Jigger Persistence and Associated Factors among Households in Mayuge District, Uganda

International Journal of Health Sciences and Research (IJHSR)

https://www.ijhsr.org/IJHSR_Vol.6_Issue.1_Jan2016/53.pdf

International Journal of Health Sciences and Research
www.ijhsr.org ISSN: 2249-9571

Original Research Article

Jigger Persistence and Associated Factors among Households in Mayuge District, Uganda

Noel Namuhani[1], Suzanne N Kiwanuka[2]

[1]School of Public Health, College of Health Sciences, Makerere University, P.O.Box 7072 Kampala, Uganda.
[2]Department of Health Policy Planning and Management, School of Public Health, College of Health Sciences, Makerere University P.O.Box 7072 Kampala, Uganda.

Corresponding Author: Noel Namuhani

Received: 03/11/2015 *Revised: 25/11/2015* *Accepted: 07/12/2015*

ABSTRACT

Background: Jigger infestation has serious health consequences and has been associated with considerable morbidity and difficulties in walking or using the hands, which prevent the victims from leading productive life. Persistent jigger infestation produces even more dire outcomes such as disability and mortality due to secondary infections. In Uganda, jigger infestation has been reported to be at epidemic levels and has persisted especially in the rural communities of the country, some households being at a higher risk of Persistent Jigger Infestation than others. This study aimed at assessing factors associated with persistent jigger infestation among households of Mayuge district, Uganda.
Methods: A total of 296 households in Bukatube Sub County, Mayuge district, were randomly selected to participate in the study. Persistent Jigger infestation was defined as individuals who experienced at least four jigger re- infestations within the past 30 days. Semi structured questionnaires, observational checklists and key informant interview guides were used to collect data. Data was analyzed using Epi info version 3.5.1, descriptive statistics were obtained, bi variable and multivariable analysis was done, to examine the association between the different variables.
Results: The prevalence of jigger infestation was found to be 25.0%, but of these, 58.3% had persistent jigger infestation. Factors that increased the likely hood of persistent jigger infestation included; low monthly income (AOR 2.84 95%CI 1.04-7.75), littered compound (AOR 5.18, 95%CI 2.56-10.46), earthen floor (AOR 3.38 95%1.08-10.55), and cracked walls (AOR 4.63 95%CI 2.23-9.60). Individuals who were knowledgeable about jigger prevention had reduced chances of being persistently infested with jiggers (AOR 0.47 95%CI 0.25-0.90).
Conclusion: The prevalence of jigger infestation and the level of persistence were moderately high. There is need to increase awareness of community members on how to control jiggers and appropriate measures to address the nature of houses that people live in, need to be implemented.

***Key words*:** Jigger infestation, Persistent jigger infestation, ecto parasitic infection.

INTRODUCTION

In Uganda, jigger infestation has been reported to be at epidemic levels and persisted, especially in the rural communities of the country. [1] In 2011, it was estimated that jiggers killed at least 20 Ugandans and infested more than 20, 000 people in just two months. [2] More than 300 households in Mayuge district are estimated to be infested with jiggers. [1]

Jigger infestation is an important but neglected public health problem in developing countries of the tropics, particularly where poverty and poor standards of basic hygiene exist, like in the resource poor communities of South

America, the Caribbean and sub-Saharan Africa. [3] According to the Kenyan Ministry of health, an estimated 1.4 million (4%) of the total population in Kenya suffer from jigger infestation. [4] In Uganda, especially in the rural communities of Busoga region, west Nile districts and in some areas in Masaka district, jigger infestation has become persistent, even after some interventions people continue to suffer from the jigger menace.

