A Qualitative Study to Understand the Risk Perception About Exposure to the Bites of Sandflies Among Migrant Workers in the Lowlands of Northwest Ethiopia. A Health Belief Model Perspective.

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Abstract

Background: Leishmaniasis is the top health problem among migrant workers in Ethiopia. Poor disease risk perception and inappropriate health-seeking behaviour are significant challenges to prevent and eliminate the disease. Therefore, there is a lack of guidance on supporting migrant workers in taking actions to prevent Leishmaniasis.

Method: Between June and November 2019, we conducted qualitative research among migrant workers at risk of Leishmaniasis in Ethiopia. Seventeen Focus Group Discussions and 16 Key informant interviews were conducted to study risk perception in relation to exposure to sandfly bites and the use of sandfly control measures amongst migrant workers. All interviews were recorded, transcribed, and translated for analysis. Data were analyzed by qualitative content analysis using ATLAS.ti.

Result: Migrant workers feel susceptible to Leishmaniasis due to their past exposure, and the disease is prevalent in the area. However, they feel that Leishmaniasis is a mild illness that is easy to cure. While there is a general acceptance of Insecticide Treated Net (ITN) as a protective measure, hesitations remain in the actual behaviour of utilizing it due to the alternative use of the traditional practice, seasonality, and the inconvenience to hang in the farmland areas. The central cues were the message reminders from health workers and rose in sandfly bite irritation regardless of the high perceived self-efficacy. Based on the findings, three-level intervention modalities are recommended: 1) awareness creation throughout of door media (posters, stickers, billboards) at pre-arrival, 2) the arrival level aims to stimulate the use of protective measures to be initiated and maintained, and 3) the aim at the departure level is to inform about the recognition of late signs and symptoms and the use of the protective measure to be continued at home.

Conclusion: This finding proposes that leishmaniasis prevention interventions should focus on individuals' perceptions to promote consistent use of protective measures. Results empowered the researchers to foster comprehension of the content required for effective intervention.

Background

Leishmaniasis is an infection brought about by protozoan parasites. When individuals develop Leishmaniasis, the most typical manifestations are fever and an enlargement of the spleen, with enlargement of the liver sometimes being seen as well [1,2]. This disease is the second-biggest parasitic killer on the planet (after malaria) [1,3]. It is endemic in 62 nations, with 200 million individuals in danger [4]. Even though a neglected tropical parasitic disease, it is assessed that yearly, 500,000 cases of Leishmaniasis happen [4,5], with a prevalence of 2.5 million [6]. The mortality rate of Leishmaniasis is almost 95% if the cause is not distinguished and when left untreated [5,7].

The main areas where Leishmaniasis is prevalent are situated in East Africa [8]. The disease is endemic in Ethiopia, Kenya, Somalia, Sudan, and Uganda, with severe plagues that killed many individuals. In

Ethiopia, Leishmaniasis happens in the lowlands of the south, southwest and the Metema-Abuderafie fields in the northeast [9,10, 11].

Leishmaniasis frequently exists in either distant or not easily accessible areas where health services are scarcely accessible or lacking. As a result, those most likely to be infected are deficient, need information on the sickness transmission and living in villages a long way from the streets [7,12,13]. The geological distribution of Leishmaniasis in Africa is because of factors related to development, including neediness because of low socioeconomic status and socio-cultural practices [12,14], lack of awareness or proper knowledge on disease transmission by the community [12,14,15,16], inaccessibility to health services, vector dynamics, massive rural-urban migration and agro-industrial projects that bring non-immune urban dwellers into endemic rural areas [17].

Migrant workers are at high risk of acquiring leishmaniasis infection, mainly due to the deplorable and harsh conditions they experience during their work in the farms [9,18,19,20]. Up to 500,000 migrant workers visit the Metema-Abuderafie lowlands yearly, mainly from the surrounding Amhara and Tigray highland areas, for weeding and reap of sesame, sorghum, and cotton, generally among June and November [9,21]. It is also believed that migrant workers bring the infection to the highlands when they return [22]. A good example is the endemic foci of Leishmaniasis in Libo Kemkem and Fogara districts, where between 2003 and 2005, a severe epidemic of the disease resulted in 2,450 primary cases [9].

Although Leishmaniasis among migrant workers in the lowlands of Northwest Ethiopia represents over 60% of the disease load in the country, no control measures are received to lessen transmission to these vulnerable populations [9,23]. Moreover, a significant constraint to the effective control of Leishmaniasis is the lack of information on knowledge, attitude and risk perception of migrant workers that affect their exposure to sandfly bites and acceptability of vector control tools.

Little is known about the level of leishmaniasis information, health perception and socioeconomic and behavioural factors that influence the exposure of migrant workers to sandfly bites and acceptability and use of vector control tools [9]. Several studies were conducted on knowledge, attitudes, and practice about Leishmaniasis in Sudan [12], Kenya [14], India [15], and northwest Ethiopia [16]. In these studies, the researchers reported that the essential elements affecting perception, attitude, knowledge, and behaviour towards the disease and with significant association include schooling level, socioeconomic status, age, gender, housing, the behaviour of resting, lack of knowledge on the transmission of the disease and human practices like deforestation and moving around evening time when the sand fly is active. However, these studies were limited to resident populations and did not address the exposure of migrant workers to sandfly bites and their acceptability of control tools. In addition, most studies failed to use a theoretical framework to guide research on perception regarding Leishmaniasis [24]. The current study aims to assess migrant workers' perception of exposure to sand fly bite and the utilization and acceptability of sandfly control measures by employing a theoretical framework. This research also offers a host of intervention strategies that may complement the ongoing KalaCORE consortium (A nongovernmental organization that works in preventing Leishmaniasis in Africa) entomological research.

