Prosthesis use and satisfaction among people with lower-limb amputation in 10 districts of Bhutan

Ugyen Norbu[1], Tandin Zangpo[2], Jit Bahadur Darnal[3], Hari Prasad Pokhrel[1], Roma Karki[4].

[1]*Gidakom Hospital, Ministry of Health, Bhutan*
[2]*Department of Public Health, Ministry of Health, Bhutan*
[3]*Royal Centre for Disease Control, Department of Public Health, Ministry of Health, Bhutan*
[4]*Department of Medical Services, Ministry of Health, Bhutan*

ABSTRACT

Introduction: The use of lower-limb prostheses restores functional mobility and improves quality of life for people with lower limb amputation. However, the use of prostheses is significantly impacted by users' satisfaction with their prostheses and service delivery. Therefore, the excellence of prosthetic rehabilitation is not only assessed by the number of prostheses users but is also determined by the level of satisfaction with the prostheses and services received. The study was conducted to determine prostheses use and satisfaction among people with lower-limb amputation. **Methods:** A cross-sectional study was conducted among lower-limb prosthetic users in 10 districts of Bhutan. Data was collected by face-to-face interview using the Quebec User Evaluation of Satisfaction with Assistive Technology (QUEST) questionnaire. Participants were recruited by purposive sampling. **Results:** The study found that 96.4% of persons with lower-limb amputation currently used prostheses and 79% of them have used it for more than 7 hours/day. However, 44% of prostheses needed repair. The total QUEST score of satisfaction was 4.0 (SD 0.5). **Conclusion:** Majority of lower-limb prostheses are in use and the users reported being quite satisfied with their prostheses and service delivery. The study recommends initiating follow-up services to improve prosthetic use and overall satisfaction scores for both prostheses and service delivery.

Keywords: Amputation; Bhutan; Prostheses; Satisfaction.

INTRODUCTION

An amputation leads to physical dependence upon others which ultimately restricts social participation and hampers the quality of life[1]. Use of prostheses restores functional mobility of people with lower-limb amputation and prostheses use has been associated with greater mobility and independent living[2]. Prostheses of good quality, when appropriate to the users and their environment, significantly influence the independence level of the users[3]. Prostheses enable users to be active members of the society and live a dignified life[3].

However, the use of prostheses is impacted by users' level of satisfaction[4]. Satisfaction with prostheses plays a key role in enhancing mobility and is significant for advancing utilization of the prostheses, counteracting dismissal, and expanding consistence with therapeutic routine[5,6]. Literature has documented end-user dissatisfaction as a major reason for device abandonment[7]. Satisfaction denotes prosthetic users' specific needs have been met and quality of service delivery have been good[8,9]. In Iran, where both high-cost and low-cost technologies are used for the production of prostheses, patients were dissatisfied with the cosmetic appearance of the prostheses, durability and the process of service delivery[10].

Studies have documented varying use of lower-limb prostheses ranging from 49-95 %[11]. Studies conducted in Malawi and Vietnam showed that 90% of the lower-limb prostheses were used by patients[8,12] while Dillingham et al. reported that 95% of their study participants used their prostheses on a regular basis[11]. Despite high rate of prostheses usage, 57% of users were dissatisfied with the comfort of prostheses and over 50% users experienced pain related to prostheses use[11,13]. The quality of rehabilitation care is not only determined by the proportion of patients who use prostheses over time but is also reflected in the functional utility and satisfaction with the prostheses over time[4]. Thus, it is imperative to understand the factors that influence the use and satisfaction among lower-limb prosthetic users,

Corresponding author:
Ugyen Norbu
u.norbuu@gmail.com

to facilitate and develop targeted advancement in prosthetic technology and future rehabilitation plans. To the knowledge of the researcher, no studies have been conducted in Bhutan and there is a lack of knowledge on the usage of prostheses and users' level of satisfaction. Therefore, this study was conducted to understand prostheses use and satisfaction among people with lower-limb amputation in Bhutan.

METHODS

Study design

This was a cross-sectional study of people fitted with lower-limb prostheses in 10 districts of Bhutan.

Setting

Prosthetic and Orthotic Unit at Gidakom Hospital was established in 1985 to provide basic rehabilitative services to people living with Hansen's disease. Gidakom hospital is the only rehabilitation centre in Bhutan providing prosthetic and orthotic services. The unit currently has one Prosthetist/Orthotist and two orthopaedic technologists. Like other health services, prosthetic and orthotic services are provided free of cost to all the citizens.

