Volume 10, Issue 3, March – 2025 International Journal of Innovative Science and Research Technology
ISSN No:-2456-2165 https://doi.org/10.38124/ijisrt/25mar1756

Impact of Health Education on the Prevention and Self-Management of Secondary Conditions among People with Mobility Impairment in Limbe Southwest Region Cameroon

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Publication Date: 2025/04/10

Abstract: People with disabilities are exposed to a wide range of physical and psychological symptoms that include pain, depression, pressure ulcers and urinary tract infections as well as lifestyle changes because of their condition and because of the physical and psychological barriers they face in life. The study aimed to measure the impact of a health education intervention on the prevention and self-management of secondary conditions among people with mobility impairment. This was a quasi-experimental intervention study in which people with mobility impairment received health education on self-care management and prevention of secondary conditions and were evaluated six months later. Quantitative data were collected and compared with the baseline study using the Chi-square test. The data was analyzed in SPSS version 27. Study findings showed there was a significant improvement in self-efficacy as 24 (85.71%) of the participants had good self-efficacy post-intervention (χ^2=42.55, p<0.001). There was an improvement in symptoms. Pain severity improved to mild post-intervention (χ^2=43.08, p<0.001). Depression levels dropped from high (67.68%) to low (96.43%) (χ^2=47.47, p<0.001). Of the 35.7% of participants with pressure ulcers pre-intervention, 3.57% had pressure ulcers post-intervention (χ^2=9.16, p=0.002). Findings also showed a significant reduction in the risks of developing secondary conditions. After the intervention, only 1 (3.57%) had a high risk of developing pressure ulcers (χ^2=62.26, p<0.001). Healthcare costs were reduced from high to low post-intervention (χ^2=56.00, p<0.001) in all participants. Health-related quality of life improved significantly from fair 14.36% and poor 85.7% to good in all participants after the intervention (χ^2=68.37, p<0.001). The study findings suggest that self-management interventions are an effective way of preventing and managing secondary conditions. The findings showed significant improvements in symptoms, health-related quality of life, and reduced healthcare costs.

Keywords: *Primary Disability, Secondary Conditions, Mobility Impairment, Prevention, Self-Management.*

How to Cite: Tabi Afuge Japhet; Tendongfor Nicholas; Asu Carine Ndum. (2025). Impact of Health Education on the Prevention and Self-Management of Secondary Conditions among People with Mobility Impairment in Limbe Southwest Region Cameroon. *International Journal of Innovative Science and Research Technology*, 10(3), 2539-2547. https://doi.org/10.38124/ijisrt/25mar1756

I. INTRODUCTION

Mobility impairment is a physical disability that limits individual functioning and activity participation [40]. People with disabilities (PWD) experience poorer levels of health than the general population as they may also have additional needs because of impairment and the consequences of impairment [38]. These unmet healthcare needs result in other health conditions termed 'secondary conditions' (SHCs) [20].

Several criteria have been used to define secondary conditions and to differentiate them from primary disability. Primary disabilities are a possible starting point for impairment, activity limitation, or participation restriction [23] [37] [39] [42], develop after the primary condition and highlight an indirect or direct link to the primary disability [9] [20], time of onset [8] [9 [20] [21], a higher occurrence in persons with disabilities than those without disabilities and the characteristics of the condition are not associated with trauma, treatment, or intervention [42].

An important characteristic of a secondary condition is its predictability [37]. This is key to establishing preventive and self–management/efficacy interventions to reduce the

ISSN No:-2456-2165 https://doi.org/10.38124/ijisrt/25mar1756

risk of developing secondary conditions. Managing complex diseases using self-management interventions expects individuals to be able to endeavour to carry out the required tasks to ameliorate their quality of life [16] [27]. According to the World Health Organization (WHO), self–management is 'the ability of individuals, families, and communities to promote health, prevent disease, maintain health and cope with illness and disability with or without the help or support of a health worker' [41].

