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Institutional Capacity of Custom Checkpoints: Implication for Assessing Wildlife Trafficking Monitoring Units Within Custom Organogram in Checkpoints of Western Tigray, Northwestern Ethiopia

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Abstract: Illicit wildlife trafficking is a complex, multidimensional challenge with far-reaching ecological and economic implication. The study was conducted from February-April, 2017 with the aim to assess the institutional capacity of custom checkpoints on illicit wildlife trafficking monitoring units within the organizational charts. The data were collected by preparing both open and close-ended questionnaire for interviews. Furthermore, the sampling was designed to take the individual checkpoint 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 nature of the data for institutional capacity of the checkpoints on illicit wildlife trafficking. All (100%) of the custom units responded that, there is no specialized security, canine and horse units which support the patrolling activities in the checkpoints. The law enforcement practices are not aligned with the intended institutional setups of the checkpoints. All (100%) of the enforcement units responded that, there is no prosecution, security research and analysis units to study the emerging trends of illicit wildlife trafficking and recommend logical intervention approaches. The majority (94.1%) of the custom units responded that, there is no wildlife investigation unit, which responds to wildlife crime. Almost a majority (88.2%) of the custom units responded that, there is no intelligence unit which gathers information intended to preempt illicit wildlife crimes. The information management system to halt illicit wildlife trafficking is not institutionally framed. The majority (94.1%) of the custom units responded that, there is no emergency management unit, to deal with urgent illicit wildlife trafficking situations. Almost a majority (88.2%) of the custom units responded that, there is no security data management unit for the conservation crime data organization. About (64.1%) of the custom units responded that, there is no wildlife trafficking patrol plan in the vicinity of the checkpoint administration. Almost half (58.8%) of the custom units responded that, there is no an anti poaching plan in the checkpoint administration. Furthermore, all (100%) of the custom units responded that, there are no sufficient vehicle number for patrolling and the inspection of illicit wildlife trafficking. The community empowerment program is not institutionally established within the checkpoints organizational charts. Almost a majority (94.1%) of the custom units responded that, there is no community scale education and empowerment program for the local people about illicit wildlife trafficking. Illicit wildlife trafficking is least targeted enforcement priority in custom checkpoints. Lack of transparency, monitoring and staff capacity are the enforcement challenges i the surveyed border checkpoints. The information obtained from this survey can be used to institutionally frame the checkpoints and address the underlying wildlife trafficking enforcement challenges at the border checkpoints of western Tigray.

Key words: Illicit · Exit · Smuggling · Dima

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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]. Animal genetic resources 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 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 in the western world [7, 8]. Globally, the recent illicit trade in wildlife is estimated to be worth US$50-150 billion per year [9]. Animal genetic resources 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, 10]. 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 a 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[16]. 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 there derivatvies include 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 [22]. Ethiopia has a relatively short history of dealing with wildlife conservation crimes [23]. 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 [23]. Ethiopia has signed the CITES which prohibits illegal wildlife trade [22].

Despite the increasing attention of law enforcement agencies, research on illegal wildlife trade has been limited [24, 25] and little is known about it [25]. There are few studies undertaken in southeastern Ethiopia custom checkpoint [26]. But, there is no any study carried out so far in western Tigray custom checkpoints. However, the illicit animal genetic resource trafficking is still persisting with a local residents interface along border checkpoint village interfaces and illicit exit routes of western Tigray. Thus, there is a need to research the extent of illicit wildlife genetic resource trafficking among border custom checkpoint enforcement units of western Tigray, northwestern Ethiopia.

Conceptual Framework of the Domestic Institutional Stracture in Comparsion to World Custom Orgnazation Enforcement Units: The basis of the research question is the standards seated by world custom organization. The custom organization enforcement practices are framed based on 19 comprehensive units. The units are departmentalized based on there economic, ecological, security and sustaining the developmental goals of the member states. For the purpose of the current research, the 19 enforcement units of the world custom orgnazation are sub departmentalized in to six categories, namely paroling, law enforcement, information management, human resource, material resource, community empowerment units. In an effort, the domestic institutional setting of the custom checkpoint adminstration is taken in to consideration. The domestic inspection team has two targets of inspection carried out both in door and out door settings. But, the enforcment emphasis of the custom adminstration is on export and import of goods with lesesser prominence to bio genetic resources. As per our observation, live domestic animal genetic resources are exported in an import of various goods of economic importance through the border checkpoints.

The systematic inspection approaches layies on a regular, random and scanning checking systems. But, the regular inspection process is mainly handled by daily laborers. Coupled with this, the checkpoints are not professionally framed based on biodiversity conservation and associated fields of study. The scanning inspection system is one of the hi-tech methods used to check the materials of enforcement priority. In this system live assets are not considered and subjected for scanning owing to the impact of active radioactive compounds. The law enforcement divisions are working to close down illicit import and export of goods contraband goods within the custom checkpoints.

The heritage inspection unit is framed to control Ethiopia heritages and ther associated assets.The custom checkpoints received full delegation by the authorizing Ethiopian authority for research and conservation of cultural heritage. But, the staffs of the department are exclusively history and cultural study graduates. The custom checkpoints adminstrations are not professionally framed based on biodiversity conservation and associated fields of study.

The custom checkpoints adminstration have federal police division supporting the enforcement practices. As part of the joint investigation tasks the federal police units are deployed at each site to regulate the security of custom inspection team, carry out random patrolling and a regular paroling effort within the physical geography of the checkpoints. The administration also has custom clearance department which works toward clearing import and export of goods. This is one of the activities delimited to customs officers despite the scope of the animal genetic resource trafficking. Furthermore, the intelligence units enforce laws by collecting relevant information pertinent to illicit tade of all controband goods and the research question being stipulated.

Generally, the domestic institutional frameworks are not consistently framed based on the the world custom organization. Moreover, the existing units and enforcing divisions lack pillar assemblage of the enforcement units which reinforce the targets in border custom checkpoints of Ethiopia. Hence, the study was aimed to assess the institunal framework of animal genetic resource montoring units in border custom checkpoint of western Tigray, northwestern Ethiopia.

