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# Traditional foods and beverages in Eastern Tigray of Ethiopia



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## Abstract

Ethiopia is a multiethnic country with diverse cultural practices to prepare foods and beverages having significant contributions in socioeconomic development. Contrary, comprehensive documentation of the products, associated knowledge, and their sociocultural roles is incomplete. In this survey, thirteen typical traditional foods (two fermented and eleven non-fermented) and five traditional beverages (four fermented and one non-fermented) were listed referring the local community of East Tigray. The noted traditional foods/beverages are known for their social and cultural values in the local community, and they are exercised following celebrity events. They are prepared often from barley (*Hordeum vulgare*), peas (*Pisum sativum*), wheat (*Triticum aestivum*), buckthorn (*Rhamnus prinoides*), maize (*Zea mays*), sorghum (*Sorghum bicolor*), and teff (*Eragrostis tef*). Some of the dishes/drinks such as Ambasha, Ebist, Gaa't, Tihelo, Beso, Zikizuko, Abaekah, Duqua, Suwa, Mes, and Tahetah are well-acknowledged for their health and economic benefits. Others, like Birkuta and sola, are used to survive a long journey and looming drought. To conclude, this article presents a list of traditional foods and beverages which are potentially applicable in modern food or beverage industries and can contribute for global healthy diet.

**Keywords:** Ethiopian traditional foods, Traditional beverages, Cuisine arts, Tigray, Erob

## Introduction

The Convention on Biological Diversity states traditional knowledge (TK) as knowledge, innovations, and practices of indigenous communities. TK is developed through experiences, associated with culture and biological resources, conserved in a traditional context, and learned through observation or/and practices [1]. Proper utilization of TK can help to address food security, human and animal health problems, and education and natural resource management issues [2].

Traditional foods or beverages are natural diets or drinks which nourished our ancestors throughout the evolutionary history of human particularly in the prehistory of the industrialization of food or beverage. In Ethiopia, the history of traditional foods or beverages is dating to the early of crop domestication and agriculture innovation, and it is linked to celebrations such as

holidays, festivals, social gatherings, funeral, to honor guests, and special occasions [3, 4]. Tigray has long been recognized as an important center of plant domestication and agricultural innovation. Archaeological evidences from the region suggest food producing societies were living in the region before the third millennia BC [5]. Geomorphologic, palynological, and archaeological studies in the region also provide the dynamic relationships between human and environment on the plateau during the Holocene [5]. Traditional foods or drinks have been serving for multipurpose in the country for a long time: nutrition, ensuring food security, medication, and socio-economic benefits. For example, during “*Zamana Mesafint*” (1769–1855) traditional foods and beverages were prepared targeting specific occasions: *Tej* to honor royalty and nobility and *Besso* and *Chekko* for military campaign [6]. Nowadays, *Besso* and *Chekko* are popular public foods that people carry with them (commonly called *Sinq*) to ensure food security during long-distance travels, and *Tej* is a famous public drink available throughout the country. *Genfo* (porridge), which is

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prepared from oat (*Avena sativa*), is a diet of women during postpartum and individuals recuperating from all kinds of illnesses [6, 7]. In north and central high lands of Ethiopia, *Tej*, *Tela*, *Ambasha*, *Tihelo*, *Injera*, and other unique foods/beverages are still predominantly in use, and the culinary art has been inherited for centuries, although the effort to document and advance is very rare [8, 9].

The highland Ethiopian agricultural complex is viewed as a combination of indigenous food/beverage crops and a number of endemic varieties including teff (*Eragrostis teff*), noog (*Guizotia abyssinica*), finger millet (*Eleusine coracana*), wheat (*Triticum aestivum*), barley (*Hordeum vulgare*), chick pea (*Cicer arietinum*), lentil (*Lens culinaris*), and fava bean (*Vicia faba L.*) [5]. This suggests a long and complex history of local cultivation and genetic diversification in the region. However, our understanding of the diversity of food and beverage production in this area is poor. Thus, researching the field is vital to conserve and advance the knowledge, protect from unethical patents, and promote the use to enhance global food security [10]. This survey aimed to document typical traditional foods/beverages, preparation practices, and their sociocultural roles in East Tigray of Ethiopia.

