Research Article **IRJPH (2019) 3:30**

International Research Journal of Public Health (ISSN:2573-380X)

Community Based Assessment of Bed Bug Infestation Status in Arba Minch Zuria Woreda, Southern Ethiopia

Abate Waldetensai[*1], Araya Eukubay[1], Jemal Mohammed[1], Sileabat Aschalew[2]

[1]Ethipian Public Health Institutes, Addis Ababa, Ethiopia
[2]South Omo zone Health Department, Jinka, Ethiopia

ABSTRACT

Introduction: Bedbug infestations have become a serious problem in housing dueto their crawling and blood sucking activities.

Objective: This study was aimed to assess the infestation status and public health importance of bed bug infestation in low income communities at household level.

Methods: A community based cross-sectional study was conducted between January and February, 2018 on 721 housuholds in Arba Minch zuria Woreda, Southern Ethiopia with random sampling technique. Data collection was undertaken on knowledge and attitude about bed bug and bedbug infestation health impacts and factors for the infestation and control practices used were collected with well prepared questionnaire and standard observational check.

Results: From all inspected materials, 97% infestation were on wall and sleeping and mosquito bed nets. The left materials relatively infested less were arm chair (2.76%) and other materials (0.89%) found in the house of the participants. About 31% and 15% participants reported bed bug infestation prohibited from using mosquito nets and cause thyphoid respectively. The left 55 % of participants reported the infestation causes wounds, itching, lossing rest and skin lesion. 98.1% of the participants have a knowledge about bed bug, blood sucking insects and 44% of respondents believed in insecticide nets increases the infestation. 72.5% household are using together hot water (42.28%) and ajjacks with water (30.2%) followed by 18.8% chemicals to control infestation. Omo soap, sun lights and plants were optional mechanisms of infestation controls.

Conclusion: Bedbugs resurgences and its related factors are being considered as public health problem in Ethiopia. More researches focusing on bed bug biology and epidemiology are required establish a new prevention, treatment, control options and public health response.

Keywords: Bed bugs, bed bugs infestation, Ethiopia

***Correspondence to Author:**
Abate Waldetensai
Ethipian Public Health Institutes, Addis Ababa, Ethiopia

How to cite this article:
Abate Waldetnasi, Araya Eukubay, Jemal Mohammed, Sileabat Aschalew. Community Based Assessment of Bed Bug Infestation Status in Arba Minch Zuria Woreda, Southern Ethiopia.International Research Journal of Public Health, 2019; 3:30

eSciPub LLC, Houston, TX USA.
Website: http://escipub.com/

Introduction

Bedbug infestations have become a serious problem in housing because of their crawling and notorious association with humans (Mcmenaman and Gausche-hill, 2016). According to Archeological evidence, blood-sucking pests first plagued humans when they lived in caves. Bed bugs can establish themselves in the new human habitats when people moved from caves to villages and cities (Tabuchi et al., 2013). Globally since the late 1990s, throughout human history, *Cimex lectularius* and *Cimex hemipterus* under family Cimicidae has undergone a significant resurgence (Davies et al., 2012). Annually, the population of bed bugs could be increasing by 100 – 500 % throughout the world. Travel, trade, and bed bug resistance to insecticide are the main factor for the resurgence (Lai et al., 2016).In developed countries, Following World War II, bedbugs became uncommon because of social and economic progress and insecticide development (Giudice et al., 2013). Incontrast to this, infestation of bed bugs beome increasing in poor countries(Chen and Copes, 2010). This dramatic increase in the number of bed bugs infestations has raised significant public attention with increasing alarm (Wang and Wen, 2011). The number of reports of human bedbug infestations has increased dramatically in the United States, the United Kingdom, Australia, and also in other European countries, attributed to increased international travel and trade, resistance to insecticides (Mumcuoglu and Shalom, 2010).

Common Bed bugs (*Cimex lectularius*) have been detected in aircraft, boats, trains and hotels to feed and risk mainly the travellers.The source of infestations identified include, backpackers, immigrants, guest workers, and the homeless (Wang and Wen, 2011).Sleeping areas in the seams of mattresses, box springs, cracks and crevices in bed frames are their main places and usually spread to gaps behind baseboards, pictures, wallpaper and electrical outlets (Jones et al., 2013; Giudice et al., 2013). Bed bugs have been recognized as important and very challenging pests (Romero, 2009). The initial bite of a bug can itch, swell, burn, become inflamed, or form a weal at the arms, legs, back and on the face around the eyes, forming a central spot at the site of the bite. In addition causing discomfort, bedbugs are confirmed to cause secondary infections and psychological disorders. Nervousness, lethargy, pallor, diarrhea, and even iron deficiency can be caused by Chronic Cimex infestation. (Mumcuoglu and Shalom, 2010). U.S. Environmental Protection Agency reported that bed bugs can carry more than 40 microorganisms in the stomach, feces, exoskeletons, and/or saliva. Studies are also reported that bed bugs may act as competent vectors for *Bartonella quintana* and *Trypanosoma cruzi*, the causes of trench fever and Chagas disease, respectively (Lai et al., 2016). Prolonged period of morbidity for the patient and increasing window of opportunity for the bedbugs to affect other surrounding individuals is due to the nonspecific nature of presentation and subsequent difficulty in prompt diagnosis (Ibrahim et al., 2017). The sufferers have often been reported to suffer from biting, cutaneous and systemic reactions (Karunamoorthi et al., 2015). Few research papers about bed bugs begun to be appear in scientific journals before a few years (Tabuchi et al., 2013). Housing entities serving low-income populations have been most severely affected by bed bugs infestation. This is because of lack of Knowledge about how to get rid of bed bugs infesatation by the property managers and tenants in apartment complexes, shelters, dormitories and other housing facilities to manage effectively (Bennett et al., 2015). Currently, purging infestation is one of the exceptional tasks as emergence of resistance to pyrethroid insecticides. Bedbug infestation which is a common phenomenon, linked to poverty in the resource-limited settings leads all sections of the society to be at the risk of being bitten (Karunamoorthi et al., 2015).