MATERIALS AND METHODS

Description of the Study Area: The study was carried out in border custom checkpoints of western Tigray, northwestern Ethiopia. The study 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° 50’ and 14° 23’ N and 36° 31’ and 37° 29’ E. Western Tigray has three Ethiopian custom and revenue authority checkpoints administered under Humera custom branch office. Ludgi checkpoint is situated at the junction of Ethio-Sudan stretched along the highway of Dansha-Abdrafi-Maycadran ending in Humera. This is one of the transboundary transit hubs for a large volume of the animal genetic resource heads crossing the border trade activities [26]. Moreover, Lugdi is predominantly

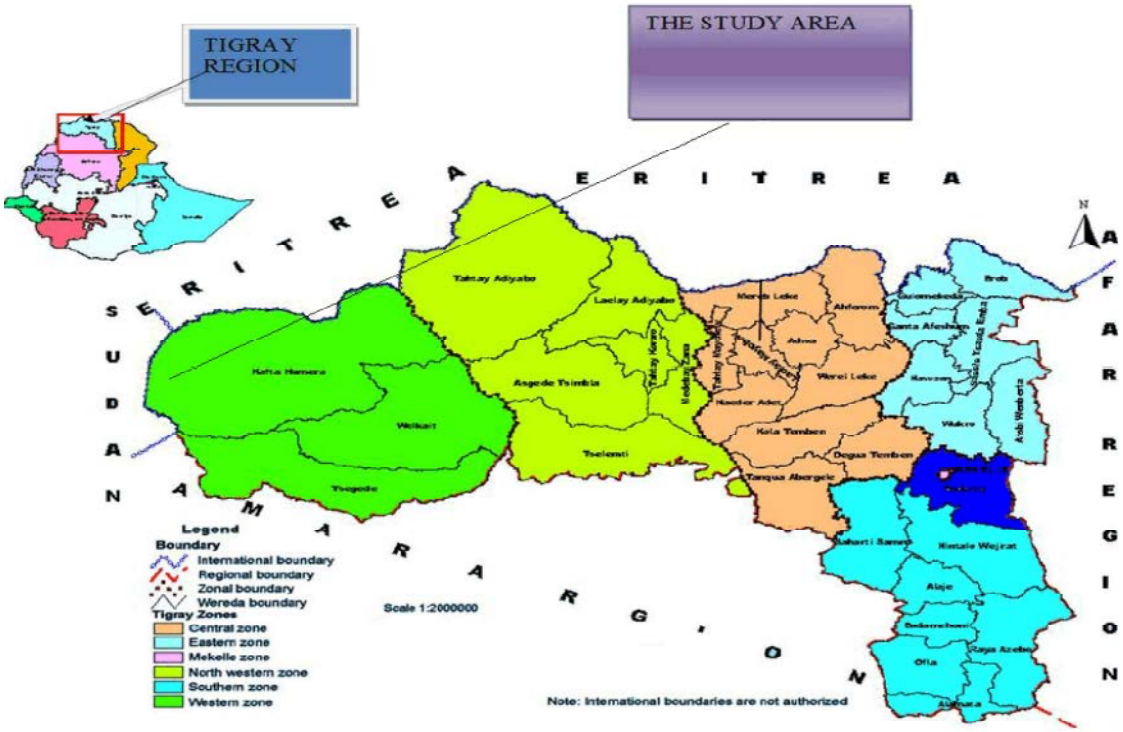

Fig 1: Map of the study area, custom checkpoint of western Tigray

described as a kola (Lowland) agro-climatic zone. Dima is one of the checkpoints located in western zone Kafta Humera woreda. Based on the figures from the central statistical agency in 2005, the site has an estimated total population of 902, of which 498 are men and 404 are women [27]. Its agro-climatic zone is identified as qolla (Lowlands/hotter climate) 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 [28].

Altitude ranges from 568 to 1861 meters above sea level. The dry season occurs during the months of October to May and the wet season June to September. It has a unimodal rainfall pattern which 80 to 85% of the rain falling during the wet season [29]. Annual rainfall is 448.8 and 1102.5 mm for the lowland and highland areas of the district, respectively. The mean annual temperature of the area is 25^{o}c to 27^{o}c in the lowlands and 20^{o}c to25^{o}c in the highlands. The study sites are found within the lowland part (Kola) of the district and share the mean annual rainfall and mean annual temperature recorded in the lowland areas. The people of the study area practice mixed farming systems as a means of livelihood. Livestock is the valuable components of the farming system contributing enormously towards ensuring food security in the study area [29].

Target Population: The target population of this study was custom enforcement units of the checkpoints of western Tigray. Based on the information obtained from the Ethiopian Biodiversity Institute genetic control staff deployed in western Tigray, there are 30 custom enforcement units in Lugdi where as Dima checkpoint has 36 enforcement units. Therefore, there is a total of 24 custom enforcement units working on the selected border checkpoints in western Tigray, northwestern Ethiopia.

Methods of Data Collection: The researchers use 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 questionnaires filled. Furthermore, the consent of the illicit animal genetic resource trafficking for custom enforcement 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 checkpoints of western Tigray.