## Materials and methods

### Study population

Tigray National Regional State is the northernmost of Ethiopia located at 12° 12' to 14° 32' N latitude and 36° 30' to 40° 30' E longitude. Tigray is one of the 85 ethnic groups in Ethiopia comprising approximately 6% of total population of the country, and 85% of the population is living in the rural areas [11]. The regional state contains other ethnic groups such as Erob and Kunama, accounting about 5% of the state's population. Tigrigna is the mother tongue of Tigray, and it is official working language of the region. Based on 2007 census conducted by CSA, 95% of Tigray people are Orthodox Christianity followers.

Erob (also called Saho) are indigenous people living in Tigray National Regional State and on the Eritrean side of the border. Erob Wereda is the district of Erob people in Eastern Tigray Zone. The mother tongue of Erob people is Saho, and "Geez" is the script. In Erob district, Tigrigna is the working language [12]. Christianity was introduced to the region as far back as the fourth century, and they are Christians either Orthodox or Catholics [13]. According to the Central Statistical Agency of Ethiopia (CSA), the population size of Erob was projected to be 29,374 in 2017 [11].

The survey was conducted in four districts of East Tigray Zone, Ethiopia. The Zone has nine districts, namely, Gulo Meheda-Wereda, Erob-Wereda, Saesi Tsadamba-Wereda, Ganta Afeshum-Wereda, Hawuzen-Wereda, Kilde Awlalo-Wereda, Atsbi Wonberta-Wereda, Adigrat

/Town/-Wereda, and Wukro/Town/-Wereda [11]. From these Erob-Wereda (14° 29' 59.99" N, 39° 39' 59.99" E), Saesi Tsadamba-Wereda (14° 15' 0" N, 39° 40' 0" E), Atsbi Wonberta-Wereda (13° 52' 0" N, 39° 44' 0" E), and Adigrat/Town/-Wereda (14° 16' 0" N, 39° 27' 0" E) were selected (Fig. 1).

### Household selection and data presentation

Consulting East Tigray Zonal Administrative Office, four districts were selected purposively considering their dependency on traditional foods and beverages. District administrative offices, peasant association leaders, district culture and tourism offices, and local elders were invited to suggest appropriate households. From a list of recommended households, 60 informants (15 from each district) were randomly selected using lottery method of sampling by assigning number, with each number corresponding to a subject. Then, they were recruited after obtaining their consent to participate in the study. For each traditional food or beverage, the informants were asked to list and explain the type of food and beverage they prepare at home, preparation method, procedures they follow, ingredients they add, preparation purpose, preparation frequency, shelf life, challenges, current status, and average Ethiopian Birr (ETB) they spent per event to prepare typical food or beverage.

The data were summarized using descriptive statistics and presented by percentages, frequency distribution, tables, charts, and graphs. All the analyses were done using SPSS Statistics for Windows, version 21 (IBM Corp., N.Y., USA).