Nearly 80% of the population are at risk of infestation with poor housing in Ethiopia.There is a shortage of evidence about the bedbug infestation and its public health impacts, community practices and knowledge toward controlling the infestation and potential risk indicators (Karunamoorthi et al., 2015; Mekonnen et al., 2018). The productivity and quality of life are negatively affected because of mental and social health impacts which become the subject of significant research and public concern. There is no single tool or activity that is used alone, to avoid bed bugs, including pesticides. The information obtained from the community could provide an opportunity to show and identify the bedbug infestation as a matter of public health and medical concern. It also could create cost-effective and sustainable management strategies, organized program for detection, prevention, and controlling the problem. Therefore the current assessment aimed to convey the infestation status, community perception toward infestation and control mechanisms being used to fill the gap exists in the speciefied community.

Materials and Methods

Study design and Setting

The study was conducted in 2018 from January to Febrary during the suspection period of infestation. A community based cross-sectional survey was undertaken with trained individuals at household levels. From Gamo gofa zone, Southern Ethiopia, 7 kebeles (Figure 1) were randomily selected. 100 households from each selected kebeles and 721 total households were selected with systematic random sampling considering LLINs posessation.

Data collection procedure

Questionnaire

To collect the important data from almost related community setting, data collection tool (questionnaire) was prepared and tested to improve the quality prior to interview. In addition, standard observational check list (SOCL) was prepared to determine the differrent levels or degree in the chosen households. Presence of insecticide treated nets in the house was checked before the commencement of the survey to be included as a study participants. Both male and female respondents >18 age-groups from households were involved after open discussion prior to the interview.

Data collection

Data collection was done by well-trained and organized teams. Infestation data were ??? collected through observation and employing questionnaire based interview. Physical observation to inspect bedbug infestation,information record on prevalence and socio-demography of the population were under taken. Respondent'sknowledge about bed bugs, attitude toward infestation and control practices to infestation according to localsituation were recorded. In addition to this physical inspection on different materials in the house was done. The inspected key indicators to be observed were presence of adults, nymphs, eggs, and faeces or traces of blood from crushed bedbugs) at different surfaces found in he house. The housing quality was also recored during proper inspection of bed bugs.

Data management and analysis

Data recorded during the actual assessment on appropriately designed forms corresponding to each survey time, date and other important variable. The study record forms for completeness and accuracy was reviewed by the study coordinator or site supervisor onsitefor completedness and error and entered into Microsoft excel for data clean up and countercheck before export to SPSS version 20 software for analysis.A descriptive statistics was used to describe the characteristics of the study participants. The data were presented using frequencies and percentages. One way ANOVA statistics was used to assess the association of bed bug infestation with the study area, residential types and insecticidal treated nets with 95 % confidence interval (CI).

Table 1: background information of the study participants and sites, gamogofa zone, southern ethiopia, january –Febrary 2018

Variables		Age				
		18 – 30 n(%)	31 – 45 n(%)	46 – 65 n(%)	above 65 n(%)	Total
Sex	Male	76 (10.5%)	87 (12.1%)	39 (5.4%)	15 (2.1%)	217 (30.1%)
	Female	214 (29.7%)	197 (27.3%)	81 (11.2%)	12 (1.7%)	504 (69.9%)
	Total	290(40.2%)	284(39.4%)	120(16.2%)	27(3.8%)	100 (100%)
Marital status	Married	258 (35.8%)	262 (36.3%)	108 (15.0%)	25 (3.5%)	653 (90.6%)
	Single	28 (3.9%)	16 (2.2%)	5 (.7%)	0 (.0%)	49 (6.8%)
	separated	1 (.1%)	1 (.1%)	2 (.3%)	0 (.0%)	4 (.5%)
	Widowed	3 (.4%)	5 (.7%)	5 (.7%)	2 (.3%)	15 (2.1%)

	Number of dwellers in the HH	
Study sites	Mean	N
Channo Mille	6	100
Cahnno Chelba	5	101
Channo Dorga	6	101
Kolla shelle	6	101
Shara	6	101
Shille	6	101
Ganta Ochollo	6	116

Table 2: Housing stractures of all study participants

Top veiw of house structure	Tine sheet cover or galvanized	677
	Bamboo cover	1
	Grass cover	39
	Mud	1
	Plastic sheet cover	3
Side vewiew of the house structure	Wood	203
	wood and mud	449
	wood, mud, clay and cement	67
	Bamboo	2
Bed type in use	Wood	640
	land spread	57
	Bamboo	1
	mud block	12
	Roap made	11
Types of sleeping material	Sponge mattress	719
	Plastic sheet	1
	Slave	1

Table 3: Knowledge of study participants toward bed bugs activities and LLINs impact on infestation

