 66.4% of those receiving treatment for TBI during that period were attributed to males and 33.6 % to females. The proportion attributed to the “40-59” Age-Group was 33.4% while 32.1% was attributed to the “20-39” Age-Group. The fatality rate among such inpatients ranged from 4% to 14.6% from 2005 to 2009. Period Incidence and Period Prevalence for TBI were calculated based on the information available from public hospitals only, as this information was not obtained from the private sector. The results are shown below in Table 5.

Year	Period Prevalence for TBI per 10 ⁵	Period Incidence for TBI per 10 ⁵
2005	233.7	204.8
2006	221.3	216.8
2007	216.1	211.5
2008	98.8	95.3
2009	105.2	102.2

Table 5: Period Prevalence and Incidence by year for TBI

4.3.1 Comparing TBI Prevalence, Incidence and Fatality Rates

As seen below in Figure 6, below, the Period Incidence rate for TBI ranged from 95.34 to 216.8 while the Period Prevalence rate ranged from 98.85 to 233.7. Both rates are given per 100,000

population. Figure 6 also shows that the Period Prevalence and Incidence of Stroke peaked in 2006 and 2007. Both were at their lowest in 2008. The Fatality Rate for TBI was at its lowest in 2006 but increased steadily to reach its highest point in 2009. The reasons for such fluctuations in these rates are unclear since the underlying causes of TBI admissions were unavailable. However, one can assume that the increasing number of TBI fatalities is linked to the parallel increase in the severity of road traffic accidents recorded during the 2005 to 2009 period, as seen in chapter three.

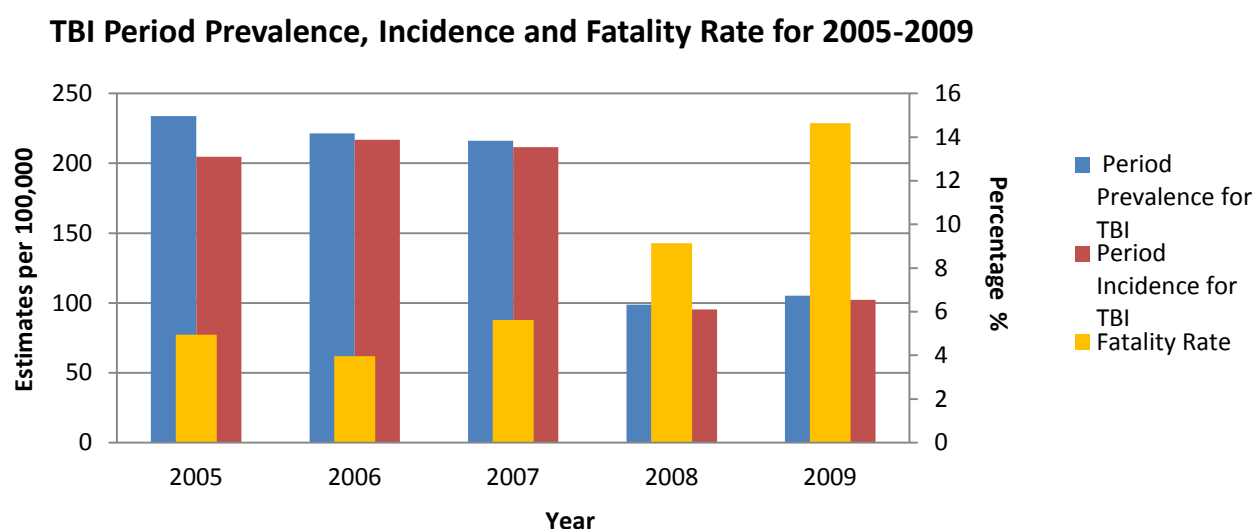


Figure 6: Comparing TBI Prevalence, Incidence and Fatality Rate for 2005 - 2009

4.4 Spinal Cord Injury

A total of 13 people died from SCI from 2005 to 2009. The number of deaths for this period ranged from 0 to 3. The average number of deaths per year was 2.6. The greatest number of deaths was recorded in 2007, 2008 and 2009 with 3 deaths each year. The lowest number was recorded in 2006 when no one died. All the deaths recorded during these 5 years were attributed to males. The “45-59 “was the most affected Age-Group with 3 deaths. According to the data obtained from the public sector, 0.8% (the case fatality rate) of patients admitted (including re-admissions) died. As seen below in Table 6, the SCI Specific Death Rate ranged from 0 to 2.44 per 100,000.

Year	SCI Specific Death Rate per 10 ⁵
2005	0.166
2006	0
2007	0.244
2008	0.243
2009	0.241

Table 6: Specific Death Rate by year for SCI

The total number of patients receiving inpatient treatment for a SCI in public medical institutions from 2005 to 2009 (including re-admissions and deaths) was 125. During that time period, the number of such inpatients ranged from 20 to 29, per year. The greatest

number of patient discharges was recorded in 2009. 71% of such inpatients during that period were attributed to males and 29 % to females. The proportion of those receiving treatment for SCI in the “60 +” Age-Group represented 27 % of cases recorded. The “20-39” Age-Group represented 29 %. The most affected Age-Group was the “40 to 59” Age-Group with 37%. Period Incidence and Period Prevalence for SCI were calculated based on the information available from public hospitals as the numbers available from the Private Sector could not be obtained. Hence as seen below in Table 7, the Incidence rate ranged from 8.8 to 16.8, while the Prevalence rate ranged from 11.7 to 17.4, per 100,000 population, respectively.

Year	Period Prevalence for SCI per 10 ⁵	Period Incidence for SCI per 10 ⁵
2005	14.6	11.4
2006	15.97	14.3
2007	13.4	12.8
2008	11.7	8.8
2009	17.4	16.8

Table 7: Period Prevalence and Incidence by year for SCI

4.5 Information Gathering System

The quantitative information described so far is based on the classification, coding methodology and data gathering route used by the Ministry of Health and Quality of Life (MoHQL) to compile the annual “Health Statistics Report”. It is therefore worth investigating these issues to assess the reliability and validity of the observations which have been made so far.

4.6 Classification Methodology used for TBI, SCI & Stroke in Mauritius

The department of Health Statistics, which oversees the annual “Health Statistics Report” within the MoHQL, uses the current [International Statistical Classification of Diseases and Related Health Problems 10th Revision](#) coding system, referred to as ICD 10, to categorise information and update their database. According to the World Health Organisation:

“The International Classification of Diseases (ICD) is the international standard diagnostic classification for all general epidemiological, many health management purposes and clinical use. These include the analysis of the general health situation of population groups and monitoring of the incidence and prevalence of diseases and other health problems in relation to other variables such as the characteristics and circumstances of the individuals affected, reimbursement, resource allocation, quality and guidelines.” [52]

It is designed to promote international comparability in the collection, processing, classification, and presentation of mortality statistics. This includes providing a format for reporting causes of death on the death certificate. The reported conditions are then translated

into medical codes through use of the classification structure and the selection and modification rules contained in the applicable revision of the ICD, published by the World Health Organization (WHO). These coding rules improve the usefulness of mortality statistics by giving preference to certain categories, by consolidating conditions, and by systematically selecting a single cause of death from a reported sequence of conditions. The single selected cause for tabulation is called the underlying cause of death, and the other reported causes are the non-underlying causes of death. The combination of underlying and non-underlying causes is referred to as the multiple causes of death.

As a result, it is used throughout the world by medical institutions to record and classify health problems observed and provides the basis for the compilation of national mortality and morbidity statistics.

Hence, Traumatic Brain Injury and Spinal Cord Injury are found in the “Injury, poisoning and certain other consequences of external causes” category and their resulting codes for data entry range from S00 to T98, inclusive. Stroke is classified under “Diseases of the Circulatory System” and with codes for data entry ranging from I00 to I99, inclusive. It is more specifically grouped in “Cerebrovascular Diseases”, Codes (I60-I69) [53]

4.6.1 TBI Classification

Traumatic Brain Injury should be under:

S06 Intracranial injury and **every** other intracranial injury listed under that code.

4.6.2 SCI Classification

Spinal Cord Injury should be classified under:

- (i) G95 Other diseases of spinal cord *Excludes:* Myelitis
- (ii) G95.9 Disease of spinal cord, unspecified, Myelopathy
- (iii) T09 Other injuries of spine and trunk, level unspecified, *Excludes:* crushing injury of trunk NOS ([T04.1](#)) multiple injuries of trunk ([T00-T06](#)) transection of trunk ([T05.8](#))
- (iv) T09.3 Injury of spinal cord, level unspecified

4.6.3 Stroke Classification

Stroke should be classified under:

- (i) Cerebrovascular diseases (I60-I69)

From I61 to I64, namely from “**Intracerebral haemorrhage**”, “**other non-traumatic intracranial haemorrhage**”, “**Cerebral infarction**” to “Stroke, not specified as haemorrhage or infarction, Cerebrovascular accident *Excludes:* Sequelae of Stroke”, including all the relevant variations of these neurological accidents.

4.7 Data Gathering Systems in Medical Institutions.

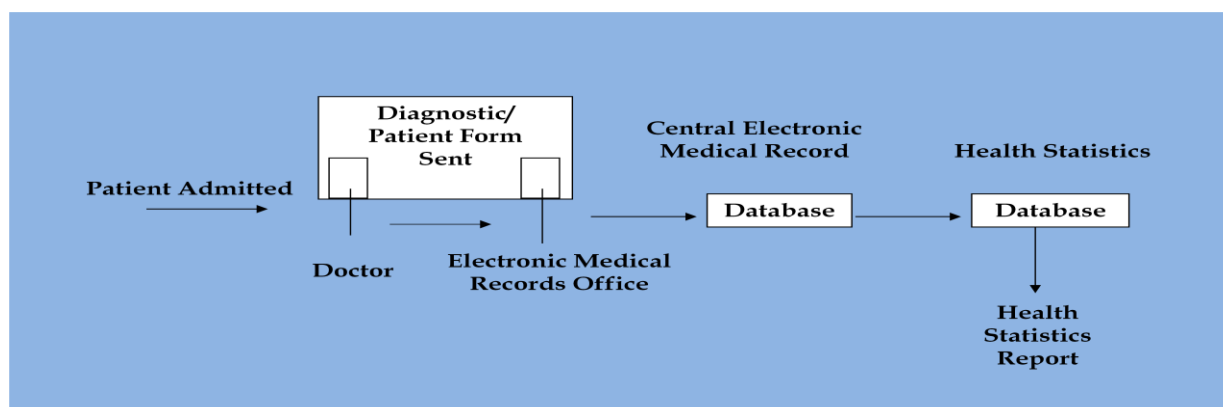


Figure 7: Health Data Gathering System

The Medical Records Office within each hospital initiates the coding phase and compiles the patient records which they receive from Doctors. Figure 7 above describes the different stages present within the data gathering process in the public sector. This information is then sent to the Central Electronic Records Office where the information is further edited and where a preliminary disaggregation takes place. From there it is sent to the Health Statistics department where further examination and editing takes place, before the data is examined for its reliability, validity and analysed. The “IMPS” software is used for coding and compiling data throughout, whereas the “Epi 6” software is used for data analysis. The output of this process is the “Health Statistics Report” which is released every year or every 2 years. Although a comprehensive picture for the data gathering process within Private medical institutions could not be obtained following the poor response from such institutions, it would appear that some of the institutions which did respond to our requests for information have roughly similar systems. Based on the responses received and subsequent interactions with such institutions, medical data is collected and compiled quarterly by the Nursing Coordinator at Fortis Clinique Darné, while there is an electronic medical records office at Apollo-Bramwell which performs similar duties. Both Fortis Clinique Darné and Apollo-Bramwell hospital use the ICD-10 classification system.

In cases of death, the relevant Medical Records Office sends the data to the Prime Minister’s Office for examination, then to the office of the Commissioner of Police for approval, before it is sent to the Department of Health Statistics, MoHQL, to be compiled. Private medical institutions also share their statistics with the public sector in death related cases.

4.7.1 Reliability and Validity of the Quantitative Data obtained

Based on figure 7, the potential for mistakes to occur at 2 distinct levels in the system can be observed: The first level where there is apparent potential for human error, is by the doctor, when performing the diagnostic and writing it down on the patients admissions form. The second level would be at the coding stage, based on the Doctor’s diagnostic and unreliable guidelines. Such errors, could lead to a blatant misrepresentation of information regarding

Traumatic Brain Injury, Spinal Cord Injury and Stroke. This would be even more important if the data is coded based on initial diagnosis, as opposed to confirmed diagnosis.

It is therefore important to investigate the actual application of the ICD 10 classification system and the potential impact of human error on the data gathering system used to produce the statistics obtained, in order to assess the validity and reliability of the information obtained.

4.7.2 Human Error: Doctor's Diagnosis

The following definitions for Stroke, SCI and TBI were given to us by 5 Medical Specialists: 1 Neurologist, 3 Neurosurgeons and 1 Anaesthesiologist (was appointed by his medical institution).

4.7.3 Definition of Stroke by Medical Specialists

- "Stroke is a rapidly focal or global disturbance of cerebral function, lasting less than 24hrs or leading to death, of cerebrovascular origin."
- More appropriately cerebrovascular diseases secondary to a disorder of blood vessels or blood supply i.e. ischemic infarction due to occasional haemorrhage due to symptoms/diseases of blood vessels"
- "Stroke is the sudden occurrence of a non-convulsive, focal neurological deficit. In its most severe form the patient may become hemiplegic or comatose"
- "Haemorrhagic and non-haemorrhagic stroke leading to neurological deficit, mainly due to Hypertension"
- "Cerebrovascular accidents due to Haemorrhage, Thrombotic events, Atherosclerosis (cerebral)"

4.7.4 Definition of SCI by Medical Specialists

- "Spinal Cord Injury is an insult to the spinal cord and resulting in either temporary or permanent change in its normal motor, sensory or automatic function"
- "Injuries as endured to the spine"
- "Traumatic injury is defined as having the following triad:
 - All voluntary movements in parts of the body below the lesion is immediately or permanently lost
 - All sensations from the lower parts is abolished
 - Reflex functions in all segments of the isolated spinal cord are suspended."
- "Structural damage to the spinal cord leading to neurological deficit"
- "Loss of consciousness, respiratory distress, bleeding ears, vomiting"

4.7.5 Definition of TBI by Medical Specialists

- “Traumatic Brain Injury is a non-degenerative, non-congenital insult to the brain from an external force, possibly leading to permanent or temporary impairment of cognitive, physical and psychosocial functions with an associated, diminished or altered state of consciousness”
- “Injuries caused by direct traumatic shearing or tearing of the axons resulting in axonal damage, haemorrhage etc including secondary damage caused by hypoxia, hypoxaemia”
- “Traumatic Injury is defined as physical wound or trauma”
- “Head Injury leading to neurological deficit, motor, cognitive”
- “Tetraplegia, Cardioplegia, involuntary bladder dysfunction”

Based on these definitions, it is quite clear that the perceptions of these 3 neurological conditions differ among Medical Specialists. It is thus possible to infer, given the area of specialization of these Doctors, their limited numbers and the weight given to their input for the coding of these conditions, that such discrepancies among the definitions received could have a negative impact on the classification and compilation of the statistics for the neurological conditions investigated. The impact of such discrepancies however, would require further investigation.

4.7.6 Coding Error and Bias: Application of the ICD 10 Classification System in Public Regional Hospitals

The Electronic Medical Records Office from the Jeetoo, JN and Flacq Hospitals were asked which ICD 10 codes they used to compile and quantify Stroke, TBI and SCI. Table 8, below, shows their responses.

Neurological condition	ICD 10 Codes Used	Name of Institution Where used
Stroke	I64	JNH, Flacq Hospital, Jeetoo Hospital
TBI	S06.9	JNH, Flacq Hospital, Jeetoo Hospital used (S10-19;S14.1;S34S34.2)
SCI	T09.3	JNH, Flacq Hospital, Jeetoo Hospital

Table 8: ICD 10 Codes used by Regional Hospitals

The following codes were deemed to be relevant to the neurological conditions under investigation. Failure to include them would imply the misrepresentation of epidemiological phenomena. The Electronic Medical Records Office from each of the institutions below was asked which ICD 10 codes they used to compile and quantify Stroke, TBI and SCI. Table 9, below, shows their answers.