Variables of the Study: The response variable of the study was illicit animals genetic resource trafficking in

checkpoints, information on exit routes and observation of the enforcement units working in the custom checkpoints. The explanatory variables/factors that were used as being factors in the practice of the illicit animal genetic resource trafficking of the selected checkpoints were:

• Age	Sex	Distance	Workload
• Attitude	Income	Training	Literacy
• Knowledge	Experience	Mobility	No. of staff
• Household size	Location	Housing	

Sampling Design: The sampling procedure was designed to collect primary data. The northwestern part of Ethiopia does have three custom checkpoints, so the data were collected taking an individual custom checkpoint as a cluster and hence cluster sampling was used. After determining the total sample size (n), proportional allocation to each cluster (i.e. Customs checkpoint) was done by further considering the amount of custom enforcement units on illicit animal genetic resource trafficking from each checkpoint. 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=24 custom enforcement units) was proportionally allocated to each custom checkpoint using the formula [30].

$$n_1 = \frac{N_1}{N} n \qquad 1 = 1,2$$

where:

N_1: Total number of custom enforcement units in l^{th} custom checkpoint, l= 1,2

N: Total population of custom enforcement units on illicit animal genetic resource trafficking in western Tigray checkpoints.

n_1: Total sample size taken from l^{th} checkpoint

n: Total sample size determined from a custom checkpoint of western Tigray

The two individual clusters (i.e. Customs checkpoint) for the sample sizes of custom enforcement units were:

Lugdi (N_1=36) and Dima custom checkpoint (N_2= 30)

The proportional allocation size was computed as follows:

$$n_1 = \frac{N_1}{N} n \text{ and } n_1 = \frac{N_2}{N} n$$

$$n_1 = \frac{36}{66}(24) \approx 13 \qquad n_2 = \frac{30}{66}(24) \approx 11$$

The sample size taken from the custom enforcement units was 13 and 11 for Lugdi and Dima border custom checkpoints respectively.

Statistical Analysis: The data were analyzed through SPSS version 20.0. The study uses descriptive methods to understand the nature of the data for the institutnal capacity of custom checkpoint to montoir illicit animal genetic resource trafficking practices. Inferential methods for detail analysis of the variables were also used.

RESULTS AND DISCUSSION

Socio-Demographic Characteristics of Custom Enforcement Units in Border Checkpoints of Western Tigray: The mean age of the custom enforcement units is 27.38 (Fig 2). The mean work experience of the checkpoint enforcement units is 6.42 (Fig 3). As well, almost half (66.7%) of the custom enforcement units is grade 10^{th} completed (Table 1).

Priority of the Illicit Animal Genetic Resource Enforcement Targets in Border Custom Checkpoints of Western Tigray: The highest mean score (5.45) of the enforcement target is recorded for contraband goods as the most important target of priority to Dima checkpoint staffs. As well, the highest mean score (8) of enforcement priority was recorded for contraband goods in the Lugdi checkpoint. The illicit animal genetic resource trafficking is least targeted enforcement priority over custom checkpoints of western Tigray (Table 2). Customs administration approaches to shield wildlife and tackle illegal wildlife trade activities are encapsulated in thier enforcement targets. This could probably reflect that the less emphasis given to the enforcement practices on illicit animal genetic resource trafficking. As well, it could also reflect that illicit animal genetic resource trafficking is least targeted enforcement practice within the current network of checkpoints. The finding of the present study is inconsistent with the study carried out in southeastern Ethiopia custom checkpoints. Getachew Mulualem *et al.* [26] has noted that, monitoring illicit wildlife genetic resource trafficking is the highest enforcement priority to southeastern Ethiopia custom checkpoints. Similar studies carried out by world custom organization revealed that; the surveyed customs checkpoint place wildlife smuggling below more traditional priorities such as tax evasion [31].

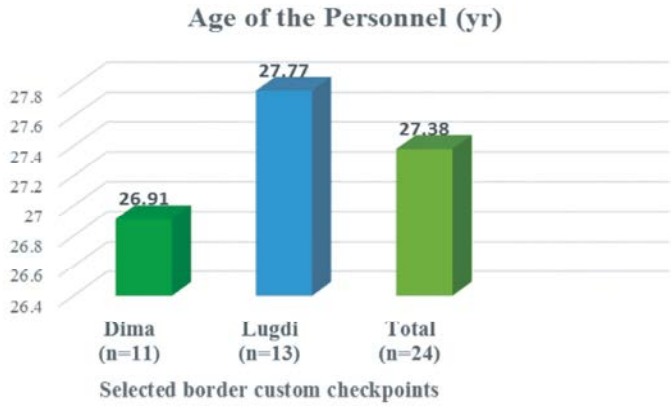

Fig. 2: Age of the interviewed custom enforcment units in western Tigray border checkpoints

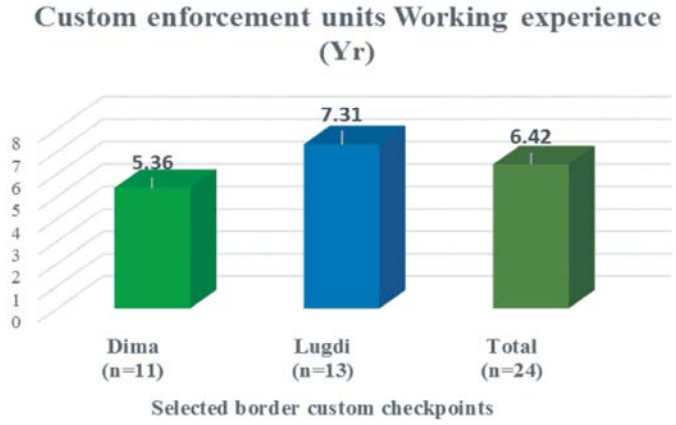

Fig. 3: Work experience of the interviewed enforcment units in western Tigray checkpoints

Table 1: Educational background of custom enforcement units of border checkpoints in western Tigray

			Selected border custom checkpoints (%)		
Nº.	Variables	Categories	Dima (n=11)	Lugdi (n=13)	Total (n=24)
1.	Educational background	10th	63.6	69.2	66.7
		12th	0.0	15.4	8.3
		Diploma	9.1	0.0	4.2
		BA	27.3	15.4	20.8

Table 2: Priority of the enforcement targets in border custom checkpoints of western Tigray

Customs checkpoints	Contraband goods	Illicit trade in wildlife	Illicit trade in domestic animals	Money laundering	Smuggling of counterfeit goods	Smuggling of illegal drugs	Smuggling of tobacco goods	Smuggling of weapons
Dima (n=11)	5.45	3.09	3.45	4.45	4.73	4.91	4.55	5.45
Lugdi (n=13)	8.0	1.08	1.92	4.08	3.85	5.69	5.0	6.38