The findings of this qualitative study and those of the entomological study will be of special value for policy makers and program implementers interested in designing appropriate interventions programs against Leishmaniasis in Northwest Ethiopia. Therefore, the study addressed the following research questions: Do the migrant workers engage in leishmaniasis prevention (e.g., use sand fly control measures) if they perceive themselves to be vulnerable to Leishmaniasis (due to not utilizing sand fly control measures)? Do the workers perceive that getting the Leishmaniasis has negative consequences (to a severe health threat)? Moreover, do the workers believe that the benefits of engaging in the protective behaviour (diminishing risk for Leishmaniasis) outweigh the costs (money spent on vector control tools)? How do they react to information indicating that they are at risk, and how do they see their ability to use the available sand fly control measures?

Review of Health Belief Model constructs

The Health Belief Model (HBM) was created during the 1950s by social psychologists in the U.S. Public Health Service to clarify individuals' far and comprehensive failure to partake in projects to forestall and recognize disease [25,26]. The HBM expects individuals to avoid disease and practice healthy behaviour when they accept that this will prevent them from getting the disease. The HBM distinguishes six kinds of risk perception as determinants of health behaviour: perceived susceptibility, perceived severity, perceived benefits, perceived barriers, cues to action and self-efficacy.

The HBM has been utilized for the more significant part of a century to anticipate health-related behaviours and improve interventions to change behaviours. As shown by previous literature review studies, the HBM has been valuable in anticipating and clarifying cancer screening and HPV immunization [27,28]. Its natural conceptualizations have made its modifiable beliefs popular for use in interventions. HBM components are additionally frequently utilized in tailored interventions to change individuals' beliefs [29]. For example, when people do not perceive benefits to an activity or action, the intervention should strengthen their perception of benefits. Numerous studies have discovered that interventions tailored to specific barriers foresee adherence to suggested health behaviours [30,31]. Research reveals that perceived susceptibility to illness is an essential predictor of preventive health behaviours [32]. Specifically, perceived barriers to healthy behaviours are the most powerful predictor of whether people are willing to engage in healthy behaviours [33]. Additionally, thinking that you will fail to adopt the desired behaviour will almost make you sure that you will. In fact, in recent years, self-efficacy is one of the most critical factors in an individual's ability to utilize protective tools [34] successfully.

Conducting qualitative research guided by theoretical frameworks can help provide valuable in-depth insights into migrant workers perceptions of leishmaniasis prevention and control and thus enhance our understanding of existing quantitative data on migrant views, perception, and experiences [35,36].

Methods

We followed the COREQ (Consolidated Criteria for Reporting Qualitative research) to report the findings. In addition, a checklist is given as supporting data (see supplementary file 1).

Research team

Our research group was multidisciplinary, with four behavioural epidemiologists, three behavioural scientists and three environmental health researchers. The project coordinator, a male Arabic-speaking entomologist with special training in qualitative research methods, directed the fieldwork. He was supported by public health experts from the University of Gondar and farmland owners known to the respondents.

Study design and setting

A phenomenological qualitative study was carried out to explore risk perceptions.

Abduraafi and Metema are found in the North Gondar administrative zone of Amhara regional state, approximately 250 and 165 Kms North of Gondar town. The year is sharply divided between the rainy season, June–October, and the dry season, November–May.

Study sample and participants

The sample size was not determined before the beginning of the research. Hence, we continued Focus Group Discussions (FGDs) and Key Informant Interviews (KII) until the point of saturation, where no new information was provided [36,37,38]. A purposeful sampling technique was used to recruit study participants both in the KIIs and FGDs. A total of 16 KIIs and 17 FGDs were employed. FGD participants were migrant workers who visited the Metema-Abuderafi lowlands, mainly from the surrounding Amhara and Tigray highland areas, for weeding and reaped of sesame, sorghum and cotton during June to October. A total of 187 migrant workers attended the 17 FGDs. Sixteen KII participants were government officials, farm owners, farm managers, leaders of migrant workers (Koberary) and health professionals. Migrant workers were highland residents who came to the lowlands to work in the agricultural farms for one agricultural season (June to October) and stayed in the lowlands during the previous or subsequent dry season for one year or another more but without establishing residence. Migrant workers also include the seasonal workers who are residents of the highlands who came to the lowlands to work in the agricultural farms for one agricultural season only (June to October), without staying during the dry season (November to May).

Inclusion criteria

Eligible migrant workers : (a) were determined by their farm landowners and Koberay as a migrant worker/seasonal worker (according to the criteria defined above); (b) were aged 18 years or over; (c) are not agricultural labourer is who are residents of the study area (i.e., a person who is staying in the lowlands area for more than three years and who has a home/address in one of the villages/towns in the area) ; (d) were determined by the health professional and Koberary as mentally capable of taking part in this study, and (e) were Amharic speaking.

Recruitment

Potentially eligible migrant workers were identified by their farmland owners through a farmland labour administrative system. It listed the names and contact details of migrant workers who attended the harvesting period during the summer and dry season. Eligible workers were informed about the study by their "Koberary" (leader of the migrant worker), which included a study information sheet and a study consent form. Migrant workers willing to participate in the study returned the consent form to the research team by their Koberary. Consenting migrant workers were required to indicate their contact details and preferred contact times on the consent form.