Code	Use		Name of institutions where not used
	Yes	No	
TBI			
S09.7		X	Flacq Hospital, JNH Hospital, Jeetoo Hospital
S10-19		X	Flacq Hospital, JNH Hospital (only 14.1 used)
S14		X	Flacq Hospital, JNH Hospital
S14.1	X		
S24		X	Flacq Hospital, JNH Hospital, Jeetoo Hospital
S24.1		X	Flacq Hospital, JNH Hospital, Jeetoo Hospital
S34		X	Flacq Hospital, JNH Hospital, Jeetoo Hospital
S34.1		X	Flacq Hospital, JNH Hospital
S34.2		X	Flacq Hospital, JNH Hospital
S34.4		X	Flacq Hospital, JNH Hospital, Jeetoo Hospital
Stroke			
I60	X		
I61	X		
I62	X		
I63	X		
I64	X		
I67		X	Flacq Hospital, JNH Hospital
I69	X		
SCI			
T06.0		X	Flacq Hospital, JNH Hospital, Jeetoo Hospital
T06.1		X	Flacq Hospital, JNH Hospital, Jeetoo Hospital
T09.3	X		
T09.4		X	Flacq Hospital, JNH Hospital, Jeetoo Hospital
T91.3		X	Flacq Hospital, JNH Hospital, Jeetoo Hospital
External causes of Morbidity and Mortality: Traffic Accidents, Self-Harm etc			
V01-09		X	Flacq Hospital, JNH Hospital
X60-X84		X	Flacq Hospital
X85		X	Flacq Hospital, Jeetoo Hospital
Y09	X		

Table 9: ICD 10 codes not used to compile information on SCI, TBI and Stroke

Based on the information above, it is possible to conclude that the quantitative information presented earlier is not as reliable as it appears. Although little quantitative information has been obtained from private medical institutions in this particular area, it is reasonable to assume that this unreliability would also extend to information that might be obtained from many private medical institutions. For example major private institutions such as Apollo-Bramwell hospital and Fortis Clinique Darné, use the ICD 10 Classification system as well.

CHAPTER FIVE: HOSPITAL SERVICE PROVIDERS

Having provided an overview of the Mauritian Health Care System in chapter 3, the following chapter describes the strengths and weaknesses of the type of inpatient and outpatient care provided to Stroke, SCI and TBI patients. The perspective taken is that of the main hospital service providers within the Mauritian Health Care System. The patient perspective on the scope and quality of these same services is investigated in chapter eight.

5.1 Hospitals

The Regional Hospitals which did respond provide health services to the following geographical regions: Grand-Port/ Savanne, Flacq with its eastern suburbs, Port-Louis, and Plaines Wilhems/Black River/Savanne. The Private medical institutions which responded claimed to offer their services to the country as a whole, sometimes internationally as well.

The number of in-patient beds per institution ranged from a total of 110 to 1000. The average number of such beds was 410 beds per hospital. Some hospitals such as Jeetoo appeared to allocate inpatient beds according to sex: 173 beds for men and 219 for women. This particular hospital also had 64 cots. There were 165 (operational) beds at Apollo-Bramwell Hospital and 110 at Fortis Clinique Darné. There were no outpatient beds recorded.

The number of inpatient beds allocated to Stroke patients during the data gathering phase of the project, ranged from 20 to 40. The number of beds allocated to SCI and TBI patients ranged from 2 to 15 and from 6 to 60, respectively. The highest number of Stroke patients was found at Victoria hospital, while the highest number of SCI and TBI patients was found at Jeetoo hospital and JN hospital. There were a total of 22 occupied beds for these conditions at Fortis Clinique Darné. Based on the information provided to us, such patients were offered beds at Apollo Bramwell, as and when required.

5.1.1 Specialised Human Resources per hospital

Table 10 below provides an outline of Specialised Human Resources in Medical Institutions as observed and listed by respondents with regard to their respective institution.

Institution	Medical Specialist	Therapist
Victoria/ENT hospital	1 Neurologists, 3 Neurosurgeons 2 Physical and Rehabilitation Medicine Specialists	3 Physiotherapists 1 Speech and Language Therapist 1 Occupational Therapist 1 Clinical Psychologist
A.G. Jeetoo Hospital	1 Neurosurgeon (visiting) 4 Physical and Rehabilitation Medicine Specialists	1 Physiotherapists 2 Speech and Language Therapist 2 Occupational Therapist 1 Clinical Psychologist
JN Hospital	Neurosurgeons (visiting)	2 Physiotherapists (estimated)

	1 Physical and Rehabilitation Medicine Specialists	1 Speech and Language Therapist (estimated) 2 Occupational Therapists (estimated) 1 Clinical Psychologist
Flacq Hospital	1 Physical and Rehabilitation Medicine Specialists (visiting)	2 Physiotherapists, 1 Speech and Language Therapist 1 Occupational Therapist 1 Clinical Psychologist
SSR Hospital	N/A	N/A
Fortis Clinique Darné	3 Neurologists, 2 Neurosurgeons 5 Physical and Rehabilitation Medicine Specialists	3 Physiotherapists 1 Speech and Language Therapist 1 Occupational Therapist 2 Clinical Psychologists
Apollo Bramwell Hospital	2 Neurologists, 2 Neurosurgeons 1 Intensive Care Consultant	5 Physiotherapists 2 Clinical Psychologists 1 Speech Language Therapist

Table 10: Specialised Human Resources in Medical Institutions

Victoria hospital is the only public medical institution with a Neurologist and 3 Neurosurgeons. Physical and Rehabilitation Medicine Specialists were attached to each medical institution, except for Apollo Bramwell hospital. The number of Physiotherapists attached to regional hospitals ranged from 1 to 3. The number of Occupational Therapists per institution ranged from 1 to 2, while the number of Clinical Psychologists was fixed at 1 per institution. The number of Speech and Language Therapists per institution ranged from 1 to 2. It appeared that in most cases, hospitals shared their human resources: hence some Medical Specialists, Clinical Psychologists and Speech and Language Therapists worked in different institutions every week. Victoria hospital differed in its arrangements for Speech and Language Therapy and Occupational Therapy. It usually refers patients with such therapeutic needs to the Ear Nose and Throat (ENT) hospital in Vacoas for follow-up.

As of December 2010, 3 Neurologists, 2 Neurosurgeons, 2 Physical Medicine Specialists, 3 Physiotherapists, 1 Speech and Language Therapist, 1 Occupational Therapist and 2 Clinical Psychologists were attached to Fortis Clinique Darné. 2 Neurologists, 2 Neurosurgeons, 5 Physiotherapists, 2 Clinical Psychologists, 1 Speech and Language Therapist and 1 Intensive Care Consultant were attached to Apollo-Bramwell hospital.

5.1.2 Acute Care provided to Stroke, TBI and SCI patients

Acute Care is usually pertains to a pattern of health care in which a patient is treated for a brief but severe episode of illness, following an accident or other trauma, or during recovery from surgery. Such care is usually given in a hospital by specialized personnel using sophisticated technical equipment and may involve intensive or emergency care. It is usually necessary for only a short time, unlike chronic care. The unit within which such care was dispensed varied but the general trend observed regarding where Stroke, TBI and SCI patients receive Acute Treatment was in the Intensive Care Unit (ICU) and in wards, as stated by Flacq Hospital and

Apollo Bramwell hospital. Victoria hospital added “the operation theatre”, JN added the “Admission and Discharge (A&D) department” for such conditions. The units within which Jeetoo hospital provided such care to inpatients varied according to the condition. Hence Stroke patients receive Acute Care in “Medical wards/Medical ICU”, SCI patients receive such care in the Neurological and Orthopaedic ward while TBI patients receive such care in the Neurological ward, Surgical ward or ICU.

The health professionals deemed to be in charge of this phase differed slightly from institution to institution. For instance, the professionals stated as being in charge at Jeetoo and JN hospitals were “Doctors and Nurses”. The response of Victoria hospital was more specific on this issue and deemed that such medical professionals would be the Neurologist or Neurosurgeon for Stroke, the Neurosurgeon or Orthopaedic surgeon for SCI. The Neurosurgeon would be in charge for TBI cases. The treating specialist, nursing staff and physiotherapist were in charge at Flacq hospital. At Fortis Clinique Darné Acute Care for such patients was provided in the ICU by the ICU specialist. At Apollo Bramwell hospital the Neurologist, Intensive Care Consultant or Physician would be the professional in charge of that phase for Stroke patients. The Neurosurgeon, Intensive Care Consultant or Orthopaedist would be in charge of the care provided to SCI cases within that same institution. The Neurosurgeon or Intensive Care consultant would be in charge of TBI cases.

Based on the information gathered from public hospitals, the average number of days spent in Acute Care for Stroke patients in 2009 ranged from 5 days at Victoria hospital, to 15 days at Jeetoo and JN hospital. The average number of days spent in Acute Care for SCI patients in 2009 ranged from 7 days at Victoria hospital to 15 days at Jeetoo and JN hospitals. The average number of days for TBI patients ranged from 7 days at Victoria to 60 days at JN hospital. The average number of days spent in such care for such patients at Fortis Clinique Darné was 5 for each neurological condition. The average number of days spent at Apollo Bramwell that same year was 6 days for Stroke (maximum 15 days), 1 day for SCI (maximum 1 day) and 3 days for TBI (maximum 8 days).

5.1.3 Neurological Rehabilitation Services provided

According to the information obtained from the questionnaires retrieved access to in-house Rehabilitation services were provided by public hospitals such as JN and Flacq hospitals but not at Victoria and Jeetoo hospitals. Such in-house services are available in private institutions at Fortis Clinic Darné and Apollo Bramwell.

The professionals who led the provision of neurological Rehabilitation for Stroke, SCI and TBI at Victoria hospital were Physiotherapists and Nurses. Those in charge of such care at Flacq hospital were Physiotherapists, Occupational Therapists and Speech and Language Therapists. Physicians were in charge of the provision of neurological Rehabilitation services at Fortis Clinique Darné.

Based on the information provided to us by public hospitals, the Rehabilitation phase usually starts when the patient is stable. This however appeared to be different in the private sector. It usually starts as soon as the patient is admitted in institutions such as Fortis Clinique Darné and Apollo Bramwell hospital. The frequency of Rehabilitation sessions for Stroke inpatients

and outpatients in Jeetoo hospital was thrice weekly, twice weekly for SCI patients but this varied for TBI patients. Such sessions were usually scheduled according to the severity of the condition and the resulting need for services such as occupational therapy and speech and language therapy. In Flacq hospital the frequency of therapy would depend on the patient's condition, but would usually occur daily, in the ward, for any of these 3 neurological conditions. These sessions would be offered twice weekly to outpatients and be followed by home visits by the Community Rehabilitation Programme staff. Rehabilitation therapy sessions were not provided to Stroke, TBI and SCI inpatients at Victoria hospital. The Rehabilitation sessions provided at Clinique Darné were 2 hours long. The frequency of the Rehabilitation, as offered at Apollo Bramwell hospital, was 2-3 times a day.

The following patient needs were provided for at Flacq hospital: Physiotherapy, Occupational Therapy, Speech and language Therapy and Social Worker. At Victoria the following services were offered: Medical Consults, Mobility, Speech, Cognitive, Bladder, Bowels and basic medical regimen. Jeetoo hospital deemed that all patient needs were catered for. The respondents from Flacq hospital saw bladder and bowels management issues as needs not provided for. Respondents from Victoria hospital observed an absence of protocol for referral to other professionals, as well as the absence of psychotherapy for in-patients. According to the data collected from Fortis Darné, it provides "total patient care" through a "holistic approach". Apollo Bramwell deemed to offer every service required in that field except for occupational therapy, and a prosthesis department.

5.1.4 Post-Discharge Care

All 4 regional hospitals and the 2 private institutions acknowledged that the discharge of patients was planned and that, in most cases, the patient would head home. However the type of post-discharge care appeared to differ according to each institution.

Hence according to Victoria hospital the type of post-discharge care provided for Stroke was a usually monthly medical review, physiotherapy twice a week, consults with the Psychiatrist as well as, home visits provided by the Ministry of Social Security's Medical Unit for the elderly in the "75 years + Age-Group".

Flacq hospital included Physiotherapy, Occupational Therapy and Speech Therapy as part of the type of post-discharge care received. The professionals in charge during that phase were thus the relevant therapists. Victoria also included the Neurologist as being part of this phase while Flacq hospital included the Community Nurse and Community Rehabilitation staff.

The health professionals involved at JN hospital were a Physiotherapist, Occupational Therapist, Speech and Language Therapist, Psychologist and Medical Officer.

Based on the information retrieved the post-discharge care received for SCI and TBI within each institution was roughly similar to the type of care provided to Stroke patients, but with slight variations. Thus Flacq hospital added "Medical Social worker (Counselling) to Physiotherapy, Occupational Therapy, Psychotherapy, Speech Therapy. In general, the professionals in charge of this phase included the corresponding therapists as well as the Community Nurse, Medical Social Worker and Community Based Rehabilitation staff, in some

cases. At Fortis Clinique Darné Doctors, Nurses and Physiotherapists were involved during that phase. Apollo-Bramwell listed “follow-up in Outpatient Department” and “Physiotherapy” as being part of post-discharge care.

Every institution acknowledged that long-term follow up was offered to Stroke, TBI and SCI patients in their area, should they experience problems such as Mobility, Problems with Bladder, Bowels, Speech and cognitive impairment. In terms of the accessibility of the medical institutions to patients with disabilities, the score assigned by respondents ranged from 5 to 8 in the public sector, with the lowest score going to JN hospital and the highest going to Jeetoo hospital. Apollo Bramwell’s and Fortis Clinique Darné’s score was 10.

5.1.5 Comments and Recommendations on Rehabilitation Services offered in Regional Hospitals:

The following was observed and suggested by respondents:

- All services should be located under one roof in the future since as at now departments are quite at a distance from each other. This could take the form of a Stroke Clinic (with a hotline) annexed to the ICU and could provide the following services:
 - “EMG”- Electromyography and “EEG”- Electroencephalography.
 - It could have an internal Rehabilitation Centre which would provide the medication required by patients such as “Baclofen”, “Tanakan” as well as Anti-oxidants.
 - It could also have a prevention unit that could perform outreach work and inform people of risk factors. It could be in charge of secondary prevention and education (post-discharge).
- There is a need for more transport facilities, which should also be appropriately adapted to patient condition. Some ambulances should also be used for Rehabilitation Services only to make access easier.
- Special Training should be provided to staff on how to provide quality care to patients. This is important as relatives who act as carers tend to neglect the care and Rehabilitation of patients. This heightens the importance of maintaining a good and effective follow-up at home by CBR staff and Community Nurses.
- The Government already provides the following services free of charge: wheelchairs, wheelchair access ramps, crutches. Children are provided with toys, especially in Speech and Occupational Therapy departments.

5.2 Medical Specialists

Respondents were all male Mauritian nationals and were aged between 34 and 62. They consisted mainly of a Neurologist, Neurosurgeons and an Anaesthesiologist with a diploma in Orthopaedics from Flacq hospital. 2 Neurosurgeons and a Neurologist were based at Victoria hospital but held consults in other regional public hospitals such as JN, Victoria, SSRN etc. The answers of the latter were however based on their experience from working in different hospitals, rather from working in a specific institution or health region. One respondent was from the private sector and was attached to Apollo Bramwell hospital.

All our respondents received their training abroad. The institutions which they listed included: “Huazhong University of Science and Technology” & “Tongji Medical College”, in China, “Nelson Mandela School of Medicine”, in South Africa, “Calicut Medical College” & “Trivandrum Medical College” in India, the “Royal College of Surgeons in Ireland”, and the “Royal College of Surgeons in Edinburgh” in the United Kingdom, respectively. One of the respondents also studied in Moscow, Russia. No respondent mentioned receiving specialised training in Neurological Rehabilitation. The length of their attachment to their respective institution ranged from 1-5 years to 10-15 years.