Traditionally, rehabilitation has been used as the main type of healthcare intervention for people with disabilities [37] and is essential in lowering healthcare costs by decreasing the number of days spent in hospitals, reducing disability, and improving quality of life [8]. People with disabilities, especially those with mobility impairment, experience a diverse range of physical and psychological symptoms such as pain, depression, pressure ulcers, and urinary tract infections as well as lifestyle changes because of their condition. The physical and psychological barriers they face can worsen their self-efficacy and health status [7]. Promoting self-efficacy can improve outcomes and quality of life [43]. Self-efficacy is the confidence to carry out behaviors necessary to reach a desired goal [3], and it is a strong foundation of self-management. Participants with high self-efficacy are likely to engage in self-management activities and report health-related improvements [1]. 'Goal setting' [2] and 'action planning' [5], are important aspects of self-management. Once goals are set, it needs to be decided how exactly they can be achieved by making an action plan, which is a central feature of self-management education [5].

People with disabilities, particularly those with mobility impairment, can always develop symptoms like pain that compel them to frequent healthcare facilities and force them to make day-to-day decisions to self-manage their conditions. There is a lack of data on self-management intervention of secondary conditions in Cameroon and on health-related aspects of disability in general. Thus, the study aims to assess the impact of information, education and training on the prevention and self-management of secondary conditions in persons with mobility impairment.

II. MATERIALS AND METHODS

➢ *Study Area*

This study occurred in Limbe, in the Fako Division of the Southwest Region of Cameroon. Limbe is the administrative headquarters of Fako Division, with an estimated population of about 200,000 inhabitants [22]. Fako Division is one of the six administrative divisions of the Southwest Region and has 8 health districts, among which Limbe Health District is one. Limbe is the administrative headquarters of Fako Division, with an estimated population of about 200,000 inhabitants [22]. Limbe Health District has eight health areas, including Batoke, Bojongo, Bota, Idenau, Mabeta, Moliwe, Seaport and Zone 2. Limbe, Cameroon, has a surface area of 545 square kilometres, an altitude to sea level of 69m, and its highest point is 362 m above sea level [36]. In addition, Limbe has some disability associations, namely, the Limbe Association of People with Disabilities, the Limbe Association of Disabled People, the Limbe II Chapter, and the Association of 'Make-Ourselves Happy'.

➢ *Study Design and Population*

This was a single-group pre-test, post-test quasi-experimental design in which people with mobility impairment aged 18 years and above were recruited using a purposive sampling technique among people with mobility impairment from associations of people with disabilities and the community in the Limbe municipality of the Southwest region of Cameroon. The group was heterogeneously represented to enable variation according to relevant key variables in the study. The selection of the participants was based on typical case sampling depending on the type and duration of the disability. A constant comparison was made within the same subject during the intervention.

➢ *Sample Size and Sampling Technique*

The sample size was calculated using G-power calculation of the sample size with the following considerations.

- Level of significance (α) = 0.05
- The power of the 2-tailed test (1-β) is 0.8 or 80%, the accepted minimum level.
- The desired effect of 0.3
- Constant proportion: 0.5

This gives a sample size of 20 participants. A total of 28 participants were recruited from associations of people with disabilities and the community using a purposive sampling technique. The selection was based on the duration and severity of the disability condition.

➢ *Intervention Package*

The intervention package was obtained using the information, motivation, and behavioural change (IMB) model [18]. The IMB model involves a three-step approach to changing preventive behaviours, conducting elicitation research using the Participatory Action Research (PAR) approach [10], setting up an intervention program, and rigorous evaluation research to determine whether the intervention has been significant and has sustained effects. During the elicitation process, the following areas of intervention were identified: knowledge of secondary health conditions, nutrition, self-efficacy, and the lack of knowledge and skills to prevent and manage symptoms like pain, depression, pressure ulcers, contractures, and bladder and bowel symptoms. Participants also reported high healthcare costs and poor and fair health-related quality of life. Caregivers of some participants, particularly those with paralysis due to spinal cord injury and those who could not read or write, were involved in the intervention. Home sessions were conducted for participants who had difficulties attending group training sessions. Measures were put in place to prevent dropouts, such as continuous encouragement for participants to stay in the program by making them understand the importance of the program to their health,

ISSN No:-2456-2165 https://doi.org/10.38124/ijisrt/25mar1756

phone calls, payment of transport fare for participants who stay too far, encouragement of participants through their WhatsApp groups and home visits. The effectiveness of the intervention was evaluated by collecting data on secondary conditions at the end of the intervention.