Data collection instruments

The qualitative data was collected by expert researchers and well-trained research assistants involved in other KalaCORE consortium epidemiological studies. Before the surveys, the research team was trained by professional behavioural epidemiologists on conducting the FGDs and KIs. During the KI and FGD, we utilized a topic guide propelled by Elnaïem D. E. et al., [39], who analyzed the ecology and control of the sand fly vectors of *Leishmania Donovanii* in East Africa. Topics included knowledge on Leishmaniasis, perception, behaviour, and use of preventive measures. The perception questions were further informed by discussions amongst the research team, including experts in health behaviour and qualitative research. Questions explored migrant workers: Perceived susceptibility [40], perceived seriousness, perceived benefits [41], perceived barriers, and cues to action [42]. To improve its prescient capacity, we incorporate the idea of self-efficacy [43].

The guides were developed in English and translated into Amharic (the local language of the participants). One-to-one interviews were conducted with key informants and FGDs with migrant workers using a semi-structured guide. The interviews for KIs and discussions for FGD were conducted in calm places that gave adequate protection, such as tea houses, shelter places in the open farmland areas, farmers and migrant workers' houses, or farmland owners offices. One researcher conducted KIs. For the FGDs, researchers worked in pairs, with one researcher serving as moderator and the other as note taker. All KIs/FGDs were conducted in Amharic. After each round of KIs and FGDs, the interviewers met to discuss and took notes of the main findings and potential difficulties. This step allowed for the opportunity to remind study staff about the interviews' objective and particular topics for the following round of interviews. It also served to develop emerging topics and to adapt the related questions.

With the participants' consent, all KIs and FGDs were digitally recorded. They were informed that all information would be de-recognized and hence stay confidential. Migrant workers were additionally informed that the meeting would last roughly 45-60 minutes and that they could stop the interview they did not feel open to reply at any time. Interviews and FGDs were continued until all categories were well defined and saturated. The research team looked into all study materials and pilot tested preceding finalization.

Data analysis

The researcher and other KalaCORE consortium staff members and accredited Ethiopian interpreters transcribed and translated each recorded interview and FGD. In addition, text passage was perused by members of the research team to acclimate themselves with the data and set up the task of codes and classification. Finally, a qualitative content analysis approach was used to identify and investigate critical factors that migrant workers consider influencing their risk perception regarding exposure to sandfly bites and utilization of vector control tools (ITN).

The beginning phases of the coding cycle followed a conventional, inductive qualitative content analysis way to minimize bias and ensure all significant codes are caught. At first, the transcripts were read line by line, their content was examined, contrasted, and classified to apply a summarization or name (a "code") that portray what was interpreted in the passage as important. Codes were then grouped around the domains of the HBM to develop more abstract classifications [34]. Classification, in this sense, is a group of codes that shared a commonality [44]. If a code could not be linked to any of the domains, a different classification was created to those domains to guarantee all information is caught, whether it fits in the current model. This assisted us in validating and broadening the underlying theoretical framework [45] thoughtfully. In light of the emerging classifications, we produce strings of meaning across classifications. Subsequently, we analyzed latent and showed content and chose each interview as the unit of analysis [44]. Finally, the investigators did initial coding.

Ethical considerations

This research was approved by ethical approval of the IRB of the University of Gondar and the Health education department. Study participants were included after explaining the details of the objective of the study. Those who were volunteer to partake in the study were included after signing a written consent agreement. Participants were informed of their rights to withdraw from the study at any stage or to restrict their data from the analysis. Any suspected cases of Leishmaniasis that were identified during the study were referred to the nearby health centre for appropriate diagnosis and treatment. To ensure data privacy, information was identified using codes, and participants' names were not used. Hard copies of questionnaires were kept securely in the office of the Principal Investigator (PI). Any electronic files were kept on a password-protected computer.

Result

Characteristics of the study population

Key informants and migrant workers were interviewed between June to October 2019. Seventeen FGDs with 8-12 migrant workers were conducted with 187 participants from 11 farms (large and small). The mean ($\pm$ SD) age of the FGD participants was 23 ($\pm$ 4.66) years. Their education level varied from no formal education to secondary education. All FGDs discussants were male migrant workers. In addition, a total of 16 individual interviews were conducted. Among the interview participants, the mean ($\pm$ SD) age was 31 ($\pm$ 6.75) years. Over half of the participants had tertiary and secondary educational status (see Table 1).

Table 1. Socio-demographic characteristics of participants of Focus group discussion and interviews in Metema -Abuderafie, 2019.

