

## **Social Network Interfaces of Illegal Animal Genetic Resource Trafficking: An Assessment on Local Security Units Proximal to Border Point Villages of Western Tigray, Ethiopia**

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**Abstract:** Illegal animal genetic resource trafficking is one of the emerging conservation challenges threatening the sustainability of the animal genetic resource. The study was conducted from February-April, 2017 with the aim to assess the social network interfaces of illegal animal genetic resource trafficking in border checkpoints of western Tigray. The data were collected by preparing both open and close-ended questionnaire for interview. Furthermore, the sampling was designed taking individual custom village interface as a cluster and hence cluster sampling was used. Final sampling units from each cluster were taken using systematic sampling. The data were analyzed using descriptive statistics to understand the social network interfaces of illegal animal trafficking. All (100%) of the local security units responded that, Lugdi and Dima custom interface villages are sites of potential animal genetic resources trafficking. All (100%) of the local security units responded that, domestic animals are the most widely trafficked biogenetic resource. All (100%) of the local security units responded that, animal genetic resource trafficking and livelihood alternatives are correlated as a source of primary income. All (100%) of the local security units responded that, there are exit points of animal genetic resources trafficking within the current network of the areas. About (70%) of the local security units responded that, unemployed youths are vigorously taking part in illegal animal genetic resource trafficking through the villages of Lugdi area. All (100%) of the local security units responded that, the degree of involvement of youths in illegal animal genetic resource trafficking is serious in Dima locality. Almost a majority (80%) of the local security units replied that, the degree of involvement of youths in illegal animal genetic resource trafficking is serious in Bereket locality. On the other hand, the degree of involvement of youths in illegal animal genetic resource trafficking is not serious in the Lugdi locality. All (100%) of the local security units responded that, Sudan is the neighboring states illegally accessing the animal resources through the hidden exit routes of western Tigray. All (100%) of the local security units responded that, animal genetic resource traffickers are seized from the patrolling efforts within the physical geography of the surveyed areas. Hence, address the missing social links through community based interventions should be integrated into the local security system of custom village interface of western Tigray.

**Key words:** Smuggling • Biogenetic • Enforcement • Exit

### **INTRODUCTION**

Ethiopia is endowed with varied ecological and vastly spanning potential bio genetic resources [1]. The country is known as one of the twelve primary centers for the origin and diversity of plant genetic resources in the

world and is also rich in fauna diversity [2]. Biodiversity plays vital and diverse roles in economic, ecological and social fabrics of the country [2]. The national economy and the livelihoods of its local community are strongly reliant on biodiversity and its ecosystem services [3]. However, newly occurring man-made and natural factors

have been experiencing an array of serious environmental challenges that are eventually leading to the loss of biodiversity and ecosystem services [2]. Bio genetic resource trafficking is one of the emerging conservation challenges leading the bio-capitals to be unsustainably exploited by illegal individuals and groups [4]. Wildlife trade is any sale or exchange of wild animal and plant resources by people [5]. This can involve live animals and plants or a diverse range of products needed or prized by humans, including skins, medicinal ingredients, timber, fish and other food products [5]. Global trade in illegal wildlife is potentially vast illicit economy, estimated to be worth billions of dollars each year, impeding international efforts to conserve rare and endangered animals and plants [6]. Owing this, most plants and animals are trafficked from developing countries to the western world [7, 8]. Globally, the recent illicit trade in wildlife is estimated to be worth US\$50-150 billion per year [9]. Bio genetic resource trafficking is a transit crime that has wide-ranging implications for society [4]. Not only does it severely affect the environment by impacting biodiversity, it also hampers social and economic development in many communities [7, 11]. Furthermore, wildlife trafficking represents an increasing threat to national and global security [5] being run by sophisticated crime groups who use the profits for terrorism and rebel uprising [5, 8]. Wildlife trafficking is linked to other serious crimes such as drug trafficking, arms trafficking, human smuggling and document counterfeiting [11]. Moreover, it is cited as a means to finance the most violent and destructive activities of criminal and terrorist organizations because of the major financial benefits derived from a relatively minimal time investment, low risks of detection and lack of serious punishment [12]. The huge profits made from the illicit wildlife trade act as incentives to organized crime networks [13]. There is also growing evidence that, non compliant or militia groups in Africa use profits from the illegal sales of wildlife to fund terrorist activities [14].

