

## MAJOR LIMB LOSS AND PROSTHESIS USE IN THE POST CONFLICT ERA IN ACHOLI SUB-REGION, NORTHERN UGANDA

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### Abstract

**Introduction:** This study assessed amputees' residual limb stump in the post war era of Acholi sub-region for suitability of prosthetic fit use and associated challenges with their current prosthesis and psycho-socio emotional experiences. **Methods:** A cross-sectional clinical assessment of amputees living within the communities in Acholi sub-region was done between September 2018 to August 2019 by a team of Surgical Consultants, orthopaedic technician and prosthetic therapist. **Result:** The biggest proportion of amputees living in the Acholi communities were adults of 35-65yrs (mean of 43.36yrs, SD+/- 15.694) and more male were affected than females (73.4%:26.6% respectively). The negative predictors of prosthetic fit and use were advancing age, gender, increased duration of disability, high percentage of disability, but stump length and power were positive predictor. Lower limb amputees tend to suffer more psycho-socio emotional disorder like pain sensation, stress, mood and anxiety disorders, as well as sexual discrimination. Lower limb amputee experiences more prosthesis complication like excessive sweating, extremely bothersome sound, terrible fit, and terrible appearance than upper limb. **Conclusion:** Residual stump length and power are the most important predictor of prosthesis fit. For proper prosthetic adherence, mental health and socio-emotional support need to be included in a comprehensive rehabilitation of amputees

**Keywords:** Major Limb Loss, Prosthetics suitability, fit, use and predictors, Psycho-socio-emotional challenges of amputation.

### INTRODUCTION

Whereas it may not be easy to access prosthetic and rehabilitation services in our setting, once provided, amputees report that their biggest difficulties are associated with standing for long periods, walking long distances and the emotional effects of the disability and these tend to be more common in lower limb amputees than upper limb<sup>1</sup>. In many setting, it is more difficult to find, fit and achieve good functionality of limb prosthetics on upper limb stumps like Above Elbow Amputation (AEB), Trans-elbow Amputation (TEA), Below Elbow Amputation (BEA), compared to lower limb stumps like Above Knee Amputations (AkA), Below Knee Amputation BKA, Trans-knee Amputation (TKA), Trans-ankle Amputation (TAA) and Below Ankle Amputation (BAA)<sup>2,3</sup>. Even then, amputation itself is often associated with psycho-emotional challenge in which depression rates at 10.4% to 63%, posttraumatic stress disorder 3.3% to 56.3%, and phantom limb 14% to 92%<sup>4</sup> respectively. Nonetheless, positive adjustment to limb loss can be achieved through: allowing greater time lapse from time of amputation, more social support, greater satisfaction with the prosthesis, active coping attempts, personality disposition, a lower level of amputation in the case of lower limbs, and control of phantom limb pain<sup>5</sup>. The 20years (1986-2006) civil war in Acholi sub-region of Northern Uganda caused various types of injuries to the civilians<sup>6,7</sup>. Besides bullet, bomb and land mine injuries, rebels would literally chop of body, parts limbs inclusive.

Those who were lucky enough to survive the trauma were taken to hospital for proper limb refashion/amputations, and were then referred to the Gulu Regional Orthopaedic workshop (GROW) for psycho-socio-emotional support, counselling, physiotherapy, fitting of prosthetics and rehabilitation<sup>8,9</sup>. Nonetheless, the region also continued to receive major limb loss cases of other non-war related etiology and send to GROW<sup>10</sup>. Since 2008 (12years), GROW significantly cut down their operations due to funding constrain and this significantly curtailed services to amputees<sup>9,10</sup>. That development created several problems to the patients who were dependent on the GROW services as they could not be followed up anymore, the status of their stumps could not be assessed and the functionality of the prosthetics could not be ascertained and broken appliance could not be repaired<sup>10</sup>. The conditions under which these amputees were left since the curtailing of GROW service need to be addressed in order to design appropriate intervention. This study sought to follow up amputees within their living communities to clinically assess their current status of livelihoods, functionality, residual stumps, prosthesis use/disuse and their psychosocio-emotion conditions

### Objectives

1. The examine the amputated stump for complications and suitability for prosthesis fitting
2. To assess the socio-pyscho-emotional experiences of persons leaving with major limb loss in Acholi sub-region of Uganda

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3. To assess the prosthesis functionality, usefulness, residual limb health.