* 8: The most important target, 1: The least important target

Institutional Capacity of Federal Police Forces to Monitor Illicit Wildlife Genetic Resource Trafficking in Border Custom Checkpoints of Western Tigray

Patrolling unit within the custom organogram of border checkpoints of western *Tigray*: All (100%) of the federal police forces responded that, there is no specialized security unit to monitor and detect illicit wildlife genetic resource trafficking and their derivatives. The finding of the current study is consistent with what has been done in northeastern Ethiopia, which noted the custom checkpoints are not framed based on an established specialized security unit. The entire (100%) of the federal police forces responded that, there is no canine unit which helps to sniff out wildlife products and track offenders. Similar studies carried out in northeastern Ethiopia in custom checkpoints has revealed that, sniffing

Table 3: Institutional capacity of federal police units to monitor illicit wildlife genetic resource trafficking in border custom checkpoints of western Tigray

		Selected border custom checkpoints			
Nº.	Questions	Categories	Dima (n=7)	Lugdi (n=10)	Total (n=17)
1.	Are there specialized security units to monitor and detect illicit trafficking of wildlife?	Yes	0.0	0.0	0.0
		No	100.0	100.0	100.0
2.	Is there a canine unit which helps to sniff out wildlife products and track illicit offenders?	Yes	0.0	0.0	0.0
		No	100.0	100.0	100.0
3.	Is there a horse unit to ease movement in mountainous topograhy during patrolling tasks?	Yes	0.0	0.0	0.0
		No	100.0	100.0	100.0
4.	Is there prosecution unit for handling wildlife related offenses?	Yes	0.0	0.0	0.0
		No	100.0	100.0	100.0
5.	Is there security research and analysis unit to study emerging trends and	Yes	0.0	10.0	5.9
	recommend appropriate solutions against illicit wildlife trafficking?	No	100.0	90.0	94.1
6.	Is there wildlife investigation unit which responds to illicit conservation crimes?	Yes	0.0	10.0	5.9
		No	100.0	90.0	94.1
7.	Is there an intelligence unit which gathers information intended to preempt wildlife	Yes	0.0	20.0	11.8
	trafficking crime?	No	100.0	80.0	88.2
8.	Is there an emergency management unit, to deal with urgent wildlife trafficking situations?	Yes	0.0	10.0	5.9
		No	100.0	90.0	94.1
9.	Is there security data management unit for conservation crime practices?	Yes	0.0	20.0	11.8
		No	100.0	80.0	88.2
10.	Is there illicit wildlife trafficking patrol plan in the checkpoint administrations?	Yes	0.0	60.0	35.3
		No	100.0	40.0	64.7
11.	Is there an anti poaching plan in the checkpoint administrations?	Yes	0.0	100.0	58.8
		No	100.0	0.0	41.2
12.	Is there enough human resource to effectively patrol in and around the checkpoint areas?	Yes	0.0	0.0	0.0
		No	100.0	100.0	100.0
13.	Are the staffs well equipped to examine illicit wildlife trafficking offenses in the	Yes	0.0	90.0	52.9
	checkpoint administration?	No	100.0	10.0	47.1
14.	Are the staffs trained in all aspects of anti poaching and follow up in the	Yes	0.0	20.0	11.8
	checkpoint administration?	No	100.0	80.0	88.2
15.	Is the existing communication system adequate to monitor illicit wildlife trafficking in the	Yes	0.0	50.0	29.4
	checkpoint administration?	No	100.0	50.0	70.6
16.	Is the vehicle number sufficient for patrolling and inspectioning of illicit wildlife trafficking?	Yes	0.0	0.0	0.0
		No	100.0	100.0	100.0
17.	Is there a patrol book to record inspection result of wildlife trafficking in the	Yes	0.0	80.0	47.1
	checkpoint administration?	No	100.0	20.0	52.9
18.	Is there a wildlife trade monitoring network with the local community in the checkpoint	Yes	0.0	0.0	0.0
	administration?	No	100.0	100.0	100.0
19.	Is there community scale education and empowerment program for proximal local	Yes	0.0	10.0	5.9
	community about illicit wildlife trafficking?	No	100.0	90.0	94.1

canine dogs are not present in an effort to support inspection of goods in the checkpoints [26]. In contrary, custom checkpoints of the republic of Kenya deploys sniffer dogs at major exit points as enforcement measures [32]. All (100%) of the federal police units responded that, there is no horse unit to ease movement towards the mountainous topography during patrolling tasks. Getachew Mulualem *et al.* [26] has also noted that, in northeastern Ethiopia custom checkpoints there is no horse unit to ease movement during patrolling of the monutianous physical geography of the locality.

Law Enforcement Unit Within the Custom Organogram of Border Checkpoints of Western Tigray: All (100%) of the federal police units responded that, there is no prosecution unit for handling illicit wildlife related offenses. The finding of the present study is in contrary

to what has been reported elsewhere, customs and border control agencies conduct their own operations through prosecution of individuals associated with professional smuggling rings [33]. Moreover, similar studies carried out in northeastern Ethiopia have also shown that prosecution units are partly found in the enforcement structures [26]. The finding of the current study is inconsistent with what has been done by Tom Ogola [32] which implies republic of Kenya has established a specialized/thematic wildlife crimes prosecution unit.

All (100%) of the federal police units responded that, there are no security research and analysis units to study the emerging trends of illicit animal genetic resource trafficking and recommend appropriate intervention approach. Getachew Mulualem *et al.* [26] has noted that, there is no an established security research and analysis unit in a manner which provides recommendation to halt illicit wildlife trafficking in custom checkpoints of northeastern Ethiopia. The majority (94.1%) of the federal police units responded that, there is no wildlife investigation unit which responds to illicit wildlife crime. The finding of the present study is in contrary to what has been done in southeastern Ethiopia, which noted the partial existence of the institutional setup of wildlife investigation unit [26]. Andres [34] has noted that, in UK there is a well-established institutional set up with various governmental actors involved in wildlife crime related issues. Almost a majority (88.2%) of the federal police units responded that, there is no intelligence unit which gathers information intended to preempt illicit wildlife crimes. This is consistent with the study carried out in northeastern Ethiopia, which noted there is no exclusive intelligence unit established to gather pertinent information on illicit wildlife trafficking than fused enforcement practices [26].