The demand for wildlife products is considerably influenced by culture and depends on different consumer groups [8,15] has identified three main types of criminals involved in wildlife trafficking: local farmers trying to supplement their incomes, mafia-style groups operating in developing countries and international smuggling networked groups. Researches revealed that, most wildlife genetic resource trafficking, particularly with regards to the initial part of the market supply chain, is carried out by individuals; opportunistic locals who try to supplement their income and professional trappers [8]. Wildlife crimes typically occur in remote rural regions characterized by low population density and diverse geographical features

[6]. These factors make it difficult for law enforcement agents to solve the crimes and bring the executors of these offenses to justice [17]. Although wildlife conservation laws and regulations provide a variety of enforcement mechanisms to curb the illicit wildlife trade, enforcement mechanisms pose a huge challenge [18]. Inadequate financial, human resources and lack of institutional capacity are barriers to enforcing these wildlife laws [19].

Poor detection of transboundary good by border custom checkpoint plays a key role in facilitating the illicit trade of wildlife [19]. Markets for protected plants, animals and animal materials includes Belgium, China, the Czech Republic, France, Hong Kong, Israel, Japan, Netherlands, Romania, Spain, the United Kingdom and Vietnam [18]. Without the commitment of the local community, customs agents and enforcement bodies in these countries and in the countries from which trafficking originates the illegal trade in endangered species will continue [19]. The great concern of wildlife trafficking in Africa is loss of security, revenue from tourism, which creates jobs and contributes resources for national development [20]. All the while, some species are pressed towards extinction at 1000 times the natural rate [21]. The fight against trans-boundary conservation crime received a boost at the G8 meeting held from 17 to 18 June 2013 at Lough Erne [22].

G8 leaders recognized the need to tackle criminal trafficking and strengthen border security, including in relation to the illicit trafficking of bio genetic resources, noting the links to governance, the rule of law and sources of funding for terrorists [23]. Ethiopia has a relatively short history of dealing with wildlife conservation crimes [24]. However, there are prominent, encouraging efforts to reduce illegal trade of wildlife by signing an international conservation and law enforcement conventions. Nevertheless, Ethiopia is identified both as a source and a key trade hub for illegal ivory trafficking [24]. Ethiopia has signed the CITES which prohibits illegal wildlife trade [22].

According to criminal justice programs and wildlife charities, a kilogram of ivory poached from elephants can be sold in Asia for around USD 850 (650) [22]. In 2011, over 31 million worth of ivory tusks were smuggled from Eastern Africa to Asia [22]. Recently, the government of Ethiopia has burned to ash six tons of ivory to discourage poaching and wildlife trafficking crimes [22]. However, the problem is still persisting with the social network interfaces along border custom checkpoint of western Tigray. Hence, there is a need to research the social network interfaces of illegal animal genetic resources trafficking on local security units proximal to border checkpoints of western Tigray, northwestern Ethiopia.

## MATERIALS AND METHODS

**Description of the Study Area:** The study was conducted in three custom checkpoint village interfaces of western Tigray, northwestern Ethiopia. The surveyed sites are located at 1383 km northwest of Addis Ababa, the capital city of Ethiopia and 600 km from Mekelle, the capital city of Tigray national regional state. Geographically, it is located between  $13^{\circ} 50'$  and  $14^{\circ} 23'$  N and  $36^{\circ} 31'$  and  $37^{\circ} 29'$  E. Western Tigray has three Ethiopian custom and revenue authority border checkpoints administered under Humera custom branch office. Lugdi is situated at the junction of Ethio-sudan heading along the highway of Dansha-Abdrafi-Maycadran ending in Humera. This is one of the transit hubs for a large volume of animal genetic resource heads and other crop varieties crossing the border trade activities. Bereket is found in Kafta Humera Werda, 14 km away from May kadra town. The locality is predominantly a kola (lowland) area. Dima is one of the custom checkpoints located in western zone Tselemti woreda. Based on figures from the central statistical agency in 2005, Dima has an estimated total population of 902, of which 498 are men and 404 are women [25]. Its agro-climatic zone is identified as qolla with an inclination to semi-arid. It is bordered by Eritrea in the north, in the western Sudan. Within Tigray it is positioned in the woreda of Kafta-Humera and Tahtay-Adiabo [26].

**Target Population:** The target groups of this study were local security units of the three custom checkpoint village interfaces of western Tigray. Based on the information obtained from the Ethiopian Biodiversity Institute genetic

control staff deployed in western Tigray, there are 28 local security units in Lugdi where as Dima checkpoint has 26 local security units and the numbers of local security units of Bereket checkpoint are 26. Therefore, there are a total of 31 local security units working on the selected border custom checkpoint village interfaces in western Tigray, northwestern Ethiopia.

**Method of Data Collection:** The researcher uses primary data for the study. The data were collected by preparing both open and close ended questionnaires for interview. Researchers, with continuous supervision, were contacted each and every respondent face- to- face to get questionnaire filled. Furthermore, the consent of animal genetic resource trafficking for local security units was confirmed being fully informed of the study objectives prior to the interview. In order to avoid communication discrepancies between the data collectors and the respondents, the questionnaires were translated to the language spoken in the custom village interface of northwestern Ethiopia.