FGD participants			Interview participants		
Characteristics	N	%	Characteristics	N	%
Total	187	100		16	100
Gender			Gender		
Male	187	100	Male	15	93.7
Female			Female	1	6.3
Age (mean (SD))			Age (mean (SD))		
23 (±4.66)			31 (±6.75)		
Type of participants			Type of participants		
Students	55	29.4	Health office heads	2	12.5
Farmers	114	60.9	Health extension worker	1	6.3
Forest workers	7	3.7	Malaria and vector born officer	1	6.3
Milisha	8	4.4	Public health officers	1	6.3
Others	3	1.6	Farm (owners, managers, and leaders)	11	68.6
Ethnicity			Ethnicity		
Amhara	171	91.4	Amhara	10	62.5
Tigray	13	7.0	Tigray	6	37.5
Oromo	3	1.6	Oromo		
Religion			Religion		
Orthodox Christian	178	95.2	Orthodox Christian	15	93.7
Muslim	9	4.8	Muslim	1	6.3
Leishmaniasis endemicity at the permanent resident			Leishmaniasis endemicity at the permanent resident		
Low land endemic areas	20	10.7	Low land endemic areas	11	68.7
High land endemic areas	167	89.3	High land endemic areas	5	31.3
Educational status			Educational status		
Non formal education	82	43.9	Non formal education	1	6.3
Formal education	105	56.1	Formal education	15	93.7

The Health Belief Model (HBM) constructs

The findings for the selected HBM constructs, perceived susceptibility and seriousness, perceived barriers and benefits, self-efficacy and cues to action are depicted below, and verbatim statements from participants are provided in detail for each construct. In general, Leishmaniasis is viewed as a low threat to well-being. Likelihood of action (Perceived benefits and barrier) is empowered by beliefs that leishmaniasis prevention results by utilizing ITN (Insecticide-treated net), but disabled by beliefs about the seasonality, cost, individual and institutional barrier, inconvenience, perceived ineffectiveness, lack of awareness, ITN insufficiency, competing priority and beliefs that the advantage can be accomplished through traditional method use. The migrant workers rarely showed a sense of self-efficacy, and the central cue was the rise in sandfly bite irritation other than those offered by health workers and Medicines San Frontier – Holland (MSF-Holland). Every component is explained in Fig.1.

Perceived susceptibility and seriousness of Leishmaniasis

There was a widespread agreement about vulnerability to Leishmaniasis of the participants, and minimal variation in the responses showed. Participants who had Leishmaniasis previously, or knew about workers diagnosed with Leishmaniasis, believed more vulnerable to Leishmaniasis than workers without a history of Leishmaniasis. Following that experience, the workers perceived that they were vulnerable to Leishmaniasis. Moreover, many migrant workers referenced that Leishmaniasis is a problem for them considering that the disease is prevalent in the area. The migrant workers noticed that the sandfly lives in the area where they work and have bitten them. However, they did not refer to any ill health effects.

" We hear the previous workers suffered a lot from sandfly bite.... We are susceptible to sandfly bites, and as a result, it will be irritating.... We are at risk for sandfly bite because we are working in a place where it is home for sand fly and prepare food and sleep anywhere in the farmland." (FGD, Migrant worker, from large and small farmland area).

However, other discussants perceived less risk of leishmaniasis disease and did not worry about sandfly bites. This was considerably more clearly expressed by the migrant workers in the weeding and harvesting season FGDs, and they said they accepted that "God, not the ITN, forestalls leishmaniasis and it is brought about by spirit".

Although the migrant workers believed that they are susceptible to sandfly bites or Leishmaniasis, the severity of the disease was considered minimal. One migrant worker summed up the migrant worker's sentiments: *"Almost everybody realizes they are vulnerable; however, no one treats it seriously"*. Many participants viewed Leishmaniasis as a mild disease that can undoubtedly be cured if timely and appropriate treatment is given. Instead, an illness locally known as "Mich", inexactly deciphered as *"sunstroke"*, was viewed as a more severe issue than Leishmaniasis. During harvesting season, practically all migrant workers spend the night in an open field inside the farm because of the hot nature of the daytime and fear of acquiring the disease "Mich".

"nowadays.... some of the workers when they get some kind of sign and symptom. They suspect as it is malaria and we send them to the health centre for treatment, but when they go to MSF, they are told they

have got Kalazar....we do not know about Kala-zar. (KII, HEW).

Other consequences of Leishmaniasis were the costs associated with looking for care. When a migrant worker was sick, economic consequences included spending money for transport, diagnosis, treatment, and loss of workdays.

Perceived benefit and barrier to protective measure usage (ITN)

Our participants acknowledged the benefit of using protective measures (ITN) as protection against Leishmaniasis. During the weeding season, sleeping in Gebaza (where migrant workers sleep, a sub shelter made of straw and grass) and staying warm under the ITN was an advantage. Some of our participants mentioned that the number of sandflies was seen to be higher in the weeding season, influencing both the perceived intensity of leishmaniasis burden and sandfly bite irritation. The sandfly bite irritation influences the perceived added benefit of the ITN as protection against sandfly bites.

Our participants mentioned various barriers that make them not use ITN to keep away from sandfly bites. The highest-level barriers to bed net use across farmland areas are mentioned in Table 2 and showed visually in Fig. 2.

Table 2: Top reasons for non-consistent protective measures (ITNs) from free listing and ranking activity in Metema -Abuderafie,2019.