## METHODS

A cross-sectional survey was carried from September 2018 to August 2019 in all the eight districts of Acholi sub-region to clinically assess persons with major limb loss. The study used data and information obtained from an earlier study which relied on Geographical Information System (GIS) to cluster families and randomly select samples of household to identify and interview, persons with disability in the community<sup>32</sup> (Figure 2, Appendix I). From the afore mentioned survey a disability focal person with major limb loss was identified and this person was used to purposely mobilize (snowball) other amputees in their locality to a nearby health facility for the research team to come and examine on the appointed date. In situations where there was no nearby health facility, either a room in the sub-county headquarters or house of one of the amputee was used to examine the respondent. Using a structured and semi-structured questionnaire, data was quantitatively collected from respondents with major limb loss. The research team consisted; Consultant surgeons, assisted by a research team consisting of social workers, a counsellor, prosthetic technicians and technologist, orthopaedic officers and physiotherapist. With the aid of simple tools like tapes measures, gloves, disinfectant and Workman's compensation Act schedule 2000 (Uganda), the residual stumps and extend of physical disability was assessed. Psychosocial support was provided by the counsellors and social worker who collected data on psycho-social-emotional aspect respectively. Quantitative data obtained from the disabled person consisted of biodata, variables relating to limb loss, availability, access and use of prosthesis as well as socio-pyscho-emotional function. The data was enter and analysed using SPSS (version 25.0).

## RESULTS

Approximately 109 amputees were accessed and clinically assessed within the eight districts in Acholi-sub-region of northern Uganda of which Nwoya district had n=26 (23.9%), Amuru (n=18, 16.5%), Pader (n=18, 16.5%), Omoro (n=14, 12.8%). Agago, Lamwo, Gulu had(n=10, 9.2%), (n=8;8,3%), (n=8;7,3%) respectively and Kitgum (6;5.5%). The majority of persons with major limb loss in Acholi sub-region had only primary level education (59.6%, n=65) followed by secondary education (23%, n=25), tertiary education (6.5%, n=5%) and others (12%, n =13). Overall, most persons with major limb loss in the region were peasant farmers (68.8%, n=75).

### Demographic of the amputees

**Table 1. Age group of amputees and their sex (Gender)**

Age Group of amputees	Sex of respondent		
	Male	Female	Total
Child (1-17yr)	3 (100%)	0	3 (2.8%)
Youth (18-35yr)	23 (74.2%)	8 (25.8%)	31 (28.4%)
Adults (36-65yrs)	47 (71.2%)	19 (28.8%)	66 (60.6%)
Elderly (>66yrs)	7 (77.8%)	2 (22.2%)	9 (8.3%)
Total	80 (73.4%)	29 (26.6%)	109 (100%)

The age of amputees living in the communities in Acholi Sub-region ranged from 13yrs to 90yrs old, (mean of 43.36yrs, SD+/- 15.694). However, the biggest proportion of amputees in Acholi were Adults (60.6%) within the age group of 36-65 years, followed by the youth of the age group of 18-35yrs (28.4%), the elderly more than 66yrs (8.3%) and the children (2.8%), this differences was statistically significant (Chi-Square 89.422, df 3, P-value 0.0001) Table 1. Furthermore, there were more male amputees compare to the female gender within all the age group (Table 1) and the male: female ratio was 73.4%:26.6% respectively.