Group discussion were done with focus groups established in the community nearby each custom checkpoint village interfaces comprising 4 to 5 members. The discussions focused on the type of animal species being trafficked, reasons that encourage trafficking, actors involved in the smuggling process, season in which smuggling is higher and why, custom checkpoint village interfaces by which smuggling is higher and why, the challenges encountered in the local community due to illegal animal genetic resource trafficking and the possible solutions to fight against it in the border points of northwestern Ethiopia.

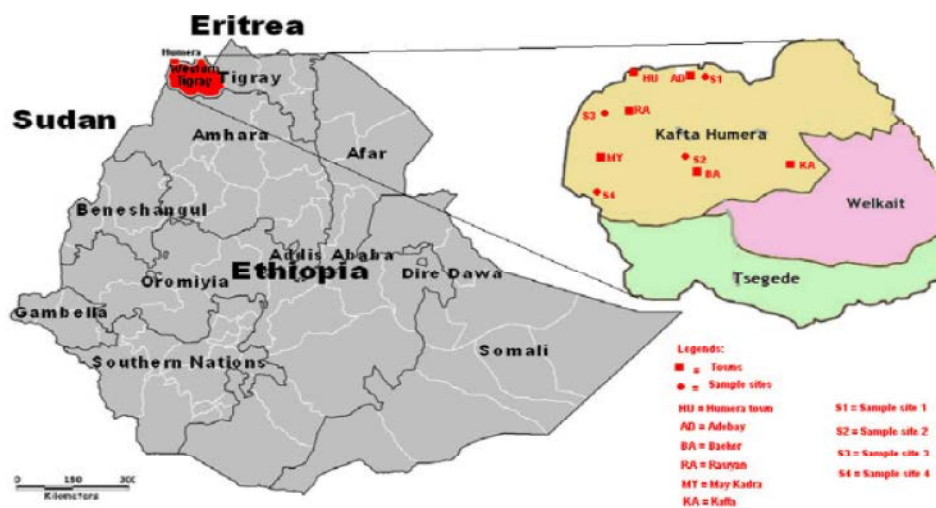


Fig. 1: Map of the study area (custom checkpoint village interfaces of western Tigray)

**Variables of the Study:** The response variable of the study was social network interfaces of illegal animal genetic resource trafficking in custom checkpoint village interfaces, information on exit point, observation of the local security settling adjacent the border point about animal genetic resource trafficking practices. The explanatory variables/factors that were used as being factors in the practice of illegal animal genetic resource trafficking of the selected group's in the custom checkpoint village interfaces of northwestern Ethiopia was:

- AgeSex Distance Workload
- Attitude Income Training Unemployment
- Knowledge Experience Mobility Literacy
- Household size Location Housing No. of staff

**Sampling Design:** The sampling procedure was designed to collect primary data. The northwestern part of Ethiopia do have three custom checkpoint village interfaces, so the data were collected taking individual custom checkpoint village interfaces as a cluster and hence cluster sampling was used. After determining the total sample size (n), proportional allocation to each cluster (i.e. Custom checkpoint village interface) was done by further considering the amount of local security units on animal genetic resource trafficking from each checkpoint village interface. Final sampling units from each cluster were taken using systematic sampling. In a systematic sampling we decide the sample size n from a population size of N. In this case, the population has to be organized in some way, such that we choose a starting point along the sequence.

The total sample size (n=31 local security units) was proportionally allocated to each border custom checkpoint village interfaces using the formula [27].

$$n_l = \frac{N_l}{N} n \quad l = 1, 2, 3$$

Where:

- $N_l$ : Total number of local security units in  $l^{\text{th}}$  custom checkpoint village interfaces,  $l = 1, 2, 3$
- $N$ : Total population of local security units on illegal animal genetic resource trafficking in northwestern checkpoint village interfaces.
- $n_l$ : Total sample size taken from  $l^{\text{th}}$  checkpoint village interfaces
- $n$ : Total sample size determined from a custom checkpoint village interfaces of northwestern Ethiopia

The three individual clusters (i.e. Custom checkpoint village interfaces) for the sample sizes of local security units was:

Lugdi ( $N_1=28$ ) Dima custom checkpoint village interface ( $N_2= 26$ ) Bereket custom checkpoint village interfaces ( $N_3=26$ )

The proportional allocation size will be computed as follows:

$$n_l = \frac{N_l}{N} n, \quad n_2 = \frac{N_2}{N} n \quad \text{and} \quad n_3 = \frac{N_3}{N} n$$

$$n_1 = \frac{28}{80}(31) \sim 11 \quad n_2 = \frac{26}{80}(31) \sim 10 \quad n_3 = \frac{26}{80}(31) \sim 10$$

The sample size taken from the local security units was 11, 10 and 10 for Lugdi, Dima and Bereket custom checkpoint village interfaces respectively.