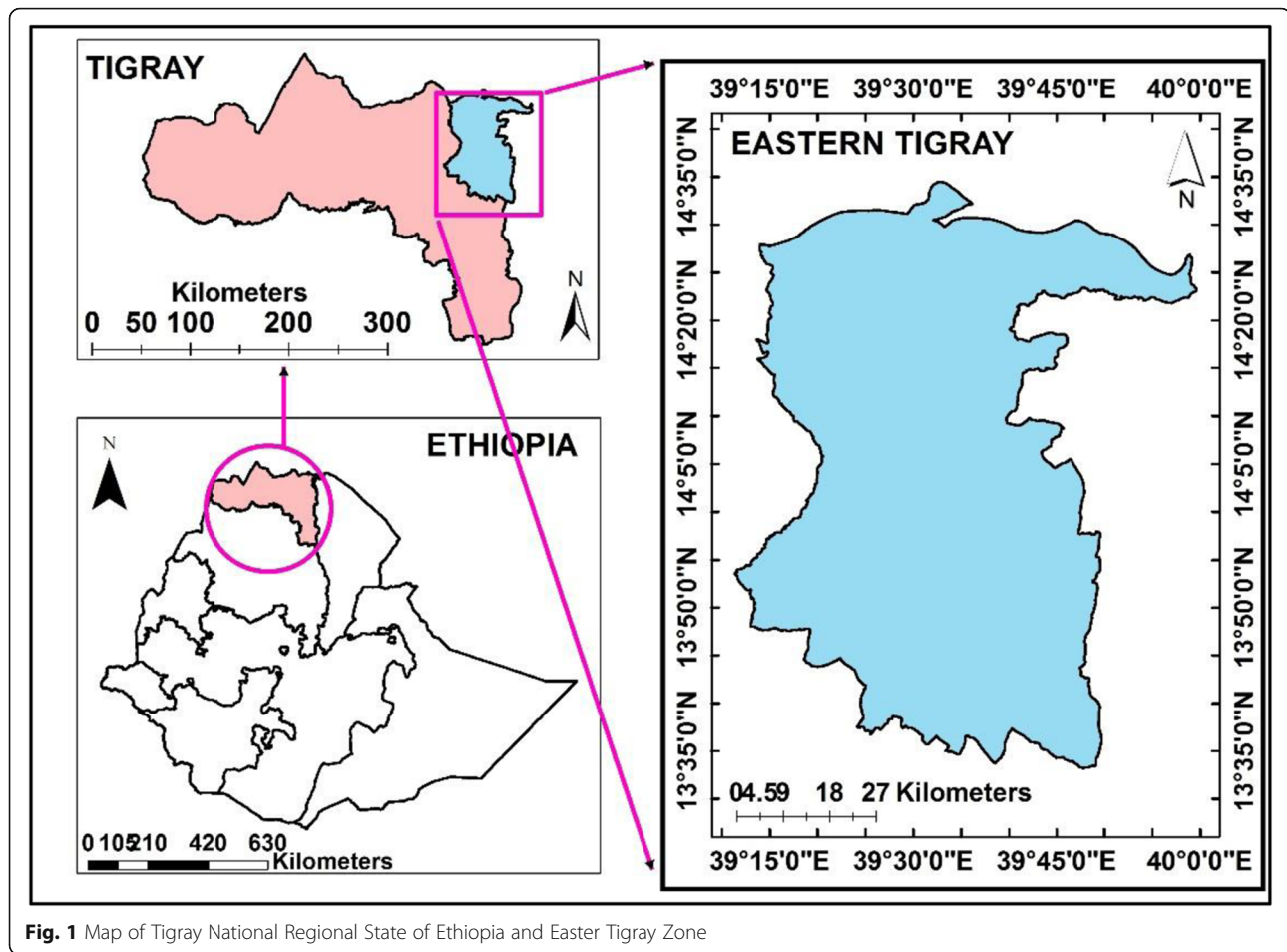
## Results

### Socio-demographic characteristics

The age of respondents varied between 25 and 77 with a mean of  $49.45 \pm 14.39$  years. All respondents were born in the study area. The minimum, maximum, and average years they lived in the study area were 25, 77, and  $47.72 \pm 14.27$ , respectively. There was no significant difference between age of the informants and number of years they lived in the study area ( $\alpha = 5\%$ , 2-tailed independent samples *t* test,  $t_{(118)} = 0.355$ ,  $P = 0.723$ , 95% CI [- 4.273 to 6.140]). Table 1 shows the socio-demographic characteristics of respondents.

### Traditional foods/beverages prepared by the local community

Totally, 13 typical traditional foods and five traditional beverages were listed by informants from the four districts of East Tigray: Erob eight (five traditional foods and three beverages), Saesi Tsadamba seven (four traditional foods and three beverages), Atsbi Wonberta 11 (seven traditional foods and four beverages), and Adigrat six (four traditional foods and two beverages). The listed



**Fig. 1** Map of Tigray National Regional State of Ethiopia and Easter Tigray Zone

traditional foods and beverages in each district are presented in Table 2. Figure 2 shows the two typical fermented traditional foods called *Ambasha* and *Ebist*.