### Etiology of Limb loss amongst the community member of Acholi

**Table 2. Limb loss in communities of Acholi sub-region of Uganda**

Cause of limb loss	Freq (n)	%tage
Land mine	51	46.8
Gun shots	21	19.3
Road traffic accident	10	9.2
Disease (gangrene)	5	4.6
Rebel assault	4	3.6
Burns	3	2.8
Bomb blast	2	1.8
Others	13	11.8
Total / (N)	109	100%

Out of 109 amputees living in the communities of Acholi sub-region, landmine accounted for the biggest etiology of major limb loss (46.8%, n= 51) as shown in Table 2. Gun-shot injuries was the second commonest cause of major limb loss (19.3%) followed by road traffic accidents (9.2%), gangrene 4.6% and rebel assault 3.6%. However, amongst those injured by land mine, 56.9% sustained Below Knee Amputations (BKA) and 46.2% Above Knee Amputation (AKA). Of the 21 amputees who were injured by gunshot bullets, 20% got AKA and 15.7% BKA. Therefore the majority of community members living with major lower limb loss, land mine is responsible for their injury and predicament.

### Limb stump complication and suitability for prosthesis fitting

The binary logistic regression analysis in Table 3, reveal that within the gender, the probability of the amputee being fitted with a useful prosthesis was 32.2%, but males gender has a 0.475times more likelihood to use their prosthesis than the females (odds ratio 0.475, 95% CI; 0.141-1.601). Stump muscle power has prosthesis fit and use probability of 70% when power is 2 and above (odds ratio 2.335 95% CI 0.333-16.376). Stump length is also an important positive predictor prosthesis use/fit by 50.2%, (odds ratio 1.008, 95% CI (0.934-1.088) followed by duration of disability (probability 49.9%, odd ratio 0.999, (95% CI 0.928-1.074). Additionally, positive predictor of prosthetic acceptability, fit and use include history of previous trauma (probability 70.9%, odds ratio 2.375, 95% CI: 0.244-23.064), history of drinking alcohol (probability 64.2%, 95% CI: 0.511-6.299, However, the following were negative predictor of prosthesis fit, acceptability and use, advancing age, (B = -0.015, probability 0.496), joint arthritis (-0.471, probability 0.385), Cardiovascular disease (B= -1.777, probability 0.145) though previous history of joint surgery does not have any effect on prosthesis suitability for fitting and use (Table 3).

Table 3. Suitability of prosthesis fit on a limb stump

Predictor variables	B	Unadjusted Odds ratio	Probability	95% CI
Sex of respondent	-0.745	0.475	0.322	0.141-1.601
Disability per cent	-0.029	0.971	0.493	0.936-1.008
Duration of disability in years	-0.001	0.999	0.499	0.928-1.074
Length of stump	0.008	1.008	0.502	0.934-1.088
Muscle power(2)	0.848	2.335	0.700	0.333-16.376
History of cardiovascular disease(1)	-1.777	0.169	0.145	0.009-3.24
History of renal functions(1)	-1.849	0.157	0.136	0.01-2.389
History of respiratory function(1)	0.151	1.163	0.538	0.059-23.097
History of arthritis(1)	-0.471	0.625	0.385	0.042-9.317
History of joint surgery(1)	19.753	3.79E+08		0
History of previous trauma(1)	0.865	2.375	0.707	0.244-23.064
History of drinking(1)	0.585	1.795	0.642	0.511-6.299
History of allergies(1)	1.767	5.853	0.854	0.442-77.442
Respondent age	-0.015	0.985	0.496	0.95-1.021
Constant	-17.41	0.000		