Jigger infestation (Tungiasis) is an ecto parasitic condition, which affects the skin of the host. It is caused by penetration of the female jigger flea also called the sand flea, chigoe or Tungapenetrans, into the epidermis of the host. [5] Jigger infestation is associated with poor sanitation and hygiene, poor housing, domestic animals living in the home or on the property and lack of footwear. [6]

Jigger infestation has serious health consequences as it has been associated with considerable morbidity particularly among school going children, the elderly, and people living with physical and mental disabilities. [4] The importance of jigger infestation is localization in the foot and hand causing serious difficulty in walking and using the hands which reduces the infected person's ability to work normally due to the pain from ruptured flesh. Children infested with jiggers are unable to walk to school, write properly or even participate in learning activities to the same level as their un-infected peers and eventually school dropout, and since most of the affected people are farmers, this reduces on their level of cultivation as their hands and toes are painful hence may result into famine and poverty. [7]

Persistent jigger infestation produces even more dire outcomes such as disability due to auto amputation of digits and mortality due to secondary infections. [8] Tetanus is a common secondary infection that has been associated with deaths of jigger victims and the spread of HIV/AIDS which is passed from one person to person due to sharing of pins. [4] In Brazil, Tungiasis causes 10% of tetanus cases with some reported deaths, not to mention other infections that may cause gangrene and amputation of extremities. [9] The dire consequences of persistent jigger infestation are very costly to manage, therefore eradication and prevention should be targeted.

In Uganda, jigger control and prevention has not been prioritized by Ministry of health and other key stake holders. However, some NGOs have launched anti jigger campaigns which involve health education activities, setting up a clinic where people suffering from jiggers receive medical assistance of removing jiggers and treating infections with antiseptics and antibiotics. The campaigns also distribute free flip flops, towels, basins and soap, to encourage proper hygiene, to remove eggs and prevent infections. [10] Despite this, jigger infestation has persisted in some of the households. This study aimed to assess the factors associated with persistent jigger infestation in households of Mayuge district in Uganda. Understanding these factors would guide stakeholders in designing appropriate interventions to control and prevent jigger infestation among households.

MATERIALS AND METHODS

Study design and setting: A cross sectional community based household survey, that employed both quantitative and qualitative data collection techniques, was conducted in Bukatubesub county, Mayuge district in Uganda. This study aimed at determining the prevalence, level of jigger persistence and exploring the factors associated with persistent jigger infestation among households of Mayuge district in Uganda. Mayuge district is located in south eastern Uganda with a projected population of 430,656 and a growth rate of 3.5% and it has thirteen sub

counties. Bukatubesub county has 5 parishes and 32 villages with a projected a population of 41109. [11]

The main economic activity carried out is subsistence farming. Other activities carried out include: fishing, transport business and operating saw mills. The sub county main source of revenue is local revenue and donor funding with people using firewood and charcoal as their main sources of energy. The study participants comprised of household heads from selected households located within Bukatube Sub County. The study population consisted of households that had lived in Bukatube Sub County for at least one year.

Study Participants and Sampling: A sample size of 296 households calculated using Kish formulae, [12] were randomly selected to participate in the study. A 50% jigger persistence level was considered in the calculation since there were limited studies conducted on persistent jigger infestation in a similar setting. A sampling error of 6% and a non-response rate of 10% were also used.

Bukatube Sub County was purposively selected in district due to the frequent outbreaks of jigger infestation. Two parishes and two villages from each parish were randomly selected to participate in the study, 74 households were systematically sampled from each village at an interval of 4 households. At the household all household members were assessed for the prevalence of jiggers by observation and self-reporting. Persistent jigger infestation was measured on the basis that an individual had experienced jigger re- infestations at least four times within the past 30 days. Household heads or any adult in the household who had lived in the community for more than one year were interviewed. Household heads that were not available and those who were found sick at the time of the survey were excluded from the study. Key informants were purposively selected to identify factors associated with jigger persistence in their area. These included one health assistant, LC III and LC I chairmen and a VHT from each village and the in charge of health centre II in each parish. These were considered to be more knowledgeable about jigger infestation in their community.

Data Collection: Data was collected during a hot season in January 2014 using a semi-structured questionnaire, Key informant interview guides, and observational checklist. Questionnaires and checklists were developed basing on reviewed literature on jiggers. Data was collected on socio demographics, prevalence, knowledge and perceptions of community members towards jigger infestation. Before data collection, research assistants were trained on appropriate interview techniques and how to record answers especially from the open ended questions without interpreting them. Data collection tools were pretested with 15 respondents in Bukatube trading center and the research assistants were involved to assess the effectiveness and accuracy of the tools in collecting the required information from study participants.