Information Management Unit Within the Custom Organogram of Border Checkpoints of Western Tigray: Almost a majority (94.1%) of the federal police units responded that, there is no emergency management unit to deal with urgent wildlife trafficking offense. This could be connected with the inadequately established institutional sett focusing on the emerging trends of illicit wildlife genetic resource trafficking in border custom checkpoints of western Tigray. Getachew Mulualem *et al.* [26] has also reported that, northeastern Ethiopia custom checkpoint has no illicit wildlife genetic resource emergency management unit in their institutional settings. Almost a majority (88.2%) of the federal police units responded that, there is no security data management unit for conservation crime data management practices. The finding of the present study is inconsistent with the study carried out in northeastern Ethiopia, which noted there is partly established security data management unit for tackling illicit wildlife trafficking [26]. About (64.1%) of the federal police units responded that, there is no illicit wildlife trafficking patrol plan in the vicinity of the checkpoint administrations. This could be connected with the absence of the intended structural unit which enforces the laws of conservation crime. The finding of the present study is inconsistent with the study carried out in northeastern Ethiopia, which noted there is partly established security data management unit for tackling illicit wildlife trafficking [26]. Around (58.8%) of the federal police units responded that, an anti poaching plan is not found in the customs checkpoint administrations of western Tigray. This could be connected with the inability of the pertinent sectors to mainstream the solutions to halt illicit wildlife trafficking in the field setting.

Human Resources Within the Custom Organogram of Border Checkpoints of Western Tigray: All (100%) of the federal police units responded that, there is no enough human resource to effectively patrol in and around the checkpoint administration. In contrary, Getachew Mulualem *et al.* [26] have reported that, southeastern Ethiopia checkpoints have enough human resource to patrol the physical geographic sett of the checkpoints. Almost half (52.9%) of the federal police units responded that, the custom enforcement staffs are not well eqipped to examine wildlife trafficking offenses in the checkpoints. This could be associated with the lack of the institutional sett along the required logistics. Almost a majority (88.2%) of the federal police units responded that, the enforcement staffs are not trained in all aspects of anti poaching practices and follow up in the checkpoint administration. The finding of the present study agrees with what has been done in northeastern Ethiopia. Getachew Mulualem *et al.* [26] has noted that, the staffs of the custom checkpoints staffs of northeastern Ethiopia are not trained in all aspects of illicit wildlife trafficking management practices. In contrary, the republic of Kenya, custom enforcement units use trained wildlife handlers in gathering evidence of illicit wildlife trafficking crimes [32].

Material Resources Within the Custom Organogram of Border Checkpoints of Western Tigray: All (100%) of the federal police units responded that, there are no sufficient vehicle numbers for patrolling and inspection of illicit wildlife genetic resource trafficking. This might affect the counter measures against the traffickers passing through the physical geography of the custom checkpoint interfaces of western Tigray. All (100%) of the federal police units responded that, there is no patrol book to record patrolling i results of illicit wildlife trafficking in the checkpoints. This could be connected with the less emphasis given to information management of patrolling concern, but not owing to the absence of the resource. Similar studies carried out in southeastern Ethiopia have revealed that, there is no patrol book to document patrolling results of illicit wildlife trafficking offenses [26].

Community Empowerment Program Within the Custom Organogram of Border Checkpoints of Western Tigray: The majority (94.1%) of the federal police units responded that, there is no community scale education and empowerment program for local people about the effect of illicit wildlife genetic resource trafficking. This could be connected with the less emphasis given to integrate the community in a way to mobilize to the fight against illicit wildlife genetic resource trafficking. Almost a majority (70.6%) of the federal police units responded that, there is no adequate communication system to monitor illicit wildlife trafficking in the custom checkpoints. This could be connected with the absence of proximal community development package consistent with the custom enforcement tasks. Similar studies carried out in northeastern Ethiopia have shown that, there are no community development practices in proximal custom checkpoints of southeastern Ethiopia [26].

Institutional Capacity of Custom Checkpoints to Monitor Illicit Wildlife Genetic Resource Trafficking in Border Checkpoints of Western Tigray

Patrolling Units Within the Custom Organogram of Border Checkpoints of Western Tigray: All (100%) of the custom staffs responded that, there is no specialized security unit to monitor and detect illicit wildlife trafficking. The finding of the current study is consistent with what has been done in northeastern Ethiopia, which noted in the custom checkpoints there is no established specialized security unit of illicit wildlife trafficking [26]. The entire (100%) of the custom staffs responded that, there is no canine unit which helps to sniff out wildlife products and track wildlife offenders. Similar studies carried out in northeastern Ethiopia custom checkpoints has revealed that, sniffing canine dogs are not present in an effort to support inspection of illicit wildlife products [26]. In contrary, custom checkpoints of the republic of Kenya deploys sniffer dogs at major exit points as enforcement measures [32]. All (100%) of the custom staffs responded that, there is no horse unit to ease movement towards the mountainous topography during patrolling. Getachew Mulualem *et al.* [26] has also noted that, in northeastern Ethiopia custom checkpoints, there is no horse unit to ease movement towards patrolling of the topography of the locality.