Participants	Abuderafie district		Metema district	
	Large Farmland areas	Small farmland areas	Large Farmland areas	Small farmland areas
Migrant workers	Seasonality	Seasonality	Seasonality	Fumigation, spray
	Mental barriers	Discomfort to hang	Inconvenience	Lack of awareness
	Discomfort to hang	Cost	Distribution problem	Cost
	Inadequacy of net	Mental block	Ineffectiveness	Fatigue
	Fatigue	lack of awareness	Cost	Spraying
	Awareness problem	Stress	Insufficiency	Distribution problem
Farmland owners and managers	Inadequacy of net	Seasonality	Seasonality	Heat
	Lack of awareness	fumigation sprays.	Ineffectiveness	Laziness
	Ineffectiveness	Laziness	Lack of awareness	Difficulty in hanging
Health workers	Lack of awareness		Lack of awareness	
	Seasonality		discomfort to hang it	
	Discomfort to hang it		fumigation	
	fumigation		Stress (mental barriers)	
	Fatigue or laziness		Cost	
Farm leader (Koberary)	Seasonality	Seasonality	Insufficiency	ineffectiveness
	Fatigue or laziness	Fumigation,sprays	Cost	Laziness
	Discomfort to hang	Discomfort to hang	Seasonality	Lack of awareness

The most reported barrier to ITN use was that they were uncomfortable hanging it in the farmland areas. Participants reported that they did not use ITN because it is inconvenient to use it due to their communal and outdoor sleeping arrangements during their time on the farms. During harvesting season, almost all

migrant workers spend the night in an open field inside the farm. These nighttime activities are when the sandflies are active [39], but ITN use is not feasible. Moreover, fatigue levels resulted in demotivation to hang and utilize ITNs. Migrant workers discussed "absence of rest" or being "feeling exhausted" as crucial patrons.

"... we are aware of the benefit of a bed net. Therefore, we brought a few bed nets to the farm, and we always kept them inside our bags. Not using the ITN is challenging to install, especially during harvesting season, we spend the night inside the farms. (FGD, migrant worker, large farmland).

Another major factor that decreased continued ITN use was seasonality, which was stated to vary due to harvesting and weeding seasons. For example, sleeping under a net in the harvesting season was perceived to make it difficult to sleep due to the heat, a barrier that appeared to be vital for the participants ITN use. On the other hand, the ITN was perceived as protecting against sandfly bites in the weeding seasons. In the perspective of the HBM, this can be viewed as a reasonable illustration of how perceived benefits and barriers are weighed against one another [46].

"...Even if we want to use the bed net, it is too hot, difficult to hang in the farm area and Gebaza" (FGD, migrant worker from large farmland area).

The previously mentioned belief in other causes of Leishmaniasis also caused a reluctance to use ITNs. Apart from sandfly, Leishmaniasis was perceived to be caused by sexual intercourse, open defecation, filthy drinking water, bad food, and being ravenous. Prevention for these causes included eliminating water ditches, eating good food, and focusing on their cleanliness. Simultaneously, some migrant workers announced utilizing fumigation (burning of woods or tires) to control sandflies in and around their sleeping areas (the farm areas). These lead to possible incorrect use of non-proven protective measures [47]. Consequently, they did not see the requirement for the prevention behaviours:

"By using bed nets, we cannot prevent. We can prevent it by using smoking, tradition herbal, not sleeping in the ground can help us prevent the bite".

"Leishmaniasis is caused by sexual intercourse...poor hygiene, sanitation, eating bad food ". and we prevent leishmaniasis by eating clean foods, by drinking clean water.....". (FGD, migrant worker, large and small farmland area).

Although all farmland owners/managers mentioned that they got free ITNs from the government to be given to the migrant workers, it was felt that these ITNs were inadequate. Besides, many migrant workers mentioned limited access to ITN to specific corruption (social vices) accepted to be expected in how the ITN are distributed. These incorporate bribery, mismanagement, and partiality at the district health office levels. A few respondents blamed health authorities for collecting the ITNs, just to be sold later to landowners or vendors in the market who purchase and sell them at more exorbitant costs. Furthermore, the costs of ITN were mentioned as a barrier to ITN ownership as the expense of 150 Ethiopian Birr (5

dollars) for ITN was viewed as unaffordable, even if the migrant workers they think of to buy from the market:

"Government provides ITN freely...but the owners give us some of them.... there are also rumours of distribution problems ...the bed net is given not equally, given to whom your favourite person is...they sold it also to businessman.... We are highly willing to have sandfly bite protective tools [ITN], but we need the cost of the material to be affordable." (FGD, M.W., from large farmland).

Though the prevalence of kala-azar disease is high and the consequence is severe, none of the key informants reported that priority is given to prevent and control this disease. Approximately 200,000 ETB (Ethiopian Birr) (\$6061) is allocated for spraying insecticide to prevent and control malaria.

" We have no budget and plan to prevent and control leishmaniasis disease.....For other diseases, for example, like the onchocerciasis, we get funds from NGO's. For malaria control, especially for the spraying purpose, we allocate up to 200,000 ETB ". (KII, member of district Health Office, HEW, Farm owners).

Self-efficacy and cues to action

Regardless of the high perceived self-efficacy, there was a solid reliance on the government to give ITN or other protective measures. Efficacy was also problematic when migrant workers needed to discuss the risk of Leishmaniasis and the use of protection with their partners or essential others. Many migrant workers reported they would use ITN if a farm manager/owner insisted. Furthermore, external influence from friends, farm leaders, and managers was seen to have a higher value in building self-efficacy or persuasion toward using protective measures (ITN).

The central cue to utilizing protective measures (ITN) was the rise in sandfly bite irritation. Additional cues to ITN use or other protective measures included being advised to do so by MSF-HOLLAND staff members, village health extension workers, farm owners, managers, and leaders.

Modifying factors

A few participants noticed that they did not have a clue how to read. A few elements impacted migrant workers choices on whether to utilize protective measures (ITN). For example, educational level seemed to change the decision-making process from various perspectives. All migrant workers believed that being educated simplified it to use protective measures. A few of them from the KII knew that sandfly bites are related to Leishmaniasis. Most participants expressed monetary difficulties in paying for their schooling, fertilizer, and food costs not to decide to buy ITN or other protective measures.

