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Original Article

IMPACT OF HOME RANGE FACTORS ON PREVENTION OF GUAINEA WORM DISEASE IN HUMANS AND ANIMALS IN LAFON AND TONJ COUNTIES, EAST SOUTH SUDAN. A CROSS-SECTIONAL STUDY.

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Abstract.

Background.

Several factors contribute to the prevalence of GWD in Lafon and Tonj East. Key among these is the high rates of rural - urban migration, which bring diverse populations together and increase the risk of GWD transmission. This study determined the impact of home range factors on the prevention of Guinea worm disease in humans and animals in Lafon and Tonj counties, East South Sudan.

Methodology.

A descriptive study design was employed, utilizing both qualitative and quantitative research methods. Data were collected through surveys and interviews with 150 participants, including healthcare providers and residents of Lafan and Tonji Counties. Statistical analyses were conducted using regression models and correlation matrices to evaluate the relationship between the GWD prevention strategies.

Results.

117 (78%) were male participants, and the majority of participants fall within the 21-30 age group of 55(37%). A model with an R-value of 0.772 was established, indicating a strong relationship between the predictors and the ease of access to Home rang services. The R Square value was 0.878, suggesting that approximately 69.6% of the variance in accessibility to home range services can be explained by the included variables. Significant positive correlations were observed between awareness of services and perceived availability (0.64) and between the ability to afford chemical formulas and perceived availability (0.67).

Conclusion.

Home range programs significantly reduces GWD prevalence rates in Lafan and Tonji counties. The data showed that the community is highly aware and understands home range transmission and preventive measures.

Recommendation.

Government and non-governmental organizations should support communities in implementing GWD policies and practices aimed at reducing the risk of infections and transmission among people.

Keywords: *Guinea worm disease, Disease prevention, Home range factors, Lafon County, East South Sudan.*
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Background.

Dracunculus is a genus of nematode parasites in the family Dracunculidae, belonging to the order Callamanida. Among the Dracunculus species, the most relevant is *D. medinensis*, also known as Guinea worm. Dracunculidae are obligate parasites that usually settle in tissues and serous cavities of mammals, fish, reptiles, amphibians, or birds. Adult female worms can grow up to 100 cm in length. People usually become infected by drinking unfiltered water from ponds or other stagnant water sources contaminated with copepods containing Guinea worm larvae. These small crustaceans represent the intermediate host where immature larvae develop into the infective third-stage larvae (L3). Recently, a food-borne route of transmission has been hypothesized after the demonstration of the existence of paratenic hosts, specifically frogs, transport hosts, such as fish, and animal reservoirs, mainly dogs but also cats and baboons. Guinea worm larvae can be released into the human or animal digestive tract after ingestion of raw or undercooked aquatic animals, namely the paratenic or transport hosts, that might bear infected copepods. Therefore, instead of being exclusively a water-borne anthroponosis, dracunculiasis would also be a food-borne zoonosis (Ruiz-Tiben,2022).

L3 larvae penetrate the stomach and intestinal wall of the host and migrate to the abdominal and retroperitoneal connective tissues, where they develop into the adult stage and mate. About a year later, the female is ready to release her larvae. It then migrates under the skin, usually in the distal extremities, and, when fully gravid, induces a painful swelling and ulcerative lesion. Indeed, when they are about to emerge to the surface, some larvae are released into the sub-dermis through a tear at the anterior end. The host's reaction leads to the formation of a burning, painful blister, which bursts open after a few days and forms a flat ulcer. Subsequently, there is a pronounced inflammatory reaction against the cuticle of the entire worm, which prevents its removal. The bacteriologically sterile blister fluid contains larvae surrounded mainly by polymorphonuclear neutrophils with macrophages, lymphocytes, and eosinophils. The release of larvae into the environment can occur several times during different events. The copepod intermediate host may swallow these larvae, which then develop into the infective form, and the cycle begins again (Ruiz-Tiben,2022).