Participants/Sampling

People fitted with lower-limb prosthesis from 2013-2017 over 18 years of age were included in the study. Ten districts with more number of people fitted with lower-limb prostheses were purposively selected. A total of 87 people with lower limb amputation fulfilled the inclusion criteria, from which 84 (96.6%) of them participated in the study.

Research Instrument and Data collection

The questionnaire comprised of socio-demographic characteristics and questions on prosthesis use. Quebec User Evaluation of Satisfaction with Assistive Technology (QUEST 2.0) questionnaire[14] was also used. Reliability, validity, and applicability of QUEST 2.0 have been documented[15]. The QUEST 2.0 has 12 items, of which 8 items are related to device satisfaction (dimensions, weight, ease in adjusting, safety and security, durability, ease of use, comfortable and effectiveness) and 4 items are related to services (service delivery, repairs and services, professional services and follow-up services). Satisfaction was assessed on a 5-point response scale: 1=Not satisfied at all; 2=Not very satisfied; 3=More or less satisfied; 4=Quite satisfied; 5=Very satisfied. QUEST 2.0 was translated

Table 1. Socio-demographic characteristics of people with lower-limb amputation in Bhutan from 2013-2017 (*n=84*)

Socio-Demographic variables	Male		Female		Total	
	n	%	*n*	%	*n*	%
Age						
18-24 years	6	9.7	3	13.6	9	10.7
25-39 years	18	29.0	8	36.4	26	31.0
40-49 years	9	14.5	6	27.3	15	17.9
50-59 years	12	19.4	1	4.6	13	15.5
60 years & above	17	27.4	4	18.2	21	25.0
Median age (range)	48.5(18-82)		37(18-75)		45.5(18-82)	
Marital status						
Never married	15	24.2	5	22.7	20	23.8
Married	43	69.4	14	63.6	57	67.9
Divorced/widowed	4	6.5	3	13.6	7	8.3
Education						
No formal education	35	56.5	10	45.5	45	53.6
Monastic	8	12.9	0	0	8	9.5
Primary/secondary	10	16.1	6	27.3	16	19.1
Higher and above	9	14.5	6	27.3	15	17.9
Occupation						
Farmer	45	72.6	18	81.8	63	75.0
Civil servant	5	8.1	1	4.6	6	7.1
Private	12	19.4	3	13.6	15	17.9

Table 2. Cause of amputation, level and general prosthetic characteristics of people with lower-limb amputation in Bhutan from 2013-2017 (*n=84*)

Variables	Male		Female		Total	
	n	%	*n*	%	*n*	%
Cause of amputation						
Road traffic accident	14	22.6	4	18.2	18	21.4
Hansen's disease	8	12.9	6	27.3	14	16.7
Diabetes	7	11.3	2	9.1	9	10.7
Crush injury	7	11.3	0	0.0	7	8.3
Necrosis/gangrene/DVT	11	17.7	2	9.1	13	15.5
Others*	15	24.2	8	36.4	23	27.4
Level of amputation						
Above-Knee	13	21.0	4	18.2	17	20.2
Bellow-Knee	49	79.0	18	81.8	67	79.8
Type of prostheses						
Conventional prostheses	50	80.7	17	77.3	67	79.8
Modular prostheses	12	19.4	5	22.7	17	20.2
Prosthesis use per day						
More than 7 hours	49	79.0	17	77.3	66	78.6
1-7 hours	10	16.1	5	22.7	15	17.9
Not using	3	4.8	0	0.0	3	3.6
Condition of prostheses						
In use with good condition	33	53.2	11	50.0	44	52.4
In use but needs repair	26	41.9	11	50.0	37	44.1
Broken and cannot be used	3	4.8	0	0.0	3	3.6
Number of prostheses change						
Never	14	22.6	3	13.6	17	20.2
1-3 times	48	77.4	17	77.3	65	77.4
More than 3 times	0	0.0	2	9.1	2	2.4
Number of repairs						
Never	13	21.0	1	4.6	14	16.7
1-3 times	44	71.0	19	86.4	63	75.0
More than 3 times	5	8.1	2	9.1	7	8.3
Pain with the use of prosthesis						
Yes	22	35.5	6	27.3	28	33.3
No	40	64.5	16	72.7	56	66.7
Skin irritation with the use of prosthesis						
Yes	14	22.6	5	22.7	19	22.6
No	48	77.4	17	77.3	65	77.4
Wounds with the use of prosthesis						
Yes	13	21.0	9	40.9	22	26.2
No	49	79.0	13	59.1	62	73.8