➢ *Intervention*

The intervention was adapted from the self-efficacy theory [3] [34] which uses the following constructs.

- Performance outcome. Performing well at a given task is influenced by positive and negative experiences. The competence of the individual will be boosted if that individual has performed well at a given task previously [3]. During every session, participants were encouraged in what they were doing.

- Vicarious experience. High or low levels of self-efficacy can be experienced through other people's performance vicariously by watching another person's performance and comparing it with self-performance [3]. During sessions, participants were asked to give feedback on their performance in physical activities and how they felt about their health.

- Verbal persuasion. Encouraging or discouraging someone about the individual's ability to perform influences self-efficacy [34]. Participants were always encouraged to engage in the training and how this was important for general health.

- Physiological feedback. The perception of emotional sensation in the body influences one's self-efficacy [3].

The self-efficacy theory was used to help participants build confidence to carry out self-management interventions. A curriculum was established, and participants received information, education, and training on the variables identified, including pain, depression, pressure ulcers, contractures, mechanism of developing pressure ulcers and contractures, self-efficacy, and bowel and bladder symptoms. The training focused on coping skills, goal setting, action planning, self-efficacy, physical exercise, respiratory exercises, nutrition and feeding habits, and techniques to prevent and manage pain, depression, pressure ulcers and contractures. A Nurse, a nutritional therapist, a clinical counsellor and a physical therapist were involved in the training. The educational content included the mechanism of developing secondary health conditions, behavioural change, symptom prevention and management, including physical exercise for people with disabilities push-ups and other techniques to prevent pressure ulcers. The intervention package also provided health education/coaching. Two major training sessions were conducted in the first two months of the intervention. Each session lasted for 2 hours and was followed by health coaching/ education during monthly evaluation meetings till the end of the fifth month of the intervention. Health coaching was used to support self-management intervention for participants during monthly evaluation sessions. Its focus is to empower people to make informed decisions about their health and develop knowledge, skills and confidence, taking opportunities to become active participants in their care [13]

➢ *Data Collection and Tools.*

Data was collected using an intervention evaluation form carrying all the variables under study. Baseline data was collected in June 2024. A constant comparison was made for each variable every month and was recorded in the intervention evaluation form. Post-intervention data was collected at the end of December 2024. Information on the variables was collected as follows. Knowledge of SHCs was graded as poor at baseline, and subsequently, the participants' ability to say what secondary conditions are, their causes and how they can be prevented and managed. They were graded on a scale of 0 to 10. Knowledge of nutrition was graded on the participant's understanding of the basics of nutrition and feeding habits as poor, fair and reasonable(good) subjectively. Self-efficacy was assessed based on participants' ability to engage in physical activities and monitor symptoms without being told to do so. The healthcare cost was evaluated based on the number of times participants visited a health facility and or purchased medications, and their health-related quality of life was self-rated as excellent, very good, good, poor or fair. Pain was graded using a scale of 0 to 10 [28]. Depression was rated as mild, moderate or high based on the participants' subjective expression and activity limitation. Contractures and pressure ulcers were evaluated by physically watching the ulcers and contractures by the solidness of the appendages and, in a few cases, the subjective report on the nearness of ulcers and contractures. The risk of developing contractures and pressure ulcers was evaluated based on how often participants did push-ups and appendage workouts. Urinary and bowel signs were assessed by the quantity of water intake, hard stool and colour of urine which were done subjectively.

➢ *Data Analysis*

The data collected was entered into a template created in the Kobo Collect tool and exported and cleaned in Microsoft Excel. Analyses were done in SPSS version 27. Descriptive analysis was done for the independent and dependent variables using frequency tables and summary statistics, respectively. The Chi-square test was used to compare the pre-and post-intervention data.

➢ *Ethical Considerations*

Ethical clearance was obtained from the Faculty of Health Sciences Institutional Review Board of the University of Buea, reference number 2024/2346-01/UB/SG/IRB/FHS. Administrative authorization was obtained from the Regional Delegation of Public Health, Southwest Region Cameroon, reference number P42/MINSANTE/SWR/RDPH/CBPF/197/689. All study participants signed a written consent form before being enrolled in the study.