5.2.1 Involvement with Stroke, TBI and SCI Patients

In general, respondents held regular sessions with such neurological cases. Neurosurgeons were working on average with 7 Stroke patients, 2 SCI patients and 14 TBI patients. The Neurologist was working with 80 Stroke patients, 20 SCI patients and 10 TBI patients. The Anaesthesiologist only had regular consults with 2 Stroke patients. The average length of consults, in both the public and private sectors, ranged from 10 min to 30 min. As observed before, the frequency of sessions with TBI, SCI and Stroke patients would depend on need and the nature of the patient condition. On average, though, they usually tried to meet Stroke, TBI and SCI patients 2-3 times a week, to once a month. Respondents would meet with SCI and TBI cases almost every day during the initial stage. The Neurologist held consults with Stroke patients but rarely with TBI and SCI patients. He would spend on average 20% of his time with such neurological cases. Neurosurgeons on the other hand would spend on average 20-25 % of their time with such cases. The Neurosurgeon from Apollo-Bramwell hospital spent the most time with such neurological cases, with an average of 40 % a week.

5.2.2 Patient Journey Stroke, TBI and SCI cases in Public Regional Hospitals.

The patient journey here refers to the sequential steps in providing a patient's clinical care and includes the movement of that patient from being admitted to being discharged. Figure 8 below, shows the general picture painted by the Neurologist from the public sector when asked about the patient journey for TBI, SCI and Stroke cases. The perspectives of other specialists from both the public and private sector on this particular topic are briefly outlined in the next sub-sections. The Anaesthesiologist could not contribute to this particular aspect of the present study. The description received on the Patient Journey for TBI, SCI and Stroke cases in the private sector were limited to information received from Apollo-Bramwell hospital and are therefore not representative of that sector as a whole.

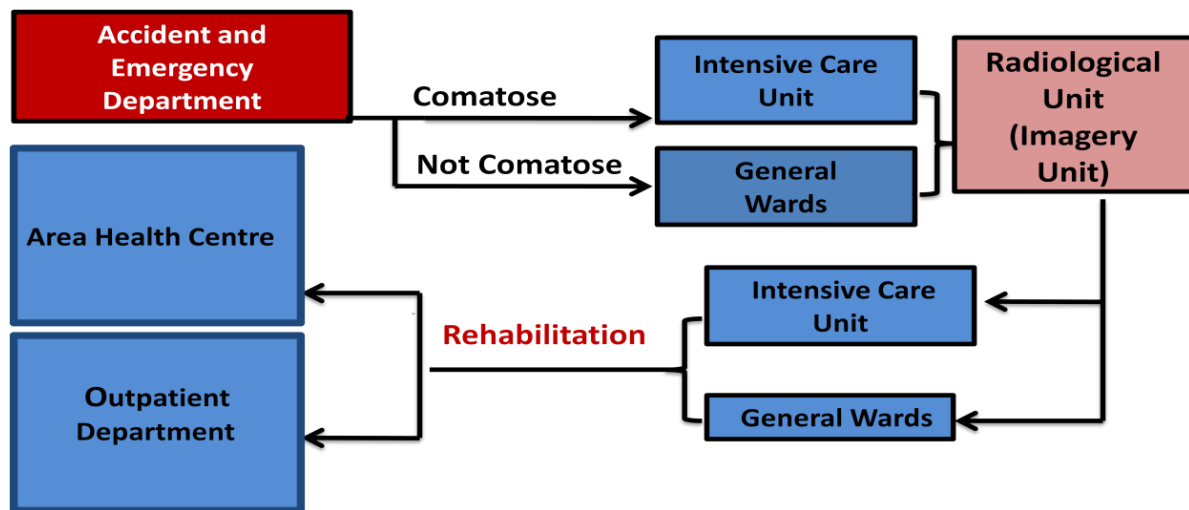


Figure 8: General Patient Journey for SCI, TBI, and Stroke in Public Regional hospitals

The perspectives on the Patient Journey for such neurological conditions did appear to vary according to Medical Specialist when asked to describe that phase. Hence the descriptions received for the Patient Journey in cases of Stroke can be seen below:

- “Referral from Physician, G.P. and other private practitioners usually via Accident or Emergency Department”
- “After neurological assessment, the patient is referred to physiotherapist or Occupational Therapy Unit”

The descriptions received for the Patient Journey in cases of SCI can be seen below:

- “Referral from Accident/Emergency unit, Neurologist, Physicians and Orthopaedic Surgeons”
- “Following clinical radiological assessment the patient is either operated on or treated conservatively.”
- “No specific spinal Rehabilitation service is available”

The descriptions received for the Patient Journey in cases of TBI were as follows:

- “Referral from Accident/Emergency unit, general surgeons, G.P.s, Physicians”
- “Following clinical radiological assessment the patient is either operated on or treated conservatively. The patient is sent home after necessary physiotherapy in hospital.”

5.2.3 Patient Journey for Stroke, TBI and SCI cases in one Private Institution

As mentioned in section 2.7 the descriptions received on the Patient Journey for TBI, SCI and Stroke cases in the private sector were limited to those of the respondent from Apollo-Bramwell hospital and are therefore not representative of that sector as a whole. When asked to describe the journey for Stroke, the following description was obtained:

- “The patient comes to the Emergency Department, where he/she will be assessed by the ER Doctor and investigators initiated. The Stroke physician on-call is informed. The patient is admitted to the Medical Unit or Intensive Care Unit where he received

appropriate treatment. Once his condition gets stabilized, the NeuroRehabilitation program starts.”

The following description was obtained with regard to the patient journey for SCI patients:

- “The Neurosurgeon/Orthopaedic surgeon is informed. Cervical spine injured patients are taken to neurosurgery side. Thoraco spine injuries are handled by Orthopaedic surgeons. Appropriate Treatment is initiated along NeuroRehabilitation.”

The following description was obtained with regard to the patient journey for TBI patients:

- “The Neurosurgeon is informed of the point as soon as he presents at Emergency department. The patient is admitted to the ICU. Conservative or surgical management is planned accordingly to the clinical condition.

5.2.4 Post-Discharge Care & Follow-up in both the Public and Private Sector

The Medical Specialists from Public Institutions who answered our questionnaire observed that most patients go home after staying in government hospitals and come back to receive treatment in outpatient departments where they receive minimum follow-up by a Medical Specialist(Physician, Neurosurgeon, general surgeons etc), on a monthly basis or at 12-16 week intervals. They sometimes receive physiotherapy on outpatient basis as well.

The respondent from Apollo Bramwell Hospital observed that patients are returned home where they continue Rehabilitation and facilities are set up, as affordable. They usually attend regional government hospitals for consolidation of their therapy and visit Apollo Bramwell Hospital, periodically, for assessments and reinforcement therapy.

5.2.5 Neurological Rehabilitation services offered in both Public and Private Institutions according to Medical Specialists

Respondents were asked to state where Neurological Rehabilitation Services could be obtained based on their experience.

- Rehabilitation Unit with Physiotherapist only exist in regional hospitals
- At ENT/Vacoas there is a Speech Therapist and an Occupational Therapist
- Only basic Rehabilitation services are provided –not aware of services available at Flacq, SSRN, JN etc
- Physiotherapy (all regional hospitals have a unit)
- Occupational therapy/speech therapy (at ENT)
- Community Based Rehabilitation
- Homes(Nursing) having a Rehabilitation unit(no example provided)
- Nil. Patients may be referred to Physiotherapy occupational therapy and speech therapy.

Table 11 below shows the responses obtained when asked where these services could be obtained, based on their professional experience:

Name of institution	Public or Private	Does the service cater to all the Patient Needs? (1-5)
Hospitals	Public	5
Private Clinics	Private	2
Victoria Hospital	Public	3
JNH Hospital	Public	3
A.G. Jeetoo Hospital	Public	3
SSRN Hospital	Public	3
Flacq Hospital	Public	3
Victoria Hospital	Public	N/A
ENT Hospital	Public	N/A
Apollo Bramwell Hospital	Private	3

Table 11: Institutions believed to provide Neurological Rehabilitation services according to Medical Specialists

5.2.6 Issues identified and solutions suggested in the Provision of Neurological Rehabilitation Services

Table 12 below shows the information obtained when Medical Specialists were each asked about the 3 most important issues identified in the local provision of Neurological Rehabilitation services and the solutions proposed, based on their professional experience.

Issue Identified	What it will change
1. To get a Rehabilitation ward in at least 3 major hospitals	1. Better and more appropriate treatment
2. Prevention Unit	2. Q&A and awareness of risk factors : it could educate people on what to do and what not to do in case of stroke
3. Proper Assessment of patient and of existing services	3. These services will help to improve the patient's welfare
4. A comprehensive Neuro Rehabilitation centre to be set-up	4. This helps to bring a holistic approach to the Rehabilitation process which would not only include neurophysical but also neurocognitive, neuropsychological and psychosocial realms into practice
5. A more significant Neuro department where patients can be admitted for extensive Rehab/physiotherapy	5. More convenient for patient, better outcome, specialised and multidisciplinary approach

6. Education of patients post-discharge	6. Increase positive behaviour change resulting in increase, morbidity and mortality, increase compliance of treatment
7. Qualified and trained staff/doctors	7. These services will help to improve the patient's welfare
8. i) Setting advanced facilities for neurorehabilitation like a Gait training lab ii) Functional electrical stimulation, electromyographic biofeedback	8. These facilities are only available abroad and will help a lot in establishing scientific practice
9. Multi-disciplinary approach in more wards: Physio, OT, Speech, Psychologist, Dietician and greater involvement of the Orthopaedic workshop from Beau -Bassin	9. Patients receiving treatment under one roof will result in better outcome and will cost less to the government to rehabilitate the patient
10. Hotline (Stroke)	10. In case of emergency
11. Specialised equipment	11. These services will help to improve the patient's welfare
12. Community to be made an active stakeholder in the overall stakeholder service	12. From a patient centric approach to community-based shifting of focus

Table 12: Issues found in Neurological Rehabilitation services and solutions put forward by Medical Specialists

5.2.7 Additional Comments and Recommendations on Services Provided

The rating given by respondents from public institutions with regard to the overall quality of neurological Rehabilitation services provided in their respective institutions ranged from 2 to 7, with Victoria/ENT hospital Apollo-Bramwell hospital receiving the highest score. This same rating extended to the facilities and equipment available in these institutions. The following was observed and suggested by respondents:

- Facilities and staff are grossly inadequate and focus mainly on Acute Rehabilitation and hence provide only general rehab services. No special Rehabilitation services for TBI, SCI or Stroke are available (in the public sector)
- Patients with TBI, SCI & Stroke deserve better and more appropriate care in a specialized centre with properly qualified staff and adequate equipment and facilities.
- A Rehabilitation Centre providing EMG, EEG needs to be set up.
- Stroke clinic annexed to ICU should be set up
- Facilities for Neurological Rehabilitation are non-existent.
- Multi-disciplinary team needs to be set up and include Physio, OT, Speech and Language Therapist, Psychologist, Social Worker, Dietician, Orthopaedic workshop staff and NGOs.
- There is an urgent need to train staff in neurological Rehabilitation (master in TB neurological rehab, hand neurological Rehabilitation, cerebral palsy)
- There is a need to organise community base rehab program for less severe cases of Stroke and Traumatic Brain Injury

- At least one person needs to be trained in Sensory Integration. This person will then be responsible to improve and provide specialised advanced rehab program for TBI, Stroke, and SCI for Mauritius.
- Current facilities at Apollo-Bramwell are good enough to deliver reasonable standard of care in Neuro-Rehabilitation but is limited in terms of higher technology and expertise. However a holistic approach aiming at neurocognitive and psychological improvement alongside physical re-conditioning is essential for the neurologically disabled patients. This can be provided by the concerted efforts of a team involving a neurophysician, neurosurgeons, a physiotherapists, occupational therapists, speech trainers, gait trainers, social psychologists and community support. The necessity of a comprehensive Neuro-Rehabilitation centre lies here and it is to this end and the hospital is headed.

5.3 Rehabilitation Nurses

Respondents were male and female and were aged between 28 and 55. They were attached to public regional hospitals only, namely, JN and Jeetoo hospitals. They all received their training in Mauritius either at the Mauritius Institute of Health in Pamplemousses or at Candos School of Nursing. No respondent was certified in Rehabilitation Nursing or had received specialised training in Neurological Rehabilitation. They worked in different wards such as the neurological, general and orthopaedic wards. The length of their attachment to their respective institution ranged from 1-5 years, to more than 15 years.

5.3.1 *Involvement with Stroke, TBI and SCI Patients*

Respondents could only answer with regards to their assigned wards and not at hospital level. As such, the number of Stroke in-patients currently believed to receive treatment for Stroke ranged from 5 to 20. There were 15 TBI and at least 10 SCI cases at JN. Individual respondents at Jeetoo and Victoria hospitals held regular sessions with patients suffering from Stroke, SCI and TBI, where and when applicable. Groups of respondents interviewed at JN held regular sessions with 10 TBI patients, 15 Stroke patients and 6 SCI patients. The length of a session lasted from 10-15 min to 1hr 45 min, depending on the condition of the patient. Respondents attended to the needs of TBI, SCI and Stroke patients on a daily basis. Based on the information retrieved, respondents spent on average 25-30% of their time, every week, with such patients. Patients were referred to Nurses by the attending Physician.

Facilities available to respondents differed from institution to institution. However, none had specific equipment for cases in need of Neurological Rehabilitation. Jeetoo hospital is equipped with specially adapted toilets and bathrooms for the handicapped, wheelchairs and adjustable beds. Other institutions only had adjustable beds or standard equipment and facilities only.

Patients usually went home or to Nursing Homes after their stay in hospital. The lack of education of some family members was pointed out as being the reason why patients received their discharge from the institution before significant progress was made. It appeared these people did not understand the importance of inpatient care.

Post discharge care also varied from institution to institution. The general trend observed was medical follow-up and appointments with physiotherapists. Some patients also receive home visits from the Community Based Rehabilitation Programme. Some institutions such as Jeetoo and JN offer some transport services to allow patients to attend their appointments.

5.3.2 Comments and Recommendations on Services Provided

When compared to other public medical institutions the score awarded by respondents to institutions ranged from 2 to 5. The lowest score was awarded to Victoria hospital and the highest to Jeetoo hospital. The latter also received the highest rating (6) in terms of overall services given to patients in need of neurological Rehabilitation. Respondents made the following observations and suggestions:

- Training of family members in physiotherapy to follow-up on medical appointments and physiotherapy sessions at the hospital
- Better and more adequate transport coverage should be made available to patients
- Group meetings and support groups could be organised for patients
- Further training should be provided to Nurses on Neurological issues. There is a distinct need for such specialist Nurses
- A specialised service should be offered and a Neurological ward needs to be set up in hospitals where it does not exist
- More Community and Rehabilitation services to provide more home visits for patients
- Institutional issues: More attention needs to be paid to team-building, better monitoring and evaluation of services. More emphasis should also be put on the quality of services, as opposed to quantity.
- Equipment: Specially adapted bathrooms for the handicapped and more room for physiotherapy in wards, Cervical Collar, Thoracic lumbar bed, lifting and collapsing trolleys and special beds are needed

5.4 Physiotherapists

Respondents were male and female and were aged between 27 and 52. They were attached to public regional hospitals and private institutions such as Fortis Clinique Darné and Apollo Bramwell hospital. All 5 regional hospitals responded to our questionnaire. One freelance physiotherapist was also part of the sample. The length of attachment to their institution ranged from less than 1 year to 6-10 years. Most respondents had been attached to their institution for 1-5 years.

They all received their training abroad. Institutions which they attended included: Delhi University, Manipal Academy of Higher Education, the Institute for the Physically Handicapped, Apollo Hospitals Enterprise Ltd, in India, Leeds School of Physiotherapy in England, University of Applied Sciences in Finland and Ulmkolleg in Germany.

5.4.1 Involvement with Stroke, TBI and SCI Patients

The estimated number of Stroke patients believed to be treated as in-patients at the time in public institutions ranged from 4 to 35, by institution. The highest estimate was recorded at SSRN Hospital. 15-20 patients were believed to be receiving treatment at Apollo-Bramwell. The same estimate per public institution for SCI patients ranged from 0 to 7 and from 0 to 5 for TBI. The highest number of TBI cases was recorded at Jeetoo hospital and the highest number of SCI cases was recorded at Flacq hospital.