#### **Tihelo**

Informants notified *Tihelo* is a unique traditional food which women prepare from barley (*Hordeum vulgare*) flour and serve it by pinching (Fig. 3). They also stated a woman who pinches *Tihelo* shall ingest a pinch of it to announce the beginning of dining; no one is allowed to eat before she does this, but while pinching, she cannot eat; it is taboo. *Tihelo* is eaten using traditional woody fork called “*Shenter*.” During group discussion session, informants proposed the following *Tihelo* preparation practices: barley pounding using woody mortar and pestle to remove chaff, wind winnowing, incubating in warm water for 1 h, drying at room temperature for 12 h, toasting with small amount of sands on a clay pan (*Mitad*), separate barley grains from sands, pounding by woody mortar and pestle to remove remaining chaff, wind winnowing, milling using traditional stone mill, sifting 2–3 times using fine sifter, make thick dough with cold water, kneading, pinching in small sizes, and

serving to eat. *Tihelo* is served with tomato stew (particularly during fasting periods) or meats stew or butter during Lenten, and *Elbet* is another cultural stew condiment which is made from peas (*Pisum sativum*) or faba beans (*Vicia faba*).

#### **Giezm**

Informants stated *Giezm* is prepared from meat of sheep/goat and table salt. They also proposed the following practices to prepare *Giezm*: selecting soft meat of sheep/goat, chopping in small sizes, wash the colon (small bowel) of sheep/goat by inverting, mix table salt with chopped meat, put the mixture in the tube of washed small bowel, cook by steaming in boiling water, and serve.

#### **Gaa't**

Informants made *Gaa't* (porridge) from barley (*Hordeum vulgare*) or wheat (*Triticum aestivum*) flour by slowly adding the flour in to boiling water (Fig. 4). They differentiate cooked *Gaa't* by its loss of water by evaporation, color change, and mixture thickness, and its hardness to stir. Melt butter (or cooking oil) mixed with

**Table 1** Gender, religion, ethnicity, occupation, and education of respondents by their district

		District							
		Erob		Adigrat		Saesi Tsadamba		Atsbi Wonberta	
		N	%	N	%	N	%	N	%
Gender	Male	6	40	8	53.3	2	13.3	7	46.7
	Female	9	60	7	46.7	13	86.7	8	53.3
	Total	15	100	15	100	15	100	15	100
Religion	Orthodox	3	20	14	93.3	15	100	15	100
	Catholic	12	80	1	6.7	-	-	-	-
	Total	15	100	15	100	15	100	15	100
Ethnicity	Tigray	-	-	15	100	15	100	15	100
	Erob	15	100	-	-	-	-	-	-
	Total	15	100	15	100	15	100	15	100
Occupation	Farmer	11	73.3	7	46.7	9	60	13	86.7
	Trader	1	6.7	5	33.3	4	26.7	-	-
	Employee	3	20	3	20	2	13.3	2	13.3
	Total	15	100	15	100	15	100	15	100
Education	Illiterate	3	20	-	-	4	26.7	4	26.7
	1–4	3	20	5	33.3	1	6.7	4	26.7
	5–8	7	46.7	6	40	5	33.3	2	13.3
	9–12	2	13.3	1	6.7	2	13.3	2	13.3
	Above 12	-	-	3	20	3	20	3	20
	Total	15	100	15	100	15	100	15	100

