

# Jigger-Control Related Health Issues and Suggested Interventions in Iganga District, Eastern Uganda

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**Abstract:** *Jigger infestation is a neglected tropical disease caused by penetration of the sand flea into the skin of a person and other hosts. The wounds created cause pain, discomfort and may lead to secondary infections such as tetanus. Human infestation with jiggers is endemic in Iganga district and several other parts of Uganda. The aim of this study was to identify Jigger-control related health issues and suggested interventions by affected communities in Iganga district. These information were obtained through review of proceedings of a total of 103 jigger control community meetings conducted in 17 sub-counties in the district during the period July to August 2016. The most (n, %) reported health issue was jigger infestation (72, 46.5%), followed by bedbug infestation (31, 20%), poor hygiene/sanitation, (31, 20%), mosquito infestation (18, 11.6%) and poor garbage disposal (3, 1.9%). Maintenance of good hygiene and sanitation (71,25.1%), was the most suggested intervention in solving the health issues, followed by creation of awareness (55, 19.4%), spraying with insecticides (54, 19.1%), smearing with cow-dung, (49, 17.3%), community self-support (27,9.5%), government support (18,6.4%), treatment of jiggers with Benzyl Benzoate Application, BBA, (6, 2.1%), wearing shoes (2, 0.7%) and pouring water on floors to control fleas(1, 0.4%) respectively. This study shows that the jigger endemic communities in Iganga are generally aware of the necessary interventions to prevent or control the infestations but do not have adequate means to do so. There is need to address the underlying factors that hinder jigger control and prevention such as household incomes so as to provide for the basic needs of health, shelter and education among others.*

**Keywords:** Control, health, interventions, jigger

## 1. Introduction

Jigger infestation is one of the neglected tropical diseases that affects many countries in Sub-Saharan Africa and Latin America. It does not receive much attention from the health systems because it is regarded as a question of poor hygiene and sanitation[1]. Hence the affected communities and persons are often ridiculed [2].

Jigger infestation is caused by a female sand flea (*Tunga penetrans*) that penetrates the skin of a host to lay eggs. The insect feeds on the host's blood and its abdomen swells with eggs to the size of a pea. It lays the eggs that drop off from the host to hatch on ground[2]. Development of fleas from eggs to larvae, pupae and adults requires suitable humidity, above 70%, and temperature of about 28°C[3].

Entry of the insect creates discomfort and wound that may lead to entry of secondary pathogens such as tetanus[4]. The victims oftentimes extract the insects from their skin using needles or thorns which aggravates the situation[5]. In severe cases of jigger infestation a person may lose toes and fingers[6].

Iganga district, as well as other nine districts of Bugiri, Buyende, Jinja, Kaliro, Kamuli, Luuka, Mayuge, Namayingo and Namutumba of Busoga sub-region in Eastern Uganda have endemic jigger infestations[2][7]. Outbreaks of jigger infestations have also been reported in other parts of the country that include Masaka district in Buganda Sub-region of Central Uganda, Kasese district in Western Uganda, Karamoja region in north eastern Uganda and West-Nile region in North Western Uganda[8][9].

Jigger infestations are known to occur in resource poor communities that are characterized by low socio-economic status; low household incomes; low level of formal education and poor hygiene/sanitary conditions[10].

A study in the district of Jinja revealed that males in all age categories were twice more likely to be infested with jiggers than the females and children below 15 years and the elderly were more vulnerable to jigger infestation than the other age groups[11].

This study aimed at identifying Jigger-control related health issues and suggested interventions in Iganga District. The findings can be recommended for incorporation into healthcare system.

## 2. Materials and Methods

The study employed both qualitative and quantitative methods. The proceedings of a total of 103 jigger control community meetings held in Iganga District were reviewed to ascertain Jigger-control related health issues and the suggested interventions. These community meetings were held from July to August 2016. Members of Village Health Teams (VHT's) and Health Assistants were briefed by a team of Health Authorities at the District Head Quarters of the purpose of the exercise which was to educate communities on jigger control, obtain other related health issues and suggest interventions.

The dates and venues for the meetings were decided by the VHT's and Health Assistants in consultation with the local

authorities and elders of each village.