Overall respondents from public institutions held regular sessions with such patients and worked on average 17 Stroke patients, 3-4 SCI patients and 2 TBI patients. This average could not be estimated for private institutions following missing data. The length of sessions ranged from 15-20 min to 1hr in both public and private institutions. Respondents from public institutions such as Jeetoo and SSRNH hospitals tended to see in-patients suffering from Stroke, TBI and SCI daily, and outpatients suffering from these same conditions, on 2-3 times a week. This frequency was appeared slightly lower in the private sector with sessions sometimes set to once a week, depending on the patient's condition. The average amount of time spent with neurological cases every week ranged from 20-50% in the Public Sector and from 10-40% in the Private sector.

Patients in both the public and private were usually referred by the Neurologist/Neurosurgeon and/or Specialist in Physical Medicine. Sometimes cases would be referred by General Practitioners and Orthopaedist. In most cases patients would head home after completing physiotherapy or go back to work, in some cases the disability unit would help in the reintegration of the individual in society. Post discharge care provided differed from institution to institution some mentioned. It consisted mainly in regular medical appointments at the hospitals, and receiving home visits from the Community Based Rehabilitation staff. The provision of regular post-discharge, physiotherapy, speech therapy, occupational therapy and psychotherapy, was only mentioned in Flacq.

The success in completing the number of required sessions varied from hospital to hospital. Hence respondents from JN and Victoria hospital were usually able to complete the number of required sessions whereas SSRN and Flacq hospital pointed out to difficulties in reaching that target with both TBI and SCI patients, respectively. Reasons for not being able to complete therapy included:

- Community Rehabilitation Programme staff would sometimes take over and patients would stop going for follow-up appointments at the hospital
- Transport difficulties are often experienced by patients
- Patients miss appointments because the ambulance service is unreliable
- Doctors do not inform patients about their prognosis
- Sometimes patients get depressed if results do not become apparent quickly and may stop coming for their appointments
- Patients do not trust the quality of services provided in the public sector

Table 13 below lists the equipment and facilities available for patients in need of neurological Rehabilitation, as available to physiotherapists, in their respective institution:

Facilities available for Spinal Cord Injury	
Flacq	Low couch and limited space
Victoria	Hydrotherapy(pool) ,lift for the pool 1 room with 11 cubicles and 10 couches
JN	Examination couch, matts
SRRN	Gymnasium, treatment couch
Jeetoo	Nothing specific for Neurological Rehabilitation, 3 couches and 1 office
Facilities available for Traumatic Brain Injury	
Flacq	Low couch and space
Victoria	Hydrotherapy(pool) ,lift for the pool 1 room with 11 cubicles and 10 couches
JN	Examination couch, matts
SSRNH	Gymnasium, treatment couch
Jeetoo	Nothing specific for Neurological Rehabilitation, 3 couches and 1 office
Facilities available for Stroke	
Flacq	Low couch and space
Victoria	Hydrotherapy(pool), lift for the pool 1 room with 11 cubicles and 10 couches
JN	Examination couch, matts
SSRNH	Gymnasium, treatment couch
Jeetoo	Nothing specific for Neurological Rehabilitation, ice machine
Equipment available for Spinal Cord Injury	
Flacq	Electrical stimulation, Ice, Heat therapy, Walkers, Ambulatory aids
Victoria	Ordinary couches and beds, infrared lights and short wave diathermy
JN	Ice machine, parallel bars, balance board, passive movement machine
SSRNH	Tilt table, couch dumbbell, parallel bar
Jeetoo	Nothing specific for Neurological Rehabilitation, ice machine
Equipment available for Traumatic Brain Injury	
Flacq	Electrical stimulation, Ice, Heat therapy, Walkers, Ambulatory aids
Victoria	Ordinary couches and beds, infrared lights and short wave diathermy
JN	Ice machine, parallel bars, balance board, passive movement machine
SSRNH	Tilt table, couch dumbbell, parallel bar, ice machines
Jeetoo	Nothing specific for Neurological Rehabilitation, Ice machine
Equipment available for Stroke	
Flacq	Electrical stimulation, Ice, Heat therapy, Walkers, Ambulatory aids
Victoria	Ordinary couches and bed, infrared lights and short wave diathermy
JN	Ice machine, parallel bars, balance board, passive movement machine
SSRNH	Tilt table, couch dumbbell, parallel bar, ice machines, walker, static cycling, mirror
Jeetoo	Nothing specific for Neurological Rehabilitation, Ice machine

Table 13: Equipment and facilities available to Physiotherapists for Neurological Rehabilitation

Based on the information gathered, SSRNH and Victoria hospital appear to be the better equipped. Jeetoo appears as the regional hospital with the least equipment and facilities for neurological Rehabilitation. The score given by respondents on facilities and equipment, when compared to other institutions, ranged from 1 to 6 with Flacq hospital receiving the lowest score and JN receiving the highest. In terms of facilities and equipment Apollo Bramwell hospital is equipped with well established treatment cubicles, exercise mats, Physio balls, Balancing board, dumbbells and biofeedback, continuous passive motion, parallel mirror. Fortis Clinique Darné had nothing specific for neurological Rehabilitation. The freelance physiotherapist interviewed had a folding table. Apollo Bramwell scored 8 when compared to other medical institutions whereas Fortis Clinique Darné had a very low score.

5.4.2 Comments and Recommendations on Services Provided

The rating given by respondents to the overall quality of neurological Rehabilitation services provided in their respective institutions ranged from 2 to 7, with JN hospital receiving the highest score again and Flacq hospital receiving the lowest. The following was observed and suggested by respondents:

- Surgical operations are sometimes performed too hastily
- Services need to be more accessible.
- A more client oriented approach is required
- There is a need for better infrastructure following the lack of equipment and appropriate facilities. More facilities are required. Gymnasiums should be set up where such facilities are lacking. Purchases in this particular area however need to be evidence-based.
- Physiotherapy at the national level requires a bigger budget to invest in specific equipment and facilities
- Physiotherapists working with such patients need to receive specific training
- Communication with institutions providing neurological Rehabilitation services abroad, should be encouraged
- Raising awareness and educating people on the social and economic impact on the person suffering from a neurological accident should be highlighted. The cost to the state needs to be investigated.
- Awareness also needs to be raised among doctors about the need for neurological Rehabilitation and the “importance of the first 3 months”
- Lack of personnel. There are only 15 physiotherapists employed by the government and 45 assistants. The existing Physiotherapists see on average 200 patients in a day and thus have to delegate care to assistants to do administrative tasks instead. More qualified physiotherapists need to be recruited. Yet, students who received training in physiotherapy at the University of Mauritius are not offered jobs by the government
- Greater involvement of the clinical psychologist in post-discharge care has to be ensured
- More time and resources need to be invested in re-inserting patients in their daily activities, both socially and professionally

- Home programmes need to be designed and the environment of patients need to be modified to make them more independent.

5.5 Occupational Therapists

Respondents were male and female and were aged between 28 and 54. Respondents were from the 5 public regional hospitals. One respondent worked as freelance in the private sector and was not attached to any institution. There were no Occupational Therapists at Apollo Bramwell and Fortis Clinique Darné. They received their training both in Mauritius and abroad. Those who received their training in Mauritius attended the University of Mauritius. Those who received their training abroad studied in the following institutions: University of Pretoria, in South Africa and the IPH institute in New Delhi, India. The length of their attachment to their respective institution ranged from <1 a year to 6-10 years.

5.5.1 *Involvement with Stroke, TBI and SCI Patients*

The estimated number of Stroke patients believed to be treated as in-patients, at the time, ranged from 10 to 35, by institution. The highest estimate was recorded at JN Hospital. The same estimate per public institution for SCI patients ranged from 1 to 20 and from 1 to 5 for TBI. Most TBI cases and SCI cases were recorded at Jeetoo hospital.

Overall respondents from public institutions held regular therapy sessions with such patients, except at Victoria hospital where regular sessions were not held with SCI patients. They worked on average with 12 Stroke patients, 3 SCI patients and 1-2 TBI patients. The length of sessions ranges from 45 min to 2 hr. Most respondents would see out-patients suffering from Stroke, TBI and SCI 2-3 times a week. Depending on progress made, the frequency would be reduced. Contact with such patients was less frequent at Jeetoo hospital and sessions were held once a week. The average amount of time spent with neurological cases every week ranged from 10% to 85%, with the highest average recorded at SSRN hospital and the lowest at Jeetoo hospital.

Patients in both the public and private sector were usually referred by the Neurologist/Neurosurgeon and/or Doctor in Physical Medicine. Sometimes cases would be referred by the Surgeon, Orthopaedist, Internist or Speech and Language Therapist. In most cases patients would stay home after they completed occupational therapy. Some would go back to work in some cases but this would of course depend on the extent of the nature and extent of the disability. The post-discharge care provided differed from institution to institution, as previously observed by other service providers. Respondents from Jeetoo and ENT/Victoria hospitals pointed out that there was no long-term follow up for Occupational Therapy. The respondents from SSRN hospital mentioned that family members receive the necessary training and counselling, together with patients, on how to deal with their disability and adapt their home environment. Patients in such institutions were discharged only after recovery period was successfully completed. Respondents from the remaining institutions mentioned patients receive home visits and care from the Community Based Rehabilitation staff.

Respondents from most hospitals were usually able to complete the number of required sessions. However the following factors did have a negative impact:

- Transport difficulties
- Depression from inactivity
- Impatience due not seeing progress being made as quickly as hoped
- Relatives are not able to accompany patients to their appointments, results being low as referral is done too late (sometimes more than a year after discharge from hospital.)
- Community Rehabilitation Programme staff would sometimes take over

Table 14 below lists the equipment and facilities available to Occupational Therapists for patients in need of neurological Rehabilitation:

Facilities available for Spinal Cord Injury	
Flacq	Nothing specific for Neurological Rehabilitation, 2 couches, 2 offices, not much space
ENT/Victoria	Nothing specific for Neurological Rehabilitation
JN	1 treatment room, 1 cabin and couch, Nothing specific for Neurological Rehabilitation
SSRN	2 treatment rooms , 1 ADC room , 1 kitchen
Jeetoo	2 treatment rooms, 1 office, 4 assessment beds
Facilities available for Traumatic Brain Injury	
Flacq	Nothing specific for Neurological Rehabilitation, 2 couches, 2 offices, not much space
ENT/Victoria	Nothing specific for Neurological Rehabilitation
JN	1 treatment room, 1 cabin and couch, Nothing specific for Neurological Rehabilitation
SSRNH	2 treatment rooms , 1 ADC room , 1 kitchen
Jeetoo	2 treatment rooms, 1 office, 4 assessment beds
Facilities available for Stroke	
Flacq	Nothing specific for Neurological Rehabilitation, 2 couches, 2 offices, not much space
ENT/Victoria	Nothing specific for Neurological Rehabilitation
JN	1 treatment room, 1 cabin and couch, Nothing specific for Neurological Rehabilitation
SSRNH	2 treatment rooms , 1 ADC room , 1 kitchen
Jeetoo	2 treatment rooms, 1 office, 4 assessment beds
Equipment available for Spinal Cord Injury	
Flacq	Bobath ball
ENT/Victoria	Bobath ball
JN	Nothing specific for Neurological Rehabilitation
SSRNH	N/A
Jeetoo	Nothing specific for Neurological Rehabilitation
Equipment available for Traumatic Brain Injury	
Flacq	Bobath ball
ENT/Victoria	Bobath ball
JN	Nothing specific for Neurological Rehabilitation
SSRNH	N/A
Jeetoo	Nothing specific for Neurological Rehabilitation

Equipment available for Stroke	
Flacq	Bobath ball
ENT/Victoria	Bobath ball
JN	Bobath ball
SSRNH	N/A
Jeetoo	Nothing specific for Neurological Rehabilitation

Table 14: Equipment and facilities available to Occupational Therapists for Neurological Rehabilitation

Based on the information above, it would appear that most public regional hospitals had few facilities to start and nothing specific for neurological Rehabilitation. In terms of equipment Bobath balls were available in some institutions such as JN, ENT/Victoria and Flacq hospitals. The score for faculties available ranged from 1 to 8, with the lowest score going to Flacq and the highest to JN.

5.5.2 Comments and Recommendations on Services Provided

The rating given by respondents regarding overall quality of neurological Rehabilitation services provided in their institutions ranged from 4 to 8, with Jeetoo hospitals receiving the highest score again and ENT/Victoria hospital receiving the lowest. The following was observed and suggested by respondents:

- There is a need for a Stroke Rehabilitation Centre
- There is a need for Occupational Therapy but human resources available at the national level are being wasted. 3 to 4 batches of students have graduated from the University of Mauritius but cannot find work in governmental institutions
- Too much emphasis is put on curative services as opposed to Rehabilitation
- More consideration needs to be given to Vocational Rehabilitation
- There is no specific tool for assessing patient needs
- There is no teamwork among other Rehabilitation departments. Patients are referred too late by Doctors. Doctors need to be sensitized to the need for early referral of neurological cases. OTs could send regular reports to Doctors so that they are aware of the patient's condition. No proper feedback is provided from CBR workers on patient needs. The orthopaedic workshop does not accept referral from therapists.
- Rehabilitation services need to be more accessible and more disability friendly. Patients discharged from hospitals need to be referred to local AHCs and CHC instead of having to come to regional public hospitals
- Equipment is provided when available from the Orthopaedic workshop (takes 1-10 days) but more equipment specific to Neurological Rehabilitation is needed. Equipment such as OB help arm and podiums should also be made available to Occupational Therapists
- Continuous professional development courses for Occupational Therapists are required for topics including Neurological Rehabilitation

5.6 Speech and Language Therapists

Respondents were female and were aged between 21 and 50. They were attached to public regional hospitals only. These included JN, Jeetoo, ENT/Victoria and SSRN hospitals. They received their training in both Mauritius and abroad. Those who were trained in Mauritius studied at the Mauritius Institute of Health in Pamplémousses. Those who studied abroad studied at the University of Cape Town, the University of Pretoria, both in South Africa, the Ali Yavar Jung National Institute for the Hearing Handicapped, the University of Mumbai, Manipal Academy of Higher Education, College of Allied health sciences in India. The length of their attachment to their respective institution ranged from 1-5 years to more than 15 years.

5.6.1 *Involvement with Stroke & TBI Patients*

The estimated number of Stroke cases treated as in-patients, at the time, ranged from 9 to 175, by institution. The highest estimate was recorded at SSRN Hospital. The same estimate per public institution for TBI patients ranged from 1 to 38. The highest estimates for both conditions were recorded at SSRN Hospital.

Overall respondents from most institutions hold regular sessions with such patients, except at ENT/Victoria where they rarely work with TBI patients. Respondents worked on average with 29 Stroke patients, 3 SCI patients and 16 TBI patients. The length of sessions ranges from 20 min to 30 min. Most respondents tend to see out-patients suffering from Stroke and TBI 2-3 times a week, decreasing to once a week, 2-3 depending on progress made and prognosis, the frequency would be reduced. Contact with such patients was less frequent at JN hospital, with sessions being held once a week. The average amount of time spent with neurological cases every week ranged from 7 to 20%, with the highest average was recorded at SSRN hospital and the lowest at Jeetoo hospital.

Patients in both the public and private were referred to by Physiotherapists, RMO Specialist, family members, General Practitioners. According to respondents the next step in the patient journey would either be going back home and receiving home visits from Community Based Rehabilitation. In some institutions such as Jeetoo and Flacq hospitals, patients and their family would receive counselling. ENT/Victoria mentioned that the next step for Stroke patients would be diagnostic services and assessment protocol (for standardised dysphagia patients for e.g. video fluoroscopy and alternative means of communication) and were not aware if follow-up was carried out by Community Based Rehabilitation staff.

Respondents from SSRN, Flacq and JN hospitals were usually able to complete the number of required sessions. However the remaining institutions did mention the following issues as having a negative impact on the outcome of therapy:

- Depression due to no interaction, family support and patience,
- With regards to TBI patients: severity of condition such as lesions etc,
- Impatience due not seeing progress being made as quickly as hoped,
- Access to services is difficult. Care givers cannot afford to take patients to their appointments.