ISSN No:-2456-2165 https://doi.org/10.38124/ijisrt/25mar1756

III. RESULTS

➢ *Demographic Characteristics*

Table 1 Demographic Characteristics of Study Participants

Variable	Categories	Frequency (n)	Percentage (%)
Age group	23-37	11	39.3
	38-52	3	10.7
	53+	14	50
	Total	**28**	**100**
Sex	Female	10	35.7
	Male	18	64.3
	Total	**28**	**100**
Type of disability	Amputee	8	28.6
	Hemiparesis	2	14.2
	Paraplegia	16	57.1
	Total	**28**	**100**
Duration of disability (in years)	1-15	13	48.1
	16-30	3	11.1
	31-45	7	25.9
	46+	4	14.8
	Total	**27**	**100**

Table 1 presents the demographic characteristics of study participants for pre-and post-intervention. Half, 14 (50%) of the participants were 53 years and above while 3 (10.7%) were within 38-52 years. The mean age was 49.61±15.33. A greater proportion, 18(64.3%) of the participants were females. As per the type of disability, 16 (57.1%) had paraplegia, while 2(14.2%) had hemiplegia. The mean duration of disability in years was 23.3±19.85, with 13(48.1%) of the participants being disabled for 1-15 years, while 3 (11.1%) had been disabled for 16-30 years.

➢ *Change in Knowledge of SHCs before and after the Intervention.*

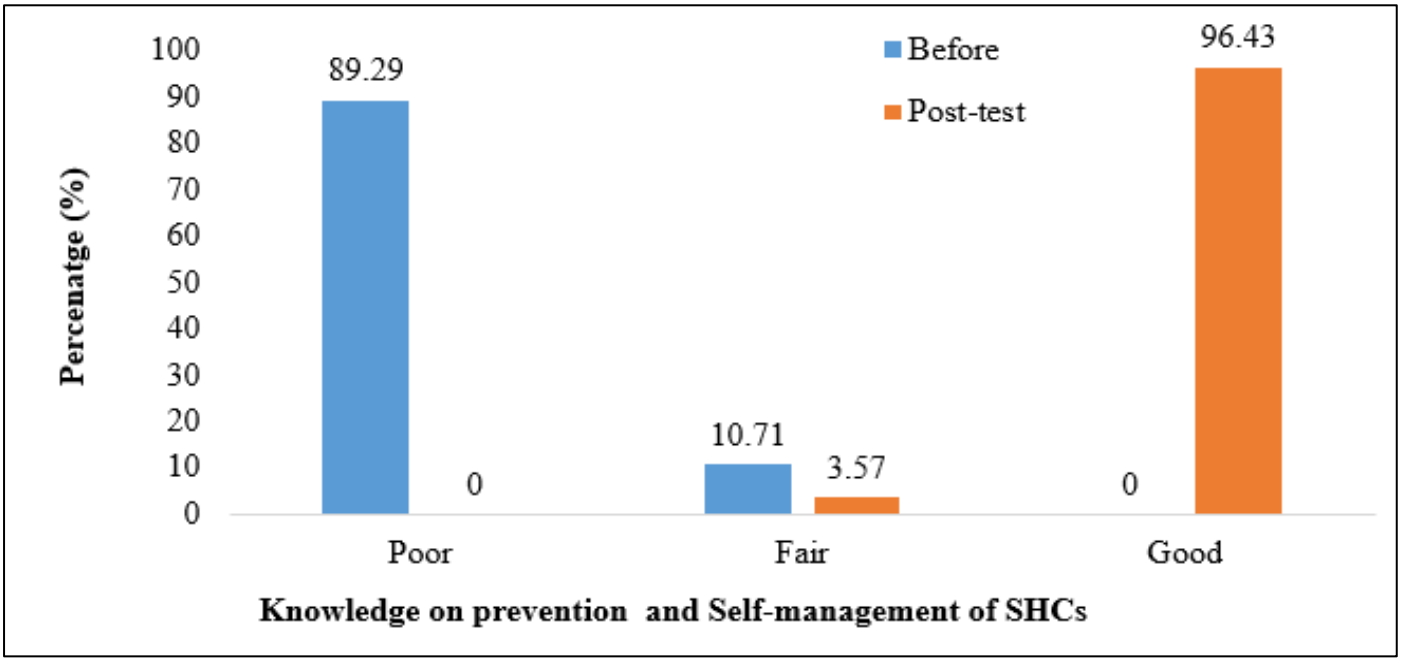

Fig 1 Change in Knowledge on Prevention and Self-Management of Secondary Conditions among Persons with Mobility Impairment before and after Intervention.