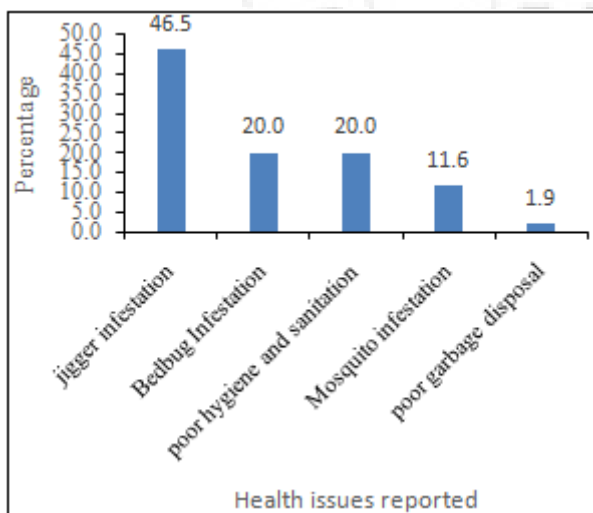
The community members in the meetings were requested to report jigger-control related health issues and details of persons with current jigger cases that included the sub-county, names of the household heads. The identities of the persons were later removed from the lists during data analysis for ethical reasons. The members in the meetings were further requested to enumerate possible interventions to the identified health issues.

The reported health issues were coded and tallied to generate frequencies and presented in bar graphs. Chi-square statistic was used to test the significance of the number of households infested with jiggers in the different sub-counties at 95% confidence level. The counts and frequencies were presented in bar graphs.

### 3. Results

A total of 103 meetings were conducted in 17 Sub-Counties in Iganga District, aimed at identifying the health issues and controlling jigger infestations in the district. The meetings were conducted in sub-counties of Bulamagi, Buwunga, Busembatya Town Council, Bulange, Buyaga, Ibulanku, Iganga Town Council, Kapyonga, Kityerera, Makuutu, Nabitende, Nakalama, Nakigo, Namalemba, Nambale, Namungalwe and Nawandala.

The most reported health issue (n, %) was jigger infestation (72, 46.5%) followed by bedbug infestation and poor garbage disposal (3, 1.9%) was the least as shown in Figure 1.

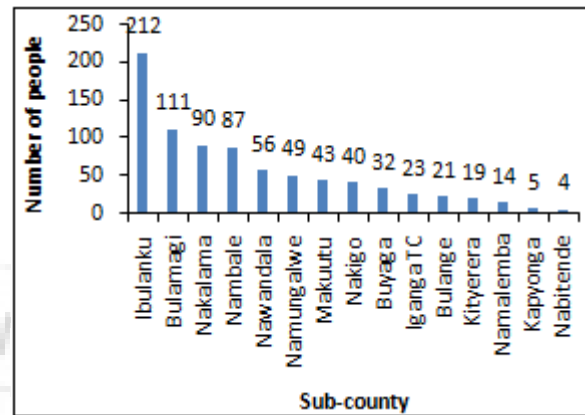


**Figure 1:** Relative percentage of health issues reported

Jigger infestation was reported in 15 of the 17 sub-counties (Figure 2), whereas bedbug infestation, poor hygiene/sanitation and mosquito infestation were reported in eight sub-counties each. Poor garbage disposal was reported in three sub-counties.

A total of 806 households in 15 sub-counties were reported to be with jigger cases. There was a significant difference in the number of households infested with jiggers in the different sub-counties ( $p=1.387E-154$ ,  $\chi^2=766.8$ ). Most (n,

%) jigger infested households occurred in Ibulanku sub-county (212, 26.3%), followed by Bulamagi (111, 13.8%). Others were: Nakalama (90, 11.2%), Nambale (87, 10.8%), Nawandala (56, 6.9%), Namungalwe (49, 6.1%), Makuutu (43, 5.3%), Nakigo (40, 5.0%), Buyaga (32, 4.0%), Iganga Town Council (23, 2.9%), Bulange (21, 2.6%), Kityerera (19, 2.4%), Namalemba (14, 1.7%), Kapyonga (5, 0.6%) and Nabitende (4, 0.5%) respectively. No cases of households infested with jiggers were reported in Buwunga sub-county and Busembatya Town Council (Figure 2).

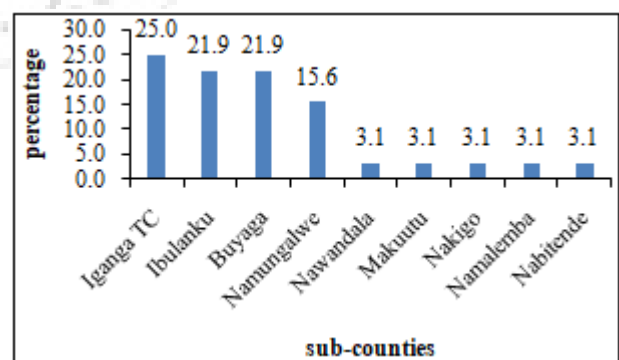


**Figure 2:** Number of households infested by jigger per sub-county

Bedbug infestation was reported in the following subcounties: Bulamagi, Bulange, Iganga Town Council, Kapyonga, Kityerera, Makuutu, Nabitende, Nakigo, Namalemba, Nambale, Namungalwe and Nawandala.