Questions	Yes	No	Don't know
Do you know that Bed bug sucks blood to transmist a disease?	707(98.1%)	12 (1.9%)	2
Do you believe that LLINs increases the infestation of bed bugs?	314 (44%)	407(56%)	0

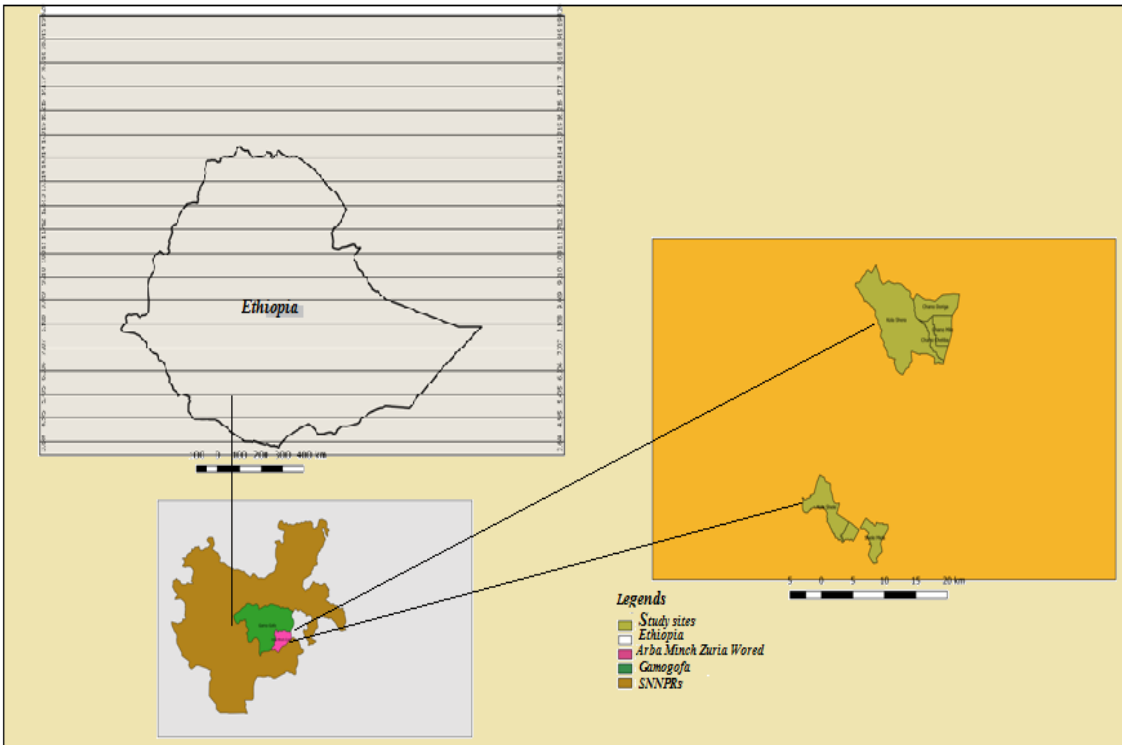


Figure 1: Map of Study Area

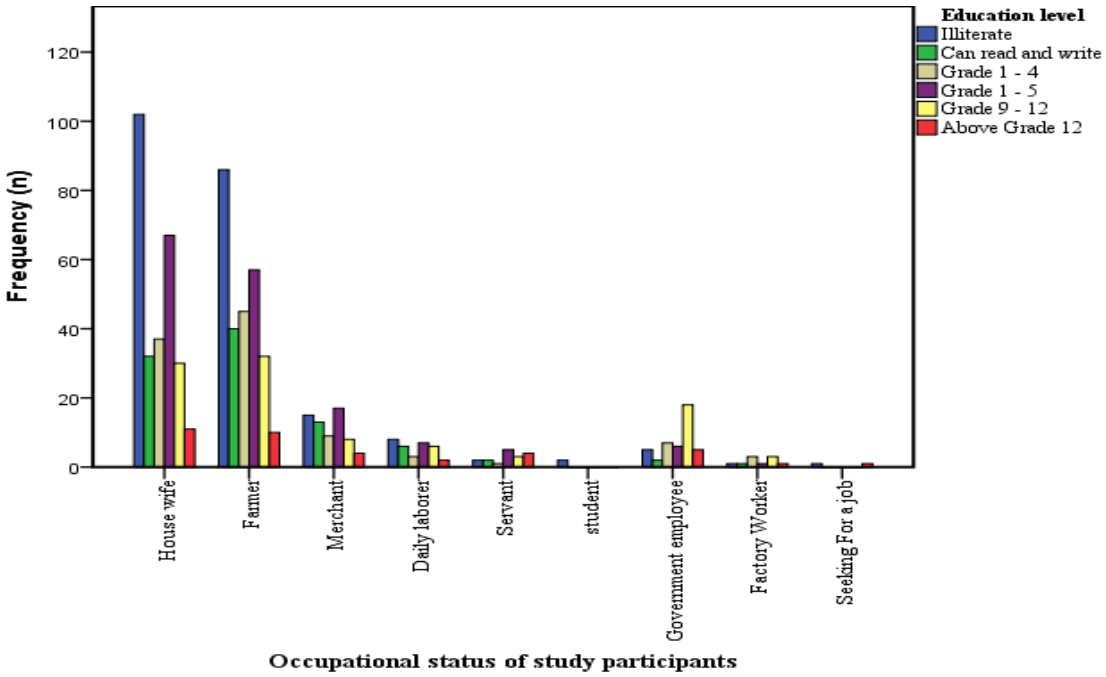


Figure 2: Occupational status with education level of study participants

A *p*-value of <0.05 was considered for statistical significance.