All data was collected, edited, coded and then checked for consistency. The data entry and cleaning was performed using EPI Info version 3.5.1 statistical package.

Statistical methods: The data was analyzed using EPI INFO Version 3.5.1 computer software while qualitative data was analyzed manually using content analysis approach, where the texts were read for meanings which were summarized into codes, subthemes were obtained and later themes. Descriptive statistics such as frequencies, proportions were used to describe the study subjects. Bi variable analysis and Multivariable analysis was done to obtain odds ratios and adjusted odds ratios respectively at 95% confidence intervals to determine the factors associated persistent jigger infestation.

Variables that were statistically significant for persistent jigger infestation at Bi variable analysis (P=less than 0.05) were entered into multivariable logistic regression model to adjust for confounding and to calculate the adjusted odds ratio (AOR; 95% CI) for the persistent jigger infestation.

Ethical Approval: The study was approved by Makerere University, school of public health Higher Degrees Research and Ethics committee. At the district level, permission to conduct the study was obtained from the local leaders and the District Health Office before conducting the study. An informed consent of each individual participant was obtained at the start of the study. To ensure anonymity of information collected, no personal identifiers such as names, address, telephone numbers, and other identifying information was collected. Respondents were assured of anonymity and of the confidentiality of their participation in the study and were informed of their right to decline to take part or to refuse to answer or to complete the entire questionnaire. A respondent was only interviewed after agreeing to participate in the study.

RESULTS

Socio demographics: Majority of the respondents was aged 36 years and above (52.7%), 81.1% were married and 74.0% were farmers. Most respondents were Muslims (44.9 %), the largest percentage of the respondents (82.8%) had attained primary education level and below, 74.0 % were farmers and 65.9 % of the respondents earned shs.50, 0000 and below a month (Table 1).

Prevalence and persistence of jigger infestation: The study revealed that 25.0 % of the households were infested with jiggers at the time of study, 48.6% were infested in the previous month, of these 58.3 % had been re infested with jiggers at least four times within the last 30 days (Persistent jigger infestation).Children under the age of five years were the most affected (39.4%). The feet were the most affected parts (67%), 23 % hands and 10 % other parts.

Table 1: Socio demographic characteristics (N=296)

Variable	Frequency N= 296	Percentage (%)
Age of respondent		
17-25	61	20.6
26-35	79	26.7
36 and above	156	52.7
Sex		
Female	146	49.3
Male	150	50.7
Education level		
None	115	38.9
Primary	130	43.9
Post primary	51	17.2
Marital status		
Married	240	81.1
Single	26	8.8
Widowed/divorced	30	10.1
Occupation		
Farmer	219	74.0
Not employed	42	14.2
Others	35	11.8
Income levels		
50,000 and below	195	65.9
50,001 and above	59	19.9
Don't know	42	14.2
Religion		
Anglican	61	20.6
Catholic	56	18.9
Moslem	133	44.9
Others	46	15.6

The majority of respondents reported itching (89.2%) as the major sign of jigger infestation. More than half (58.1%) reported dirty environment and poor hygiene as the main predisposing factor for jigger infestation, and 93.9% used a pin, needle or thorn to remove jiggers from their bodies. Less than half (45.3%) of the respondents mentioned practicing good hygiene and sanitation as a preventive measure for jigger infestation and slightly more than half (51.1%) reported that their leaders did nothing to control jiggers in their area. Most (58.4%) respondents viewed jiggers as a common problem, and many of them attributed the persistence to poverty (35.1%) and cultural issues or family curse (22.3%) (Table2).

From qualitative data, all VHTs and local council leaders acknowledged that jigger infestation was a common problem in their area, as quoted by one of the local leader.

"Jiggers are still a big problem though there has been some reduction and some leaders deny that we don't have jiggers but jiggers are still infesting our people, last year (2013) one elderly man in Bukasero village died because of jiggers" (**LocalCouncil leader-Key informant**).