Fig. I show a change in knowledge of prevention and self-management of SHCs, of which 25 (89.29%) of the participants had poor knowledge during the pre-test. After the intervention, all the participants had good knowledge. Likewise, no participant had good knowledge of prevention and self-management of secondary health conditions during the pre-test, but this increased to 27 (96.43%) after the intervention (χ^2=65.60, p<0.001).

ISSN No:-2456-2165 https://doi.org/10.38124/ijisrt/25mar1756

➢ *Change in Self-efficacy and knowledge of nutrition.*

Table 2 Change in Self-efficacy and Nutrition before and after Intervention.

Variables	Categories	n	Period				Chi-square	P-value
			Pre-test	%	Post-test	%		
Knowledge of nutrition	Poor	20	20	71.43	0	0	58.74	**<0.001**
	Fair	10	8	28.57	2	7.14		
	Good	25	0	0	25	89.29		
	Total	**55**	**28**	**100**	**27**	**96.43**		
Self – efficacy	Poor	13	13	48.15	0	0	42.55	**<0.001**
	Fair	18	14	51.85	4	14.29		
	Good	24	0	0	24	85.71		
	Total	**55**	**27**	**100**	**28**	**100**		

Table 2 shows the change in self-efficacy among the participants from the baseline information. Nobody had good self-efficacy during the pre-test, but after the intervention, 24 (85.71%) of the participants had good self-efficacy. This gives an 85.71% change from poor and fair self-efficacy to good self-efficacy and was statistically significant ($\chi2=42.55$, $p<0.001$). Also, no participant had a reasonable knowledge of nutrition during the pre-test. After the intervention, 25 (89.29%) of them had good knowledge. This shows an 89.29% change from poor and fair levels of knowledge on nutrition to reasonable knowledge, which was statistically significant ($\chi2=58.74$, $p<0.001$).

➢ *Behavioral Change in Consumption of Alcohol, Cigarette Smoking and use of Drugs.*

Table 3 Behavioral Changes in Alcohol Consumption, Cigarette Smoking and use of Drugs

Variable	Categories	n	Period				Chi-square	P-value
			Pre-test	%	Post-test	%		
Alcohol/cigarettes/Drugs	No	48	24	85.71	24	88.89	0.13	0.724
	Yes	7	4	14.29	3	11.11		
	Total	**55**	**28**	**100**	**27**	**100**		

Table 3 There was no significant decrease in the consumption of alcohol, cigarette smoking, and the use of drugs ($\chi2=0.13$, $p<0.724$). Four (14.29%) of the participants consumed either alcohol, cigarettes or drugs during the pre-test, which decreased to 3 (11.11%) after the intervention.

Table 4 Change in Health-Related Characteristics before and after Intervention

Variable	Categories	n	Period				Chi-square	P-value
			Pre-test	%	Post-test	%		
Pain	Mild	22	0	0	22	78.57	43.08	**<0.001**
	Moderate	13	7	25	6	21.43		
	Severe	21	21	75	0	0		
	Total	**56**	**28**	**100**	**28**	**100**		
Pressure ulcer	Absent	45	18	64.29	27	96.43	9.16	**0.002**
	Present	11	10	35.71	1	3.57		
	Total	**56**	**28**	**100**	**28**	**100**		
Risk of developing pressure ulcers	Low	25	0	0	25	89.29	62.26	**<0.001**
	Moderate	2	0	0	2	7.14		
	High	29	28	100	1	3.57		
	Total	**56**	**28**	**100**	**28**	**100**		
Contractures	Absent	30	9	32.14	21	75	0.34	**0.001**
	Present	26	19	67.86	7	25		
	Total	**56**	**28**	**100**	**28**	**100**		
Risk of developing contractures	Absent	25	0	0	25	92.59	47.53	**<0.001**
	Present	30	28	100	2	7.41		
	Total	**55**	**28**	**100**	**27**	**100**		
Urinary symptoms/ risks	Absent	26	0	0.00	26	96.30	51.14	**<0.001**
	Present	29	28	100	1	3.70		
	Total	**55**	**28**	**100**	**27**	**100**		
Bowel symptoms	Absent	26	0	0	26	96.30	51.14	**<0.001**
	Present	29	28	100	1	3.70		