**Statistical Analysis:** The data was analyzed through SPSS version 20.0. The study uses descriptive methods to understand the nature of the data for illegal animal genetic resource trafficking crimes. Inferential methods for detail analysis of the variables were used. Furthermore, matrix ranking was used to provide rank of the illegal animal genetic resources species being trafficked along the surveyed border custom check points and proximal village interfaces of northwestern Ethiopia.

## RESULTS

**Socio-Demographic Characteristic of Local Security Units in Custom Checkpoint Village Interfaces of Western Tigray:** The mean age of the interviewed local security units is 41.9, 51.2, 39.8 in Lugdi, Bereket and Dima custom checkpoint village interfaces of western Tigray respectively (Fig. 1). The mean work experience of the interviewed local security units is 8.7, 15.8, 7.3 in Lugdi, Bereket and Dima custom villages interface respectively.

The mean score of the educational background of the interviewed local security units is 27, 20 in Lugdi and Bereket custom checkpoint village interfaces of western Tigray. On the other hand, a mean score of 30 is recorded in the educational background of Dima village local security units as grade 9<sup>th</sup> (Table 1).

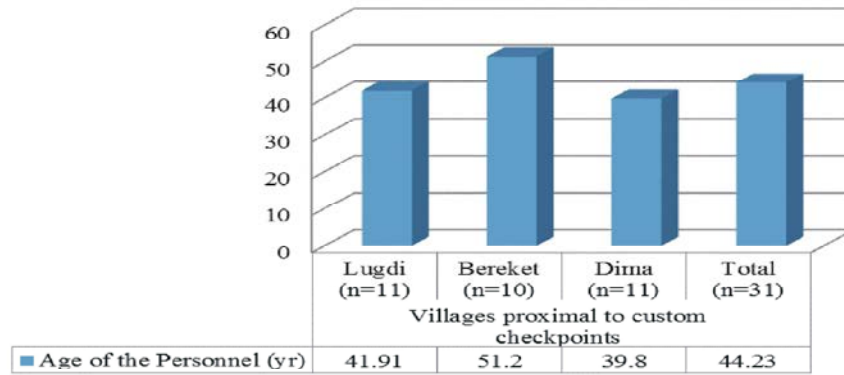


Fig. 2: Age of the interviewed local security forces in custom villages interfaces of western Tigray

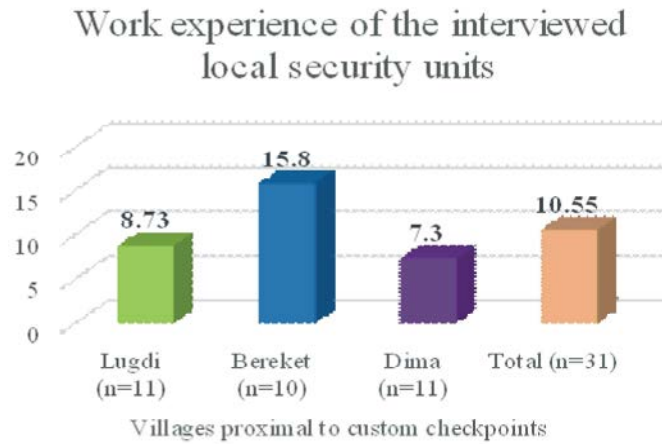


Fig. 3: Work experience of the interviewed local security forces in custom village interfaces of western Tigray

Table 1: Educational background of local security units in custom checkpoint village interfaces of western Tigray

			Villages proximal to custom checkpoints (%)			
No.	Variables	Categories	Lugdi (n=11)	Bereket (n=10)	Dima (n=10)	Total (n=31)
1.	Educational Background	Illiterate	9.1	10.0	20.0	12.9
		3 <sup>rd</sup>	9.1	0.0	0.0	6.5
		4 <sup>th</sup>	18.2	10.0	0.0	0.0
		5 <sup>th</sup>	9.1	20.0	10.0	12.9
		6 <sup>th</sup>	27.3	20.0	10.0	19.4
		7 <sup>th</sup>	0.0	0.0	10.0	3.2
		8 <sup>th</sup>	9.1	10.0	10.0	9.7
		9 <sup>th</sup>	9.1	10.0	30.0	16.1
		10 <sup>th</sup>	9.1	0.0	0.0	3.2

**Enforcement Challenges of Illegal Animal Genetic Resources Trafficking in Custom Checkpoint Village Interfaces of Western Tigray:** Illegal animal genetic resource trafficking has multifaceted enforcement challenges in the network of custom checkpoint village

interfaces of western Tigray. Lack of strong penalty, legal basis, capacity, community support and sufficient resources were ranked 1-5 sequentially as enforcement challenges in all the surveyed custom checkpoint village interface of western Tigray (Table 2).