Intervention Modality

Health Extension Workers and Health workers and farmland owners and leaders

Cues to action

Self-efficacy

Likelihood of action

Availability and accessibility

Competing priority

Perceived threat

Perceived benefit

Availability and accessibility

Activities

- Migrant worker
screening and
surveillance
- Distribution of leaflet
as reminder
- Health education
- Posters and stickers
distributed to the
migrant workers and
community

Pre-Arrival

At arrival

- Available prevention and treatment products/services and services providers
 - Appropriate distribution of ITN
 - Integrated vector control
 - Accept referrals
 - Increase appropriate utilization of protective measures and services
 - Increase demand for products and services.
 - preventive practices should be strengthened through the provision of IEC materials,
 - local capacity-building, the traditional/mass media, and farmland owner support
 - Dispel rumors about ITN
 - Intersectoral collaboration

At departure

- Awareness creation

through outdoor media (banners,
stickers, announcements)

- Change perceptions/beliefs
- Increase knowledge
- Introduce more effective vector control tools.
- Screenings of Leishmaniasis film

at the place where the migrant
workers gather

- Encouragement of ITN use
- Improve design of “Gebaza” to

avoid heat and for appropriate
protective measure use

- Spray pesticide

- All migrant workers have a good knowledge and improved risk perception
- All migrant workers use vector control protective tools

- Protective use initiated and maintained by all migrant workers

- Recognition of sign and symptoms continued at home

Outputs

Health facility staffs and farmland owners, leaders, and managers

Health Extension and Health Workers and Health Development Army

Health worker and Farmland owners, leaders, managers

Health system and research strengthening

- Linkage of facilities and migrant workers
- Ensure environmentally sound approaches to leishmaniasis prevention and related products
- Conduct further research to identify appropriate protective measures

The intervention for the prevention and control of Leishmaniasis among migrant workers could be implemented at three levels: pre-arrival, arrival, and departure (Figure 3).

1. *Pre-arrival* - the aim at this level is awareness creation throughout door media (posters, stickers, billboards) and screening to address the misperception about the real causes for Leishmaniasis and its transmission. A few migrant workers realized that sandflies cause Leishmaniasis, but simply knowing that does not prohibit other potential causes. Therefore, education campaigns with a comprehensive scientific explanation need to be considered to educate migrant workers about the transmission and why sandflies only cause Leishmaniasis and mention it is not GOD. This will require learning how to increase protective measure use and ensure the early identification of migrant workers through screening at arrival so that they are effectively referred to a health facility for initiation of treatment.
2. *At-arrival* - the aim at the arrival level is to promote the use of protective measures. The most reported barrier to ITN use was that they were uncomfortable hanging it in the farmland areas. Therefore, we need to identify local solutions to hang the nets. In addition, ITN that is self-supporting, accessible in a range of sizes, and does not occupy a great deal of space might be preferable. Moreover, increasing demand for products and services: recommending the cost of ITN should be decreased to be generally utilized. This could be accomplished by mass buying, local tailoring, community-based mechanisms of dissemination, and public appropriation. Integral leishmaniasis control strategies include wearing long sleeves during nighttime, utilizing local and modern fans, and utilizing mosquito loops, moisturizers, and sprays. This will require learning how to ensure all migrant workers receive ITN or other protective measures early, and those migrant workers can continue using ITN or other protective measures when they go to farmland areas or Gebaza.
3. *At-departure* - the aim at the departure level is to inform about the recognition of late signs and symptoms and the use of the protective measure. Because most social cues are learned from peers, health care providers should employ migrant workers peers to disseminate prevention information. This will require learning how to recognize the late symptoms of Leishmaniasis and the continued use of ITN.

Discussion

Leishmaniasis risk perception (mainly due to the perceived barrier), perceived as mild illness (perceived severity), and "Believe in God" (perceived susceptibility) was associated with inconsistent use of protective measures, despite the high perceived benefits and cues to action. The researcher could not delve into additional details about their perceived benefit, cues to action, self-efficacy and modifying

factors. This was basically because of participants repeating their lack of knowledge concerning Leishmaniasis and sandfly bite. Detailed discussion on perceived barriers, susceptibility, and severity they perceived about the Leishmaniasis or sandfly bite, was established.

Perceived susceptibility and severity

Vulnerability to Leishmaniasis among the migrant workers was reported due to their sleeping pattern and food preparation under the shade of acacia and balanitis trees. In this way, the workers' perceptions are somehow factual for the known epidemiology of Leishmaniasis in Ethiopia [39] and the behaviour of the sandfly vector, which is commonly found near acacia and balanite trees in the lowland farm areas of Metema-Abuderafie at the day and night times and dry and rainy seasons of the year [48]. Moreover, High-perceived leishmaniasis risk with their previous exposure was also reported, which can substantially impact workers' decision-making for using protective measures. This is in accordance with past studies portraying the significance of experiential components for individual decision making [36,37]. They thought about a variety of factors before deciding on whether to go through preventive activities. However, God was referenced as powerful other who was seen as being accountable for the health of individuals and liable for sickness in migrant workers. As found in the results, a portion of the migrant workers appeared to depend on God or spirit for a migrant worker to recuperate from disease. Some of the migrant workers perceived that there was nothing to do to forestall Leishmaniasis depending on God. This implies a diminished perceived vulnerability which may result in a smaller likelihood of taking precautions.