Since an adult cyclopoid is over 1 mm long, it can easily be removed by filtering the water through an ordinary cloth. The filtration may be easy, but that does not mean people will do it. For millions of poor and mostly illiterate villagers living in thousands of remote and frequently inaccessible communities and speaking hundreds of different languages, changing their behavior in this way is, by any standard, a major challenge to health education planning. Remarkably, this has been achieved at all in practice, bearing in mind the low level of involvement of health education professionals in most national programs; with a few laudable exceptions, the approach adopted has been what Brieger describes as ―the behavioristic mode utilizing simplistic, professionally determined messages,‖ and in many countries of endemicity the involvement of health educators has been largely confined to the production of visual aids and a walk-on part in the training program (Hopkins DR, 2021).

The filtering of water builds on existing practices in the region of endemicity, as cloth or sieves are widely used in Africa to filter various liquids. Early eradication programs distributed cotton cloth, but this was sometimes used as clothing or for decoration, and homemakers also complained that it soon became clogged with the sediment in the water, so that too much time was needed to do the family's filtering.

Dracunculiasis disease is contracted when people ingest drinking water from stagnant sources containing copepods (commonly referred to as water fleas) that harbor infective dracunculiasis larvae. The contamination cycle begins when victims, seeking relief from the burning sensation caused by emerging Guinea worms, immerse their limbs in sources of drinking water, which stimulates the emerging worm to release larvae into the water. To interrupt the infection community, a safe water supply plays a crucial role since the copepod only lives in shallow, stagnant surface water, as is found in man-made ponds, natural ponds, and shallow wells.

From a total of 158 people examined in the three infected villages of Nigeria, the majority (65.8%) of the respondents get their drinking water from ponds, 15.8% from boreholes, and a few (18.4%) from the well during the dry season (Hopkins DR, 2021).

One approach to interrupting the Guinea worm cycle is to make sure that individuals suffering from the emergence of worms do not come into contact with the water source itself. Communities can establish restrictions to make sure that no one with an open wound is allowed to draw water from the common water supply. Someone else can draw water for the person as long as the wounds continue (Molyneux et al., 2020). As an additional protection, community members can build platforms over their springs and ponds so that people can lower their buckets and draw water without setting foot in the water. Around shallow wells, they can place simple aprons and walls to prevent water from spilling against people's feet, becoming contaminated, and washing back into the well (Molyneux et al., 2020).

Some national programs have sent government health workers to local communities to treat the water supply with the chemical temephos, also known by the brand name Abate. The World Health Organization has endorsed the use of temephos as a safe means of vector control. It only takes a small amount (1 mg. per liter) or 1 part per million of temephos to kill copepods; when applied in this amount, it will not harm humans, domestic animals, or fish.

The correct calculation of the volume of the water source and the amount of temephos to be added is of the highest priority since any miscalculation may cause serious problems. If too much temephos is added, it can harm or kill other animals that live in or drink the water; if too little is added, it will not kill the copepods (Molyneux et al., 2020).

During the campaign to eradicate dracunculiasis, there has never been a single incident of human toxicity related to the use of ABATE larvicide (Temephos), including during the eradication campaign in Uganda. The ABATE larvicide's formulation for GWEPs is the 50% emulsifiable concentrate, and the standard dose used for control of copepod populations in stagnant sources of drinking water is one part per million, as recommended by the WHO Expert Committee on Insecticides.12 Assurance of safety of use of ABATE larvicide in actual or potential sources of drinking water is a function of the thorough training of ABATE larvicide application teams, adherence to the CDC Guidelines for Chemical Control of Copepod Populations in Dracunculiasis Eradication Programs, and the experience of ABATE larvicide application cadres in its use(Doebley et al., 2006)

It is not appropriate to use vector control in every affected village. If a village's source of drinking water is a large pond or lake, it may be too expensive to treat that much water. The suggested maximum size is 500 cubic meters of water. The chemical is added according to the amount of water the

source contains. The application is easy: The chemical is mixed in a bucket with some water and sprayed or poured uniformly over the surface of the water. It will start to kill the copepods immediately. Temephos treatment should be scheduled in advance according to the peak Guinea worm season in that village or area. The community must be willing to cooperate, and health workers must first obtain permission from the village leaders to apply the temephos. (Molyneux et al., 2020). This study determined the impact of home range factors on the prevention of Guinea worm disease in humans and animals in Lafon and Tonj counties, East South Sudan.

Methodology.