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	Total	**55**	**28**	**100**	**27**	**100**		
Stress/depression	Low	30	3	10.71	27	96.43	47.47	**<0.001**
	Moderate	7	6	21.43	1	3.57		
	High	19	19	67.86	0	0		
	Total	**56**	**28**	**100**	**28**	**100**		
Health care costs in terms of hospital consultations and purchase of drugs	Low	28	0	0	28	100	56.00	**<0.001**
HRQoL	High	28	28	100	0	0	68.37	**<0.001**
	Total	**56**	**28**	**100**	**28**	**100**		
	Poor	4	4	14.29	0	0		

SHCs= Secondary health conditions, HRQOL= Health-related quality of life.

Table 4 shows the change in self-management of SHCs after the intervention. Most (75%) of the participants had severe pain during the pre-test, while none had mild pain. After the intervention, 22 (78.57%) of the participants had mild pain, while none had severe pain. This was statistically significant (χ^2=43.08, p<0.001). Ten (35.71%) of the participants had pressure ulcers during the pre-test, while only 1 (3.57%) had pressure ulcers after the intervention. Thus, there was a 32.14% decrease in the occurrence of pressure ulcers after the intervention; this decrease was statistically significant (χ^2=9.16, p=0.002). All the participants had a high risk of developing pressure ulcers during the pre-test, while just 1 (3.57%) had a high risk of developing pressure ulcers after the intervention, with 25 (89.29%) having a low risk. Hence, there was a 96.43% change from high to moderate or low risk of developing pressure ulcers after the intervention (χ^2=62.26, p<0.001). Also, 19 (67.86%) of the participants had contractures during the pre-test, which decreased to 7 (25%) after the intervention. This shows a 42.86% decrease in the occurrence of contractures after the intervention (χ^2=10.34, p=0.001). In addition, the risk of developing contractures was present in all the participants during the pre-test, and after the intervention, it decreased to 2 (7.41%). This shows a 92.59% decrease in the risk of developing contractures after the intervention, which was statistically significant (χ^2=47.53 p<0.001). All the participants had a risk of urinary symptoms during the pre-test, while just 1(3.7%) had the risk after the intervention. Hence, there was a 96.3% decrease in the development of urinary symptoms after the intervention (χ^2=51.14, p<0.001). All the participants had a risk of bowel symptoms during the pre-test, while 1 (3.7%) had a risk of bowel symptoms after the intervention. This shows a 96.3% decrease in the development of bowel symptoms among the participants after the intervention and this decrease (χ^2=51.14, p<0.001). A greater proportion, 19 (67.86%) of the participants had a high level of stress/depression during the pre-test, no one had a high level of stress/depression after the intervention, and 27 (96.43%) of them had low stress/depression levels post-intervention. Thus, there was a 100% change from high stress/depression levels to either moderate or low stress/depression levels (χ^2=47.47, p<0.001). All the participants reported having high healthcare costs in terms of hospital consultations and purchase of drugs, while after the intervention, all reported having low healthcare costs. Hence, there was a 100% change from high to low healthcare cost (χ^2=56.00, p<0.001). In addition, there was a significant improvement in health-related quality of life from poor (14.3%) and fair (85.7%) in the pre-test to good in all participants after the intervention. This shows a 100% change from poor and fair health-related quality of life to good health-related quality of life (χ^2=68.37, p<0.001).