Table 15 lists the equipment and facilities which are available for patients going for Occupational Therapy and who are in need of Neurological Rehabilitation:

Facilities available for Traumatic Brain Injury	
Flacq	1 Therapy room, 1 wheelchair, picture cards, computer facilities (same as Jeetoo but smaller)
ENT/Victoria	Inpatients (bedside) and outpatients in office space
JN	Therapy conducted in ward or department
SSRNH	Room, wheel chair, therapy materials
Jeetoo	1 Therapy room, 1 wheelchair, picture cards, computer facilities
Facilities available for Stroke	
Flacq	1 Therapy room, 1 wheelchair, picture cards, computer facilities (same as Jeetoo but smaller)
ENT/Victoria	Inpatients (bedside) and outpatients in office space
JN	Therapy conducted in ward or department
SSRNH	Room, therapy, wheelchair, therapy materials
Jeetoo	1 Therapy room, 1 wheelchair, picture cards, computer facilities

Table 15: Equipment and facilities available to Speech and Language Therapists for Neurological Rehabilitation

Based on the above information, it would appear that public regional hospitals have very few facilities to start with and nothing specific for neurological Rehabilitation. ENT/Victoria, Jeetoo and Flacq hospitals appeared to be reasonably well equipped.

5.6.2 Comments and Recommendations on Services Provided

The rating given by respondents regarding overall quality of neurological Rehabilitation services provided in their institutions ranged from 3 to 7, with SSR hospital receiving the highest score and Flacq hospital receiving the lowest. The following was observed and suggested by respondents:

- Overall, the service is good.
- Not enough space/limited facilities to deliver a good service. More equipment, infrastructure and resources required for a more effective and efficient service.
- Holistic approach lacking Rehabilitation, this used to be present at SSR. There is a need for a more
- Organised Rehabilitation service, all under one roof. Medical and Rehabilitation professionals do not communicate. As such, late referral from Doctors leads to a bad prognosis and little therapeutic progress. Patient records need to be shared for a more effective referral
- Referral to speech and language therapists for TBI patients is important
- Group therapy needs to be encouraged

5.7 Clinical Psychologists

Respondents were all female, aged between 28 and 29. All respondents received their training abroad. They received tertiary education at institutions which included “Université Catholique de Leuven”, in Belgium, “Université Lumière Lyon II”, “Université Montpellier III”, “Université Paris VIII” in France, and the “University of Pune”, in India. 2 of the respondents were attached to public regional hospitals, namely Victoria, Jeetoo and Flacq hospitals. 1 Respondent was attached to a private institution: Apollo-Bramwell hospital. They had been attached to these institutions for either less than year or between 1 and 5 years. Respondents from the public sector were attached to 2 institutions at the same time.

5.7.1 Psychological services offered in the institution

Services offered to fight anxiety and depression at Victoria and Jeetoo hospitals were medication and psychotherapy. One session in public institutions lasted on average 30 min while they lasted on average 1hr at Apollo Bramwell. Patients in need of such services at Apollo-Bramwell were referred to either a Psychiatrist or to a Psychotherapist for assessment and treatment of anxiety and depression.

5.7.2 Involvement with Stroke, TBI and SCI Patients

Respondents attached to public regional hospitals were not aware that such patients were admitted to their respective institution. They did not hold regular sessions with them at the time when this questionnaire was filled in. Patients at Apollo-Bramwell were usually only seen in wards and did not come to OPD for follow-up. Patients were usually referred to them by Oncologists, Psychiatrists, Speech Therapists, Internists and Paediatricians.

5.7.3 Comments and Recommendations on Services Provided

The quality rating given to the institutions already mentioned in this particular area of service ranged from 3 to 5. The following was suggested for Stroke, TBI and SCI patients:

- Providing a specialised, multi-disciplinary service
- Providing Group Therapy
- Offering support to the family
- Continuous evaluation of the patient’s mental state and follow-up.

CHAPTER SIX: HUMAN RESOURCES AND TRAINING IN NEUROLOGICAL REHABILITATION

While chapter three provided a broad overview of the Human Resources available in the Mauritian Health Care System, the following chapter gives an overview the type of human resources involved directly or indirectly, in the field of neurological rehabilitation. It also outlines the existing training opportunities in neurological rehabilitation and related fields.

6.1 Human Resources available for Neurological Rehabilitation

Table 16 shows the information obtained regarding the availability of relevant Human Resources and compares these results with the pre-requisites for a basic multi-disciplinary team in Neurological Rehabilitation. Such models of Rehabilitation exist in more developed countries like in the United Kingdom and in the United States. [54]

UK/US model	HR available in Mauritius (Public Sector)	Comments
Neurologist	1	2 in the private sector + 2 visiting consultants
Neurosurgeon	5	+ 6 visiting consultants (foreign)
Physical and Rehabilitation Medical Specialist	4	None
Rehabilitation Nurse	Unknown	In general Specialist Nurses appear not to be acknowledged, except in the case of HIV
Dietician	16	Not involved directly
Physiotherapist	17	33 assistants
Occupational Cadre	27	Includes OTs & their assistants
Speech Therapist/audiologist	4	10 assistants
Clinical Psychologist	4	Patients not referred
Recreational therapist	0	Does not exist

Table 16: Human resources available in Mauritius vs the UK/US model, adapted from the MDC, 2010 & MoHQL, 2010 [55, 56]

The number of human resources available for neurological rehabilitation is quite low. As mentioned in Chapter 3, while the exact number of nurses involved in rehabilitation is unknown, out of the 3500 nurses and midwives recorded in 2009, there were only 7 Specialist Nurses in the whole island. Acknowledging the need for specialist training in nurses is only now being discussed between Nursing Unions and the government of Mauritius. It is however

interesting to note the existence of other potential Human Resources which do not fit in the Western model namely [57]:

Community Health Rehabilitation Officer: 75

Orthopaedic Technician (incl Assistant): 17

Community Health Rehabilitation Officers provide home-based care and follow-up to patients while Orthopaedic Technicians create adapted equipment for the disabled.

6.2 Local Training Institutions

The following subsection reviews some of the courses offered by major training institutions either locally or jointly, with affiliated institutions abroad. However no diploma, certificate or degree in neurological rehabilitation, or equivalent was found as a stand alone or as an area of sub-specialisation. The closest training opportunity found was a short module offered back in 1991[58], by a visiting specialist, to local rehabilitation therapists. The visiting specialist was affiliated to the Royal Society of Physiotherapists.

6.2.1 Mauritius Institute of Health

The MIH was established in 1989 and is affiliated to the following institutions: “Université Victor Segalen”, “Bordeaux II”, in France and the United Nations’ Population Fund (UNFPA) in the United States. With a current student body of 97, its target groups vary according to courses offered: School Leavers, Young Health Professionals, Mid-Career professionals, as well as others not fitting into these categories. While the MIH does not offer courses in Neurological Rehabilitation as such, it does offer the following training opportunities which are related to the field of Neurological Rehabilitation as shown in table 17 below:

Name	Target Group	Length
Speech and Hearing	School leavers	1 year
Community Based Rehabilitation	School leavers	1 year
Assistant Orthopaedic Technician	School leavers	2 years
Care for the Elderly and the Disabled	School leavers	9 months

Table 17: Training and further education courses offered by MIH (2010)

Observations and recommendations made included:

- Training of Health Personnel in Neurological Rehabilitation required
- Training Community Based Rehabilitation personnel in Neurological Rehabilitation required
- Qualified Physiotherapist could be trained abroad as trainer.

6.2.2 Past training offered in collaboration with MIH

As mentioned previously, it is important to note that in the past, Community Based Rehabilitation staff had the opportunity to attend some training on the “Rehabilitation Treatment of Neurological Disorders” by Miss M.E. Carrington, a specialist from the United Kingdom, in 1992. Some of the topics covered in this training included:

- “How does the brain work ?”
- “Typical Spasm patterns in Stroke”
- “Home Programmes”
- “Sensory problem after Stroke”
- “The Stroke patient at home”
- “Splints and Othoses”
- “Functional Activities of (Cardio Vascular Accident) CVA patients”
- “The Bobath concept”

According to the information at our disposal, such in-depth training regarding neurological conditions such as Stroke and associated hemiplegia, has not been provided to therapists and outreach workers such as the Community Based Rehabilitation staff, ever since. Miss Carrington produced a short report on medical rehabilitation in the public sector after dispensing this training module and meeting with CBR staff, Speech and Language Therapists, Occupational Therapists and Physiotherapists. Among her comments and recommendations she stated:

- the need to recognise Physiotherapy and Occupational Therapy for the training which they have received
- that steps should be taken to encourage dialogue between therapists and referring doctors
- the need to create more posts for all the above professions and to reduce the ratio of assistants to therapists

6.2.3 Apollo-Bramwell Nursing School

This institution was founded in 2008 and is affiliated to the University of Mauritius. With a current student body of 116, its main target group is school leavers. It does not currently offer any training relevant to Neurological Rehabilitation but is seriously considering offering specialist courses for nurses, after the completion of their 3 yearlong diploma, should the demand for such courses arise in the near future. Such courses might include Neurology.

Observations and recommendations made included:

- The need for neuropsychological rehabilitation on the island, especially for old people

6.2.4 The University of Mauritius

While there were no courses under the heading “Neurological Rehabilitation”, the University of Mauritius offers the following related courses and modules in the Faculty of Science, department of Health Sciences. [59,60]:

- Occupational Therapy(B.sc)
- Physiotherapy (B.Sc Hons)
- Dietary science (B.Sc & M.Sc)

The following modules are offered in the department of Medicine:

- Med 1231 - Cardiovascular system
- Med 2141 - Central nervous system (head and neck)
- Med 2151 - Central nervous system (peripheral nervous system)
- Med 2251 - Skeletal and locomotor system

CHAPTER SEVEN: HOME-BASED AND RESIDENTIAL CARE

The following chapter draws a basic picture of Home and Residential Care offered by the public sector in Mauritius. It follows up on the state of Social and Disability Policy in Mauritius introduced in chapter three. It also outlines the services actually offered to people suffering from SCI, TBI and Stroke by the Government via the Ministry of Health and the Ministry of Social Security.

7.1 Community Based Rehabilitation Programme (CBRp)

Respondents from our sample covered 4 Health regions out of 5. These included regions 2 (Pamplemousses/Rivière du Rempart), 3 (Flacq), 4 (Grand-Port/Savanne district) and 5 (Grand-Port/Savanne district). The number of people employed by these branches of the Programme ranged from 12 to 15. Staff all received a certificate in Community Based Rehabilitation from the Mauritius Institute of Health. Their training covered the Human Anatomy, Occupational Therapy, Physiotherapy, Psychiatry, Speech and Language Therapy. Branch No. 3 mentioned a staff member receiving further training abroad, in Malawi.

7.1.1 *Scope of services offered by CBRp branches:*

The number of people receiving monthly visits ranged from 700 to 1080. The services offered by these branches appear fairly standardized. They include:

- Screening of the disabled in localities
- Providing physiotherapy and occupational therapy services to patients as well as training to the family
- Counselling
- Health Education: provision of prevention and case management information
- Referral to Community Health Centres and Area Health Centres
- Referral to specialised institutions
- Applying for specialised equipment and referrals to Orthopaedic workshop
- Rehabilitation of the disabled for Social Integration: Job-Placement
- Training of trainer at community level
- Liaising with other governmental institutions working in the care of the disabled such as the Ministry of Social Security, education (for children) and employment
- Integration of the disabled in the family and in the Community

7.1.2 *Services offered to Stroke, SCI & TBI Patients*

Respondents from all branches hold regular sessions with TBI, SCI and Stroke patients. The estimated number of Stroke patients with whom these different branches hold sessions ranges from 1 to 437 per respective health region. The highest number of sessions held with Stroke patients is in Health Region 2. The same estimate for TBI, ranged from 1 to 20, and from 2 to

33 for SCI, per Health Region. The highest numbers of sessions held for TBI was held in region 2 and the lowest in region 4. The highest number of sessions held with SCI cases are also in Region 2 and the lowest in Region 4. The length of sessions ranged from 30 to 45 min. Cases are referred to these branches by the Community Physician, Nursing Officers, Occupational Therapists, family members, Physiotherapist, Speech and Language Therapist, Area Health Centres and Community Health Centres.

The average proportion of the time spent by Community Based Rehabilitation staff every week with neurological cases ranged from 10 to 50 %. In general, services which they provide to such patients include referral to the Orthopaedic workshop, to NGOs such as the Red Cross and other charitable institutions. They provide transport facilities to medical institutions and make arrangements for dressing of disabled with bed sores and for catheters to be changed by nursing personnel. Arrangements for the provision of adapted home equipment are also made. Respondents from regions 2 and 4 also provided basic training to family members on how to help patients with their rehabilitation. Frequency of visits is once a month on average, sometimes more, during the initial stage.

Respondents were usually able to follow-up on cases. The branch from Region 3 mentioned being able to follow-up on patients for up to six months, or more. However the following issues were reported as having a negative impact on the outcome of therapy:

- The occurrence of secondary severe diseases for 3 case types. For e.g. Septicaemia, Septic bed sores for SCI cases
- Family interference
- Staff needs to be accompanied to go to some homes
- Sometimes new cases have to be prioritized over older ones, reducing the frequency of visits to the latter.
- Inadequate Staff
- Limited transport facilities

7.1.3 Equipment found in patient homes

As see in Table 18, following equipment was found in the home of some patients with the financial means to procure such facilities and equipment:

Home Equipment and facilities available in Patient homes	
Spinal Cord Injury	Ramps ,Walking aids, Adapted shoes, Splints, Ripple mattresses, Fowler bed, Adapted Bed, Adapted Toilet, Wheelchair, Walking frames and Adapted chair
Traumatic Brain Injury	Ramps ,Walking aids, Adapted shoes, Splints, Ripple mattresses, Fowler bed, adapted bed, adapted Toilet, Wheelchair, Walking frames and Adapted chair
Stroke	Ramps ,Walking aids, Adapted shoes, Splints, Ripple mattresses, Fowler bed, adapted bed, adapted toilet and Adapted chair, Parallel Bars, Elbow Crutch, Walking Stick, Walking Stick

Table 18: Home Equipment and facilities available in Patient homes

7.1.4 Unmet Needs of Patients

In most cases, the most common complaints and needs expressed by TBI, SCI and Stroke patients and their relatives, to the CBRp staff included:

- No doctor visits at home
- A greater need for adapted equipment such as chairs, beds, backrest, and wheelchairs.
- The waiting list to receive adapted equipment from the Orthopaedic workshop is too long. Often patients have to wait for months to be able to receive adapted equipment
- The pensions provided by the government to carers (family members with a disabled relative) is not enough for family members to be able to take good care of their relative
- More frequent visits need to be paid to the disabled at the Community level. No recreational facilities, cannot participate in the community.
- Medication needs to be provided at the local/Community level

7.1.5 Services offered by Non-Governmental Organisations

Respondents listed the following organisations as working in the field Home-based Care and Rehabilitation:

- Association pour Enfants Inadaptés de L'île Maurice (APEIM)
- Camp Diable Islamic Home,
- Georges Charles Centre for the Disabled in Pointes-aux-Sable
- The Muscular Dystrophy Association (MDA)
- The Lois Lagesse Centre
- Simple Life (this is a Social Enterprise is believed to provide adapted equipment to the disabled)
- The Mauritius Red Cross

7.1.6 Observations and Recommendations

The perception of respondents regarding the overall quality of neurological rehabilitation services provided in Mauritius ranged from 5 to 7. The following was observed and suggested by respondents:

- There is a need to train staff, to offer refresher courses and workshops to cope with changing needs
- More staff are required to meet patient needs
- Better transport facilities are needed. There is currently only one van which is shared by all the Community Branches throughout the island
- There is a need for modern administrative equipment such as computers, telephones and fax machines
- Branches need to work in collaboration with NGOs

- Equipment such as bed raise, back rest, splint, neck collar, chairs with special head support, walking frames should be made more easily available to patients
- Monthly Doctor's visits should be provided for patients under 75 years
- The procedure to receive adapted equipment should be simplified