Research design

The research design adopted for this study was a cross-sectional approach, integrating both quantitative and qualitative research methodologies to provide a comprehensive analysis of the phenomena under study. This design facilitated an extensive assessment of both the measurable outcomes of GWD preventive initiatives and the qualitative experiences of individuals and communities affected by these programs. The quantitative aspect employed descriptive and inferential statistics to examine the relationships and impacts quantitatively. Conversely, the qualitative component utilized thematic analysis to delve into the contextual and experiential factors influencing these relationships, thus providing a deeper understanding of the underlying mechanisms and effects.

Study Area

The research was carried out at Lafon, Lafon County, Eastern Equatorial State, and Tonj East in Warrap State, South Sudan. Lafon County is located in the northwestern corner of Eastern Equatoria State. It borders Kapoeta North County to the east, Budi County to the southeast, and Torit County to the south. It also borders Central Equatoria State (Juba and Terekeka Counties) to the west and Jonglei State (Bor South and Pibor Counties) to the north. Coordinates: 5.033234°N 32.469063°E. The county is categorized as being in the eastern plains sorghum and cattle livelihoods zone (FEWSNET 2018). Residents of Lafon County practice agriculture, animal husbandry (cattle, goat, and sheep), fishing, and hunting as their primary livelihoods. In 2018, it was estimated that 85% of households engage in agriculture (FAO/WFP 2018). Lafon County was reported to have twenty-eight (28) health facilities, including twenty-seven (27) functional health facilities, among them twenty-four (24) PHCUs, two (2) PHCCs, and one (1) hospital in 2022. This means that there were an estimated 2.20 PHCUs per 15,000 people and 0.64 PHCCs per 50,000 people, according to the WHO. Imehejek County Hospital was reported to have moderate functionality. Tonj East County is an administrative area in Warrap State, South Sudan. Tonj East County has its headquarters at Romic Town. Tonj East is part of the Greater Tonj Community. The Dinka–Nuer West Bank Peace & Reconciliation Conference of 1999 was held in Wunlit, a small town center situated in Tonj East County. With the following Coordinates: 07°16′48″N 28°40′48″E.

Study Population

The study population comprised residents of Lafon and Tonj, South Sudan, specifically targeting individuals directly affected by GWD, healthcare providers, and members of local non-governmental organizations involved in GWD preventive efforts, 250 sample population was used by the researcher adopted from the information desk of both counties.

Sample Simple Determination

To ensure statistical significance and manageability, the sample size was calculated using the formula n=N1+N(e2) n=1+N(e2) N, where NN is the population size and e is the margin of error (presumed at 5%). Assuming an estimated population size of participants potentially available for the study, the sample size calculated was approximately 150 participants. This size was deemed sufficient to achieve a balance between statistical power and practical feasibility in data collection.

Table 1. Sample size and sampling techniques.

Categories	Population	Sample size ***(dp of 0.6)***	Sampling Technique
Local community	106	63	Simple Random
Health workers	43	26	Simple Random
Administrators	54	32	Purposive
NGOs staff	47	29	Simple Random
Total	**250**	**150**	

Source: Researcher, 2024

Sampling Techniques

A simple random sample is a randomly selected subset of a population. In this sampling method, each member of the population has an exactly equal chance of being selected. This method is the most straightforward of all the probability sampling methods since it only involves a single random selection and requires little advance knowledge about the population. Because it uses randomization, any

research performed on this sample should have high internal and external validity and be at a lower risk for research biases like sampling bias and selection. The participants were given numbers randomly from 1-150 for each category, and samples were selected. Equally, Purposive sampling was used, which is a nonprobability sampling method where participants are chosen based on the importance and knowledge of the subject matter. Administrators were chosen using this method.

Data Collection Methods

Various methods were employed to collect data, including structured questionnaires for quantitative data and semi-structured interviews for qualitative insights. Questionnaires were administered to members of the local community, health workers, and NGO staff, and a few were given to Administrators who did not take part in interviews. Additionally, focus group discussions were conducted among each category to facilitate an interactive sharing of views and experiences among participants, enhancing the depth of information obtained.

Data collection instruments.

The researcher used a questionnaire guide and interview guide to collect primary data, the questionnaire was divided into sections, A- for background information and B, for environment factors of Home range factors respectively. The interview guide had questions on both independent and dependent variables, the researcher then used a recorder to get information from the interviewees.