Law Enforcement Units Within the Custom Organogram of Border Checkpoints of Western Tigray: All (100%) of the custom staffs responded that, there is no prosecution unit for handling wildlife related offenses. This might be amalgamated with the general prosecution enforcement tasks. The finding of the present study is in contrary to what has been reported elsewhere, customs and border control agencies conduct their own operations through prosecution of individuals associated with professional smuggling rings [33]. Moreover, similar studies carried out in northeastern Ethiopia have also shown that, prosecution units are partly found in the custom enforcement structures [26]. The finding of the current study is inconsistent with what has been noted by Tom Ogola [32] which implies republic of Kenya has established a specialized/thematic wildlife crimes prosecution unit. The entire (100%) of the custom staffs responded that, there are no security research and analysis units to study emerging trends of illicit wildlife trafficking and recommend appropriate logical intervention approaches. Getachew Mulualem *et al.* [26] have noted that, there is no established security research and analysis units in a manner which provides recommendation to fight against illicit wildlife trade and their derivatives in custom checkpoints of northeastern Ethiopia. All (100%) of the custom staffs responded that, there is no wildlife investigation unit which responds to illicit wildlife crime. This could be connected with the absence of wildlife professional integrated in to custom institutional sett. All (100%) of the custom staffs responded that, there is no intelligence unit which gathers information intended to preempt wildlife crimes. This is consistent with the study carried out in northeastern Ethiopia, which noted there is no exclusive intelligence unit established to gather pertinent information about illicit wildlife trafficking practices [26].

Information Management Unit Within the Custom Organogram of Border Checkpoints of Western Tigray: All (100%) of the custom staffs responded that, there is no emergency management unit to deal with urgent situations. The finding of the present study is consistent with the study carried out in northeastern Ethiopia, which noted emergency management unit which deals with urgent situations of illicit animal genetic resources trafficking is not found [26]. This could be connected with the inadequately established institutional sett focusing on emerging trends of illicit wildlife trafficking in border checkpoints. Getachew Mulualem *et al.* [26] has also reported that northeastern Ethiopia custom checkpoint has no emergency management units in there c institutional settings. All (100%) of the custom staffs responded that, there is no security data management unit for conservation crime data management practices. The finding of the present study is inconsistent with the study carried out in northeastern Ethiopia, which noted there is partly established security data management unit for tackling illicit wildlife trafficking [26]. The entire (100%) of the custom staffs responded that, there is no wildlife trafficking patrol plan in the vicinity of the custom checkpoint administration routes. This could be less connected with the concern of the custom checkpoints towards managing the intended patrolling data not owing to the absence of the material resources required for patrol. All (100%) of the custom staffs responded that, there is no an anti poaching plan of the checkpoint administration. This could be connected with the inability of the pertinent sectors to mainstream the solutions towards illicit wildlife trafficking practices in field setting.

Human Resources Within the Custom Organogram of Border Checkpoints of Western Tigray: All (100%) of the custom staffs responded that, there is no enough human resource to effectively patrol in and around the custom checkpoint administrations. In contrary, Getachew Mulualem *et al.* [26] have reported that, southeastern Ethiopia custom checkpoints have enough human resource to patrol the physical geographic sett of the checkpoints.

Material Resources Within the Custom Organogram of Border Checkpoints of Western Tigray: All (100%) of the custom staffs responded that, the staffs are not well-equipped to examine wildlife trafficking offenses at the custom checkpoints. This could be connected with the lack of concern towards the patrolling activities. All (100%) of the custom staffs responded that, the enforcement staffs are not trained in all aspects of anti wildlife poaching and follow up in the checkpoint administration. The finding of the present study is consistent with the study carried out in northeastern Ethiopia, which noted the custom staffs are not trained in anti-poaching and follow-up of illicit wildlife trafficking [26].

Community Empowerment Program Within the Custom Organogram of Border Checkpoints of Western Tigray: All (100%) of the custom staffs responded that, the existing communication system is not adequate to monitor illicit wildlife trafficking in the checkpoint administration (Table 4). This could be connected with the absence of community development package consistent with the custom enforcement tasks. As per the custom enforcement units responded that, the communication system is loosely connected with the enforcement practices.

Enforcement Challenges of the Illicit Animal Genetic Resource Trafficking in Border Custom Checkpoints of Western Tigray: Several enforcement challenges to illicit animal genetic resource trafficking have been reported in the surveyed checkpoint administration. Lack of transparency, monitoring and staff capacity are the 1st, 2nd and 3rd enforcement challenges in the checkpoint administration. The finding of the present study is consistent with what has been done in southeastern Ethiopia checkpoints, which noted transparency among enforcement bodies and lack of resource are the common enforcement challenges [26].

The finding of the present study is consistent with what has been done in southeastern Ethiopia border custom checkpoints, which noted transparency among enforcement bodies and lack of resource are the common enforcement challenges [26].

The organizational structure of world custom organization are are in consistenly found in Ethiopian custom and revenu authrotirty ograngram. However, the supporting units beneath each enforcement priority are loosely tied in the surveyed border custom checkpoint adminstration. Furthermore, the enforcment balace is not sncrhornized consistently with pertinient sectors aurthoized to conserve biodiversity of economic and ecological importance. Thus, the exsitng organogram should be revised along the animal genetic resource subjected for illicit trafficking through border custom checkpoints of western Tigray.

Table 4: Institutional capacity of custom staffs to monitor illicit wildlife genetic resource trafficking in border custom checkpoints of western Tigray