Table 2: Knowledge and perceptions of households toward jigger infestation

Variable	Frequency	Percentage (%)
Signs of jigger infestation		
Itching	264	89.2
Walking difficulties	18	6.1
Others	14	4.7
Predisposing factors for jigger infestation		
Dirty environment/ Poor hygiene	172	58.1
Do not know	72	24.3
Poverty	36	12.2
Others	16	5.4
Treatment measures		
Using a pin, needle, thorn	278	93.9
Others	18	6.1
Prevention of jigger infestation		
Practicing good hygiene and sanitation	134	45.3
Do not know	96	32.4
Others	66	22.3
Leader's role in the control of jiggers		
Nothing	152	51.4
Sensitization	56	18.9
Given us chemicals, shoes, spray	32	10.8
Do not know	56	18.9
View of Jiggers as a common problem in the home		
Yes	123	41.6
No	173	58.4
Reasons for persistent jigger infestation		
Poverty	104	35.1
Laziness	80	27.0
Cultural issues/cursed family	66	22.3
Poor sanitation/unhygienic/irresponsible	46	15.6

Individual factors associated with persistent jigger infestation: The education level, monthly income, and occupation were statistically significant for persistent jigger infestation. Having an education level of primary and below predicted 2.84 times more of being persistently infested with jiggers than individuals of post primary education level. There was a reduced risk of persistent jigger infestation for families that had a monthly income of above 50,000 shillings as compared to those who earned shs.50,000 and below (OR;0.23). Farmers were 3.48 times of being persistently infested with jiggers more than people having other jobs such as civil servants, business, among others.

From qualitative data, one of the key informants emphasized poverty and low education level as some of the contributing factors for persistent jigger infestation as shown below;

"According to me, it's basically illiteracy and poverty, people are so poor that they cannot afford cementing their houses, can't buy chemicals, shoes for their children. Also most people did not go to school, so they don't understand what we teach them on how to prevent jiggers" **(Village Health Team member-Key informant)**

The level of knowledge on prevention and the predisposing factors for jigger infestation were positively significant for persistent jigger infestation. Respondents who did not know the predisposing factors for jigger infestation and those who did not know how to prevent jiggers were three times more likely of being persistently infested with jiggers than those who knew.

Individuals who attributed the persistence of jigger infestation to laziness had a reduced risk of being infested as compared to those who attributed it to cultural issues (OR; 0.17, 95%CI; 0.07-0.38).

From qualitative data, this was emphasized by one of the key informants.

"I think those families heavily infested are suffering because of their family background, some are just cursed, some their cultural spirits are un happy with them, actually Busoga we have so many problems like bed bugs, hot weather, jiggers, un productive soils because our cultural king spirits are un happy, unless we settle the issue of kyabazinga (king), we shall continue suffering from these problems," **(Elderly community leader-Key Informant)**

All the respondents and all VHTs of the various villages reported that there was not any health facility offering health care services to people infested with jiggers. This was emphasized by one of the key informants.

"These jiggers have persisted because we have no health facility where people can go and get some treatment; get some chemicals to spray in their homes and feet, so jiggers continue infesting people and even the government has neglected the area" (local leader-Key Informant)

Table 3: Bi variable analysis of individual factors associated with persistent jigger infestation