Whereas poor hygiene/sanitation was reported in Buyaga, Ibulanku, Iganga Town Council, Makuutu, Nabitende, Nakigo, Namungalwe and Nawandala. Poor garbage disposal was reported in Iganga Town council, Makuutu and Nawandala sub-counties.

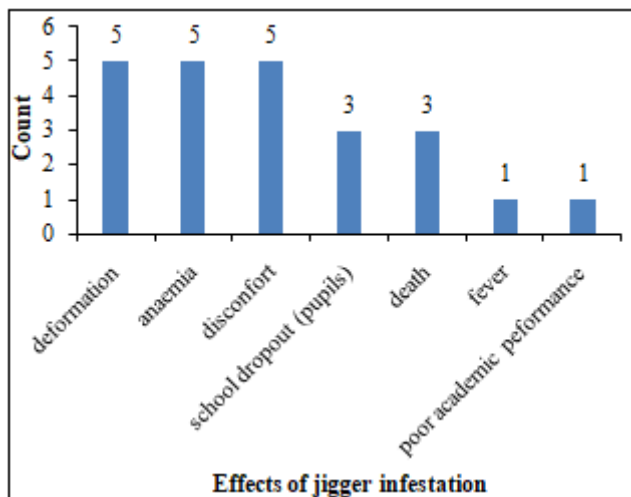
Poor hygiene and sanitation was identified as the only cause of jigger infestation by thirty two respondents in nine sub-counties, namely; Iganga Town Council (8), Ibulanku (7), Buyaga (7), Namungalwe (5), Nawandala (1), Nakigo (1), Nabitende (1) and Makuutu (1) as shown in Figure 3.



**Figure 3:** Percentage of respondents per sub-county who identified poor hygiene and sanitation as the cause of Jigger infestation

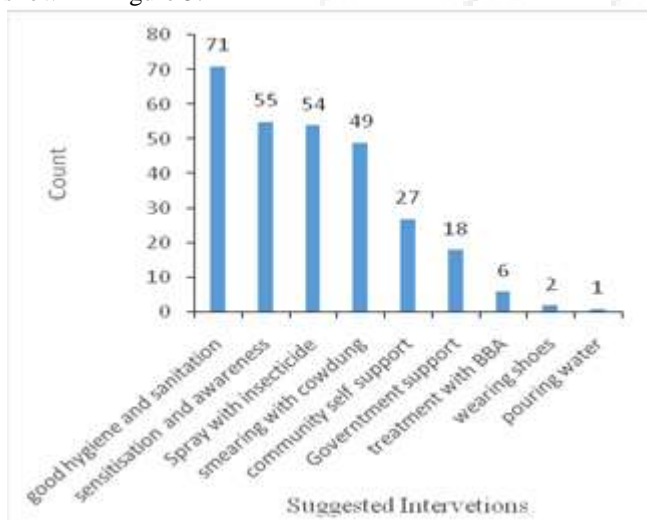
Deformation of body parts, especially feet and hands, anaemia and discomfort were identified as the commonest (n,%) effects of jigger infestations (5, 21.7%), followed by pupils dropping out of school and death (3, 13.0%), fever

and poor academic performance (1, 4.3%) as shown in Figure 4.



**Figure 4:** Effects of jigger infestation

The most (n,%) suggested intervention for jigger infestation was maintenance of good hygiene and sanitation (71, 25.1%), followed by health authorities in the district creating awareness and sensitizing the communities (55, 19.4%) as shown in Figure 5.



**Figure 5:** Count of suggested intervention to health issues

Other suggested interventions were: spraying houses with insecticides (54, 19.1%), smearing floors and wall with a mixture of cow-dung, soil and ash (49, 17.3%) community self-support (27, 9.5%), government support (18, 6.4%) treatment of jiggers with Benzyl Benzoate Application, BBA, (6, 2.1%), wearing shoes (2, 0.7%) and pouring water on floors to control fleas (1, 0.4%) respectively as shown in Figure 5.

#### 4. Discussion

There is high prevalence of jigger flea, bedbug and mosquito infestations as well as poor hygiene and sanitation in Iganga district in Eastern Uganda. These health issues point to the underlying factor of low socio-economic status of the affected communities[12][13]. United Nations Development Programme (UNDP) poverty status report on Uganda (2014)

indicates that poverty levels declined in all other regions of the country except Busoga sub-region[14].

The communities are characterized by peasant farmers whose main occupation is subsistence farming and petty trade. The household incomes are generally too low to provide for all the basic needs such as food, adequate shelter and education. The residences are made of brick walls with unplastered surfaces and dusty floors. Such conditions provide conducive environments for fleas, bedbugs and other insects to thrive[10].