Table 2: Enforcement challenges of animal genetic resource trafficking in custom checkpoint village interfaces of western Tigray

No	Enforcement challenges	Villages proximal to custom checkpoints (%)			Ranking
		Lugdi (n=11)	Bereket (n=10)	Dima (n=10)	
1.	Lack of community support	2.36	2.10	2.20	4
2.	Lack of resource	2.09	1.90	2.90	5
3.	Lack of capacity	2.45	2.70	2.30	3
4.	Lack of legal basis	3.36	3.40	3.20	2
5.	Lack of penalties	4.82	5.00	4.40	1

\* 5: the most important challenge, 1: the least important challenge

Table 3: Enforcement practices of animal genetic resources trafficking in custom checkpoint village interfaces of Western Tigray

No	Questions	Categories	Villages proximal to custom checkpoints (%)			
			Lugdi (n=11)	Bereket (n=10)	Dima (n=10)	Total (n=31)
1.	Do you have the knowledge about animal genetic resources?	Yes	100.0	100.0	100.0	100.0
		No	0.0	0.0	0.0	0.0
		I don't know	0.0	0.0	0.0	0.0
2.	How rich is the biophysical setting with animal genetic resource potentials?	Not rich	0.0	0.0	0.0	0.0
		Partly rich	0.0	10.0	60.0	22.6
		Potential Site of wild and Domestic	100.0	90.0	40.0	77.4
		A site of key conservation sites of wild and domestic biota	0.0	0.0	0.0	0.0
3.	Do you Know about animal genetic resources trafficking practices in the Biophysical?	Yes	100.0	100.0	100.0	100.0
		No	0.0	0.0	0.0	0.0
4.	If your answer to question No 4 is "Yes" what are the animal genetic resources being trafficked in the locality?	Domestic animals	100.0	100.0	100.0	100.0
		Wild animals	0.0	0.0	0.0	0.0
		Plant genetic resources	0.0	0.0	0.0	0.0
		Crop genetic resources	0.0	0.0	0.0	0.0
5.	How serious is the degree of animal genetic resource trafficking practices in the locality?	Not serious	0.0	0.0	0.0	0.0
		Partly Serious	0.0	0.0	0.0	0.0
		Serious	100.0	90.0	100.0	96.8
		Threatening	0.0	0.0	0.0	0.0
6.	How is the relationship between animal genetic resource trafficking and livelihood in the locality?	Source of primary income	90.9	70.0	80.0	80.6
		Source of alternative livelihood	9.1	20.0	10.0	12.9
		Source of job for unemployed youths	0.0	0.0	10.0	6.5
		A means of supporting family income	0.0	0.0	0.0	0.0
7.	How is relationship between animal genetic resource trafficking and employment in the locality?	It is a good job opportunity	0.0	0.0	60.0	19.4
		The locals are taking the trafficking as permanent job	9.1	20.0	10.0	12.9
		The locals are motivated to involve in trafficking as a job	90.9	80.0	30.0	67.7

**Enforcement Practices of Animal Genetic Resources Trafficking in Custom Village Interfaces of Western Tigray:** All (100%) of the local security units responded that, the local militia have knowledge about animal genetic resources found in custom checkpoint village interfaces of western Tigray. About (60 %) of the local security units noted that, the biophysical setting of Dima village is partly rich with animal genetic resources of economic importance. On the other hand, 100% and 90 % of the

local security units responded that, Lugdi and Dima custom checkpoint villages interface proximal to the Ethio-Sudan border point is a potential site of animal genetic resources trafficking (Table 3). All (100%) of the local security units responded that, they know about illegal animal genetic resources trafficking practices in their biophysical environment. All (100%) of the local security units responded that, domestic animal genetic resources are the most widely trafficked biogenetic resources.

All (100%) of the local security units responded that, the degree of animal genetic resource trafficking practices is serious in custom checkpoint interface villages of western Tigray. All (100%) of the local security units responded that, animal genetic resource trafficking and livelihood are correlated as a source of primary income in the surveyed local community of the villages. About 60% of the local security units responded that, animal genetic resource trafficking is considered as a good job opportunity in terms of employment for the local youths living in the custom checkpoint village interfaces of western Tigray (Table 3).