Our broad conversations with migrant workers instructed us that Leishmaniasis is a mild illness and is indeed not a primary health problem here, but rather a locally known disease called "Mich" was viewed as a more severe issue than Leishmaniasis because of the distorting skin results, and the society thinks encompassing it. Thus, in contrast to some studies [30,49,50,51,52], our study results upheld a conviction that Leishmaniasis was not recognized as a matter of migrant workers concern which could be a solid reason to have a significant negative relationship with intentions to utilize preventive measures (ITN). Accordingly, a low perceived severity of Leishmaniasis revealed in the present study could be ascribed to the "If a disease is seen, as usual, it might not be severe" [53]. Leishmaniasis may, in this way, be seen as less severe if simultaneously it is seen as usual and recognizable, as it was mentioned by many of the migrant workers. This would imply that perception of how common an illness is, as far as the HBM factor susceptibility, may influence the view of the disease's seriousness, influencing the probability of taking preventive action, for example, utilizing bed nets.

Perceived benefit and barrier

Despite vulnerability to leishmaniasis disease and widespread opinions that ITNs are an adequate measure of protection against Leishmaniasis [31,32,54,55], most respondents reported that they did not use bed nets because it is inconvenient and impossible to use all the time due to their communal and outdoor sleeping arrangements during their time on the farms. During harvesting season, almost all migrant workers spend the night in an open field inside the farm. These nighttime activities are the time

when the sandflies are active, but ITN use is not feasible. This is in line with a published literature review that identified common nighttime activity categories across different contexts in developing countries involving recurring social and community events [32,51,52]. Therefore, ITNs are not suitable for this risk group or at least not during the harvesting season. Identifying and disseminating alternative solutions like local neem oil, odourless neem, impregnated socks, long-lasting commercial skin repellent, and commercial wrist band should be considered. Supplying photographic images on using bed nets in farmlands or other challenging contexts should also be explored. To this end, when proven effective, personal protection measures should be promoted among those who must stay in the farmland at night to work or perform other duties [33-35,51,52].

Seasonal usage of protective measures (ITN) attributed to the problem of using ITN in the hot. The discomfort of using the ITN during the harvesting season. This finding is in line with a review of literature which reported discomfort, mainly related to heat, was a major impeding factor to bed net use [25,51,52]. Although improved Gebaza design that increases airflow may help reduce heat in the sleeping area, additional research on this topic is warranted.

Apart from sandfly, Leishmaniasis was also perceived to be caused by sexual intercourse, open defecation, messy environmental factors, filthy drinking water, bad food, and being ravenous, and their prevention might decrease the perceived benefit of sandfly control measures (ITN) [14,22,47,51,52,56].

While the alternative causes referenced cannot cause Leishmaniasis, they may prompt different diseases with similar signs and symptoms, like Acute Watery Diarrhea (AWD). The migrant workers mentioned different causes more frequently than the key informants can attribute to different reasons. First, migrant workers are more subjected to both seeing various diseases in workers. Secondly, accepting health education messages given by health professionals frequently resulting in a blend of biomedical and local prior thoughts and ordinary senses which is similar to malaria studies.

Intervention modality

Generally neglected by researchers and funding agencies, leishmaniasis control strategies have varied little for decades [57]. In this regard, the prevention and control of Leishmaniasis should be considered for inclusion in integrated vector management. The findings of this qualitative study will be of exceptional value for policymakers and program implementers interested in designing appropriate interventions programs against Leishmaniasis. The misperception identified with Leishmaniasis and sandfly bite were driving forces in developing an intervention to enhance vector control protective measure utilization to prevent Leishmaniasis. The misperceptions and lack of knowledge on leishmaniasis [9] and sandfly bite in the FGD revealed the requirement for building an intervention around the area.

Furthermore, concerns of barriers in utilizing protective measures also help in the amount of information migrant workers have. While there is an understanding of better health by treatment and utilizing protective measures and the trust in getting it, there are anxieties in their actual behaviours because of

misperceptions and a lack of existing information. In light of the data gathered in these groups, an intervention vigorously dependent on perception is very indispensable. Leishmaniasis/sandfly bite relationship to migrant workers, possible seriousness, and broad perception on the protective measure is vital in building perceived seriousness and susceptibility while lessening barriers in protective measures used.

Limitation

This study has some significant limitations that should be kept in mind. First, there were some limitations in running focus groups. The main limitation was with the logistics. Groups were created depending on the time accessibility of the study participants. This occasionally implied that groups from one farmland area would appear together, filling in as an inhibitor in people's openly (freely) talking. Secondly, while findings might be pertinent to other comparative settings, they cannot be generalized due to the purposive nature of the sample, but they do highlight issues that are worthy of exploration to help further develop leishmaniasis prevention strategies. Third, our results are intended to provide an in-depth understanding of migrant workers risk perception and the use of vector control protective measures. We used a qualitative content analysis approach which the HBM guided. This might be condemned because of its possibility to bias the analysis and consequently the study findings [34]. Nonetheless, to guarantee a non-biased way to deal with coding, which permits distinguishing and sorting all instances and dimensions of migrant workers risk perception and use of protective measure, we coded all transcripts inductively first and looked for the HBM to illuminate the later stages regarding the analysis. Finally, participant demographics served as an additional limitation of the study. Most of the participants were males. A more diverse group may have responded differently.