Variable	Category	Jigger infestation N (%)		OR(95%CI)
		Yes (n=73)	No(n=222)	
Socio demographics				
Education level	Primary and below	67(91.8)	177(79.7)	2.84(1.15-6.96)*
	Secondary and above	6(8.2)	45(20.3)	1.0
Marital status	Married	60(82.2)	180(81.1)	1.08(0.54-2.14)
	Not married	13(17.8)	42(18.9)	1.0
Monthly income(shs)	Above 50,000.	5(6.8)	54(24.3)	0.23(0.09-0.60)**
	50,000 and below	68(93.2)	168(75.7)	1.0
Occupation	Farmer	68(93.2)	176(79.6)	3.48(1.32-9.13)*
	Other jobs**	5(6.8)	45(20.4)	1.0
Religion	Christianity	44(60.3)	118(53.2)	1.33(0.78-2.290
	Moslem	29(39.7)	104(46.8)	1.0
Knowledge				
Knowledge on risk factors	Don't know	46(63.0)	76(34.4)	3.25(1.87-5.63)**
	Know	27(37.0)	145(65.6)	1.0
Knowledge on prevention	Don't know	50(68.5)	86(38.9)	3.41(1.94-5.99)**
	Know	23(31.5)	135(61.1)	1.0
Individual perceptions for jigger persistence	Culture	23(31.5)	41(18.6)	1.0
	Lazy	11(15.1)	115(52.3)	0.17(0.07-0.38)**
	Poverty	39(53.4)	64(29.1)	1.09(0.57-2.08)
Personal hygiene				
Had Long nails	Yes	9(12.3)	17(7.7)	1.70(0.72-3.99)
	No	64(87.7)	205(92.3)	1.0
Found walking bare footed	Yes	67(91.8)	121(54.5)	9.32(3.88-22.38)
	No	6(8.2)	101(45.5)	1.0
Found with dirty feet	Yes	70(95.9)	101(45.5)	27.95(8.54-91.45)**
	No	3(4.1)	121(54.5)	1.0

* $p<0.05$, ** $p\leq0.001$, statistically significant

Environmental factors associated with persistent jigger infestation: Cracked floor (OR 21.17, 95% CI 10.90-41.11), dirty floor (OR 12.14, 95% CI 3.70-39.86), earthen floor (OR 7.51(2.91-19.4) and littered compound (OR 7.30, 95% CI 4.03-13.52) were the major factors associated with persistent jigger infestation. Cracked floor increased the risk of one being persistently infested with jiggers by 21.17 times as compared to one with a smooth floor. Individuals who lived in cemented houses had reduced risk (OR 0.15) of persistently being infested with jiggers as compared to those who lived in earthen floors.

From qualitative data, poor hygiene and sanitation, ignorance, laziness, dusty and hot weather, dusty schools, lack of health facility, poverty and cultural beliefs,

were the factors reported to contribute to persistent jigger infestation. This was emphasized by some of the responses from KI interviews as quoted below;

"Let me tell you, jiggers are still a problem because people don't want to smear their houses, people are sleeping in dusty houses, some people are just lazy and irresponsible" **(Village Health Team member-KI)**

"Jiggers are mainly coming from our schools, because most of them are so dusty, and nowadays teachers don't mind about the hygiene of the pupils. So our children pick jiggers from schools and infest those at home who don't have" **(LC 1 Chairman)**

Rearing cattle (OR 1.34, 95% CI 0.75-2.39), and chicken (OR 1.33 95%CI 0.61-2.92) were not statistically significant for persistent jigger infestation. However households that reared pigs had an increased risk of being infested with jiggers by a factor of three as compared to households that did not rear pigs Rearing Pigs (OR 3.89 95%CI 1.15-13.14) (Table 4).

Variables that were statistically significant for persistent jigger infestation at Bi variable analysis were considered for multivariable analysis.

The logistic regression analysis revealed that, among the individual factors, monthly income less than fifty thousand shillings increased the likely hood of persistent jigger infestation (AOR;2.84 95%CI1.04-7.75) compared to those who earned more than fifty thousand, and high knowledge on prevention, reduced the risk of persistent jigger infestation (AOR;0.47 95%CI 0.25-0.9).

In Multi variable analysis, rearing pigs was not statistically significant for persistent jigger infestation, however environmental factors like littered compound, earthen floor and cracked walls showed an increased risk of persistent jigger infestation. Households that had cracked walls were 4.63 times more likely of being persistently infested with jiggers than those that had smooth walls (AOR4.63 95%CI 2.23-9.60) (Table 5).