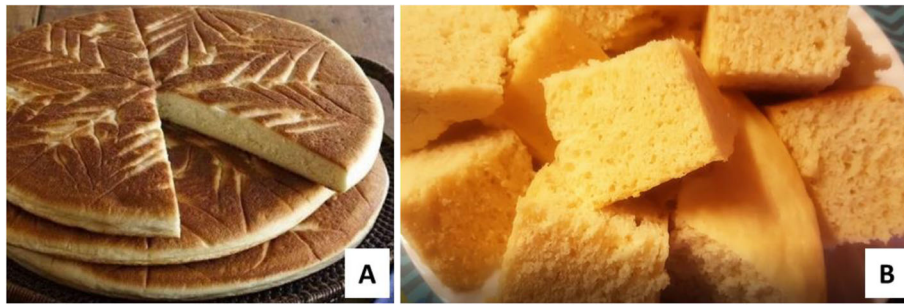
N number of respondents from district, % percent of respondents within district, - no value

**Table 2** List of traditional foods and beverages by district

	Local name of traditional food/beverage	Districts			
		Erob	Saesi Tsadamba	Atsbi Wonberta	Adigrat
Food	<i>Ambasha</i>	-	Yes	Yes	-
	<i>Beso</i>	-	-	Yes	-
	<i>Birkuta</i>	Yes	-	-	-
	<i>Dageha</i>	Yes	-	-	-
	<i>Ebist</i>	-	Yes	-	-
	<i>Gad't</i>	-	-	Yes	Yes
	<i>Giezm</i>	Yes	Yes	-	Yes
	<i>Hilumayt</i>	Yes	-	-	-
	<i>Sola</i>	-	-	-	Yes
	<i>Tihelo</i>	Yes	Yes	Yes	Yes
	<i>Tiqtiqo</i>	-	-	Yes	-
	<i>Torosho</i>	-	-	Yes	-
	<i>Zikizuko</i>	-	-	Yes	-
Beverage	<i>Abaekah/Habesh</i>	-	Yes	-	-
	<i>Duqua</i>	-	-	Yes	-
	<i>Suwa</i>	Yes	Yes	Yes	Yes
	<i>Mes</i>	Yes	Yes	Yes	Yes
	<i>Tahetah</i>	Yes	-	Yes	-

The food or beverage was listed in the district (Yes); the food or beverage was not listed in the district (-)





**Fig. 2** **a** *Ambasha*, relatively a thin circular bread. It is triangularly sliced to serve. **b** *Ebist*, a thick celebrity bread. *Ebist* is sliced into cubes by elder after praying in a religious way. Both *Ambasha* and *Ebist* are fermented traditional foods which are commonly prepared from wheat flour (screen capture, <https://www.youtube.com/watch?v=mrIRDcUDACQ>)

pepper powder is used as a condiment of *Gaa't*; the butter or oil is put in the middle of *Gaa't* by molding it using spoon back. The following brief *Gaa't* preparation practices were proposed by informants: barley or wheat pounding using woody mortar and pestle to remove chaff, wind winnowing, slightly toasting (if it is barley), pounding by woody mortar and pestle to remove chaff (if it is barley), wind winnowing (if it is barley), milling to make flour, boil water, cooking on stove (by mixing hot water, flour, and table salt), stir continuously for 30 to 60 min, take off from the stove and wait until the temperature comes down, transfer the cooked *Gaa't* from cooking pot in to bowl using woody scoop, and serve with butter. Usually, hot *Gaa't* is used to serve, and the amount of *Gaa't* to be prepared depends on the number of individuals to be served.

### **Zikizuko**

Informants make *Zikizuko* from roughly ground barley (*Hordeum vulgare*). The coarser particles left on the mesh strainer after sifting are called *Enfafo* or *Zikizuko*, and it is eaten by mixing with boiled milk or warm

water. Informants prepare *Zikizuko* in the following brief way: incubate barley grains in warm water for 3 h, decant the water and keep overnight at room temperature, toast, slowly pound using woody mortar and pestle to remove chaff, wind winnowing, roughly grind using traditional stone mill, and sift using sieve; the remaining coarser on the sieve is called *Enfafo*, mix *Enfafo* with boiled milk or warm water for 10 min, and serve it.