Ethical Review

The study was approved by scientific review committee of Ethiopian bublic health institute inline with LLINs longevity study approval. A support letter was obtained from zonal health department and Woreda health Office to carry out house-to-house bedbug infestation assessment. Written and oral informed consents were obtained from study participants before commencing interview.

Results

This study was aimed to assess bed bug infestation and factors in similar socio-demographic community of seven study sites in Southern Ethiopia. Study data collection was done in 721 households (HH) in the study area. From selected HH, all study participants were volunteered to give informed consent prior to the data collection. About 70% (504) of respondants were female with only 30% (217) male respondents. For both sexes, 290 (40.2%) and 284 (39.4%) number of respondants were found between 18 – 30 and 31 – 45 years respectively with 120 (16.2%) at the age range of 46 – 65 years. A small number, 27 (3.8%) of participants were found to be above 65 age range. Regarding the marital status, 90.6 % (653) of study participants were found to be married, 6.8% (49) single, 0.5% (4) separated and 2.1% (15) widowed. The mean number of dwellers found in each house were the same (6) (Table 1).

The educational and occupation status of the participants were also assessed and presented (Figure 1). High numbers of study participants High numbers of study participants were known about bed bugs and impacts of long lasting insecticidal treated bed nets (LLINs) on infestation (Table 3). From all sampled 721HHs, 707 study participants were known as bed bugs sucks bloods and transmit disease to humans. As shown in the table, 314 were found to be housewifes and farmers from all educational levels, starting from illitrated to above grade 12. The other few numbers of participants were merchant, daily laboror, servants, government employee, students and factory workees from all stated education level.

Regarding the housing structures of the households selected for bed bug infestation, most houses were tine sheet cover or galvanized and grass cover at the top view and wood (203), wood and muds (449) at side view. All houses were found with cracks with sponge mattres on wood made bed types (Table 2).

The current study was also identified that different surfaces of infestation with bed bugsin the community. Wall and sleeping (about 49%) and mosquito bed nets (48%) were found to be infested near to the same percents. The left arm chair surfaces and othr materials found in the house of the partcicipants were 2.76% and 0.89% infestation repecctively (Figure 2).

Mosquito bed nets were found to be the most infested materials that categorized based on counted number of bed bugs, 1 to 5, 5 to 10 and > 10. At the category of 1 to 5 about 88, 5 to 10 about 59 and > 10 about 345 bed bugs were inspected on the insecticidal treated mosquito nets (Figure 4). The infestation of bed bugs impacts in causing of thyphoid, wounds, Itching prohibiting from sleeping and using nets well and skin lesion as showed in figure 5. These infestation impacts could varies in different seasons in the study areas. The infestation was high in bega where low infestation was obsereved during Mehir and Tseday (Figure 5).

participants were believed in LLINs increases the infestation of bed bugs.

In the study communities, hot water and ajjacks with water were found to be the most control methods infestation where, chemicals, hot water, Omo soap, sun lights and plants were other optional mechanisms of infestation controls (Figure 5).