Table 4. Psycho-socio-emotional of losing a major Limb/S

	Level of limb loss							Total
	AKA(%)	TKA(%)	BKA(%)	AEA(%)	TEA(%)	BEA(%)	BAA(%)	
<b>What is the current stress disorders (possible causes)</b>								
None	17(30.9)	6(10.9)	26(47.3)	2(3.6)	2(3.6)	1(1.8)	1(1.8)	55 (72%)
Yes	8(38.1)	1(4.8)	10(47)	1(4.8)	0	1(4.8)	0	21 (28%)
<b>What is the current Pain sensation and tolerance</b>								
None	17(33.3)	4(7.8)	25(49)	0	2(3.9)	2(3.9)	1(2)	51 (59%)
Yes	13(37.1)	4(11.4)	16(45.7)	2(5.7)	0	0	0	35 (41%)
<b>What's the level of Previous and current interactions with persons with disabilities</b>								
None	8(20.5)	5(12.8)	22(18.9)	1(2.6)	1(2.6)	1(2.6)	1(2.6)	39 (41%)
Yes	23(41.1)	2(3.6)	24(42.9)	3(5.4)	1(1.8)	3(5.4)	0	56 (59%)
<b>Any obstacles to compliance to current condition/treatment</b>								
None	15(35.7)	6(14.3)	20(47.6)	0	0	1(2.4)	0	42 (61%)
Yes	7(25.9)	2(7.4)	14(51.9)	3(11.1)	1(3.7)	0	0	27 (39%)
<b>Marital status</b>								
Not married	19(47.5)	1(2.5)	15(37.5)	3(7.5)	0	2(5)	0	40 (38%)
Married	20(29)	7(10.1)	36(52.2)	1(1.4)	2(2.9)	2(2.9)	1(1.4)	69 (62%)
<b>Sexual history</b>								
Inactive	11(32.4)	3(8.8)	18(52.9)	1(2.9)	0	0	1(2.9)	34 (32%)
Active	27(38)	5(7)	32(45.1)	2(2.8)	2(2.8)	3(4.2)	0	71 (68%)
<b>Current mood (acceptance of the condition)</b>								
Bad	2(28.6)	1(14.3)	3(42)	1(14.3)	0	0	0	7 (7%)
Good	36(36.4)	6(6.1)	47(47.5)	3(3)	2(2)	4(4)	1(1)	99 (93%)
<b>Anxiety</b>								
No	19(32.8)	5(8.6)	28(48.3)	1(1.7)	2(3.4)	2(3.4)	1(1.7)	58 (77%)
Yes	3(17.6)	2(11.8)	9(52.9)	2(11.8)	0	1(5.9)	0	17 (23%)

### Socio-psycho-emotional experiences of Major Limb Loss

From Table 4, the commonest psycho-social-emotional problems suffered by persons living with major limb loss is pain sensation on the stump (41%), followed by failure in married (divorced or single) (38%), being sexually inactive or isolated (32%), stress disorder (28%), Anxiety disorder (23%) and psychotic tendency (3%). Overall, stress disorder is more common in persons living with lower limb amputations (LLA) such that Below Knee Amputation (BKA); (47%, n=10), Above Knee Amputation (AKA) (38.1%, n=8) and Trans knee Amputation (4.8%, n=1). Anxiety disorder was similarly more common in persons living with Lower Limb Amputation (LLA): BKA (52.9%, n=9), AKA, (17.6%, n=3) and TKA (11.8%, n=2) compared to upper limb major amputations. Sexual discrimination also tended to predominate amongst persons with major LLA (32%) of which 38% are not married, Therefore lower limb loss tend to be associated with more psycho-socio-emotional challenges compared with upper limb.

### Factors affecting Prosthesis usefulness and functionality in Major limb loss

According to Table 5, as amputees use their prosthetic device, the commonest complications reported is terrible fit of the prosthesis (50%) especially in clients with below knee amputation (60.5%). The prevalence of terrible discomfort while standing or walking with prosthesis is 37.5%, followed by extremely bother some sound as the client walks (35.3%), extreme sweating inside the prosthesis (33.8%) and unsightly look of the prosthesis (35.3%).

Approximately 17.4% of respondents report that their limb stump get so swollen all the time they use the device to the extent that they need to change the prosthesis. However, this complications are most commonly seen in amputees with below knee and above knee amputation but rarely in client with upper limb loss.