### **Suwa**

Informants briefed that *Suwa* is one of the most common home-brewed alcoholic drink which is served at home during holidays (Fig. 5). They prepare *Suwa* usually from barley (*Hordeum vulgare*) or sorghum (*Sorghum bicolor*) and buckthorn (*Rhamnus prinoides*). In our group discussion session, they proposed the following brief recipe as a common to prepare *Suwa*: wash a barrel (traditional clay container called *insera*) 3–5 times using *Grawa* (*Vernonia amygdalina*), fumigating barrel by smoking *weyra* (*Olea europaea subsp. Cuspidate*) and/or *tinjute* (*Otostegia integrifolia*), mix buckthorn powder with water and keep at room temperature for 5



**Fig. 3** **a** Pinched *Tihelo* on platter and stew in casserole. *Tihelo* is prepared from wheat flour and served with stew of tomato or meat. Usually, *Elbet* (not shown on this picture) is used to minimize the hot flavor of stew. **b** Statues of *Mes*, *shenters* (traditional woody forks), and a traditional tumbler of *Suwa* on the street of Adigrati city (November 2018)



**Fig. 4** *Gaa't* (porridge) with its condiment in a groove. *Gaa't* can be prepared from whole grain flours such as wheat, oat, barley, corn, or sorghum. Its condiment is commonly prepared by mixing ghee with pepper powder. (screen capture, <https://www.youtube.com/watch?v=NGicUBo90Cc>)

days, pound barley using woody mortar and pestle to remove chaff, wind winnowing, milling using traditional stone mill, preparing dough, baking pancake on clay pan, milling the malt by traditional stone mill, mix (malt, buckthorn, and pancake) in the barrel, keep the mixture at room temperature for 4 days, dilute with water at the end of 4th day and firmly close the mouth of the barrel, open the barrel on 5th day, and serve it.

#### *Duqua*

Informants notified they prepare *Duqua* from barley (*Hordeum vulgare*) or sorghum (*Sorghum bicolor*) and buckthorn (*Rhamnus prinoides*). The proposed recipe to prepare *Duqua* was pounding barley using woody mortar and pestle to remove chaff, wind winnowing, milling using traditional stone mill, kneading with cold water to make dough, fumigating the barrel with smoke of *weyra* (*Olea europaea subsp. Cuspidate*), transfer the dough in

to fumigated barrel, take out the dough on the 3rd day and fumigate the barrel (repeat this on every 3rd day until 12th day), bake traditional pancake on the 12th day, dry the pancake by basking on sunlight (this is called *Awunishite* preparation), prepare *Ankuro* (pounding, wind winnowing, milling, toasting), boil water, incubating barley in boiling water for 2 h, invert the container mouth for 9–10 h to completely remove the water, toast the barley, slowly pound using mortar and pestle, wind winnowing, milling using traditional stone mill, sifting using fine sieve, mix (*Ankuro*, powder of buckthorn, water, and malt) in a fumigated barrel, keep the mixture at room temperature for 7 days, mixing *Awunishite* and *Ankuro* (one hand *Awunishite* to two hand *Ankuro*), keep at room temperature for 3 days, dilute with cold water, and at the end of 10 days it will be ready to serve. The *Difdif* can stay for more than 6 months without deteriorating.

#### *Mes*

Based on informants' agreement during group discussion, *Mes* is a delicious drink that many households make at home to honor important events (Fig. 6). They remarked *Mes* preparation is simple, requiring honey and buckthorn powder. The whole process may take a month, and its quality depends on the quality of honey and the experience of a person who prepares it. The proposed recipe was fumigating a barrel by smoking *weyra* (*Olea europaea subsp. Cuspidate*), dilute in a ratio of 1 kg honey to 2 L of water, stirring, keep at room temperature for 4 days, filter, add buckthorn powder and "*tsedo*" (bark of a tree, the name of this plant was claimed to be confidential. Only few informants use *tsedo*, and their *Mes* is preferable), keep at room temperature for 20 days, transfer into another fumigated barrel, add 1 kg honey (if needed), and serve it. *Mes* is typically served with a flask like a glass called *Brille*.