Table 4: Bi Variable analysis of environmental factors associated with persistent jigger infestation

Variable	category	Family infested with Jiggers N (%)		OR(C.I at 95 %
		Yes(n=73)	No(n=222)	
Nature of housing				
Cracked floor	Yes	55(75.3)	28(12.6)	21.17(10.90-41.11)**
	No	18(24.7)	194(87.4)	1.0
Dusty floor	Yes	65(89.0)	121(54.5)	6.78(3.12-14.80)**
	No	8(11.0)	101(45.5)	1.0
Dirty floor	Yes	70 (95.9)	146(65.8)	12.14(3.70-39.86)**
	No	3 (4.1)	76 (34.2)	1.0
Earthen floor	Yes	68(93.2)	143(64.4)	7.51(2.91-19.40)**
	No	5(6.8)	79(35.6)	1.0
Cemented	Yes	5(6.5)	74(33.3)	0.15(0.06-0.38)**
	No	68(93.5)	148(66.7)	1.0
Cracked walls	Yes	49(67.3)	50(22.5)	7.02(3.93-12.55)**
	No	24(32.7)	172(77.5)	1.0
Rough walls	Yes	67(91.8)	144(64.9)	6.05(2.51-14.58)**
	No	6(8.2)	78(35.1)	1.0
Animals reared in household				
Rearing Pigs	Yes	6(8.2)	5(2.3)	3.89(1.15-13.14)*
	No	67(91.8)	217(97.7)	1.0
Rearing Cattle	Yes	52(71.2)	144(64.9)	1.34(0.75-2.39)
	No	21(28.8)	78(35.1)	1.0
Rearing Chicken	Yes	64(87.7)	187(84.2)	1.33(0.61-2.92)
	No	9(12.3)	35(15.8)	1.0
Compound hygiene				
Littered compound	Yes	55(75.3)	65(29.3)	7.30(4.03-13.52)**
	No	18(24.7)	157(70.7)	1.0
Has compost pit	No	41(56.2)	66(29.7)	3.02(1.76-5.22)**
	Yes	32(43.8)	156(70.3)	1.0

*p<0.05, **p≤0.001, statistically significant

Table 5: Multi Variable analysis of factors associated with persistent jigger infestation

Variable	category	Crude OR	Adjusted OR(95%CI)
Individual factors			
Education Level	Secondary and above.	2.84	0.84(0.30-2.36)
	Primary and below.		1.0
Monthly income (shs.)	50,000 and below.	0.23	2.84(1.04-7.75)*
	50,000 and above).		1.0
Occupation	Others(civil,business,etc)	3.48	0.52(0.18-1.55)
	Farmer		1.0
Knowledge on risk factors	Know	3.25	0.53(0.28-1.00)
	Don't know		1.0
Knowledge on prevention	Know	3.41	0.47(0.25-0.90)*
	Don't know		1.0
Environmental factors			
Rearing pigs	Yes.	3.89	1.89(0.46-7.74)
	No		1.0
Littered compound	Yes	7.3	5.18(2.56-10.46)**
	No		1.0
Housing			
Earthen floor	Yes	7.51	3.38(1.08-10.55)*
	No		1.0
Dusty floor	Yes	6.78	2.27(0.92-5.59)
	No		1.0
Cracked walls	Yes	7.02	4.63(2.23-9.60)**
	No		1.0
Rough walls	Yes	6.05	1.02(0.33-3.13)
	No		1.0

*p<0.05, **p≤0.001, statistically significant

DISCUSSION

The study revealed that the proportion of families infested with jiggers was relatively high and more than half (58.3%) of the infested families had persistent jigger infestation. These study findings were consistent with the studies conducted in most of the endemic areas where jigger prevalence ranged from 15-40% and over 50 % of the individuals persistently lived with the jiggers. [13] However the prevalence of jigger infestation in this study was low as compared to the reported 45.2 % in Nigeria [14] and 53% in North West Cameroon. [6] The jigger prevalence in this study was lower than that in the previous studies probably because there had been some interventions to control jiggers in the study area. [15] Jigger prevalence was highest among children below 15 years and the elderly people, this study agreed with a study conducted in Nigeria. [14] This is probably because people of these age categories are unable to care for themselves. The high persistence of jigger infestation in this study could be attributed to the low involvement of all stake holders in the control of jiggers it was indicated by most of the respondents. This implies that there is need for involvement of different stakeholders in designing appropriate control measures to eradicate jigger infestation.