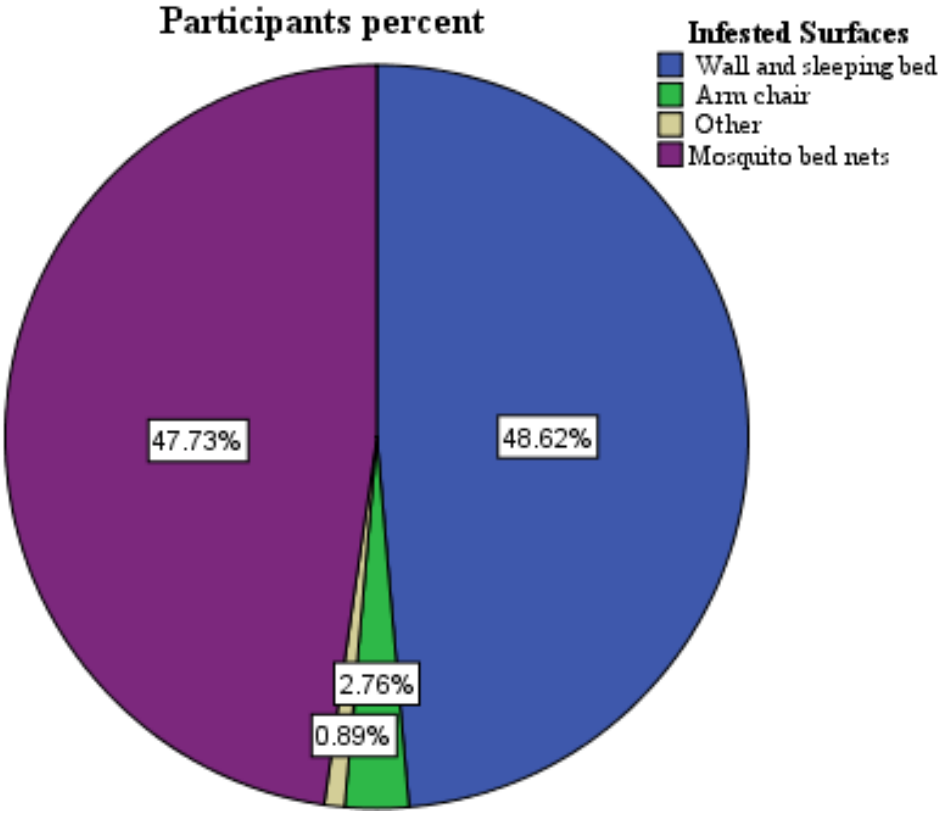


Figure 3: Surfaces of infested with bed bugs in participants houses

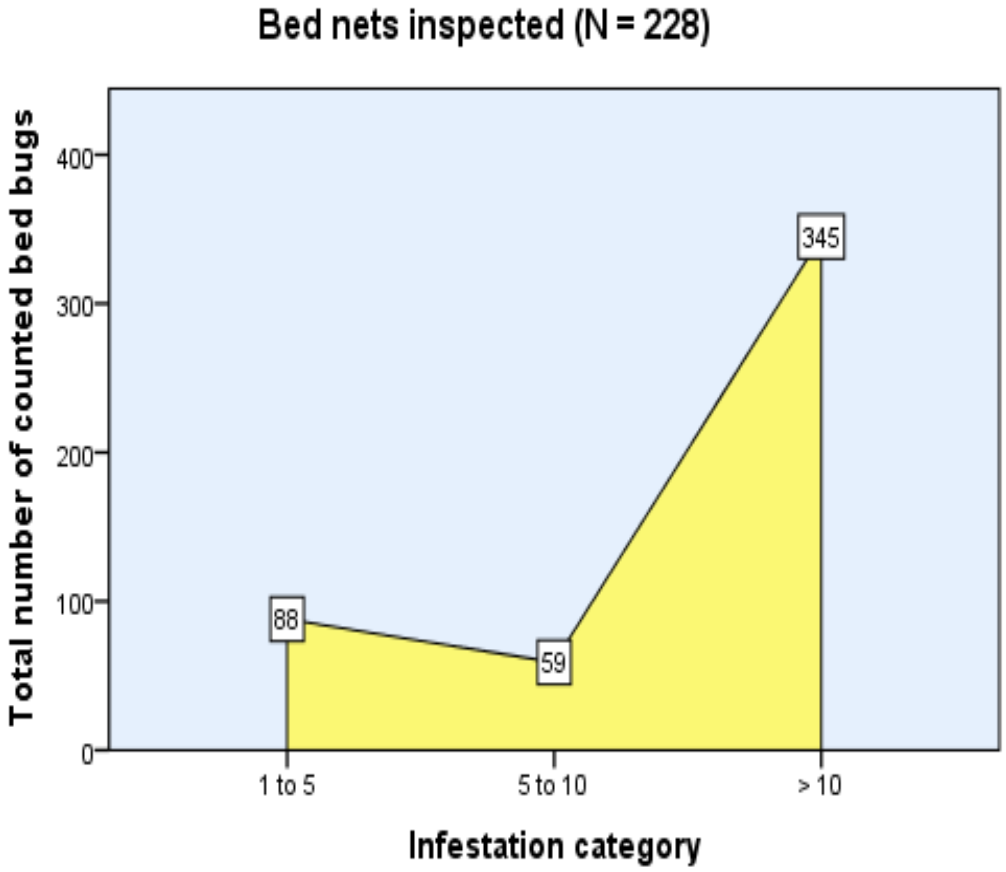


Figure 4: Bed bugs infestation category on insecticidal treated nets