**Fig. 5 a** *Suwa* in tumbler glass. Urban areas of Ethiopia usually use tumbler glasses to drink *Suwa* (<https://untappd.com>). **b** Traditional beakers to serve *Suwa*. They are made from wood or clay. (Picture was taken consenting a respondent who possessed the heritage and resident of Adigrat city, 2018)



**Fig. 6** **a** *Mes* and *Brille*. The dark-red *Brille* is used to honor elders or respected guest. **b** *Tsedo*, bark of a tree. The name of the plant was claimed to be confidential. Informants use *tsedo* to increase quality and durability of *Mes*, and it is favored by consumers. (Pictures were taken consenting a respondent who is a resident of Adigrat city, 2018)

### **Habesh/Abaekah**

The respondents notified they prepare *habesh* from roasted barley and sugar. The proposed recipe to prepare *habesh* was wash barley with warm water, dry by basking on sunlight, roast on a traditional clay plate, milling using traditional stone mill, mix flour and water, remove supernatant after day one, mix thoroughly by stirring, transferring into large jar, add water, keep at

room temperature for 6 days, add sugar on the 7th day, then serve it.

### **Status and sociocultural roles of traditional foods/ beverages**

From the total listed traditional foods, 46% were prepared for daily consumption or commercial purposes and 54% to celebrate events or to sell on the local

**Table 3** Roles and status of traditional food/beverage preparation

Traditional food/beverage	Purpose of preparation	Prepared by	Preparation rate compared to past	Frequency of preparation per year	Market affordability	Who is allowed to eat/drink?
Food						
<i>Ambasha</i>	DC/CP	F	Constant	8	Affordable	All
<i>Beso</i>	DC	F	Constant	6	Affordable	All
<i>Birkuta</i>	DC	M	Decreasing	3	Affordable	All
<i>Dageha</i>	DC	F	Constant	5	Affordable	All
<i>Ebist</i>	CeP	F	Constant	10	Affordable	All
<i>Gaa't</i>	CeP	F	Constant	8	Affordable	All
<i>Giezm</i>	CeP	M	Decreasing	4	Pricy	All
<i>Hilumayt</i>	CeP	M	Decreasing	4	Pricy	All
<i>Sola</i>	CeP	M	Constant	5	Affordable	Adults
<i>Tihelo</i>	CeP/CP/DC	F	Constant	8	Affordable	All
<i>Tiqtiqo</i>	CeP	F	Decreasing	1	Affordable	All
<i>Torosho</i>	DC	F	Decreasing	2	Affordable	All
<i>Zikizuko</i>	DC/CeP	F	Decreasing	8	Affordable	All
Beverage						
<i>Habesh/Abaekah</i>	CeP/CP	F	Constant	7	Affordable	All
<i>Duqua</i>	CeP/CP	F	Constant	5	Affordable	Adults
<i>Suwa</i>	CeP/CP	F	Constant	8	Affordable	Adults
<i>Mes</i>	CeP/CP	M/F	Decreasing	6	Pricy	Adults
<i>Tahetah</i>	CeP	F	Decreasing	4	Pricy	All

CD for daily consumption, CP commercial product, CeP celebration purpose, M male, F female