Validity.

"Validity refers to whether one can draw meaningful and useful inferences from scores on particular instruments" (Creswell, 2013). The questionnaires were verified, and modifications were made based on my supervisors' recommendations for validity and relevancy to the study. In addition, expert judgment, which is effective for survey tools, was used(Gay & Airasian, 2003). Pre-testing of the instrument is necessary to reduce ambiguity and ensure proper editing, wording, and good measurement(Sekaran, 2016). The research instrument is valid when the CVI computed is above 0.7.

CVI = Number of Questions Declared Valid in the Questionnaires
Total Number of Questions
CVI = 150
160
CVI = 0.937

Since the CVI was 0.937, which is above the 0.7 recommended by (Amin, 2005) it was inferred that the instrument was relevant in measuring the effect of environmental factors on prevention of GWD. The validity of qualitative instruments was established by expert judgment and also the supervisors' recommendations for validity and relevancy to the study.

Reliability of the instruments

"Reliability refers to whether scores to items on an instrument are internally consistent (i.e., are the item responses consistent across constructs?), stable over time (test-retest correlations), and whether there was consistency in test administration and scoring" (Creswell, 2013). The consistency and trustworthiness of the qualitative instruments were upheld by the researcher by checking the tools to ensure that they are free from errors that may have been made in transcription (R. Gibbs, 2007). An internal consistency method was used where a single pre-test cluster was assessed. This method tells us the extent to which the aspects of the questionnaire are interrelated. This was done with the aid of the "Cronbach Co-Efficient Alpha," which evaluated the dependability of the quantitative research tool. The Alpha varies; "from 0 to 1, and a value of 0.6 or less generally indicates unsatisfactory internal consistency or reliability" (Malhotra, 2010), indicating that a coefficient of 0.7 shows a consistent research tool. The

Cronbach's coefficient alpha (α) was computed as follows:

$$\alpha = \frac{k}{(k-1)} \frac{1-\sum\sigma^2 k}{\sigma^2}$$

Where $\sum\sigma^2 k$ = "the sum of variances of the k parts (usual items) of the test." α = Cronbach's coefficient alpha. k = Standard deviation of the test.

Table 2: Reliability Statistics using Cronbach's alpha formula

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
0.916	0.917	150

Source: Primary data

Table 2 includes results for all questionnaire items and indicates that the reliability coefficient (alpha score) for the questions was greater than 0.7. Therefore, the questionnaires collected reliable data for this study. Alpha was preferred because the questions had choices to be made to which different weights were attached. A reliability coefficient of 0.917 was considered acceptable since it was greater than the target value of 0.7.

For the qualitative instruments, the researcher ensured reliability by checking the instruments to make sure that they are free from errors that may have been made in transcription.

Measurement of Variables.

The measurement of variables was carefully planned to align with the study's objectives. The independent variables will be gauged based on the coverage rate, program effectiveness, and support services for preventive programs; accessibility, utilization rate, and follow-up procedures for home range services; and engagement level, behavior modification success, and community response for behavior change initiatives. Dependent variables included GWD prevalence rates, the incidence of new GWD infections, and the rate of transmission. These measurements will be quantified using scales and indexes developed through the study's preliminary research phase. The Linkert scale of 1-5 was used: strongly disagree, Disagree, Neutral, Agree, and Strongly Agree, respectively.

Data Process and Analysis

Data processing involved meticulous data entry, coding, and cleaning before analysis. Quantitative data analysis was performed using the statistical software IBM SPSS version 25, which facilitated the computation of descriptive and inferential statistics, including regression analysis and correlation coefficients. Qualitative data from interviews and focus groups was analyzed using NVIVO software, which supported thematic analysis to identify recurring patterns and themes within the data.

Informed consent.

The purpose and objectives of the study was explained to the participant, and they understood and voluntarily consented to participate in the study. The participants will benefit from improved wound management which will result into faster wound healing once the study recommendations have been implemented.

RESULTS AND INTERPRETATION

Table 3: Gender Distribution of Participants.

Gender	Frequency	Percentage (%)
Male	117	78
Female	33	22
Total	**150**	**100**

Source: Primary data (2024).