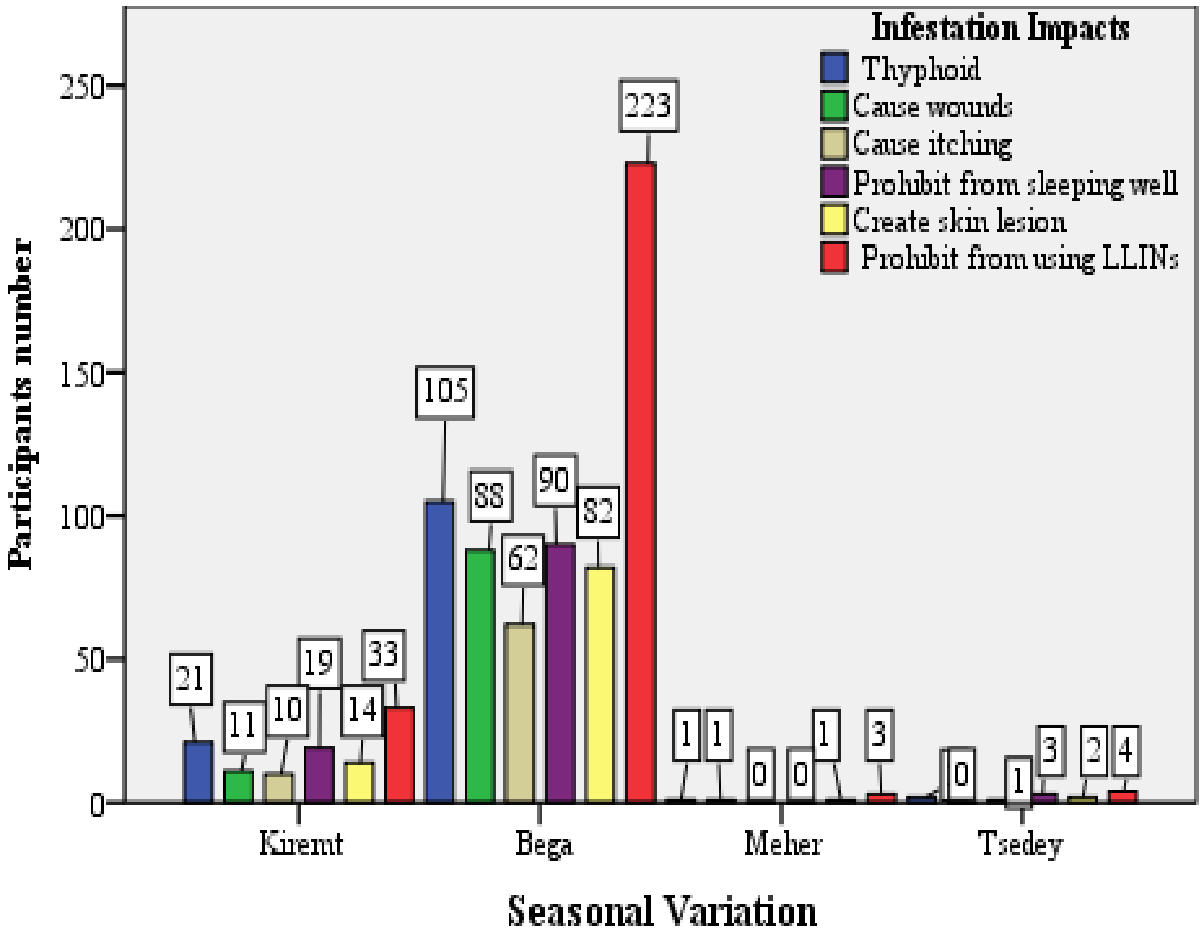
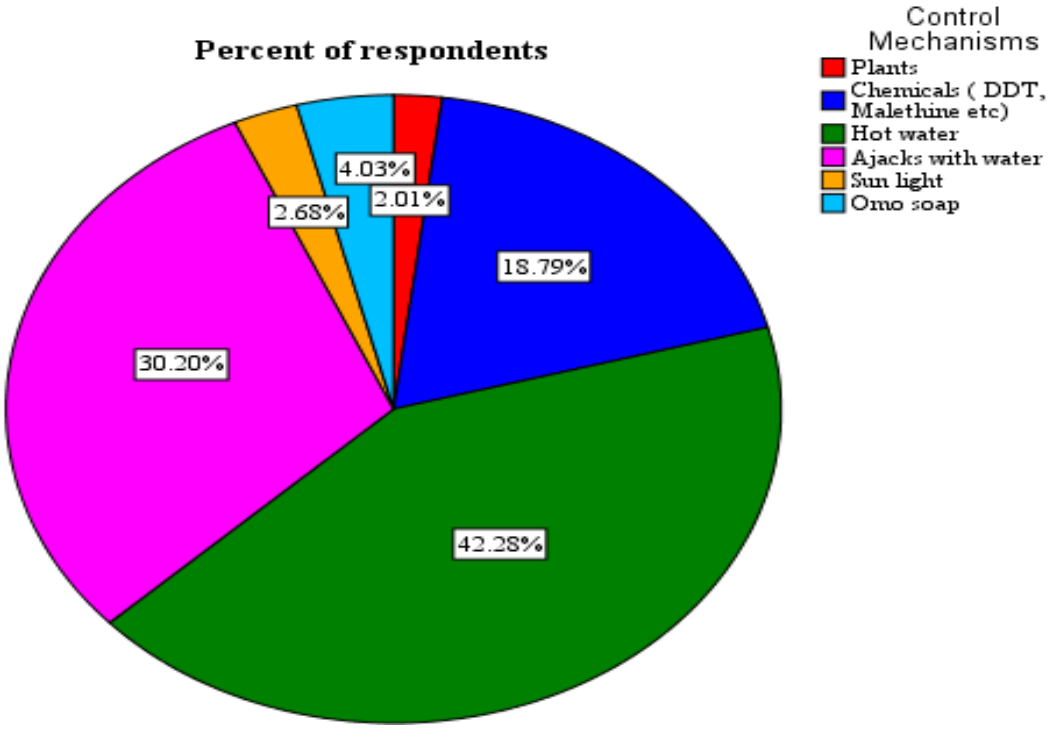


Figure 5: Impacts of bed bugs infestation with seasonal viration in the study communities



.