IV. DISCUSSION

The study aimed to assess the impact of information, education and training on the prevention and self-management of secondary conditions among people with mobility impairment. A total of 28 participants were recruited for the study, and all were followed up till the end. Elicitation research was conducted using the Participatory Action Research (PAR) approach [10]. The findings showed that the participants lacked knowledge of SHCs and the basics of nutrition and had low self-efficacy. It also showed that they suffered from symptoms like pain, depression, pressure ulcers, contractures and urinary and bowel symptoms and were at high risk of developing these symptoms. Also, they reported their HRQOL as poor and fair, with high healthcare costs for all the participants. The findings of Participatory Action Research were consistent with findings in other studies. Studies of individuals with long-term mobility impairment showed that they develop multiple physical [4] [21] and mental disorders [19]. As a result of these, they are more predisposed to social limitations [20], which further compounds the overall condition of the person [21], aggravates the disability and increases the mortality rate [21]. A study by Pilusa and colleagues showed that participants expressed pain as the most common SHC experienced, leading to limitation in functioning and mobility, pressure sores, weakness, effects of activities of daily living (ADL), depression, and challenging bowel and bladder symptoms [31].

Findings revealed significant improvements in knowledge of secondary conditions, nutrition, feeding habits and self-efficacy which were considered key factors in improving outcomes post-intervention. Improvements in understanding SHCs and the basics of nutrition and self-efficacy helped to build participants' confidence to participate in the program. Furthermore, it improves functional independence. Participants were able to perform activities on their own, monitor symptoms and carry out physical exercises independently. Studies have indicated the importance of self-efficacy in preventing and managing chronic conditions [13] [17] [26]. This significantly contributed to the reduction of

ISSN No:-2456-2165 https://doi.org/10.38124/ijisrt/25mar1756

symptoms. Pain, depression, pressure ulcers, and contractures post-intervention. This supports the growing evidence that self-management intervention programs are effective ways of improving health outcomes and quality of life while reducing healthcare costs in people with physical disabilities [29] [33]. The findings also revealed that self-management intervention programs can prevent the risk of developing secondary health conditions. The risk of depression, pressure ulcers, contractures, and bladder and bowel symptoms were all significantly reduced. These findings are consistent with the evidence in the literature that shows that self-management interventions have been used to prevent some SHCs like pain and depression [11] [14] [16] [30] [3]. The reduction of symptoms and the risk of secondary health conditions were reflected in the drop in healthcare costs as the health-related quality of life.

People with mobility impairments often face the co-existence or clustering of secondary health conditions [31]. Furthermore, they are prone to exhibiting multiple health behaviours, a sedentary lifestyle, smoking and alcohol use [24] [25] [32]. The study findings showed no significant behavioural changes in the above risk factors post-intervention. The reason for this may lie in the reality that changes in behavioural risk factors often take time to manifest. Understanding this delay is crucial in acknowledging the importance of long-term strategies in promoting health and well-being.

The above findings indicate that the intervention was effective. The effectiveness could be attributed to the improvement in self-efficacy among the participants. The program's effectiveness could also be attributed to the intervention package used. The use of telephone calls and WhatsApp messages might have played a vital role in the change of outcomes of post-intervention. This supports evidence that telephone and internet-based interventions are effective measures in the self-management behaviours of people with disabilities [44]. The role of caregivers for those who could not read or write and for participants with paralysis secondary to spinal cord injuries might also have been a big booster to the post-intervention outcome. They could have provided the needed and critical assistance with the participants' self-management. Evidence in research shows that involving caregivers and family members in interventions would improve individual quality of life and behavioural and emotional outcomes. The study implemented a monthly review of the activities and health coaching or education during the sessions. Health coaching is a supported health intervention approach. This supports the evidence that health coaching or education plays a significant role in chronic disease management. Despite the effectiveness noticed at the end of the intervention, further studies could be carried out in the following areas: participants' perspectives post-intervention and the role of caregivers in self-management intervention.

V. CONCLUSION

The study's findings showed that self-management programs are an effective way of preventing and managing secondary health conditions. However, there was no significant improvement in behavioural changes in risk factors for secondary health conditions like alcohol, cigarette smoking and drug use, suggesting that behavioural risk factors may take long periods of intervention before any significant changes are realised. Also, the study shows that improving self-efficacy is essential in self-management intervention programs.

VI. LIMITATIONS AND FUTEURE STUDY

Financial constraints limited the study to one geographical area and thus could not be generalized to other areas of the national territory. A more extensive coverage of the national territory in this study is recommended to assess its validity.

- *Conflict of Interest*

The authors of this study declare that there are no conflicts of interest.

ACKNOWLEDGEMENT

The authors would like to thank every participant who took part in the study.

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