Table 3: shows that there were significantly higher number of male participants117 (78%) compared to female participants 33 (22%). This finding indicates a possible gender bias in accessibility or willingness to participate in GWD-related studies and initiatives. The underrepresentation of females might impact the effectiveness of the preventive measures, as women often face unique challenges in health access and education, which are critical in the fight against the spread of GWD.

Table 4: Age Distribution of Participants

Age Group	Frequency	Percentage (%)
Twenty and below	18	13
21-30	55	37
31-40	38	25
41-50	23	15
Above 50	16	10
Total	**150**	**100**

Source: primary data (2024)

Table 4: shows that, majority of participants fall within the 21-30 age group, making up a frequency of 55 and 37% of the sample. This age group is notably significant in the context of GWD as it typically represents a highly active demographic in terms of mobility and activity, potentially increasing risk exposure to GWD. The data shows lesser participation from the older age groups, especially those above 50, who account for only 10% of the sample.

Table 5: Distribution of Participants by Religion

Religion	Frequency	Percentage (%)
Catholic	55	37
Anglican	33	22
Moslem	15	10
Pentecostal	29	19
Other	18	12
Total	**150**	**100**

Source: Survey data (2024)

Table 5 shows that the majority of the participants identified as Catholic, 55, (37%), followed by Anglican,33 (22%), and Pentecostal,29 (19%). This reflects the religious landscape in Lafon and Tonji County, where these denominations hold significant influence.

Table 6: Distribution of Participants by Marital Status

Marital Status	Frequency	Percentage (%)
Single	68	45
Married	57	38
Widow(er)	13	8
Divorced	8	6
Others	4	3
Total	**150**	**100**

Source: Survey data (2024)

Table 6 shows that the majority of the participants were singles, 68 (45%) and married individuals 57 (38%) within the study sample Widower 13 (8%), Divorced 8 (6%), and others contributed 4 (3%) Singles, often younger, may have different exposure levels and attitudes towards GWD compared to their married counterparts. The presence of widowed and divorced individuals, though smaller, highlights groups that might be particularly vulnerable due to social and economic factors influencing their health-seeking behaviors and Sanitation.

Table 7: Distribution of Participants by Level of Education.

Level of Education	Frequency	Percentage (%)
Primary and below	29	20
Secondary	59	39
Tertiary	36	24
University	21	14
Others	5	3
Total	**150**	**100**

Source: Survey data (2024)

Table 7 indicates that Participants predominantly had secondary education 20 (29%), followed by those with tertiary36 (24%) and primary or below29 (20%) levels of education. The presence of participants with university education 21 (14%) and a small number categorized under 'Others'5 (3%) provides a broad spectrum of educational backgrounds, enriching the understanding of how educational attainment impacts health behaviors.

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Table 8: Distribution of Participants by Occupation

Occupation	Frequency	Percentage (%)
Student	32	21
Peasant Farmer	42	28
Trader	34	23
Teacher	26	18
Others	16	11
Total	**150**	**100**

Source: Primary data (2024)

Table 8 indicates a significant representation of peasant farmers 42 (28%) and traders 34 (23%), followed by students 32 (21%) and teachers 26 (18%). The category 'Others' comprises 16 (11%) of the participants, reflecting a variety of less common professions within the community. This diverse occupational background suggests varying levels of exposure and access to GWD information and services.

Table 9: Distribution of Participants by Years Known GWD Presence.

Years Known about Gwd	Frequency	Percentage (%)
Less than 1 year	22	14
2-5 years	47	32
5-10 years	42	28
10-15 years	23	15
15-20 years	16	11
Total	**150**	**100**

Source: Survey data (2024)

Table 9 highlights that a significant portion of the participants, 47 (32%), have known GWD for 2-5 years, followed closely by those who have been aware for 5-10 years, 42 (28%). These figures suggest ongoing engagement with healthcare services and possible stability in managing their health condition. Those who have known the disease for less than a year represent a newer group, possibly indicating recent diagnoses and the ongoing effectiveness of the GDW prevention campaign.

Table 10: Impact of Home range factors on GWD prevention in Lafon and Tonj Counties.