Table 3. Satisfaction with prostheses and services among people with lower-limb amputation in Bhutan from 2013-2017 (*n=84*)

Satisfaction with the prosthesis												
Variables	**Not satisfied at all**		**Not very satisfied**		**More or less satisfied**		**Quite satisfied**		**Very satisfied**		**QUEST score (1-5)**	
	n	**%**	***n***	**%**	***n***	**%**	***n***	**%**	***n***	**%**	**Mean**	**SD**
Dimension (size, height, length, width)	_	_	_	_	2	2.4	60	71.4	22	26.2	4.2	0.5
Weight	_	_	_	_	30	35.7	43	51.2	11	13.1	3.8	0.7
Ease in adjusting (fixing, fastening)	_	_	_	_	4	4.8	49	58.3	31	36.9	4.3	0.6
Safe and secure	_	_	_	_	3	3.6	50	59.5	31	36.9	4.3	0.5
Durability (endurance, resistance to wear)	_	_	_	_	4	4.8	66	78.6	14	16.7	4.1	0.5
Easy to use	_	_	_	_	8	9.5	44	52.4	32	38.1	4.3	0.6
Comfortable	_	_	_	_	5	6.0	65	77.4	14	16.7	4.1	0.5
Effective (the degree to which your device meets your needs)	_	_	_	_	3	3.6	62	73.8	19	22.6	4.2	0.5
Prosthesis subscale score											4.2	0.6
Satisfaction with the services												
Service delivery program (procedures, length of time)	_	_	_	_	5	6.0	62	73.8	17	20.2	4.1	0.5
Repairs and servicing (maintenance)	_	_	_	_	1	1.2	59	70.2	24	28.6	4.3	0.5
Quality of professional services (Information, attention)	_	_	_	_	3	3.6	64	76.2	17	20.2	4.2	0.5
Follow-up services (continuing support services)	_	_	83	98.8	_	_	1	1.2	_	_	2.0	0.2
Services subscale score											3.7	0.4
Total QUEST Score											4.0	0.5

Table 4. The 3 most important QUEST items as per prostheses users in Bhutan from 2013-2017 (*n=84*)

Importance ranking of QUEST items	**QUEST items**	**Prosthetic users**	
		n	**%**
1	**Follow-up services**	60	71.4
2	**Weight**	58	69.0
3	**Durability**	46	54.8
4	Service delivery	41	48.8
5	Professional service	36	42.9
6	Dimension	30	35.7
7	Repairs/servicing	29	34.5
8	Comfort	26	31.0
9	Safety	25	29.8
10	Effectiveness	23	27.4
11	Adjustments	22	26.2
12	Easy to use	21	25.0

to Dzongkha, the national language of Bhutan, after seeking permission from the author. Data was collected through face-to-face interview with the participants.

Data Management and Analysis

Data was double-entered and validated in EpiData version 3.1 and analysed using STATA/IC version 13.1. Mean and standard deviation (SD) for total QUEST score and sub-scores of the device (prosthesis) and services were calculated using QUEST manual[16]. Descriptive statistics were generated and presented in the median, inter-quartile range (IQR) and percentages.

Ethical approval

This study was granted ethical approval by the Research Ethics Board of Health, Ministry of Health, Bhutan, vide approval letter REBH/Approval/2018/008 dated 26th March 2018. Written informed consent was obtained from all participants.

RESULTS

Socio-demographic characteristics of participants

Over two-thirds of the participants (73.8%) were male. The median age was 45.5 (IQR 29, 59.5; range 18-82) years and 67.9% were married. Over a half the participants (53.6%) didn't have formal education and around 7% were civil servants (Table 1).

The most common cause of amputation was motor vehicle collision (21.4%), while the most common level of amputation was below-knee (79.8%). Overall, 96.4% of people with lower-limb amputation use prostheses. Most prosthetic users (78.6%) use the prostheses more than 7 hours per day (Table 2).

Satisfaction with prostheses and services

Most people with lower-limb amputation expressed that they were quite satisfied with their prostheses (mean of 4.2 out of 5) and services (mean of 3.7 out of 5). The total QUEST score for satisfaction was 4.0 (SD 0.5) as reflected in Table 3.