			Selected border custom checkpoints (%)		
№	Questions	Categories	Dima (n=4)	Lugdi (n=3)	Total (n=7)
1.	Are there specialized security units to monitor and detect illicit wildlife trafficking?	Yes	0.0	0.0	0.0
		No	100.0	100.0	100.0
2.	Is there a canine unit which helps to sniff out wildlife products and track offenders?	Yes	0.0	0.0	0.0
		No	100.0	100.0	100.0
3.	Is there a horse unit to ease movement in mountainous topography during patrolling tasks?	Yes	0.0	0.0	0.0
		No	100.0	100.0	100.0
4.	Is there prosecution unit for handling wildlife related offenses?	Yes	0.0	0.0	0.0
		No	100.0	100.0	100.0
5.	Is there a security research and analysis unit to study emerging trends and recommend	Yes	0.0	0.0	0.0
	appropriate intervention approach?	No	100.0	100.0	100.0
6.	Is there wildlife investigation unit which responds to conservation crime?	Yes	0.0	0.0	0.0
		No	100.0	100.0	100.0
7.	Is there an intelligence unit which gathers information intended to preempt wildlife crime?	Yes	0.0	0.0	0.0
		No	100.0	100.0	100.0
8.	Is there an emergency management unit, to deal with urgent illicit wildlife	Yes	0.0	0.0	0.0
	trafficking situations?	No	100.0	100.0	100.0
9.	Is there security data management unit for conservation crime management?	Yes	0.0	0.0	0.0
		No	100.0	100.0	100.0
10.	Is there wildlife trafficking patrol plan in the vicinity of the custom	Yes	0.0	0.0	0.0
	checkpoint administration?	No	100.0	100.0	100.0
11.	Is there an anti poaching plan in the checkpoint administration?	Yes	0.0	0.0	0.0
		No	100.0	100.0	100.0
12.	Is there enough human resource to effectively patrol in and around the checkpoint area?	Yes	0.0	0.0	0.0
		No	100.0	100.0	100.0
13.	Are the staffs well equipped to examine wildlife trafficking offenses in the custom	Yes	0.0	0.0	0.0
	checkpoint administration?	No	100.0	100.0	100.0
14.	Are the staffs trained in all aspects of anti poaching and follow up in the	Yes	0.0	0.0	0.0
	checkpoint administration?	No	100.0	100.0	100.0
15.	Is the existing communication system adequate to monitor wildlife trafficking in	Yes	0.0	0.0	0.0
	the checkpoint administration?	No	100.0	100.0	100.0

Table 5: The enforcement challenges of illicit animal genetic resources trafficking in border custom checkpoints of western Tigray

	Selected border custom checkpoints			
Enforcement challenges	Dima (n=11)	Ranking	Lugdi (n=13)	Ranking
Lack of monitoring	3.64	4	3.15	4
Lack of resources	2.45	2	2.77	2
Lack of capacity	2.82	3	2.92	3
Lack of interagency cooperation	1.64	1	1.15	1
Lack of transparency	4.73	5	5.00	5

* 5: The most important challenge, 1: The least important challenge

CONCLUSION

The custom checkpoints that regulate economic trade have not been adequately prepared and institutnally departmentalized to deal systematically with illicit wildlife trafficking. Monitoring illicit wildlife genetic resource trafficking is least targeted enforcement priority in border checkpoints of western Tigray. The patrolling activites are not systematic due to the absence of well established checkpoint institutional structures. Custom checkpoint organizational frameworks like specialized security, canine and horse units are not present. Moreover, the observed poor law enforcement practices are aligined with the absence of prosecution, security research and analysis, wildlife investigation and intelligence units. The existing information management systems are not aligned with the extent of illicit wildlife genetic resources trafficking. Institutional settings like emergency management, security data management, wildlife trafficking patrol plan and an anti poaching plan should estblished to

the institutional frameworks of the checkpoint administration. The insufficient human resources are adversely affecting both the law enforcement practices and patrolling efforts. Furthermore, the staffs are not well equipped and trained to examine illicit wildlife trafficking offenses. The material resources and the scale of the problem underlying illicit wildlife trafficking are not balanced. The vehicle numbers are also not sufficient for patrolling and the inspection of illicit wildlife trafficking. As well, there is no patrol book to record inspection result of wildlife trafficking in the checkpoint. The loosely connected community empowerment programs are not effective to address the problem of illicit wildlife genetic resource trafficking. This is due to the absence of community scale education and empowerment program for proximal local pcommunity. The custom enforcement units noted that, there is no adequate communication system established to monitor wildlife trafficking in the checkpoint administration. Generally, the institutional setting required for monitoring illicit wildlife genetic resource trafficking is not yet installed in the custom checkpoints adminstration of western Tigray.

Recommendations:

- The educational background of most the custom enforcement units is grade 10^{th}. Thus, a short and long term academic training should be given.
- The least enforcement priority given to the illicit animal genetic resources trafficking should be treated equally with other custom enforcement priorities.
- The monitoring system and custom staff capacity should be capacitated and technically equipped to cope up with a real solution against the illicit animal genetic resources trafficking.
- Lack of transparency, monitoring and staff capacity are the identified enforcement challenges. Hence, expanding transparent system and strengthening the monitoring system and enhancing staff capacity should be the future concern.
- The backbones of patrolling efforts such as, security units, canine units and horse unit should be made aviailabe in a manner to tackle the conservation crimes.
- There are no prosecution units, security research and analysis unit and intelligence unit. Thus, enhancing the law enforcement practices through establishing fundamental institutional frameworks should be a concern of the custom authorities.
- Emergency management unit, security data management unit, wildlife trafficking patrol plan and an anti poaching plan should be set within the institutional framework of the checkpoint administration.
- Well equipped and trained staffs to examine all aspects of anti-poaching and follow up should be devised in the custom checkpoint administration.
- Allocating sufficient vehicle numbers for patrolling and the inspection of illicit wildlife trafficking. As well, formulating patrol book to record inspection result of wildlife trafficking should be a concern in the checkpoints administration.
- A community based communication system with consistent youth development package should be aligned in the checkpoint enforcement tasks of western Tigray.
- The law enofrcment units should be commited to excute the custom rues and regulation along animal genetic resource trafficking pracitces
- Full delegations to monitor biodiversity in general and wildlife in paritcualr should be given by Ethiopian wildlife conservation authority and Ethiopian biodiversity insitiute.
- The regular inspection process of custom checkpoints should be fully supported by well departmentalized experts
- The thematization of the random inspection of goods should consider bio genetic resource of economic and conservation importances.

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REFERENCES

1. Institute of Biodiversity Conservation, 2012. Ethiopia: third country report on the state of plant genetic resources for food and agriculture. Country report, pp: 1-106.