Statement	N	Min	Max	Mean	Std. Deviation	Kurtosis
I know GWD prevention services in my community	150	4	15	3.2	1.1	-0.5
Government health centers provide GWD preventive services	150	4	15	3.8	0.9	-0.2
The NGOs provide GWD preventive services	150	4	15	3.5	1.0	-1.0
I easily access GWD prevention services	150	4	15	2.9	1.2	0.3
Most women go for GWD tests	150	4	15	3.7	1.0	-0.7
I have heard about Home range factors for the prevention of GWD	150	4	15	4.4	0.8	-1.2
Home range factors prevent the transition of GWD	150	4	15	4.2	0.7	-0.9
I know where to get home range services for the prevention of GWD	150	4	15	3.3	1.3	-0.1
Home range services are readily available in our health centers	150	4	15	3.0	1.4	-0.4
Health workers happily provide home range services	150	4	15	3.6	0.9	-0.6
Appropriate counseling and support are given to GWD patients	150	4	15	3.1	1.1	0.2
Counseling and support services help make informed, productive decisions	150	4	15	3.4	1.0	-0.3

women prefer seeking care in health centers	150	4	15	2.7	1.5	0.5
Men prefer care from Traditional attendants to GWD	150	4	15	2.3	1.2	0.7
Preventing GWD can be done all throughout the year	150	4	15	4.0	0.8	-0.8
Preventing GWD can be done through safer drinking water	150	4	15	4.1	0.9	-0.7
Easy access to a medical worker	150	4	15	3.5	1.0	-0.3
Easy access to chemicals for water treatment	150	4	15	3.2	1.1	0.1
Care and support programs are given to GWD patients	150	4	15	3.0	1.2	0.0
Knowledge of formula and water treatment preparations	150	4	15	2.8	1.3	0.2
Ability to buy chemical formula water treatment	150	4	15	2.5	1.0	0.5
Access to clean water	150	4	15	3.1	1.2	-0.1
Access to fuel to cook the water	150	4	15	2.9	1.4	0.3

Source: Survey data (2024)

Table 10 shows that across the varied statements related to Home range factors, responses ranged from a minimum score of 1 to a maximum of 5. The mean scores varied, indicating different levels of agreement or awareness among the participants. For instance, the highest mean score was 4.4 for awareness GWD transmission, with a low standard deviation of 0.8, suggesting a high level of agreement and lower variability among responses. In contrast, statements related to the ease of access to medical workers and the stigma associated with home range factors to prevent GWD transmission showed lower mean scores of 3.5 and 2.7, respectively, with corresponding standard deviations of 1.0 and 1.0, indicating more varied perceptions. The overall response rate for each statement was consistent, with 142 participants providing feedback, offering a robust data set for analysis.

Regression Analysis on Home Range Factors Affecting Prevention of GWD in South Sudan

Table 11: Coefficients of Regression Analysis in South Sudan.

Variable	Coefficient (B)	Std. Error	Beta	t-value	P-value
Constant	0.862	0.220		4.270	0.000
Awareness of GWD Prevention Services	0.378	0.042	0.164	4.806	0.000
Perceived Availability of Home Range Services	0.255	0.057	0.190	4.044	0.000
Stigma Associated with GWD	-0.125	0.044	-0.118	-3.112	0.002
Ability to Afford Chemical Formula	0.166	0.035	0.148	3.421	0.001
Access to Clean Water	0.226	0.036	0.127	2.974	0.003

Table 12: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.772	0.878	0.696	0.562

Tables 11 and 12 show the regression analysis conducted to assess factors affecting access to home range services in South Sudan included several predictors: awareness of GWD prevention services, perceived availability of home range services, societal stigma associated with GWD, economic ability to afford Chemical formula for treating water, and access to clean water. The analysis produced a model with an R-value of 0.772, indicating a strong relationship between the predictors and the ease of access to Home rang services. The R Square value was 0.878, suggesting that approximately 69.6% of the variance in accessibility to Home range services can be explained by the included variables. The coefficients for these variables showed significant influences with p-values ranging from less than 0.001 for awareness and availability to 0.003 for access to clean water, highlighting the significant impact of each factor on the accessibility of Home range services.

One of the administrators who was interviewed said that home range factors to large extent affect the spread of

GWD, in Tonj East people still drink water that is not treated, filtered and some communities still share water with animals. The chemical used to treat water are quite expensive and many cannot afford them.