Figure 6: Control mechanisms in use for bed bug infestation in study communities

Discussion

Understanding bed bug basics is an important foremost step before tackling their infestation on a community level, even community vary from place to place. By conducting a door-to-door survey across residential row homes, we were able to describe patterns in recent bed bug infestations in Arba Minch zuria Woredas, Southern Ethiopia.Our findings from the assessement responses indicated that an increase of bedbug infestations in homes. This is in agreement with a trend observed in other parts of Ethiopia (Karunamoorthi et al., 2015; Mekonnen et al., 2018). The increase in bedbug infestations was recorded in different house stractures and surfaces of materials found in, single family residences and rooming houses (Mumcuoglu and Shalom, 2010). More cases of bedbug infestations (47.73%) wereobserved from insecticide treated bed nets and wall and sleeping bed materials (48.62%) surfaces in houses. The fact that more bedbug infestations were reported from insecticide treated bed nets and wall and sleeping materials could be attraction of heats which is more favourable for reproduction of bed bug as explained by the participants in the study areas. Poorly maintained buildings and high occupancy turnover contributed to building wide infestations which inturn increase the likelihood of bed bug migration through cracks in building infrastructure providing entry points for the bed bug (Fong et al., 2013). In the study areas, most of housesconstructed by the communitieswere poorly made from tine cover, wood and mud, with full of cracks on the walls which increases the chance of exposure to infestation or harbour pests.The current studyfinding is inline with the finding reported by *Mekonnen et al. (2018)* in Amhara regional states, Ethiopia. The current finding from this study indicated that, more than 96% of the bedrooms, followed arm chairinfestation were observed within a single house holds. Bed, chairs and walls in the householdswe re the most potential risk-associated areas because, bed bughide in and emerge to feed on human during their active times. This finding infestation report is much higher than the sudy report in North West of Horo-Guduru WollegaZone, Oromia region, Ethiopia (Karunamoorthi et al., 2015).

The current high infestations report and poor treatment methods emphasize the difficulty of managing bed bugs in their complex environments, especially in low income communities (Wu et al., 2014).

The current study showed that bedbug infestation is being a major public health problem in the study area similarily with the study conducted in America (Studdiford et al., 2012). Different kinds of impacts of infestations were collected from the study participants. A majority (i.e. 223) of the participants reported that the infestation prohibited them to use LLINs effectively. Thyphoid is also another major health impacts reported by high number (105) of study participants in line with wounds, itching, skin lesion and avoiding well rest or sleep disturbnce are among reported health impacts because of high infestation (Fong et al., 2013; Liu et al., 2015; Salazar et al., 2015). The effects were also reported as it have seasonal variation in the study areas. The health impacts of the infeastion was found to depend on Bega followed by Kihremt, Tseday and Mehir as their respective impact level (Figure 4). While this finding also agrees with the finding reported in Amhara region, Ethiopia and Nortwest Itally (Giorda et al., 2013; Mekonnen et al., 2018).

The lack of cheaper and more effective treatment methods to curtail and eliminate bed bug infestation leads infeastion epidemic in unknow areas (Wu et al., 2014). This is also because of uncertainty on the control methods, the fact that it is not a notifiable disease, the resistance to insecticides, the absence of interest in researching new active principles, can influence the pest rise (Mumcuoglu and Shalom, 2010). There is no study on resistance

to pesticides in Ethiopia. Vigilant efforts are not always successful in ideal management strategy of the infestation including prevention. Since eliminating infestations requires strategic approachinvolving inspection, cleaning, treatment, and follow-up (15). Interestingly, the information gathered from the study participants showed there is no a single control mechanisms of the infestation. Most participants were used home made control methods. About 42% and 30% of participants were used hot water and ajacks with water mix to control the infestation. Marketable chemicals, Omo soap, sun lights and plants are other optional mechanisms of infestation controls (Figure 5) developed through experience. Most of the study population reported, there is insecticide chemicals sprayed for the purpose of malaria control by campaign which could not kill or control bed bug infestation, maight be dueto resistance to the chemical.

Conclusion and reccommendation

The current assessment conclude that,the incidence of bed bug infestations is increasing because of poor quality of housing, overcrowding and absence of a single control mechanisms with confounding factors. More research focusing on bed bug biology and epidemiology, creating awareness or educating the public regarding bed bug should be required to increase early detection of infestations and improving outcomes. The health sectors should give focus on bed bugs infestation health impacts to establish a new prevention, treatment and control options. IPM practices should be readjusted jointly with regulatory officials, building management and pest management professionals. Continuous surveillance systems regarding health impacts should be important to develope the response of public health and pest management professionals in addressing bed bug infestations. Bed bugs resurgence should be considered as an emerging public health problem dueto a single effective pesticide and awareness of the people towards the control techniques.

Aknowledgement

This study was made by the support of the Ethiopian Public Health Institutes (EPHI) through Ministry of Health (MoH) for under the network of Global fund during malaria research. The contents are the responsibility of the authors and do not necessarily reflect the views of EPHI or MoH. We are grateful to all communities in the study area for their willingness to give respond for the questionnaire. We would like to express our deepest gratitude to the health sectors for their good cooperation to conduct this assessment.

Conflict of interests

The authors declare that they have no competing interests.

Authors' contributions

AW: developed questionnaires, coordinated field activities, mapping, collected data, analysied data, wrote and revised the paper; AE: participated in field data collection or activities, assisted with the statistical analysis and revised the paper; JM and SA participated in field activities and data collection, revised the paper. All authors have read and agreed with the content of the submitted manuscript.

References

1. Mcmenaman KS, Gausche-hill M. Cimex lectularius (" Bed Bugs ") Recognition , Management , and Eradication. CME. 2016;32(11):801–4.
2. Tabuchi RL, Sutherland AM, Choe D, Tsutsui ND. Researchers combat resurgence of bed bug in behavioral studies and monitor trials. Calif Agric. 2013;67(3):172–8.
3. Davies TGE, Field LM, Williamson MS. The re-emergence of the bed bug as a nuisance pest: Implications of resistance to the pyrethroid insecticides. Medical and Veterinary Entomology. 2012. p. 241–54.
4. Lai O, Ho D, Glick S, Jagdeo J. Bed bugs and possible transmission of human pathogens : a systematic review. Arch Dermatol Res [Internet]. Springer Berlin Heidelberg; 2016;308(8):531–8. Available from: "http://dx.doi.org/10.1007/s00403-016-1661-8