People with lower-limb amputations who availed prosthetic rehabilitation services were asked to select the 3 most important items from 12 items of QUEST items. Accordingly, the users have chosen the need for follow-up services, followed by the light-weight and durable prostheses as important factors for prostheses use and satisfaction in Bhutan (Table 4).

DISCUSSION

Majority of people with lower limb amputations in Bhutan use lower-limb prostheses and they reported being quite satisfied with their prostheses and service delivery. The study found a high usage (96.4%) of lower-limb prostheses as reported in other low-income countries[12,17]. Perhaps this could be attributed to provision of free healthcare services in Bhutan.

The satisfaction score for the device (4.2 out of 5) reported in this study is higher than those reported by studies conducted in other developing countries. This could be due to low education level of participants which was found to be associated with lower expectations of healthcare services [19]. The Malawian prosthetic users were quite satisfied with their device with a mean of 3.9 out of 5 while in Sierra Leone and Lao, the users reported a mean satisfaction of 3.7 and 3.77 out of 5, respectively [8,12,17,18]. Despite reporting higher satisfaction score, the prosthetic users in Bhutan experienced pain and wounds which correspond with the findings reported from Nepal[1], Malawi[8] and Sierra Leone[18].

Along similar lines, the present study indicates that prosthetic users are quite satisfied (mean of 3.7 out of 5) with service delivery, similar to studies conducted in Sierra Leone[18] and Lao[17]. However, a study in Malawi[8] found prosthetic users were very satisfied with the services (mean of 4.4 out of 5) they received.

The prosthetic users in the present study reported lower satisfaction scores for service delivery compared to satisfaction with the device. This could be due to the absence of alternative services[20]. Community based rehabilitation has been the focus of rehabilitation efforts in Bhutan since the 1990s. However, the prosthetic services are limited to a centre at Gidakom hospital till date. Studies have reported that accessibility to the services and cost of transportation were found to hamper satisfaction score[8,9,21,22]. This could be the reason why one-fifth of the users never changed their prostheses and 16% of the participants did not repair their prostheses from 2013-2017.

The 3 most important items from the 12 items of QUEST 2.0 according to prosthetic users in Bhutan were follow-up services, weight and durability of the prostheses. The findings are consistent to those reported by studies conducted in Sierra Leone[18] and Malawi[8]. This probably explains the lowest satisfaction score with regards to follow-up services among prosthetic users as there is no follow-up system in Bhutan. Initiating follow-up services can improve prosthetic use and overall satisfaction scores for both prostheses and the services.

Purposive sampling of 10 districts may not be representative of prosthetic users in Bhutan and could be a major limitation of the study. However, the sampled 10 districts had majority of the prostheses users and participants and are from different regions.

CONCLUSION

Majority of people with amputations are using lower-limb prostheses, however over one-third of them require repair. Seventy-nine percent use their prostheses more than seven hours per day. Overall, users were quite satisfied with their prostheses and the service delivery despite follow-up services being rated as the least satisfied component, followed by the weight and durability of the prostheses. The study recommends initiating follow-up services to improve prosthetic use and developing a national plan for the distribution of prosthetic and orthotic

services such as starting services at regional referral hospitals to provide timely and quality prosthetic services in Bhutan.

ACKNOWLEDGEMENT

This research was conducted as a part of Bhutan's Structured and Mentoring Approach to Research Training (B SMART) course. Authors would like to extend gratitude to all the participants, enumerators, staff of Prosthetic and Orthotic unit, Gidakom Hospital, and Disability Prevention and Rehabilitation Program, MoH for funding.

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AUTHORS CONTRIBUTION

Following authors have made substantial contributions to the manuscript as under:

UN: Concept, design, data collection and analysis, manuscript writing and review.

TZ: Design, data collection and analysis, manuscript writing and review

JBD: Design, data collection and analysis, manuscript writing and review

HPP: Design, data collection and analysis, manuscript writing and review

RK: Design, data collection and analysis, manuscript writing and review

Author agree to be accountable for all respects of the work in ensuring that questions related to the accuracy and integrity of any part of the work are appropriately investigated and resolved.

CONFLICT OF INTEREST

None

GRANT SUPPORT AND FINANCIAL DISCLOSURE

Travel for data collection was supported by the Disability Prevention and Rehabilitation Program, Ministry of Health, Bhutan.