2. Ethiopian Biodiversity Institute, 2015. Ethiopia's National Biodiversity Strategy and Action Plan 2015-2020., pp: 1-138.
3. Benis, N., A.N. Egoh, J. Patrick, B. O'Farrell, A. Aymen Charef, A. Leigh Josephine Gurney, C. Thomas Koellner, D. Henry NibamAbi, E. Mody Egoh and W. Louise, 2012. An African account of ecosystem service provision: Use, threats and policy options for sustainable livelihoods. Ecosystem Services, 2: 71–81.
4. Allister Slingenberg, Leon Braat and Henny van der Windt, 2009. Study on understanding the causes of biodiversity loss and the policy assessment framework. Techincal report, pp: 3-206.
5. IFAW, 2008. Criminal Nature: The Global Security Implications of the Illegal Wildlife Trade. Report, Yarmouth Port, MA: International Fund for Animal Welfare.
6. Pervaze, A. and S. Liana, 2013. International Illegal Trade in Wildlife: Threats and U.S. Policy.Congressional Research Service, pp: 3-12.
7. Warchol, G.L., 2004. The international illegal wildlife trafficking. Criminal Justice Studies: a Journal of Crime, Law and Society, 17(1): 57-73.
8. Dalberg, 2012. Fighting Illicit Wildlife Trafficking: A Consultation with Governments. Report. Gland (Switzerland): WWF.
9. UNEP, 2014. UNEP Year Book 2014: Emerging Issues in our Global Environment. United Nations Environment Program, Nairobi, pp: 3-14.
10. Sollund, R., 2011. Expressions of speciesism: the effects of keeping companion animals on animal abuse, animal trafficking and species decline. Crime, Law and Social Change, 55(5): 437-451.
11. United Nation office on Drug and crime, 2009. Organized crime and trafficking in Eastern Ethiopia. Regional Ministerial Meeting on Promoting the Rule of Law and Human Security in Eastern Africa. A discussion paper, pp: 2-43.
12. UNODC, 2012. The use of the internet for terrorist purposes. United Nations Counter-Terrorism Implementation Task Force. Discussion paper, pp: 2-158.
13. David Karanja, 2012. The Role of the Kenya Wildlife Service in Protecting Kenya's Wildlife. The George Wright Forum, 29(1): 74-80.
14. Wyler, L. and P. Sheikh, 2013. International Illegal Trade in Wildlife: Threats and U.S. Policy Congressional Research Service. <http://www.fas.org/ sgp/ crs/misc/RL34395.pdf> (Accessed 03/04.2017).
15. Zimmerman, M.E., 2003. The black market for wildlife: combating transnational organized crime in the illegal wildlife trade. Vanderbilt Journal of transnational Law, 36: 1657-1689.
16. Carlos, C., 2000. Size, Accessibility and Crime in Regional Australia. Australian institute of Criminology, pp: 1-6.
17. Eliason, S.L., 2011. Patrolling the peaks and the plains: An examination of Big Sky game wardens. Criminal Justice Studies, 24(4): 409-418.
18. United nation office on drug and crimes, 2016. World Wildlife Crime Report: Trafficking in protected species. World wildlife crime report, pp: 1-100.
19. Kaaria, D. and M. Muchiri, 2011. Ninth International Conference on Environmental Compliance and Enforcement, pp: 204-208.
20. Vernon R. Booth, 2010. The Contribution of Hunting Tourism: How Significant is this to National Economies? In Contribution of Wildlife to National Economies. Joint publication of FAO and CIC. Budapest, pp: 72.
21. Pimm, S., C. Jenkins, R. Abell, T. Brooks, J. Gittleman, L. Joppa, P. Raven and C. Roberts and J. Sexton, 2014. The biodiversity of species and their rates of extinction, distribution and protection. Science, 344: 987-997.
22. Getachew and Weldemariam, 2016. Contemporary Status of Illicit Wildlife Genetic Resource Trafficking: Future Policy, Legal and Institutional Consideration of Sustainable Wildlife Conservation in Ethiopia. Journal of Zoology Studies, 3(4): 91-101.
23. Ethiopian Wildlife Conservation Authority, 2014. National Ivory Action Plan for Ethiopia. Technical report, pp: 4-5.
24. Schneider, J., 2008. Reducing the Illicit Trade in Endangered Wildlife: The Market Reduction Approach. Journal of Contemporary Criminal Justice, 24(3): 274-295.
25. Rosen, G. and K. Smith, 2010. Summarizing the Evidence on the International Trade in Illegal Wildlife. EcoHealth, 7(1): 24-32.
26. Getachew Mulualem, Weldemariam Tesfahunegny, Mengistu Walle, Abeje Kassie, Nibret Alene and Mebrahtom Mesfin, 2017. Knowledge, Attitude and Practice of Custom Agents on Wildlife Trafficking in Three Bottlenecks Border Custom Checkpoint of Southeastern Ethiopia. Advances in Biological Research, 11(4): 171-182.
27. CSA, 2005. National Statistics Archived November 23, 2017, at the Wayback Machine.

28. Abebayehu Tadesse, EsetHadgu, Berhanu Mekbib, Rahmet Abebe and Solomon Mekuria, 2011. Mechanically Transmitted Bovine Trypanosomosis in TselemtyWoreda, Wetern Tigray, Northern Ethiopia. agricatural journal, 6(1) 10-13.
29. Ftiwi, M. and B. Tamir, 2015. On-Farm Phenotypic Characterization of Indigenous Begait Cattle in Western Tigray, Northern Ethiopia. J Anim Pro Adv, 5(7): 718-732.
30. William Cochran, 1977. Sampling thecnigques. 3rdedtion. John and Wlley sons publishing.
31. Chang-Ryung, H., 2014. A survey of customs administration perceptions on illegal wildlife Trade. Research paper, 34 :1-21.
32. Tom Ogola, 2016. Addressing the challenges of poaching and illegal wildlife trade: legislative frameworks; prosecution & closing trafficking routes - experiences from Kenya, pp: 1-
33. Gautam Basu, 2016. Combating illicit trade and transnational smuggling: key challenges for customs and border control agencies. World customs journal, 8(2): 1-12.
34. Andres, 2016. Wildlife Crime in the United Kingdom. Policy Department: Economic and Scientific policy, pp: 3-31.