Despite the limitations, transcription's interpretations were led by accredited Ethiopian interpreters and approved by local researchers. Questioners were qualified experts and went through workshops on the KIs and FGD materials utilized in this study. Furthermore, this study gives an overview of the perceptions of leishmaniasis and vector control protective use in Metema-Abederafie. It shows that, although Leishmaniasis is no longer viewed as a significant health issue, vector control protective use might be sustained by shifting the balance towards use either the perceived benefits can be increased or the perceived barriers reduced.

Implication for health care

Concerns for Leishmaniasis among migrant workers are significant because of their potential health risks. Increasing risk perception and knowledge on Leishmaniasis influencing the migrant workers is essential in promoting protective measures. While there is an overall acknowledgement for the utilization of ITN, reluctance remains in the actual behaviour of using the protective measures. This is because of low perceived seriousness, susceptibility, barriers, and lack of knowledge [9] regarding Leishmaniasis and the protective measures demonstrated by the FGD conducted in the study. The HBM utilized in this study

[26] can foster an intervention to promote risk perception and utilization of protective measures among migrant workers.

Implication for the researchers

While this study provides many valuable perceptions that can be considered when implementing leishmaniasis prevention interventions, there might be different factors beyond the individual perceptions that may also influence in the steady utilization of leishmaniasis preventive measures. Thus, future research should consider different factors beyond the individual perceptions to give insights on how they also influence intentions to use leishmaniasis preventive measures. Moreover, potential studies that investigate the variation of individual perceptions across various seasons are necessary.

Conclusion

This article utilized the HBM to look at factors that predict behaviours related to decreased exposure to sandfly bites and thus decreased leishmaniasis disease transmission in Metema-Abuderafie lowland areas. Understanding perceptions of migrant workers in terms of perceived threat (Perceived susceptibility and severity), the likelihood of action (Perceived benefit and barrier), self-efficacy, and cues to action may enhance prevention efforts. A pivotal element to decreasing exposure for sandfly bites and Leishmaniasis comes from designing behaviour change communication that helps migrant workers adopt preventive behaviours generally fitting for them.

Abbreviations

FGD Focus Group Discussion

HBM Health Belief Model

KII Key Informant Interview

V.L. Visceral Leishmaniasis

WHO World Health Organization

Declarations

Ethics approval and consent to participate

The study was approved by ethical approval of the IRB of the University of Gondar and the Health education department. Study participants were included after explaining to them the details of the

objective of the study. Those who were volunteer to participate in the study were included after signing a written consent agreement.

Consent to publish

Not applicable

Availability of data and materials

The datasets used and analyzed during the current study are available from the corresponding author on reasonable request.

Competing interests

The authors declare they have no competing interests.

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Authors' contributions

This research article is part of a thesis by R.B., who wrote the draft proposal, applied for ethical clearance, collected data, analyzed data, and wrote the manuscript. M.S. supervised R.B. during initiation of the proposal, reviewed and edited the proposal, assisted in interpreting the result and composing the manuscript. M.S., F.S., M.A., Z.Y., AN, DE, CA assisted in data assortment and assessing the manuscript and M.A., YA., DE, L.P. reviewed and edited the project proposal and manuscript. All authors have critically perused and assessed, and endorsed the manuscript for publication.

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Figures

Figure 2

Visual representation (word cloud) of a perceived barrier for utilization of protective measures.

	Pre-Arrival	At arrival	At departure
Health work	Health Extension Workers and Health workers and farmland owners and leaders	Health facility staffs and farmland owners, leaders, and managers	Health Extension and Health Workers and Health Development Army
Activities	<div><div><ul style="list-style-type: none">- Awareness creation through outdoor media (banners, stickers, announcements)- Change perceptions/beliefs- Increase knowledge- Introduce more effective vector control tools- Screenings of Leishmaniasis film at the place where the migrant workers gather- Encouragement of ITN use- Improve design of "Gebaza" to avoid heat and for appropriate protective measure use- Spray pesticide</div><div>Perceived threat Perceived benefit Availability and accessibility</div></div>	<div><div><ul style="list-style-type: none">- Available prevention and treatment products/services and services providers- Appropriate distribution of ITN- Integrated vector control- Accept referrals- Increase appropriate utilization of protective measures and services- Increase demand for products and services- preventive practices should be strengthened through the provision of IEC materials, local capacity-building, the traditional/mass media, and farmland owner support- Dispel rumors about ITN- Intersectoral collaboration</div><div>Likelihood of action Availability and accessibility Competing priority</div></div>	<div><div><ul style="list-style-type: none">- Migrant worker screening and surveillance- Distribution of leaflet as reminder- Health education- Posters and stickers distributed to the migrant workers and community</div><div>Cues to action Self-efficacy</div></div>
Outputs	<ul style="list-style-type: none">- All migrant workers have a good knowledge and improved risk perception- All migrant workers use vector control protective tools	<ul style="list-style-type: none">- Protective use initiated and maintained by all migrant workers	<ul style="list-style-type: none">- Recognition of sign and symptoms continued at home
	<div>Health system and research strengthening</div> <ul style="list-style-type: none">- Linkage of facilities and migrant workers- Ensure environmentally sound approaches to leishmaniasis prevention and related products- Conduct further research to identify appropriate protective measures		

Figure 3

Three-level intervention modalities for prevention and control of Leishmaniasis among migrant workers.

Supplementary Files

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- [ResomBMCSupplementaryData72020211.pdf](#)