7.2 Other Home Visits provided by the Government

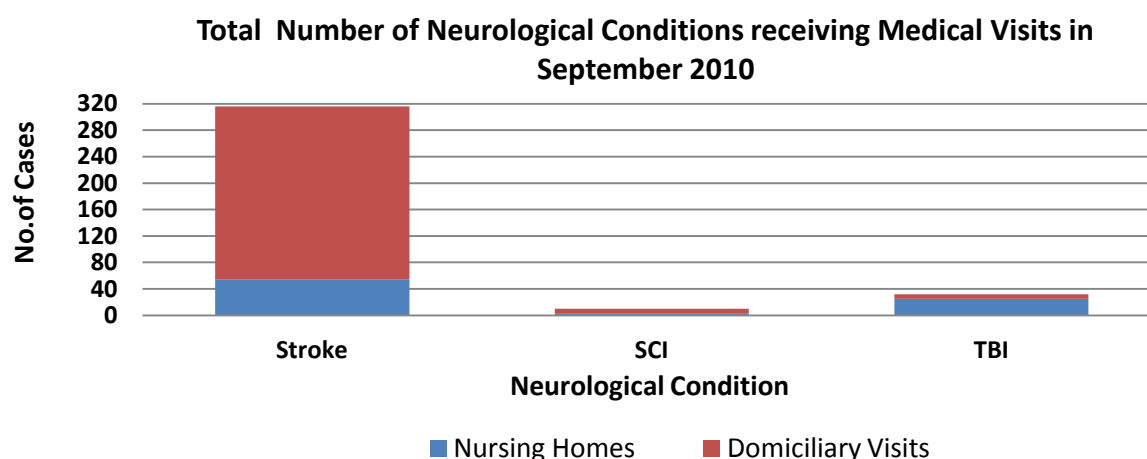


Figure 9: Total Number of Neurological Conditions found in September 2010

The Medical Unit within the Ministry of Social Security coordinates close to 5000 visits every month. As mentioned before in Chapter 3, this service is offered mainly to those aged 75 and above, and for those aged 60 and above, but only under special circumstances. The frequency of such visits is usually once a month. Medical Officers perform domiciliary visits in individual homes. Nursing Officers perform similar duties in Charitable Institutions/Nursing Homes for the Elderly. According to the information obtained there were 316 Stroke cases, 10 SCI cases and 32 TBI cases receiving such services, out of a sample of 3028 people visited in September 2010. Only 17% of Stroke patients lived in a Charitable Institution/Nursing Home for the Elderly. The remaining lived at home where, in most cases, they were cared for by their family. 78% of the TBI cases recorded lived in Charitable Institutions, while the remaining lived at home. 7 SCI cases out of 10 lived at home.

7.3 Foyer Trochetia

Started in 2008, the Foyer Trochetia, located in Petit-Verger, Pointe-aux-Sable, aims to foster a homely environment so as to enhance the development, autonomy and integrity of its elderly residents, by providing quality medical and social care. The estimated cost of the project was Rs 40 million. Monthly running costs (recurring expenditures) are estimated at Rs 200,000.



Pictures 2 & 3: Foyer Trochetia (from the outside) in Petit Verger, Pointe-aux- Sables

7.3.1 Organisation and Management of services

This Foyer is a project sponsored by the Luxembourg Authorities through “Lux Development”, in collaboration with the Ministry of Social Security. A public-private partnership model has been opted to manage the centre. The “Arya Sabha Mauritius” is the only NGO which has agreed to collaborate with the Ministry of Social Security to run the centre. The board of management of Foyer Trochetia is chaired by the Permanent Secretary of the Ministry of Social Security.

7.3.2 Scope of services provided

Foyer Trochetia can accommodate 32 (usually 16 males and 16 females) residents and caters to elderly persons who have been deemed severely disabled by the Medical Board of the Ministry of Social Security, and unfit to be left on their own and/or difficult to look after. The Foyer was specially designed for the disabled and is hence equipped with adequate facilities to provide them with appropriate Care Services.



**Picture 4: Specially Adapted toilet; Picture 5: Specially Adapted shower;
Picture 6: Washing Bed**

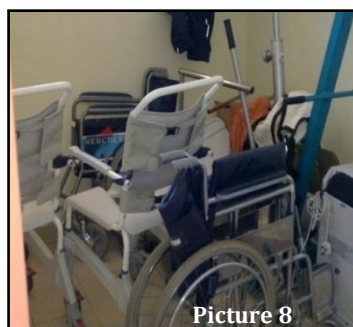
Since January 2010 the residents have benefitted from sessions of physiotherapy and occupational therapy as well. Sessions of physiotherapy and occupational therapy were extended to disabled children (including cases of cerebral palsy) from March 2010. The Centre also provides 24hr Care services by certified carers who work on shifts, on top of regular meals, washing, being overseen by nursing staff and regular medical visits by Doctors. There are also some leisure facilities such as televisions, radios and books etc

7.3.3 Equipment

Foyer Trochetia is also equipped with high tech physiotherapy equipment as seen below:



Picture 7



Picture 8



Picture 9

Picture 6: Tilt bed & Ice Machine; Picture 7: Wheelchairs; Picture 8: CP Machine

It is equipped with a Tilt bed & Ice Machine (as seen in picture 6), wheelchairs (as seen in picture 7), a Continuous Passive Machine (as seen in picture 8), a Bobath bed, Ice packs, a Dissociation bed, a suspension cage with pulley and a monkey chain, among other items. The physiotherapy room itself is air conditioned.

7.3.4 Human Resources

As of August 2010 the personnel of this specialized centre consisted of:

- An administrator appointed by the Ministry
- A manager appointed by the Arya Sabha NGO
- Medical (Nurses and 2 Doctors) and paramedical professionals (carers) appointed by the Medical Unit of the Ministry of Social Security
- Supporting staff performing maintenance, cleaning, laundry and who manage the kitchen
- Occasional Interns in the field of Occupational Therapy
- 1 Physiotherapist and 1 Occupational Therapist (Both part-time)
- Security staff

7.3.5 Profile of Residents

Table 19 shows the medical issues experienced per resident's age and sex, in August 2010:

SN	Gender	Age	Diagnostic	Remark
1	M	70	Hemiplegic/Poliomyelitis	Depression on and off
2	M	85	Alzheimer	
3	M	83	Elephantitis/Fracture left pelvis	
4	M	70	Hemiplegic/Brain Atrophy	Dementia on and off
5	M	58	Paraplegia/ Deformity of limbs	
6	M	63	Hemiplegia	Dementia

7	M	65	Brain Atrophy/ Cannot communicate	Dementia
8	M	60	Dysphasia/Hemiplegia	Depression
9	M	70	Parkinson/Paralysis	Dementia/Hallucination
10	M	70	Poliomyelitis/Scoliosis	
11	M	65	Parkinson/ Spinal Cord Injury	Dementia
12	F	86	Hemiplegia	Dementia
13	F	94	Osteoarthritis/Physical disabled	Dementia
14	F	61	Hemiplegic/Dysphagia mild	Dementia
15	F	84	Paraplegia	
16	F	81	Hemiplegic/fracture femur	Dementia
17	F	84	Fracture femur	Dementia
18	F	97	IHD/blind	Dementia
19	F	85	CVA fracture hip	Dementia
20	F	83	Senile debility/Poor vision	Dementia
21	F	75	Injury left leg	Depression
22	F	80	CVA /Hemiplegia	Dementia
23	F	86	CVA /Alzheimer	
24	F	79	Poliomyelitis/Blind	Dementia
25	F	69	Physical handicap/Mental	Dementia
26	F	64	Hemiplegia	Dementia
27	F	65	Poor vision/Shizophrenia	
28	F	63	Severe Rheumatoid/Mobility disorder	
29	F	82	Alzheimer/Dyskensia	
30	F	85	Fractured hip	Dementia
31	F	75	CVA	Dementia
32	F	82	Part blind/No mobility	Dementia

Table 19: Medical Profile of Residents at Foyer Trochetia, in August 2010

7.3.6 Observations

- While there were only 1 case of spinal cord injury and 4 cases of Stroke (CVA) there were many other neurological conditions such as Hemiplegia, Brain Atrophy, Alzheimer, Parkinson's Disease
- The facilities of Foyer Trochetia was clean, well maintained and very well organised
- Residents were clean, well-fed and appeared comfortable despite their disability/disabilities
- Staff seemed well trained and competent
- The Physiotherapy facilities appeared under-utilised with only a part-time physiotherapist and a part-time occupational therapist who used it approximately 3 times a week
- A nutritionist could not confirm the adequacy of the diet given to residents

- Most residents suffered from more than one chronic condition at the same time
- Counselling services could be a plus for residents as depression was deemed to be quite common following the input received from medical staff

7.4 Leonard Cheshire Home in Pierrefonds

Leonard Cheshire home in Pierrefonds was approached on the basis of the residential care and basic outreach service which they provide to the elderly with disabilities. While this institution did cater to the needs of 6 Stroke patients and 1 Spinal Cord Injury patient, out of some 30-40 residents, via group sessions organised by an Occupational Therapist from the U.K., this service was discontinued when the latter left the country in February 2011. The duration of the sessions which she had been providing was 1h30 min. The facilities which had been available to her were sponge balls, walking bars and bean bags.

CHAPTER EIGHT: PATIENT INTERVIEWS

The following qualitative information was obtained from Stroke, SCI and TBI patients to complement the information obtained from the perspective of Hospital Service Providers in Chapter 5. Hence a sample of 16 interviewees living in the following regions were interviewed: Flacq, Quatre-Bornes, Pamplemousses, Grand-Port/Savanne and Bambous. Respondents included patients who suffered from a Traumatic Brain Injury, Spinal Cord Injury and Stroke. Interviews were carried out in their homes or in the outpatient department of JN hospital. Our sample consisted of 12 Stroke cases, 2 SCI cases and 2 TBI cases, respectively, following the epidemiological distribution and resulting weight assigned to these neurological conditions at the population level. The purpose of these interactions were to briefly understand and investigate the patient's journey from the onset of the disease, to where their present situation, from their own perspective. The focus of that exercise was on learning where they had been admitted and for how long, the type of services which they received since the onset of their neurological condition and finally, to assess their level of satisfaction with the care received.

8.1 Traumatic Brain Injury patients

The TBI patients interviewed were both male and were aged 40 and 59 years old. They lived in Quatre-Bornes and Bambous and had been incapacitated for 8 months and 4 years, respectively. One of the interviewees was involved in a car accident while the other fell and hit his head. They were admitted to Clinique Darné (now Fortis Clinique Darné) and Victoria hospital.

8.1.1 *Scope and Quality of Medical Services Received*

According to their next of kin, they were taken to hospital to receive emergency care by car and private ambulance, respectively.

The patient admitted to Victoria hospital was attended to by Neurosurgeons and had to undergo surgery. He felt that nurses took good care of him. They bathed and provided him with food. He stayed in hospital for 2 months.

Following a serious road accident, the patient admitted to Fortis Clinique Darné was seen in the Accident and Emergency department and underwent his first surgical operation before being placed in the Intensive Care Unit, within 48 hours. He underwent his second surgery shortly afterwards, followed by a third one (a tracheotomy) a few months later. He stayed in hospital for 4 months and still had to be fed by tube for 18 months. Some therapists gave up completely on him. The amount of the invoice sent to his family was Rs 2.5 million.

The rating given to the patient admitted to Victoria hospital to the quality of services received was 9, while the rating given by the other patient was 7.5. According to the relatives neither had been aware of the type of services available for such neurological conditions, but did feel that the rehabilitation process should start as soon as possible. They also felt that capable and committed people should be involved at that stage. It was also mentioned that the patient

admitted to Victoria was tied to his bed at times and was just left there as a result of his occasional agitated state, reinforced by his inability to communicate with nurses.

8.1.2 Scope and Quality of Post-Discharge Care Received

The post-discharge care received by patients included: receiving home-care from family members and paid professionals. The patient admitted to Victoria was the only one receiving home visits. There were no medical home-visits arranged by the institutions where they had been treated as inpatients. The patient admitted to Clinique Darné did receive occasional visits from his neurosurgeon. A team of nurses also looks after him and a physiotherapist comes to see him every week. Such level of care was however only made possible through the fundraising initiatives of his friends and family. On average his relatives spent a total of Rs 70,000 on human resources, equipment and medication, every month, to enable him to receive such care. Interestingly enough, the rating given to this level of service by his relatives was 7 out of 10. The relatives of the other patient spent on average Rs 10,000 a month.

8.1.3 Observations and Recommendations

The patients and family members interviewed made the following observations and suggestions:

- Allowances given to Carers need to be increased to allow carers to cope with the additional monthly expenditure which looking after TBI patient represents
- Arrangements for Doctors to make home visits need to be made
- Reliable transport facilities need to be made available to patients to allow for follow-up Doctors and Therapists
- Full-time carers are needed. Looking after someone all the time is difficult when one has other responsibilities
- Specialised home equipment would be required for e.g. special equipment to lift the patient from bed
- Equipment for Physiotherapy and access to a swimming pool would also be needed
- Regular Speech and Language Therapy sessions and Cognitive Assessment at home would be required
- The personnel involved need to be highly trained and motivated to ensure the provision of a good level of service

8.2 Spinal Cord Injury patients

The SCI patients interviewed were both male and were aged 30 and 44 years. They lived in Bambous and Flacq and had been incapacitated for 20 years and 10 months, respectively. One of the interviewees was injured in an industrial accident, while the other was in a car accident. They were admitted to Jeetoo hospital and Flacq hospitals.

8.2.1 Scope and Quality of Medical Services Received

They were taken to hospital to receive emergency care in a truck and in an ambulance, respectively. The patient admitted to Flacq hospital was admitted to the Intensive Care Unit where he was seen by an Orthopaedist. He had to undergo an orthopaedic surgical intervention which was performed by an orthopaedic surgeon. He was assigned a special nurse afterwards who bathed and provided him with food. Medication was prescribed by the Orthopaedic Specialist. He did not receive any physiotherapy or occupational therapy. He stayed in hospital for 11 weeks. The patient admitted to Jeetoo hospital 20 years ago, was seen by Doctors in the Accident and Emergency department. He could not remember exactly what happened next, but did recall being on a drip and being very well cared for by nurses who were extremely encouraging and kind. He did receive physiotherapy as an inpatient. He stayed in hospital for 5 months and rated the service he received as 10 out of 10. On the other hand, the patient admitted to Flacq hospital rated the service he received as worth 7 out of 10. He added that the staff were not always attentive to his needs or was simply unresponsive at times. Neither was aware of services available for people having suffered from such injuries before their respective accident.

8.2.2 Scope and Quality of Post-Discharge Care Received

The post-discharge care received by these patients included home-care from family members, home dressing done by community nurse, appointments with Doctors at public regional hospitals, visits by the Community Based Rehabilitation Programme staff, some additional services from paid professionals such as Physiotherapists and an allowance from the Ministry of Social Security, National Solidarity and Reform Institutions. There was no medical follow-up arranged by the institutions where they had been treated as inpatients. The patient admitted to Jeetoo hospital estimated that he and his family must have been spending at least Rs 4,500 every month for a few years, before he was able to support himself a little and received a carer's allowance.

8.2.3 Observations and Recommendations

The SCI patients interviewed made the following observations and suggestions:

- Resources should be devoted to setting up outreach programmes for the handicapped
- Day Care centres need to be set up
- Psychological and emotional support needs to be provided to the patient and his family
- Special beds need to be provided
- Transport facilities to allow for medical follow-up and to allow patients to go out a little
- Better medical/hospital equipment for those with SCI needs should be made available

8.3 Stroke patients

The Stroke patients interviewed included both males and females. They were aged between 49 and 72 years old. They lived in Bambous, Flacq and in the Grand-Port/ Savanne region. The duration of their condition ranged from 3 months to 36 years. Patients were admitted to SSRN, Jeetoo, JN and Flacq hospitals, respectively.

8.3.1 *Scope and Quality of Medical Services Received*

Patients admitted to Jeetoo hospital were seen by Doctors and Nurses in wards and were provided with medication. Adult diapers and physiotherapy were not provided. The length of their stay ranged from 3 days to 2 months. Some patients deemed that the staff could be more responsive. The average rating given regarding the quality of the services provided during their stay was 7 out of 10.