Table 5. Prosthesis fit and its functionality

	Level of limb loss					Total
	AKA	TKA	BKA	AEA	BEA	
<b>How well does your Prosthesis fit you</b>						
Terrible	10(26.3)	4(10.5)	23(60.5)	1(2.6)	0	38(50.0%)
Excellent	13(54.2)	1(4.2)	10(41.7)	0	0	24(31.6%)
Faire	4(36.4)	1(9.1)	5(45.5)	0	1(9.1)	11(14.5%)
I Have no prosthesis	1(33.3)	0	1(33.3)	0	1(33.3)	3(3.9%)
<b>What is the comfort of your prosthesis while standing and using your prosthesis</b>						
Terrible	8(29.6)	3(11.1)	16(59.3)	0	0	27(37.5%)
Excellent	15(44.1)	1(2.9)	17(50)	1(2.9)	0	34(47.2%)
Fair	4(36.4)	2(18.2)	5(45.5)	0	0	11(15.2%)
<b>How often does your stump swell to the point of changing the fit of your prosthesis</b>						
All the time	2(16.7)	2(16.7)	8(66.7)	0	0	12(17.4%)
Never	21(39.6)	4(7.5)	25(47.2)	1(1.9)	2(3.8)	53(76.8%)
Rarely	0	0	4(100)	0	0	4(5.8%)
<b>How much do you sweat inside your prosthesis</b>						
Extreme amount	7(29.2)	3(12.5)	13(54.2)	0	1(4.2)	24(33.8)
Not at all	14(41.2)	2(5.9)	16(47.1)	1(2.9)	1(2.9)	34(47.9%)
At times	4(30.8)	1(7.7)	8(61.5)	0	0	13(18.3%)
<b>The appearance of your prosthesis (how it has looked)</b>						
Terrible	7(30.4)	2(8.7)	14(60.9)	0	0	23(31.9%)
Excellent	12(33.3)	3(8.3)	20(55.6)	0	1(2.8)	36(50.0%)
Fine	6(46.2)	1(7.7)	5(38.5)	1(7.7)	0	13(18.1%)
<b>How limited is your choice of clothing was because of your prosthesis</b>						
Worst possible	6(54.5)	0	4(36.4)	0	1(9.1)	11(15.5%)
Not at all	15(27.8)	5(9.3)	32(59.3)	1(1.9)	1(1.9)	54(76.0%)
Depends on clothing	2(33.3)	1(16.7)	3(50)	0	0	6(8.5)
<b>How often your prosthesis has made sounds (belching, squeaking, clicking, etc.)</b>						
Always	9(34.6)	1(3.8)	15(57.7)	0	1(3.8)	26(35.6%)
Never	12(33.3)	3(8.3)	19(52.8)	1(2.8)	1(1.8)	36(49.3%)
At times	4(36.4)	2(18.2)	5(45.5)	0	0	11(15.0%)
<b>How much bothersome these sounds were to you</b>						
Extremely bothersome	10(41.7)	1(4.2)	13(54.2)	0	0	24(35.3%)
Not at all	12(32.4)	4(10.8)	18(48.6)	1(2.7)	2(5.4)	37(54.4%)
Somehow bothersome	2(28.6)	1(14.3)	4(57.1)	0	0	7(10.3%)

## DISCUSSION

Major limb loss is very devastating. It is a major health burden on the families, society, medical services with catastrophic, irreversible and emotionally consequence to the victims<sup>11</sup>. In civil war situation, amputation tend to be common amongst civilian as a result of stray missiles and land minds. Assaultants plant antipersonnel mines on feeder roads and foot path leading to gardens, water sources, and neighbourhood and the unsuspecting poor civilians' limb often end up being blow off. In Acholi sub-region, the 20years protracted Lord resistant armed conflict may have contributed to the high prevalence of land-mine related major lower limb loss in the region seen in this study. The male gender tended to predominate amongst amputee due to the nature of their livelihood that involve a lot of movement, gathering food resources, and in war situation women and children are often advised to stay home for safety as the man looks for food. This study found landmine to be the commonest cause of major limb loss (46.8%, n= 51) amongst citizen living in communities of Acholi sub-region and this was followed by gun-shot injuries(19.3%) road traffic accidents (9.2%), gangrene 4.6% and rebel assault 3.6% (Table 2). Whereas it is expected that all amputee with major limb loss would access prosthetic devices to aid their movement and function, it is not automatic that all limb stumps are fit to accept the device. This study found that the positive predictor of prosthesis fit and use include stump length and stump muscle power, while advanced age, increased physical disability, female gender, joint arthritis, long duration of disability tend to be negative predictors (Table 3).