In this study, conditions related to housing were the most important factors associated with persistent jigger infestation. Living in a house with cracked floor, dusty floor, and earthen floor, cracked and rough walls increased the odds for persistence of jigger infestation by a factor of 6.05 - 21.17(Table 4). The odds ratios in this study were even higher than the odds for a study conducted in Northeast Brazil where dusty and cracked floors increased the infestation by 1.9-4.7. [16] The free-living stages of jiggers usually develop in dry and sandy soil. Therefore, if the floor of a house is earthen and dusty, development of larvae and adults may even take place within the house hence continuous re infestation of individuals living in such houses. Houses made of cracked earthen walls and floors may have an additional advantage for the multiplication of jiggers. There are always cracks and crevices in the wall and the floor, which provide shelter for adult fleas

until a suitable host presents. For houses which are cemented, they are always smooth and free from dust; this hinders the development and survival of jiggers. This therefore implies that cementing and smearing to smoothen walls and the floors of houses would reduce the prevalence and persistence of jigger infestation.

Being a zoonosis, Tungiasis affects animals and humans alike. Among domestic animals, dogs, cats, pigs, cattle, goats and others are always infested. [17] In a study on the animal reservoirs for jiggers in two endemic communities, [18] found that up to 67% of dogs and 50% of cats were infested. These findings however contradict with the findings of this study, that the presence of domestic animals (cattle, chicken, dogs and sheep) had no statistical significance on the association with persistent jigger infestation (table 4). Therefore at community level keeping away domestic animals may not be used as an intervention to reduce the persistence of jigger infestation in the study area.

The level of knowledge on the prevention and the predisposing factors for jigger infestation was relatively low. Individuals, who did not know how to prevent jigger infestation, were more likely to be persistently infested with jiggers compared to respondents who had good knowledge on jigger prevention. It is possible that the high level of knowledge enables community members make informed choices about improved hygiene and sanitation so that people are able to control and prevent jigger infestation. However the study findings contradict with a study conducted in Kenya where the reported level of knowledge on jiggers was relatively high but there was no related evidence for jigger prevention and control in the area. [19] The implication of the study findings is that there is need for the health workers to conduct health education sessions on prevention and predisposing factors for jigger infestation so that the community is enabled to prevent and control jiggers.

Respondents who attributed the persistence of jigger infestation to poverty, cultural spirits, and cursed family were more predictive of being infested with jiggers. These study findings are consistent with several studies conducted in Kenya, [8] where most of the infested individuals said they were cursed while others believed it was witchcraft. These beliefs hinder the practice of jigger control and preventive measures, this therefore calls for appropriate messages to be passed on to the community to dispel some of these retrogressive culturally held beliefs that hinder the promotion of jigger preventive measure and activities.

An important finding is that half (51.5%) of the household members who acknowledged that their leaders and health workers did not get involved in the control and prevention of jiggers, had persistent jigger infestation. Local leaders and health workers inspire and encourage the community to get involved and practice jigger control and preventive activities like good hygiene and sanitation activities. This implies that there is need for all local leaders to actively get involved in jigger control activities.

Limitations: This being a cross sectional study, it was not easy to establish cause-effect relationship. Despite that fact however, this study provides important information on predictor factors for persistent jigger infestation in a rural community.

CONCLUSION

Much as there had been some interventions to control jiggers in the area, jigger infestation is still a serious public health concern. Nature of the housing; especially cracked floors and walls, dust floor, level of knowledge on prevention and perceptions were the most factors associated with persistent jigger infestation. Effective and sustainable

measures like smearing houses with mud to smoothen floors and walls, regular cleaning of houses and increasing awareness of community members on how to prevent jigger infestation should be implemented. There is need for collaboration between health workers, local leaders and community members in ensuring that appropriate interventions to control and prevent jiggers are implemented.

ACKNOWLEDGEMENT

We extend our gratitude to the Mayuge district health team, local leaders and respondents for their cooperation and valuable time rendered to us that enabled us successfully collect data.