5. Giudice P Del, Levy-bencheton A, Chosidow O, Marty P, Delaunay P, Brouqui P. Bedbugs and Infectious Diseases. Clin Infect Dis. 2013;52(2):200–10.
6. Chen H, Copes R. A review on bed bugs : epidemiology , health effects , and surveillance activities. 2010;1–35.
7. Wang C, Wen X. Bed bug infestations and control practices in China: Implications for fighting the global bed bug resurgence. Insects. 2011;2(2):83–95.
8. Mumcuoglu KY, Shalom U. Questionnaire survey of common bedbug (Cimex lectularius) infestations in Israel. Isr J Entomol. 2010;40:1–10.
9. Jones SC, Bryant JL, Harrison SA. Behavioral Responses of the Bed Bug to Permethrin-Impregnated ActiveGuard™ Fabric. 2013;230–40.
10. Romero A. Biology and management of the bed bug, Cimex lectularius L. (Heteroptera: Cimicidae). Dissertation. 2009.
11. Ibrahim O, Syed UM, Tomecki KJ. Bedbugs : Helping your patient through an infestation. CME. 2017;84(3):207–11.
12. Karunamoorthi K, Beyene B, Ambelu A. Prevalence , Knowledge and Self-Reported Containment Practices about Bedbugs in the Resource-Limited Setting of Ethiopia : A Descriptive Cross-Sectional Survey. Health (Irvine Calif). 2015;7:1142–57.
13. Bennett GW, Gondhalekar AD, Wang C, Buczkowski G, Gibb TJ. Using research and education to implement practical bed bug control programs in multifamily housing. Pest Manag Sci. 2015;(April).
14. Mekonnen D, Zenebe Y, Derbie A, Adem Y, Hailu D, Mulu W. Health impacts of bedbug infestation : A case of five towns in Amhara Region , Ethiopia. Ethiop J Heal Dev. 2018;31(4):251–8.
15. Fong D, Bos C, Stuart T, Perron S, Kosatsky T, Shum M. Prevention , Identification , and Treatment Options for the Management of Bed Bug Infestations. J Can Inst Public Heal Insp [Internet]. 2013;55(4):1–17. Available from: www.ncceh.ca
16. Wu Y, Tracy DM, Barbarin AM, Barbu CM, Levy MZ. A Door-to-Door Survey of Bed Bug (Cimex lectularius) Infestations in Row Homes in Philadelphia , Pennsylvania. Am J Trop Med Hyg,. 2014;91(1):206–10.
17. Studdiford, James S Conniff, Kathryn M Trayes, Kathryn P Tully AS, Clinic C, River R. Bedbug Infestation. Am Fam Physician [Internet]. 2012;86(7):653–8. Available from: www.aafp.org/afp
18. Liu B, Kim H, Pennington-Gray L. Responding to the bed bug crisis in social media. Int J Hosp Manag. 2015;47:76–84.
19. Salazar R, Castillo-Neyra R, Tustin AW, Borrini-Mayorí K, Náquira C, Levy MZ. Bed bugs (Cimex lectularius) as vectors of Trypanosoma cruzi. Am J Trop Med Hyg. 2015;92(2).
20. Giorda F, Guardone L, Mancini M, Accorsi A, Macchioni F, Mignone W. Cases of bed bug (Cimex lectularius) infestations in Northwest Italy. Vet Ital. 2013;49(4):335–40.

- Title: International Research Journal of Public Health
- ISSN: 2573-380X
- DOI: 10.28933/IRJPH
- IF: 1.36 (citefactor)
- Email: IRJPH@escipub.com
- TEL: +1-281-656-1158

About the journal

The journal is hosted by eSciPub LLC. Our aim is to provide a platform that encourages publication of the most recent research and reviews for authors from all countries.

About the publisher

eSciPub LLC is a publisher to support Open Access initiative located in Houston, Texas, USA. It is a member of the largest community of professional publishers in the United States: the Independent Book Publishers Association. It hosts more than 100 Open Access journals in Medicine, Business & Economics, Agriculture, Biological Sciences, Chemistry, Education, Physical Sciences, Sociology, and Engineering and Technology.

Rapid Response Team

Please feel free to contact our rapid response team if you have any questions. Our customer representative will answer your questions shortly.

Terms of Use/Privacy Policy/ Disclaimer/ Other Policies:

You agree that by using our site, you have read, understood, and agreed to be bound by all of our terms of use/privacy policy/ disclaimer/ other policies (click here for details). This site cannot and does not contain professional advice. The information on this site is provided for general informational and educational purposes only and is not a substitute for professional advice. Accordingly, before taking any actions based upon such information, we encourage you to consult with the appropriate professionals. We do not provide any kind of professional advice. The use or reliance of any information contained on this site or our mobile application is solely at your own risk. Under no circumstance shall we have any liability to you for any loss or damage of any kind incurred as a result of the use of the site or our mobile application or reliance on any information provided on the site and our mobile application. We may publish articles without peer-review. Published articles of authors are open access. Authors hold the copyright and retain publishing rights without restrictions. Authors are solely responsible for their articles published in our journals. Publication of any information in authors' articles does not constitute an endorsement by us. We make no representation or warranty of any kind, express or implied, regarding the accuracy, adequacy, validity, reliability, availability or completeness of any information that authors provided. more.....