In Table 4, the study found the psycho-social-emotional episodes suffered by persons living with major limb loss to be; pain sensation on the stump (41%), followed by failure in married (divorced or single) (38%), being sexually inactive or isolated (32%), stress disorder (28%), Anxiety disorder (23%) and psychotic tendency (3%). Furthermore as they use the prosthetic limb, the commonest complications reported is terrible fit of their prosthesis (50%), followed by terrible discomfort while standing or walking (37.5%) extremely bothersome sound as the client walks (35.3%), extreme sweating inside the prosthesis (33.8%) and unsightly look of the prosthesis (35.3%, Table 5). Although previous studies in a different research setting found that malignancy and diabetic complications were the leading cause of amputation in the same region<sup>10</sup>, this study found land mine and gunshot injuries to account for the highest proportion of amputees living in the community. This difference is related to variation in the research setting in that this study was done in the community. Other researchers also reported that generally more males tend to suffer major limb loss particularly those below the age of 40yrs of which lower limb amputations exceed upper limb amputations ((74.2% v 25.8% respectively)<sup>12, 13</sup>. In studies of major limb loss where land mine led in etiology, the age group of 20-40yr male gender predominate and lower limb amputations tend to be more amputated compared to the upper limbs<sup>14</sup>. Just like in this study, the poorly educated male civilian above 20 year are often the most affected by land-mine related amputations<sup>14 & 15</sup>. After major limb loss, most amputees will partly deal with the loss by attempting to replace the limb with an artificial one to regain function and/or the

appearance of being whole or normal again. Prosthetic use is not for everyone, upper-limb amputees often are more likely to choose not to use a prosthesis than lower-limb amputee<sup>16</sup>. Other authors found that a large number of amputees reject prostheses or points out a low satisfaction level in prosthesis, due to a sub-optimal interaction between the socket and the residual limb tissues; and indeed 52.4% of lower limb amputees report falling accidents with prosthesis<sup>17</sup>. Raichle, Hanley, Molton, *et al.* (2008)<sup>18</sup> found the positive predictors of prosthesis use to include younger age, full- or part-time employment, marriage, a distal amputation, an amputation of traumatic etiology, having lower limb stump and an absence of phantom limb pain. According to Sansam *et al.* (2020)<sup>19</sup>, unilateral stump, long stump length, and younger age are positively predictive of better usability of prosthesis but sex probably does not have a significant influence on prosthesis.

Other authors report that whereas Male gender positively predicted fitting with a prosthetic limb at both trans-tibial amputation ( $p=0.001$ ) and trans-femoral amputation ( $p=0.001$ ) levels, bilateral amputations and increasing age are negative predictors of prosthetic limb fit ( $p < 0.001$ )<sup>20</sup>. Another study found that patients with longer stump length were more efficient due to significant difference ( $p < 0.05$ ) between the gait parameters of BKA with medium compared with longer stump length<sup>21</sup>. Therefore amputation surgeons must realize that stump length is an important predictor of prosthetic fit. Improving the antagonist and agonist muscle strength and balance, prevent atrophies, increases muscle strength and thus suitability for prosthesis fit. Muscle strength as a good predictor of suitability for prosthetic use was reported by Demir, and Aydemir (2020)<sup>22</sup>. Indeed several factors, including level of ambulation upon completion of rehabilitation, may predict functional prosthetic outcome after lower-limb amputation<sup>23</sup>. Major limb amputation is indeed emotionally devastating to the victims. As reported in this study, high prevalence of psycho-socio emotional was noted amongst amputees. Many studies have also elucidated the psycho socio-emotional effect of a major limb loss. Sahu *et al.* (2016)<sup>11</sup> reported the prevalence of psychiatric disorders among amputees to range from 32% to 84% of which depression rates at 10.4% to 63%, posttraumatic stress disorder (3.3% to 56.3%), and phantom limb phenomenon 14% to 92%. Furthermore social discomfort and body-image anxiety amongst amputees, have been found to be associated with increased activity restriction, depression, and anxiety<sup>24</sup>. Another study reported the most frequent psychological adjustment problems amongst amputees to be mood disorders, anxiety, altered self-esteem, body image and feelings of helplessness<sup>25</sup>. Thus following amputation the new, less attractive body image can lead to negative self-image, social avoidance, isolation, fear of low performance and unwillingness to maintain a sexual life or intimacy<sup>26</sup>. Like in this study, other authors also found that the lower limb amputation lead to impairments in the sexual function and quality of life in male patients and these sexual dysfunction is strongly associated with emotional state, pain, and lower quality of life<sup>27</sup>. Therefore care of amputees need to address sexual and socio-pyscho-emotion wellbeing besides just prosthesis. Prosthetic devices are not without complications especially lower-limb devices. Over the time, its suction effect can lead to chronic swelling, a bulbous end on the limb, dark red discoloration abnormal postural alignment, muscle imbalances, strains, gait abnormalities, back pain and foul smelling bacterial colonization<sup>16</sup>. This complications are more common on lower limb amputees since only 27–56% of upper-