REFERENCES

1. Uganda Radio Network. Fresh Jigger infestation reported in Mayuge [Internet].2013 [cited 2013 Nov 13]. Available from: http://ugandaradionetwork.com/a/story.php?s=29205.
2. Kennedy Jawoko, Jiggers outbreak in Uganda. CMAJ. 2011; 183(1): E33-E34.
3. Feldmeier H, Eisele M, Van Marck E, Mehlhorn H, Ribeiro R, Heukelbach J. Investigations on the biology, epidemiology, pathology and control of Tungapenetrans in Brazil: IVclinical and histopathology. Parasitol Res. 2004; 94 (204): 275-282.
4. Ministry of health Kenya. National policy guidelines on prevention and control of jiggers [internet]. Division of Environmental Health. 2014;[cited 2015 Oct.15]. Available from: http://jigger-ahadi.org/NationalPolicyGuidelinesforPrevention
5. CDC. DPDX-Tungiasis-Index [Internet]. Laboratory Identification of parasitic diseases of public health concern. 2013 [updated 2013 Nov.23; cited 2015 June 20]. Available from: http://www.cdc.gov/dpdx/tungiasis/
6. Wachira Anne. Jigger infestation in poor resource communities in Africa [Internet]. Consultancy Africa Intelligence. 2012 [updated 2012 may 02; cited 2013 Oct.15]. Available from www.consultancyafrica.com
7. Ruttoh S K, Ochieng D O, and Wanyama I N, Tungapenetrans—A Silent Setback to Development in Kenya.JESE. 2012; 1(4): 527-534.
8. Ahadi. Jigger menace in Kenya [Internet]. 2008 [cited 2013 Nov 13]. Available from: http://www.jiggerahadi.org/anti_jigger_magazine_year_2_%20final.pdf.
9. Feldmeier H, Eisele M, Sabo´ iaMoura RC, Heukelbach J. Severe Tungiasis in Underprivileged Communities: case series from Brazil. Emerg Infect Dis. 2003:9:949-955.
10. Alanta Colley. Jigger invasion of Busoga Region [Internet]. Uganda Village Project. 2010 [updated 2010 Nov. 30; cited 2013 Oct. 3]. Available from http://www.ugandavillageproject.blogspot.ug/2010/jigger-invasion-of-busoga-region.html
11. Uganda Bureau of Statistics.National population and housing census 2014 provisional results [Internet]. 2014; [updated 2014 Nov. cited 2015 Oct 15]. Available from www.ubos.org/NPHC/2014/PROVISIONALRESULTS
12. Kish L. Survey sampling. New York: John Wiley and Sons, inc. 1965.
13. Pampiglione J, Diana F, Gustinelli O, Luchetti M, Caroline T. Medical and veterinary entomology.Vol. 23 Blackwell Publisher; 2009.
14. Ugbomoiko U S, Tungiasis: High prevalence, parasite load, and morbidity in a rural community in Lagos State, Nigeria.Int J Dermatol. 2007; 46(5): 475-481.
15. District Health report. Jigger infestation in Mayuge. Mayuge district health office. 2013; [updated 2013 March, cited 2013 December]
16. Muehlen M, Feldmeier H, Wilcke T, Winter B, Heukelbach J. Identifying risk factors for Tungiasis and heavy infestation in resource poor community in Northen Brazil.Trans R

Soc Trop Med Hyg. 2006; 100(4): 371-380.
17. Heukelbach J, Fabiola A S O, Gerhard H, Herman F. Tungiasis: a neglected health problem of poor communities. Trop Med IntHealth. 2001; 6(4): 267-272.
18. Heukelbach J, Costa A M, Wilcke T, Mencke N, Feldmeier H, The animal reservoir of Tungapenetrans in severely affected communities of north-east Brazil, Med Vet Entomol. 2004; 18 (5): 329-335.
19. Kimani B, Nyagero J, Ikamari L. Knowledge, attitude and practices on jigger infestation among household members aged 18 to 60 years: case study of a rural location in Kenya. Pan Afr Med J.2012;13(1):7

How to cite this article: Namuhani N, Kiwanuka SN. Jigger persistence and associated factors among households in Mayuge District, Uganda. Int J Health Sci Res. 2016; 6(1):376-386.

****