#### Exit Points of Illegal Animal Genetic Resources Trafficking in Custom Village Interfaces of Western Tigray:

All (100%) of the local security units responded that, there are hidden exit points of illegal animal genetic resources trafficking in the custom village interfaces of western Tigray. Based on the response of the local security units, the animal genetic resources of the locality are being trafficked through the hidden exit routes of the bio-physical setting of western Tigray (Table 4). All (100%) of the local security units responded that, the hidden exit routes of animal genetic resources are serious and threatening for the animal resources of conservation and economic importance in custom village interfaces of western Tigray.

Table 4: Exit and entry points of illegal animal genetic resources trafficking in custom village interfaces of western Tigray

No.	Questions	Categories	Villages proximal to custom checkpoints (%)			
			Lugdi (n=11)	Bereket (n=10)	Dima (n=10)	Total (n=31)
1.	Are there hidden exit points of illegal animal genetic resources trafficking in the locality?	Yes	100.0	100.0	100.0	100.0
		No	0.0	0.0	0.0	0.0
2.	How are the animal genetic resources of the area being trafficked through the locality?	Through custom checkpoints	9.1	0.0	0.0	6.5
		Hidden exit routes	90.9	100.0	90.0	93.5
3.	Did you spot hidden genetic resource trafficking routes during the security works?	Yes	72.7	70.0	90.0	77.4
		No	27.3	30.0	10.0	22.6
		I don't know	0.0	0.0	0.0	0.0
4.	How severe are the hidden exit routes for the animal genetic resource potentials?	Not Serious	9.1	0.0	0.0	6.5
		Serious	90.9	100.0	90.0	93.5
		Partly serious	0.0	0.0	0.0	0.0
		Very threatening	0.0	0.0	0.0	0.0

Table 5: Key actor involved in animal genetic resources trafficking in custom checkpoint village interfaces of western Tigray

No.	Questions	Categories	Villages proximal to custom checkpoints (%)			
			Lugdi (n=11)	Bereket (n=10)	Dima (n=10)	Total (n=31)
1.	Do you come across individuals or groups involved in wildlife genetic resource trafficking practices?	Yes	100.0	100.0	100.0	100.0
		No	0.0	0.0	0.0	0.0
2.	If your answer to question No 1 is "Yes" who is involved in illegal animal genetic resources trafficking practices in the locality?	Unemployed youth	27.3	40.0	70.0	45.2
		Brokers (Middle man)	0.0	0.0	10.0	6.5
		Middle business mans	72.7	40.0	20.0	45.2
		Emerging youth business men	0.0	0.0	0.0	0.0
3.	From your experiences of working with local security and exposure to such conservation offences. What are the likely reasons for smuggling?	Economic benefits from this trade	90.9	90.0	90.0	90.3
		To enhance their livelihood	0.0	0.0	10.0	3.2
		Unemployment level	9.1	10.0	0.0	0.0
4.	What is the source of animal genetic resource trafficking crossing through the hidden exit routes?	Local households	72.7	30.0	10.0	38.7
		Local markets	18.2	10.0	70.0	32.3
		Emerging local business mans of adjacent villages	9.1	60.0	20.0	29.0
5.	How is the degree of involvement of local youths in illegal animal genetic resource trafficking in the locality?	Not Serious	45.5	0.0	0.0	16.1
		Partly Serious	0.0	0.0	0.0	6.5
		Serious	54.5	80.0	100.0	77.4
		Very threatening	0.0	0.0	0.0	0.0
6.	Which neighboring states are illegally accessing the trafficked the animal genetic resources through the hidden routes?	Sudan	100.0	100.0	100.0	100.0
		Eritrea	0.0	0.0	0.0	0.0

Table 6: Constraints of effective enforcement of state and international legislations of animal genetic resource trafficking in custom checkpoints village interface of western Tigray

No.	Questions	Categories	Villages proximal to custom checkpoints (%)			
			Lugdi (n=11)	Bereket (n=10)	Dima (n=10)	Total (n=31)
1.	How do you enforce laws against animal genetic resource trafficking practices in the locality?	Voluntarily	72.7	20.0	50.0	48.4
		Pressure from local administrators	27.3	60.0	40.0	41.9
		Humanly	0.0	0.0	10.0	9.7
		Pressure from the local community	0.0	0.0	0.0	0.0
2.	How do you seize individuals or groups involved in animal genetic resource trafficking?	From patrolling efforts	100.0	100.0	100.0	100.0
		Confidential information from local community	0.0	0.0	0.0	0.0
		Support from federal and military	0.0	0.0	0.0	0.0

**The Key Actor Involved in Animal Genetic Resources Trafficking in Custom Checkpoint Village Interfaces of Western Tigray:** All (100%) of the local security units responded that, they come across individuals or groups involved in illegal animal genetic resource trafficking practices in custom village interfaces of western Tigray. About (72%) of the local security units responded that, middle businessmen are involved in illegal animal genetic resources trafficking practices in Lugdi area. On the other hand, 40% of the local security units reported that, unemployed youths and emerging businessman are actively engaged in animal genetic resource trafficking through the villages of Lugdi area. About (70%) of the local security units in Dima responded that, unemployed youths vigorously participated in illegal animal genetic resource trafficking through the villages of Lugdi area. Almost all (90%) of the local security units responded that the likely reasons for smuggling animal genetic resource trafficking is the need to obtain economic benefits among the local youths.