Those who were admitted at Flacq hospital were seen by Doctors, Nurses and other medical staff in wards. They were put on a drip and nurses provided adult diapers. The length of their stay ranged from 4 days to 3 weeks. As mentioned in Jeetoo hospital, the staff were deemed to be relatively unresponsive. One of the patients interviewed recalled trying to go to the toilet on his own and falling. It is only then that the ward staff helped him and started paying more attention to him. The average rating given to the quality of the services provided during their stay was 5 out of 10.

Those who were treated as inpatients at SSRN were seen by Doctors and Nurses, as well as therapists. They were put on a drip, received injections and were provided with medication. They also received Physiotherapy, Occupational Therapy and Speech Therapy. Nurses fed the patients, washed them and took them to the toilet. A patient felt that inpatients required more privacy and that diapers should be provided to those who cannot afford them. The length of their stay ranged from 1 week to 12 days. The average rating given by patients was 8 out of 10.

The patients admitted at JN hospital were seen by Doctors and Nurses. Doctors asked for a brain scan and provided medication. Nurses gave them adult diapers, bathed and fed them. Physiotherapists came to see them and showed how to perform some exercises for physical rehabilitation. The length of their stay ranged from 14 to 15 days. According to a patient, services were deemed to be generally good and the ward staff were excellent. On the other hand, Doctors did not seem to pay the same level of attention to everyone. The average rating given to the quality of the services provided during their stay was 8 out of 10.

At the onset of their condition, interviewees were either driven by family members, had someone take them by taxi or were transported by an ambulance. Only one of the patients interviewed was aware of services available to Stroke patients before experiencing their Stroke.

8.3.2 *Scope and Quality of Post-Discharge Care Received*

The post-discharge care received by former inpatients at Jeetoo hospital varied. Most patients were receiving home-care from family members and from the Community Based

Rehabilitation Programme staff. Some received physiotherapy from either the public or private sector and had a medical follow-up every few months. Others complained about not getting a referral to therapists or not getting any medical follow-up. A patient did mention receiving regular medication for conditions such as arthritis, hypertension and cholesterol.

Former patients at Flacq hospital received home-care from family members and from the Community Based Rehabilitation Programme staff as well. One patient received an allowance from the Ministry of Social Security.

Former inpatients at JN Hospital received the following services: home-care from family members, occupational and speech therapy and medical follow-up appointments. One patient mentioned Doctors only prescribing medication but not really doing any follow-up

Care received by former SSR patients varied. While most received home care from family members and the Community Rehabilitation Programme staff, a patient mentioned receiving medication from their local Area Health Centre or Community Health Centres but also having to buy some medication from private pharmacies. Another patient mentioned getting a medical appointment every 4 months at SSRN and going to Victoria hospital for neurological follow-up.

On average patients spent a total of Rs 7,180 every month on care, medication and equipment, where applicable.

8.3.3 Observations and Recommendations

The Stroke patients and family members interviewed made the following observations and suggestions:

- Home equipment required: bed and backrest, access rails for stairs, beds with elevators, adapted chairs, adapted toilet chairs, wall bars, special cutlery as well as equipment for Occupational Therapy
- Medical follow up is poor
- Doctors need to be more attentive to patient needs and should keep prescribing medication. Painkillers should be made more easily available
- Both patients and family members need to be provided with psychological support and be taught how to deal with their new situation. Counselling at hospital level should be provided by therapists
- Regular hospital appointments with Doctors are needed
- Regular home visits by physicians, CBR officers, Speech and Language Therapists are required
- Better coordination of services and referral by therapists are required
- Adequate transport facilities for more effective follow-up should be provided
- A Day Care Service needs to be set up
- Diapers for adults should be made available as they are expensive

- More substantial financial aid is needed. Allowances should be raised to Rs 10,000-15,000
- Food which can be easily eaten by such patients could be provided (E.g Nestum, Milk etc)
- Regular visits from Physiotherapists would greatly benefit the patient
- Some leisure activities for patients could be organised by relevant institutions
- Hospital staff need to be trained with more up-to-date techniques on how to deal with neurological conditions
- The Social Security system needs to run more quickly and efficiently as there are often long waiting lists for pensions and equipment

CHAPTER NINE: REFLECTIONS AND COMMENTS ON FINDINGS BY DR SOOPRAMANIEN (AS)

The following section outlines the comments and reflections of Dr Soopramanien on the previous chapters, prior to the Validation Workshop held by the MRC in April 2011. The issues raised in this section guided the discussions with the stakeholders present at the workshop. This event is further elaborated upon in the next chapter.

9.1 Comments received on Chapter 3: “The Mauritian Context”

AS notes with satisfaction efforts made over the years to acquire diagnostic tools, including MRI and CT scanners, together with the implementation of open tertiary care services such as cardiac services and invasive cardiology. That transmissible diseases are on the decline is most gratifying.

Unfortunately, there is a significant increase in non-communicable, metabolic diseases and there appears to be a growing number of ‘casualties’ (although there is no information on the types and severity of resulting injuries).

Improvement in acute care typically leads to an increased survival in patients, who then go on to require long-term general care. Thus stroke or head injury patients who benefit from improved acute care, such as thrombolysis for stroke victims, or brain decompression for head injury sufferers, may live longer, they will then have significant medical, nursing and therapy needs, especially as they often present disabilities. There is no suggestion in the above report that provision be made to address these needs.

Regarding the UN Convention of Human Rights, it is heartening to note that in January 2010 Mauritius became the 77th country to ratify the UN Convention on the Rights of Persons with Disabilities. But questions arise from this welcome development:

- Are Mauritians with disability aware of the facilities that are at their disposal?
- Do disabled Mauritians know of the benefits on offer, such as duty free adapted vehicles, equality of access to health, etc?
- Are these laws being implemented?

9.2 Comments received on Chapter 4: “Descriptive Statistics on Stroke, TBI and SCI”

The difficulty in gathering data is noted and that this is due – in no small part - to the poor response from certain quarters, such as private institutions. Coding diseases is complex, and can lead to inaccurate and unreliable data, but despite any shortcomings the results indicate the potential scale of the problem; the incidence and prevalence of strokes, traumatic brain injuries and spinal cord injuries.

In 2009 the distribution was as follows: 160 for spinal cord injury, 1020 for traumatic brain injury and 4320 for strokes. These are huge numbers: a 40 bed spinal unit in UK treats about 80 patients each year, with a typical stay being from 6 to 12 months

9.3 Comments received on Chapter 5: “Hospital Service Providers”

This chapter offers an insight into the issues:

In the answers ‘rehabilitation’ is at times confused with Neurorehabilitation, which is a specialty within neuroscience that deals with complex medical processes to help patients to recover from an insult to the nervous system, and to devise ways to compensate for functional alterations? The skills for a neurorehabilitation professional are acquired by extensive formal and ‘bedside’ training.

Physiotherapists and occupational therapists are recognised as rehabilitation specialists, yet the specialisation of nurses is not widely acknowledged at a national level, except in the field of HIV.

In acute hospitals (both public and private) patients have access to good acute medical care, but therapy is for a limited period only, and there is negligible access to a medical doctor who specialises in neurorehabilitation. Interestingly, no respondent in the interviews mentioned receiving specialised training in neurological rehabilitation.

Attempts were made to monitor patients’ progress at home after discharge.

Two excerpts are worth noting:

- “Facilities and staff are grossly inadequate and focus mainly on Acute Rehabilitation and hence provide only general rehab services. No special Rehabilitation services for TBI, SCI or Stroke are available (in the public sector)”.
- “Patients with TBI, SCI & Stroke deserve better and more appropriate care in a specialized centre with properly qualified staff and adequate equipment and facilities.”

There are too few personnel:

- “There are only 15 physiotherapists employed by the government and 45 assistants. The existing physiotherapists see on average 200 patients in a day and thus have to delegate care to assistants to do administrative tasks instead. More qualified physiotherapists need to be recruited.”

9.4 Comments received on Chapter 6: “Human Resources and Training in Mauritius”

No diploma, certificate, nor degree in neurological rehabilitation was seen to be available - whether ‘stand-alone’ or in an area of sub-specialization. The closest training opportunity

found was a seemingly 'one-off' initiative in 1991 - a short-module offered by a visiting specialist to local rehabilitation therapists! The neurologists and neurosurgeons are not specialists in rehabilitation.

9.5 Comments received on Chapter 7: "Home-Based and Residential Care"

The existence of the Community Rehabilitation Programme is noted, along with the support it provides for patients with SCIs, TBIs and Strokes (notwithstanding the other groups that it helps). The Community Rehabilitation Programme devotes between 10% and 50% of its time to these groups, but is handicapped by factors that include a shortage of staff, and 'cultural' issues that can lead to relatives interfering with treatment programmes.

There is confusion in the conclusions, confusion between what we set out to explore, i.e. the need for neurological rehabilitation, and general care of the elderly: the Ministry of Social Security refers to visits to the over 60s (in fact mostly over 75s), but in neuro-rehabilitation no group can be excluded – thus the target for any such audit should be far broader and necessarily include the younger population.

Foyer Trochetia appears to have good rehabilitation facilities, it would be interesting to know if they are being fully utilised. Furthermore Foyer Trochetia houses an elderly population, most of which suffers from dementia or Alzheimer's. Unfortunately such patients tend to offer limited potential for active rehabilitation.

9.6 Comments received on Chapter 8: "Patient Interviews"

It would have been useful to have a comprehensive account of the patient 'journey' for each pathological group: TBI, SCI and Stroke. We are aware that time constraints and limited manpower (a single researcher only) did not allow for a more comprehensive account, yet we are provided with a useful overview of the challenges faced by all groups. It is reassuring that the acute care is rated relatively highly, but this is just the beginning of a patient's journey. The limitations in information gathering in some areas were identified thus: "...regarding local training opportunities, only the University of Mauritius, the MIH and Apollo Bramwell Nursing School answered our questionnaire and were willing to share their documents. For the remaining information, only that which was available in the public domain was used"

CHAPTER TEN: VALIDATION WORKSHOP & WAY FORWARD

A workshop on the state of Neurological Rehabilitation services in Mauritius was held by the Mauritius Research Council (MRC) on April 07, 2011, which coincided with “World Health Day”. Dr Anba Soopramanien agreed to travel from the UK to discuss the findings of the Needs Assessment and share his experience in this field with those present. The Minister of Health and Quality of Life, the Hon. Mrs S.B. Hanoomanjee, was present and gave the opening address. Stakeholders from both the public and private sector were given the opportunity to voice their views on the findings and to provide input on the way forward.

10.1 Objectives of the Workshop

The primary objective of the workshop was to introduce the importance of Neurological Rehabilitation for TBI, SCI and Stroke patients in Mauritius and validate the findings of the Needs Assessment study carried out by the MRC. The secondary objective of this event was to discuss the resulting recommendations and the way forward for Neurological Rehabilitation in Mauritius.

10.2 Issues discussed: A Summary

The following findings from the report were discussed with the stakeholders present at this event:

- The high incidence of Stroke, SCI and TBI,
- Although there are improving facilities for diagnostics (CT scan, MRI) and treatment (neurosurgery, cardiology, cardiac surgery and soon thrombolysis for stroke), there are very basic structures to deal with the consequences of neurological insult,
- Rehabilitation provision is piecemeal, and not coordinated by Consultants in Rehabilitation Medicine,
- There is a shortage of specialists, i.e. Physiotherapists, Occupational Therapists, Speech and Language Therapists, Clinical Psychologists and Consultants in Rehabilitation Medicine,
- There is no specific training in neurological rehabilitation,
- Limited available resources are not being used appropriately; thus wheelchairs that are distributed may not be used and therefore wasted,
- Discharge planning is poor and homes may not be accessible, well adapted or able to accommodate wheelchairs. As a result discharged patients are confined to a life in bed,
- Rehabilitation follow-up, post-discharge, is minimal due to lack of human resources (community rehabilitation teams, doctors, therapists),
- The whole country (pavement, public and private buildings, hotels) is not wheelchair friendly. Regulations concerning access and use of disabled parking bays often go unobserved,

- People with disabilities are not aware of benefits to which they may be entitled to.

10.2.1 Some of the Institutions and individuals present:

The Ministry of Health and Quality of Life, Central Laboratory, Jam Rehabilitation Centre from South Africa, BFV distribution, Harling Medicare, Clinique St Jean, Apollo-Bramwell Hospital, Fortis Clinique Darné, Medical Update Group, DCDM, Nursing Council, Clinique de Lorette, Medical Council of Mauritius, Clinique Mauricienne, NGOs and Ms Tabea Schurr, a freelance physiotherapist from Germany, specialized in Neurological Rehabilitation.

Individuals and family members of individuals with neurological disabilities were also present.

10.3 Output of Workshop: Main Issues identified

Based on the findings of the Needs Assessment and in-depth discussion, it was decided that the following priority areas should be addressed in order to improve the state of Neurological Rehabilitation Services in Mauritius.

10.3.1 Training in Neurological Rehabilitation

It was agreed that there is a pressing need to increase the focus on modern neurological rehabilitation, as a discipline, in Mauritius. Discussions took note that a few sessions of physiotherapy are no substitute for structured and specialist rehabilitation. Specialists in rehabilitation are few in numbers, and neurological rehabilitation as a specialty, is non-existent in the country.

10.3.2 Infrastructure for post acute care

Information gathered on the 'Patient journey' clearly shows that whilst acute facilities are satisfactory, those for post acute care are not. There are no dedicated facilities for neurological rehabilitation at this time.

10.3.3 Removal of architectural barriers

There was a consensus among participants of the workshop that pavements in most of the country, nearly all government or private institutions, private houses or hotels are not accessible to wheelchair-users. Disabled parking bays are abused and law enforcement is not always present. There is hardly any vehicle (private car or bus) to accommodate a wheelchair user.

10.4 Policy Recommendations by Drs Soopramanien and Sohur

The gaps found in post-acute care, highlighted and discussed more extensively with stakeholders during the workshop; suggest that such short-comings amplify the effects of disability on patients and their families, as well as on Mauritian society at large. Therefore,

Mauritius needs to improve its long-term neuro-rehabilitation and social re-integration of disabled people. In light of these findings, we submit the following comprehensive policy recommendations with the aim to improve long-term neurological rehabilitation for disabled patients and to better re-integrate them in their communities. For some of these recommendations, significant budget allocations at the national level are required. For others, efforts are already being made by the Ministry of Health to address the lack of multidisciplinary teams involved in Neurological Rehabilitation. However a lot of these issues can be addressed quickly and effectively with simple administrative re-alignments.

For a sustainable, long-term neuro-rehabilitation infrastructure we therefore strongly suggest:

10.4.1 In hospitals

- Allocate more staff to meet patient needs in this clinical area;
- Develop expertise in Neurological Rehabilitation for medical doctors and Allied Health Professionals;
- Offer specialist training, refresher courses and workshops to staff on how to provide quality care to patients and cope with changing needs;
- Re-align multidisciplinary teams to include a Physiotherapist, OT, Speech and Language Therapist, Psychologist, Social Worker, Dietician, Orthopaedic workshop staff and NGOs;
- Develop specialist skills that include sensory rehabilitation and swallowing assessment;
- Set up a Neuro-Rehabilitation Unit. All services would be located under one roof as currently departments are quite at a distance from each other. This Unit would include treatment facilities (medical and/or surgical, therapy like gymnasium and hydrotherapy pool, sensory room), diagnostic facilities (EMG, Radiology, swallowing clinic), outpatient and outreach services, and preventative medicine.
- Provide a rehabilitation programme in the community for less severe cases or as a follow-up, following acute admissions.
- Develop a good and reliable transport infrastructure, which should also be appropriately adapted to patient condition. Some ambulances should solely be used for Rehabilitation Services to make access easier and faster;
- Encourage communication and exchange programmes with institutions providing Neurological Rehabilitation services abroad;
- Enhance the communication infrastructure to include administrative equipment such as computers, telephones and fax machines;

10.4.2 In patients' homes

- Introduce and increase the frequency of follow-up, where applicable, of home visits by doctors, therapists, Community Nurses and Carers;
- Customise programmes and leisure activities to highlight personal independence and skills;

- Educate patients and families about their rights, the services and benefits to which they are entitled;
- Subsidise in-cash or in-kind home adaptations for disabled individuals;
- Supply equipment such as specialist beds, backrest, splint, neck collar, chairs with special head support, walking frames, waterproof chair, etc. These should be easily available and not subject to waiting lists;
- the use of local technology should be encouraged;
- Provide specialised training to carers as well as regular refreshers' courses.