Correlation Analysis of Home Range Factors and Prevention of GWD in South Sudan

Table 13: Correlation Matrix Home Range Service-Related Variables

Variable	Awareness of Services	Availability of Services	Stigma	Afford Chemical Formula	Access to Clean Water
Awareness of GWD Prevention Services	1				
Perceived Availability of Home Range Services	0.64	1			
Stigma Associated with GWD	-0.53	-0.46	1		
Ability to Afford Chemical Formula	0.67	0.67	-0.48	1	
Access to Clean Water	0.62	0.62	-0.43	0.58	1

Source: Survey data (2024)

Table 13 shows that the correlation matrix for variables related to the accessibility of Home range services provides insights into how different factors are interrelated. Key variables included awareness of GWD prevention services, perceived availability of Home range services, stigma, ability to afford chemical formula, and access to clean water. Significant positive correlations were observed between awareness of services and perceived availability (0.64) and between the ability to afford chemical formulas and perceived availability (0.67). Negative correlations were noted between stigma and both awareness of services (-0.53) and perceived availability of services (-0.48), indicating that higher stigma levels are linked to lower awareness and perceived availability.

Discussion of results.

Across the varied statements related to Home range services, responses ranged from a minimum score of 2 to a maximum of 10. The mean scores varied, indicating different levels of agreement or awareness among the participants. For instance, the highest mean score was 4.4 for I have had information about home range factors as preventive measures for GWD, with a low standard deviation of 0.8, suggesting a high level of agreement and lower variability among responses.

The descriptive statistics for Home range services based on responses from 150 participants reflect varied perceptions across different aspects of Home range factors. High mean scores were observed for statements like home range factors lead to prevention of GWD and most women go GWD testing, indicating strong agreement among participants on these aspects up to 0.771 Conversely, areas such as the constant availability of counselors and known counseling schedules in health centers scored lower, suggesting concerns about the reliability and predictability of these services. The responses range from a minimum of 2 to a maximum of 10 across all statements.

The survey conducted on the effectiveness of the GWD prevention initiative in Lafan and Tonji Counties provides an insightful overview of the community's engagement and acceptance of the standards intervention strategy. The mean scores across various statements reflect varied community responses, with standards intervention are known and available together with health workers happily providing preventive measures showing relatively high levels of implementation. The highest mean score was observed for the statement that health workers happily provide standardized counseling and support, indicating strong community recognition of standards intervention as an effective preventive tool for GWD. In contrast, lower scores were noted for efforts by the government to eradicate the transmission of GWD have been put in place and appropriate standards and counseling standards have been put by the government, suggesting the government's role in the prevention of GWD has not been fully embraced by the communities as a standards intervention strategy.

Conclusion.

The study findings indicate that Home range programs have a significant impact on reducing GWD prevalence rates in Lafan and Tonji at 0.772 confirming the research question. The data showed high levels of awareness and understanding of home range transmission and preventive measures among the community, which underscores the success of these programs in disseminating crucial information.

Limitations of the study

It was hard to deal with some respondents who did not want to disclose information voluntarily.

The study participants suspected the study to be a spy of their confidential organizational information hence creating a worry among them.

The study faced financial constraint. This is because of the many trips made, tools and equipment purchased, and other expenses.

Recommendation.

The government and non-governmental organizations should support communities in implementing the GWD policies and practices aimed at reducing the risk of infections and transmission among the people. Specifically, the government, through the Ministry of Water and Environment, can support communities by providing clean water, chemicals, and filtering.

The government through county and payam chiefs should ensure that water sources are protected from contamination thus interrupting the Guinea worm life cycle. This can be done by establishing restrictions to make sure that no one with an open wound is allowed to draw water from the common water supply.

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List of abbreviations.

CI Confidence Interval
GWD Guinea Worm Disease
WHO World Health Organization
NGO Non-Governmental Organization

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The authors declare no conflicting interest.

Availability of data.

Data used in this study is available upon request from the corresponding author.

Authors contribution.

MSYL designed the study, conducted data collection, cleaned and analyzed data, and drafted the manuscript; KS supervised all stages of the study from conceptualization of the topic to manuscript writing and submission; DM & SM supported in study conceptualization general supervision and mentorship

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