The most jigger infested sub-counties (Ibulanku, Bulamagi and Nakalama) are in the rural parts of the district whereas bedbug infestation and poor garbage disposal were reported more in the urban centres (e.g. Iganga Town Council) though there could be a possibility of under reporting of some cases.

The communities in Iganga district are generally aware of the causes of the health issues but seem to lack adequate resources to solve them. For instance, poor hygiene and sanitation was correctly identified as the main factor leading to jigger infestation but little was done to ensure that the residences and homesteads were kept tidy.

None of the members in the meetings reported improvement in household incomes to provide for good housing and other needs of life as an intervention to solve the identified health issues. It has been noted in this sub-region[9] and elsewhere that low household incomes and low level of formal education are the main underlying factors leading to these health issues[15].

#### 5. Conclusions

There is high jigger infestations in Iganga district as well as other health issues of bedbug and mosquito infestations. Poor garbage disposal is also rampant especially in urban centres.

The community members in the affected areas are aware of the health issues and appropriate interventions to solve them but are however unable to do so as a result of limited resources due to low socio-economic status.

#### 6. Recommendations

Community education and sensitization on good hygiene and practices by Village Health Teams and Health Assistants should be continued to address the health issues.

The mobilization strategies should be integrated with other poverty reduction programmes so that household incomes are improved to solve health issues of the affected people.

The communities should be encouraged by the local authorities to make efforts to improve their own socio-economic status other than waiting for government interventions to solve the health issues since government efforts are often inadequate to solve every individuals' problems.

Jigger infestation should not be neglected by the communities and the authorities in the district and relevant government departments since it affects productivity and participation of affected persons in improving livelihoods.

## References

- [1] Kimani, B., J. Nyagero, and L. Ikamari, *Knowledge, attitude and practices on jigger infestation among household members aged 18 to 60 years: case study of a rural location in Kenya*. The Pan African Medical Journal, 2012. **13**(Suppl 1).
- [2] Feldmeier, H., E. Sentongo, and I. Krantz, *Tungiasis (sand flea disease): a parasitic disease with particular challenges for public health*. European journal of clinical microbiology & infectious diseases, 2013. **32**(1): p. 19-26.
- [3] Krasnov, B., et al., *Development rates of two Xenopsylla flea species in relation to air temperature and humidity*. Medical and veterinary entomology, 2001. **15**(3): p. 249-258.
- [4] Хроменкова, О.Б., *Medical Significance of Phylum Arthropoda*. 2014.
- [5] Lefebvre, M., et al., *Tungiasis: a poorly documented tropical dermatosis*. Médecine et maladies infectieuses, 2011. **41**(9): p. 465-468.
- [6] Mwakanyamale, J.G., et al., *Contributions of socio-economic and cultural factors in Tungiasis at Kwakombo village in Korogwe district, Tanzania*. IMTU Medical Journal, 2015. **6**(1): p. 54-61.
- [7] Jawoko, K., *Jiggers outbreak in Uganda*. 2011, Can Med Assoc.
- [8] Eisen, R.J., et al., *Early-phase transmission of Yersinia pestis by cat fleas (Ctenocephalides felis) and their potential role as vectors in a plague-endemic region of Uganda*. The American journal of tropical medicine and hygiene, 2008. **78**(6): p. 949-956.
- [9] Wafula, S.T., et al., *Prevalence and risk factors associated with tungiasis in Mayuge district, Eastern Uganda*. The Pan African Medical Journal, 2016. **24**.
- [10] Muehlen, M., et al., *Identifying risk factors for tungiasis and heavy infestation in a resource-poor community in northeast Brazil*. Transactions of the Royal Society of Tropical Medicine and Hygiene, 2006. **100**(4): p. 371-380.
- [11] Amatre, G., Lejju B.J., Andama, M., *Prevalence of Jigger Flea (Tunga Penetrans) Infestation amongst Age Groups, Male and Female Persons in Jinja District, Eastern Uganda*. International Journal of Science and Research (IJSR), 2018. **7**(3): p. 1180-1183.
- [12] Bloom, D. and D. Canning, *The health and poverty of nations: from theory to practice*. Journal of Human Development, 2003. **4**(1): p. 47-71.
- [13] Gupta, I. and A. Mitra, *Economic growth, health and poverty: An exploratory study for India*. Development policy review, 2004. **22**(2): p. 193-206.
- [14] UNDP, *Uganda Poverty Status Report 2014*, Uganda Ministry of Finance Planning and Economic Development: Kampala.
- [15] Heukelbach, J., et al., *Tungiasis: a neglected health problem of poor communities*. Tropical Medicine & International Health, 2001. **6**(4): p. 267-272.

## Author Profile



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