About (72%) of the local security units reported that, the source of illegal animal genetic resource trafficking through the hidden exit routes are animal of the local households in lugdi custom village interface area. Moreover, 60% of the local security units reported that, the source of illegal animal genetic resource trafficking through the hidden exit routes are emerging local businessmens adjacent to villages of lugdi area. On the other hand, 70% of the local security units reported that, the source of animal genetic resource trafficking heading through the hidden exit routes is collected from the local markets of Lugdi area.

All (100%) of the local security units responded that, the degree of involvement of local youths in illegal animal genetic resource trafficking is serious in Dima custom village interfaces. Almost a majority (80%) of the local security units replied that, the degree of involvement of

youths in illegal animal genetic resource trafficking is serious in Bereket locality. On the other hand, the degree of involvement of local youths in illegal animal genetic resource trafficking is not serious in the Lugdi custom village interface area. All (100%) of the local security units responded that, Sudan is the neighboring state accessing the illegally trafficked animal genetic resources through the hidden exit routes of custom village interfaces of western Tigray.

**Constraints of Effective Enforcement of State and International Legislations of Animal Genetic Resource Trafficking in Custom Checkpoint Village Interfaces of Western Tigray:** About (72%) of the local security units of Lugdi area responded that, they enforce laws against illegal animal genetic resource trafficking practices voluntarily. About 50% of the local security units in Dima enforce laws against illegal animal genetic resource trafficking voluntarily. On the other hand, 60% of the local security units enforce laws by the working pressure from local administrators. All (100%) of the local security units responded that, they seize individuals or groups engaged in illegal animal genetic resource trafficking from their patrolling efforts within the physical geography of the surveyed areas.

## DISCUSSIONS

The educational background of the interviewed local security units is grade, 6<sup>th</sup> (Table 1). This might reflect the interviewed security units of the custom checkpoint village interfaces are moderately illiterate. As well, it will also reflect that, the local security units are partly aware of handling illegal animal genetic resource trafficking practices within the current network of the villages proximal to the custom checkpoints of western Tigray.



Lack of penalty has a higher mean score (5) in Bereket custom village interface area proximal to the border point of Sudan. This might be related to the absence of custom checkpoint regulatory efforts and integrated scheduled patrolling efforts in the village and its vicinity. As well, it might also be associated with poor law enforcement practices and less emphasis given to illegal animal genetic resource trafficking within the current network of custom village interfaces western Tigray. Similar studies conducted in southeastern Ethiopia noted that, lack of resource and monitoring performance were the enforcement challenges [28].

All (100%) of the local security units have knowledge about the site specific potentials of animal genetic resources in western Tigray. This could be associated with the significant potential of the locality in animal genetic resources of conservation and economic importance. All (100%) of the local security units responded that, they are aware of illegal animal genetic resource trafficking happening in the current network of the custom village interfaces of the locality. This could reflect that, the local security units are able to handle activities related to illegal animal genetic resource conservation offenses in the locality (Table 3). This study is inconsistent with what has been done in southeast Ethiopia, which noted the enforcement units are not aware of illegal animal genetic resource trafficking [28].

All (100%) of the local security units responded that, domestic animals genetic resources are the most widely trafficked bio-genetic resources within the surveyed area. This could be associated with the potential animal genetic resources within the physical geography of the custom village interfaces of western Tigray. The finding of the present study is inconsistent with what has been done in southeastern Tigray. [28] has noted that, wildlife genetic resource is the most trafficked animal genetic resources in southeastern Ethiopia.

All (100%) of the local security units responded that, illegal animal genetic resources trafficking is a serious issue in the network of the local environmental condition of the locality. This can be associated with the rich animal genetic resource trafficking, porous border point security coupled with the promising market demand in neighboring states. Similar studies conducted in southeastern Ethiopia noted that, illegal animal genetic resource trafficking is a serious issue [28].

Illegal animal genetic resource trafficking is associated as a source of income of the local community in the custom checkpoint village interfaces of western Tigray. This could probably reflect that, the

unemployment rate of the locals and absence of alternative source of income is leading to engage in trafficking. Moreover, illegal animal genetic resource trafficking is related as a good job in terms of employment level of the local community. This calls for the unsustainability in the life of the locals in custom village interfaces of western Tigray.