limb amputees use prosthesis<sup>28</sup>. While using a prosthesis, if the friction coefficient inside the socket is too high, the high shearing stress generated, the tissue distortion during donning/doffing and ambulation, causes a risks of skin breakdown<sup>17</sup>. All these affects satisfaction and acceptability of prosthesis. Patient satisfaction with prosthesis are also influenced by its appearance properties, fit, use as well as aspects of the residual limb<sup>29</sup>. Since residual limb health is important in the fit and use of the prosthesis, avoiding pain, blisters, sores, rashes, controlling skin irritations and ensuring patient satisfaction with prosthetic cosmetic appearance could improve prosthetic adherence and use<sup>30&31</sup>. However due to some of this problem some amputees just avoid using prosthesis, and thus the need for improvement in prosthesis bioengineering.

## Conclusion

Residual stump length and power are the most important factor in prosthesis fit but for prosthetic advice adherence, mental health and socio-emotional support need to be include in a comprehensive rehabilitation of amputees. There is also need to re-engineer a more individually and socially acceptable prosthesis.

**Conflict interest :** The authors here declares no conflict of interest in this study

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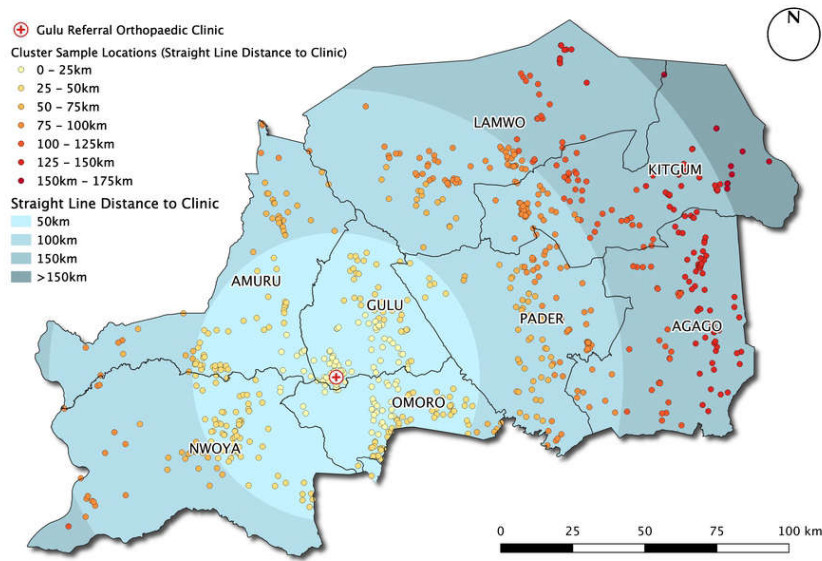
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APPENDIX

Appendix I. Cluster of households in Acholi sub-region



Appendix II. The approved consent form