10.4.3 For easier re-integration of disabled people into society

- Encourage hospitals to work in close collaboration with relevant NGOs;
- Raise awareness and educate the general public about the social and economic impact on people suffering from neurological accidents;
- Make specially adapted vehicles more easily available;
- Comply with UN standards such as provision of disabled access features to all new public buildings, public spaces, free and reserved parkings.

10.4.4 Encourage monitoring, evaluation and research in this particular area

- Encourage institutions to share data for more effective monitoring and planning for Neurological conditions in view of setting up a central database for Stroke, Spinal Cord Injury and Traumatic Brain Injury
- Provide controlled access to such information to researchers and university students with an interest in Neurological Rehabilitation
- Evaluate programmes systematically to ensure the effectiveness of the measures taken.

10.5 Way Forward

Based on these recommendations the following guiding principles and steps were suggested for the way forward:

1. A Steering Committee is to be set up to prepare a Strategic Plan, based on the above findings from the report focusing on formulating constructive ideas to shape the future,
2. The Steering Committee of 10 people should be headed by the Ministry of Health and made up of rehabilitation professionals, an MRC representative, patients and their advocates(NGOs etc),
3. Goals to be set should be SMART (Specific, Measurable, Attainable, Relevant, Time-bound),
4. One view during the workshop was to start with simple projects, like the setting up of a SCI centre. The model could then be extended to TBI and Stroke,

5. The country should mobilise all its active forces (public, private sectors, individuals, charities) to deal with the huge challenges ahead, e.g. dealing with architectural barriers,
6. Draft Strategic Plan to be circulated by the Ministry of Health to relevant stakeholders involved for a wide, time-bound consultation exercise.

10.6 Concluding Remarks by Drs Soopramanien and Sohur

We think that if there is national will, we can become a shining example of commitment to the enhancement of the lives of people with disability. The task ahead is difficult, but both Drs. Soopramanien and Sohur remain optimistic that by tapping into the already existing pool of dedicated men and women health care professionals, we have the possibility to improve the rehabilitation services in the country. It is our ardent wish that this report will begin the national conversation to improve the living condition for our citizens with disability who have been ignored for too long.

Conflict of Interest Disclosure: Drs. Soopramanien and Sohur declare no financial conflict of interest. They are engaged on a pro bono level through their associations with the Mauritius Research Council, and as a service to the country.

REFERENCES

- [1]. World Health Organisation (2003): "Access to rehabilitation for the 600 million people living with disabilities" Retrieved on: <http://www.who.int/mediacentre/news/notes/2003/np24/en/index.html> , on December 2010
- [2]. World Health Organisation (2008): "Top ten causes of death" Retrieved from: http://www.premierheart.com/webapp/downloads/who_stats.pdf, on December 2010.
- [3]. World Health Organisation (2008): "Top ten causes of death" Retrieved from: http://www.premierheart.com/webapp/downloads/who_stats.pdf, on December 2010.
- [4]. Gondin, F; et al (2011): "Spinal Cord Trauma and Related Diseases" Retrieved on: <http://emedicine.medscape.com/article/1149070-overview>
- [5]. World Health Organisation(2004): "World report on road traffic injury prevention" Retrieved from: http://www.who.int/violence_injury_prevention/publications/road_traffic/world_report/en/, on November 2010
- [6]. World Health Organisation(2004): "World report on road traffic injury prevention" Retrieved from: http://www.who.int/violence_injury_prevention/publications/road_traffic/world_report/en/, on November 2010
- [7]. World Health Organisation(2004): "World report on road traffic injury prevention" Retrieved from: http://www.who.int/violence_injury_prevention/publications/road_traffic/world_report/en/, on November 2010
- [8]. British Society of Rehabilitation Medicine(2008)"Neurological Rehabilitation, A Briefing Paper for Commissioners of Clinical Neurosciences" Retrieved from: http://www.bsrm.co.uk/Publications/NeuroRehabBriefing%20Paper-Revised-nov09June10%20_2_.pdf , on June 2011
- [9]. World Health Organisation (2011), "Stroke /Cerebrovascular Accident" Retrieved from: http://www.who.int/topics/cerebrovascular_accident/en/ , on June 2011
- [10]. de Freitas, G; (2005) Stroke: background, epidemiology, etiology and avoiding recurrence Retrieved from http://bilder.buecher.de/zusatz/14/14684/14684880 lese_1.pdf Gabriel R. on, January 2011, Cambridge University Press
- [11]. Centre for Control of Diseases (2011) Injury Prevention and control- Traumatic Brain Injury Retrieved from: <http://www.cdc.gov/traumaticbraininjury/> , on July 28th 2010
- [12]. Centre for Control of Diseases (2011) Injury Prevention and control- Traumatic Brain Injury Retrieved from : <http://www.cdc.gov/traumaticbraininjury/> ,on July 28th 2010

- [13]. Dawodu et al 2011 "Spinal Cord Injury - Definition, Epidemiology, Pathophysiology ",Retrieved on : <http://emedicine.medscape.com/article/322480-overview> on September 11th 2010
- [14]. DeLisa JA, Currie DM, Martin GM. In: DeLisa JA, Gans BM, (1998), Rehabilitation medicine: past, present and future. Rehabilitation Medicine. Principles and Practice. 3rd ed. Philadelphia: Lippincott-Raven, 3.
- [15]. Wright,J; (1998): "Development and importance of health needs assessment", British Medical Journal (BMJ) Retrieved from: <http://www.bmj.com/content/316/7140/1310.full> ,on December 7th 2010
- [16]. Wright,J; (1998): "Development and importance of health needs assessment", British Medical Journal (BMJ) Retrieved from: <http://www.bmj.com/content/316/7140/1310.full> , on December 7th 2010
- [17]. Wright,J; (1998): "Development and importance of health needs assessment", British Medical Journal (BMJ) Retrieved from: <http://www.bmj.com/content/316/7140/1310.full> on December 7th 2010
- [18]. Ministry of Health and Quality of Life (2010,2011) "General Functions and Administration" Retrieved from: <http://www.gov.mu/portal/site/mohsite/menuitem.87d6fc32e054fac41a42860aa0208a0c/> in October 2010
- [19]. Ministry of Health and Quality of Life (2010,2011) "Mission Statement" Retrieved from: <http://www.gov.mu/portal/site/mohsite/menuitem.e4b03432f69080d41a42860aa0208a0c/> in October 2010
- [20]. World Health Organisation (2000) "Annual Report 2000", Retrieved from <http://www.who.int/whr/2000/en/>, on November 2010
- [21]. World Health Organisation (2000) "Annual Report 2000", Retrieved from <http://www.who.int/whr/2000/en/>, on November 2010
- [22]. Trading Economics. Mauritius. Retrieved from: <https://www.tradingeconomics.com/mauritius/health-expenditure-per-capita-us-dollar-wb-data.html> on July 22nd, 2011.
- [23]. World Health Organisation Regional Office for Africa, (2009) "Country Collaboration Strategy 2008-2013" Retrieved from: http://www.who.int/countryfocus/cooperation_strategy/ccs_mus_en.pdf on Dec 10th 2010
- [24]. World Health Organisation Regional Office for Africa, (2009) "Country Collaboration Strategy 2008-2013" Retrieved from: http://www.who.int/countryfocus/cooperation_strategy/ccs_mus_en.pdf on Dec 10th 2010

- [25]. World Health Organisation Regional Office for Africa, (2009) "Country Collaboration Strategy 2008-2013" Retrieved from:
http://www.who.int/countryfocus/cooperation_strategy/ccs_mus_en.pdf
- [26]. World Health Organisation Regional Office for Africa, (2009) "Country Collaboration Strategy 2008-2013" Retrieved from:
http://www.who.int/countryfocus/cooperation_strategy/ccs_mus_en.pdf on Dec 10th 2010
- [27]. World Health Organisation Regional Office for Africa, (2009) "Country Collaboration Strategy 2008-2013" Retrieved from:
http://www.who.int/countryfocus/cooperation_strategy/ccs_mus_en.pdf
- [28]. Ministry of Health and Quality of Life (2005,2010) Retrieved from: "Health Centres"
http://www.gov.mu/portal/site/mohsite?content_id=2771f202ef308010VgnVCM100000ca6a12acRCRD in November 2010
- [29]. Sungkur,K; Goorah,S; and White,G; (2009)"Exploring The Contribution Of E-Health In The Health Sector In Mauritius: A Survey-Based Investigation In A Selected Locality", University of Mauritius,Faculty of Science, Department of Medicine
- [30]. Ministry of Health and Quality of Life-Mauritius (2010, 2011) "Health Statistics Annual 2010" Retrieved from: <http://www.gov.mu/portal/goc/moh/file/statism10/hsa.pdf> on December 9th 2010
- [31]. Ministry of Health and Quality of Life-Mauritius (2010, 2011) "Health Statistics Annual 2010" Retrieved from: <http://www.gov.mu/portal/goc/moh/file/statism10/hsa.pdf> on December 9th 2010
- [32]. Ministry of Health and Quality of Life (2010) Health Statistics Annual 2010, Retrieved from <http://www.gov.mu/portal/goc/moh/file/statism10/hsa.pdf> on December 9th 2010
- [33]. World Health Organisation Regional Office for Africa, (2009) "Country Collaboration Strategy 2008-2013" Retrieved from:
http://www.who.int/countryfocus/cooperation_strategy/ccs_mus_en.pdf on Dec 10th 2010
- [34]. Ministry of Health and Quality of Life (2005,2006,2007,2008,2009) : " Health Statistics Annual 2010"
http://www.gov.mu/portal/site/mohsite/menuitem.8e3b5784f38e0311f0322fb8a0208a0c/?content_id=98135a7f5aa57110VgnVCM1000000a04a8c0RCRD
- [35]. Ministry of Health and Quality of Life (2005,2006,2007,2008,2009) : " Health Statistics Annual 2010"
http://www.gov.mu/portal/site/mohsite/menuitem.8e3b5784f38e0311f0322fb8a0208a0c/?content_id=98135a7f5aa57110VgnVCM1000000a04a8c0RCRD
- [36]. Central Statistics Office (2010), "Historical Series - Road Transport & Accidents 1981-2009" Retrieved from:

http://www.gov.mu/portal/site/cso/menuitem.dee225f644ffe2aa338852f8a0208a0c/?content_id=5c2ce924d448a010VgnVCM1000000a04a8c0RCRD on November 22nd 2010

- [37]. Ministry of Social Security, National Solidarity and Reform Institutions (2008) "National Policy Paper and Action Plan on Disability: Valuing people with disabilities"
- [38]. Ministry of Social Security, National Solidarity and Reform Institutions (2008) "National Policy Paper and Action Plan on Disability: Valuing people with disabilities"
- [39]. Ministry of Social Security, National Solidarity and Reform Institutions (2008) "National Policy Paper and Action Plan on Disability: Valuing people with disabilities"
- [40]. Ministry of Social Security, National Solidarity and Reform Institutions (2011) "Social Benefits Granted to Disabled Persons" Retrieved from <http://www.gov.mu/portal/site/ssnssite/menuitem.ccec743110d6590e8f77861084d521ca/> on Dec 15th 2010
- [41]. Ministry of Social Security, National Solidarity and Reform Institutions (2011) "Social Benefits Granted to Disabled Persons" Retrieved from <http://www.gov.mu/portal/site/ssnssite/menuitem.ccec743110d6590e8f77861084d521ca/> on Dec 15th 2010
- [42]. Ministry of Social Security, National Solidarity and Reform Institutions (2011) "Social Benefits Granted to Disabled Persons" Retrieved from <http://www.gov.mu/portal/site/ssnssite/menuitem.ccec743110d6590e8f77861084d521ca/> on Dec 15th 2010
- [43]. 28. Ministry of Social Security, National Solidarity and Reform Institutions (2011) "Social Benefits Granted to Disabled Persons" Retrieved from <http://www.gov.mu/portal/site/ssnssite/menuitem.ccec743110d6590e8f77861084d521ca/> on Dec 15th 2010
- [44]. 28. Ministry of Social Security, National Solidarity and Reform Institutions (2011) "Social Benefits Granted to Disabled Persons" Retrieved from: <http://www.gov.mu/portal/site/ssnssite/menuitem.ccec743110d6590e8f77861084d521ca/> on Dec 15th 2010
- [45]. 28. Ministry of Social Security, National Solidarity and Reform Institutions (2011) "Social Benefits Granted to Disabled Persons" Retrieved from: <http://www.gov.mu/portal/site/ssnssite/menuitem.ccec743110d6590e8f77861084d521ca/> on Dec 15th 2010
- [46]. 28. Ministry of Social Security, National Solidarity and Reform Institutions (2011) "Social Benefits Granted to Disabled Persons" Retrieved from: <http://www.gov.mu/portal/site/ssnssite/menuitem.ccec743110d6590e8f77861084d521ca/> on Dec 15th 2010
- [47]. Ministry of Social Security, National Solidarity and Reform Institutions (2007) "National Policy Paper and Action Plan on Disability: Valuing people with disabilities"

- [48]. Ministry of Social Security, National Solidarity and Reform Institutions (2007) "National Policy Paper and Action Plan on Disability: Valuing people with disabilities"
- [49]. United Nations (2007) "From Exclusion to Equality: Realizing the Rights of People with disabilities: Handbook for Parliamentarians on the Convention on the Rights of Persons with Disabilities and its Optional Protocol"
- [50]. Ministry of Health and Quality of Life-Mauritius (2010, 2011) "Health Statistics Annual 2010", obtained through official request in August 2010
- [51]. Ministry of Health and Quality of Life-Mauritius (2010, 2011) "Health Statistics Annual 2010", obtained through official request in August 2010
- [52]. World Health Organisation (2010,2011) International Classification of Diseases: Retrieved from <http://www.who.int/classifications/icd/en/> on October 2010
- [53]. World Health Organisation (2010,2011) International Classification of Diseases: Retrieved from <http://www.who.int/classifications/icd/en/> on October 2010
- [54]. The Ohio State University Centre (2010, 2011), "Rehabilitation for Neurological Disorders" Retrieved from :
http://medicalcenter.osu.edu/patientcare/healthcare_services/nervous_system/about/rehab/Pages/index.aspx on November 22nd 2010
- [55]. The Ohio State University Centre (2010, 2011), "Rehabilitation for Neurological Disorders" Retrieved from :
http://medicalcenter.osu.edu/patientcare/healthcare_services/nervous_system/about/rehab/Pages/index.aspx on November 22nd 2010
- [56]. Ministry of Health and Quality of Life-Mauritius (2010, 2011) "Health Statistics Annual 2010" Retrieved from:
<http://www.gov.mu/portal/site/mohsite/menuitem.f00b9679e19211ea0794fe10a0208a0c/> on Dec 9th 2010
- [57]. Ministry of Health and Quality of Life-Mauritius (2010, 2011) "Health Statistics Annual 2010" Retrieved from:
<http://www.gov.mu/portal/site/mohsite/menuitem.f00b9679e19211ea0794fe10a0208a0c/> on Dec 9th 2010
- [58]. Carrington,J, (1991): "Comments on Hospital Based Rehabilitation and Recommendations for change" Retrieved from the MIH archives in Pamplemousses in September 2010
- [59]. The University of Mauritius Faculty of Science: Courses offered at the Department of Medicine (2011) <http://www.uom.ac.mu/faculties/fos/Medicine/courses.htm> on January 2011
- [60]. The University of Mauritius Faculty of Science, Department of Health Sciences (2011) Retrieved from <http://www.uom.ac.mu/faculties/fos/HealthSc/courses.htm> on January 2011

ANNEX 1

ANNEX 2

ANNEX 3

ANNEX 4

ANNEX 5

ANNEX 6

ANNEX 7

ANNEX 8

ANNEX 9

ANNEX 10

ANNEX 11

ANNEX 12