All (100%) of the local security units noted that, there are several hidden exit points of illegal animal genetic resources trafficking in the custom village interfaces. This could be associated with the porous border security and loose integration of the local security forces with the custom checkpoints deployed at villages proximal to border points of western Tigray. Owing this, the smugglers are heading illegally the animal genetic resources through the hidden exit routes of western Tigray (Table 4).

Based on the response of the local security units, the exit routes are a site of illegal animal genetic resources trafficking practices. This could be related with the potential animal genetic resources of conservation and economic importance that are found in the physical geography of the custom checkpoint village interfaces of western Tigray.

All (100%) of the local security units noted that, the hidden exit routes are serious sites as a smuggling route of animal genetic resources of the state. This can be associated with the poor patrolling efforts and lack of integration among the custom, federal and local security units within the current network of custom village interfaces of western Tigray.

The majority of the local security units responded that, middle businessmen are actively involved in illegal animal genetic resources trafficking practices. This could be related with the porous border security to access the illegal routes through the custom checkpoint village interfaces. Moreover, unemployed youths and emerging businessmen engages in illegal animal genetic resources trafficking. This probably reflects that, the less emphasis given to the social network interfaces of illegal animal genetic resource trafficking in border custom checkpoints interfaces of western Tigray.

About (72%) of the local security units of Lugdi responded that, the local security units enforce laws against illegal animal genetic resource trafficking practices voluntarily in the locality. This could reflect that, the local security units are committed to impose laws to tackle illegal animal genetic resource trafficking without having the government intention in custom checkpoint village interface of western Tigray.

## CONCLUSIONS

Illegal animal genetic resource trafficking is influenced by social networks within the current network of custom checkpoint village interfaces of local security units of western Tigray. Illegal animal genetic resource trafficking is a serious issue with a social network manifested as livelihood source, means of employment and source of job for the local youths. All of the local security units noted that, there are hidden exit routes of animal genetic resource trafficking. The illegal routes are very threatening to our animal genetic resource of conservation importance. Illegal groups are frequently observed in the custom village interfaces trafficking animal genetic resources. Unemployed youths, emerging business men, middle businessmen are actively engaged in animal genetic resource trafficking. The likely reason for illegal animal genetic resource smuggling is the need to obtain economic wealth among the local youths shortly. The local security forces are not materially equipped to seize traffickers within the current network of the locality. The traffickers are caught through the patrolling effort of the local security units. Thus, filling the connective social links can address the underlying threats of illegal animal genetic resources trafficking in custom village interfaces of the western Tigray.

### Recommendations:

- The law enforcement practices, legal basis, staff capacity, communication system should be well-built and allow to tackle the multifaceted problems of animal genetic resources conservation crimes operating along the custom village interfaces of western Tigray.
- The awareness of the local community towards animal genetic resources of the locality should be positively shaped along its implication to national economic improvement and sustainable development in a manner which assures conservation of the animal genetic resources.
- The northwestern part of Ethiopia physical geography is a hub for illegal animal genetic resources of conservation and economic importance. Hence, integrated monitoring tools and community campaigns to tackle illegal animal genetic resource trafficking is vital.
- The experience of the local security units on illegal animal genetic resource trafficking should be carefully managed and integrated with pertinent sectors working in border point illegal law enforcement tasks.

- The most widely illegally trafficked animal genetic resource in the custom village interfaces is domestic animals. Hence, regulatory approaches with an extended segment of local market should be created in potential animal genetic resource hubs of western Tigray.
- The degree of illegal animal genetic resources trafficking practices is serious. Thus, the emphasis on patrolling efforts and multi stakeholder integration should be strengthen at regional and national level.
- Illegal animal genetic resource trafficking is associated with the livelihood of the locals adjacent to border custom checkpoint interfaces of western Tigray. Hence, an alternative livelihood package with a concentric ring of the smugglers should be devised at its early stage.
- Illegal animal genetic resource trafficking is associated with unemployment rate of the local youths. Hence, alternative jobs should be created with an awareness creation community campaign.
- Hidden exit points are becoming a serious hub for illegal animal genetic resource trafficking. Hence, a purposively selected satellite checkpoint with a strong patrolling team combining local security units and custom units should be established on the vulnerable sites.
- Unemployed local youths, emerging businessmen, middle businessmen are the key actors involved in illegal animal genetic resource trafficking. Thus, youth development package and sustainable local market networking with a supply chain to national Ethiopian market should be emphasized.
- The law enforcement practices of local security units have certain challenges. Thus, addressing the constraints with a concentric ring of incentivizing and capacity building programs should be done. As well, the patrolling effort of the local security units should be materially supported and effectively scheduled.

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