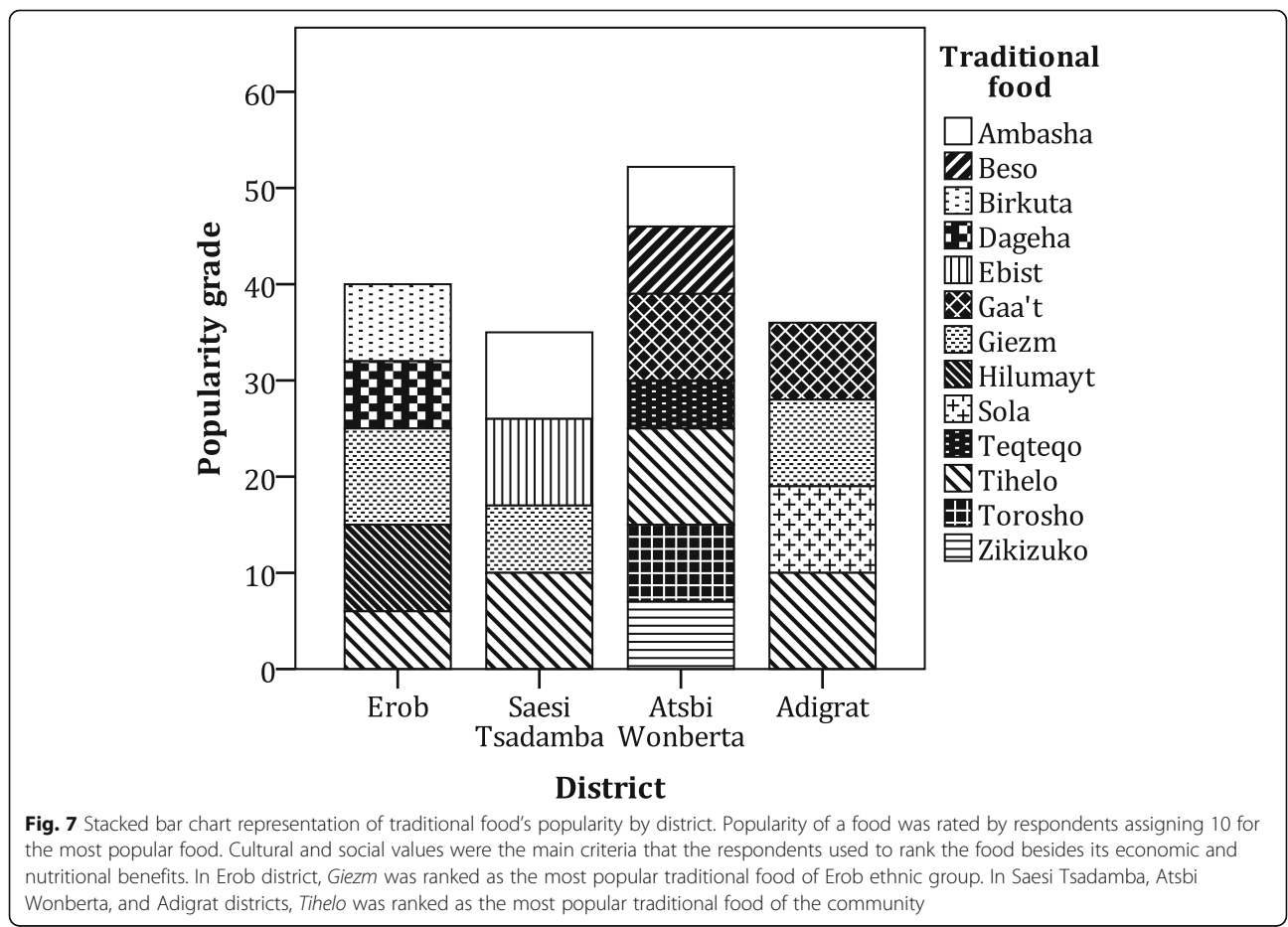
market. All the noted beverages were prepared either for ceremonial usage or domestic commercial purposes. Of the total listed product, 22% are prepared by male and consumed by adult. The maximum frequency of traditional food or beverage preparation at home in past depended on the cost of materials needed to prepare the product. The sociocultural roles and the current status of traditional food/beverage preparation are presented in Table 3.

The local community notified they prepare traditional food or beverage regularly following yearly coming ceremonial days like religious holidays. They explained they usually prepare both traditional food and beverage simultaneously and customarily during public holidays: Ethiopian New Year, *Meskel* (an annual religious holiday of Ethiopian Orthodox church to commemorate the discovery of True Cross), Christmas (annual religious celebration, called *Gena*), *Timkat* (annual celebration of Epiphany), *Fasika* (Ethiopian Easter), *Zikir* (to remember Angels or Saints, for instance *Hidar-12/November-21* to remember Saint Michael), on memorial days (for instance to memorize the day someone passed from family which is called *Teskar*), and birthdays; and they prepare

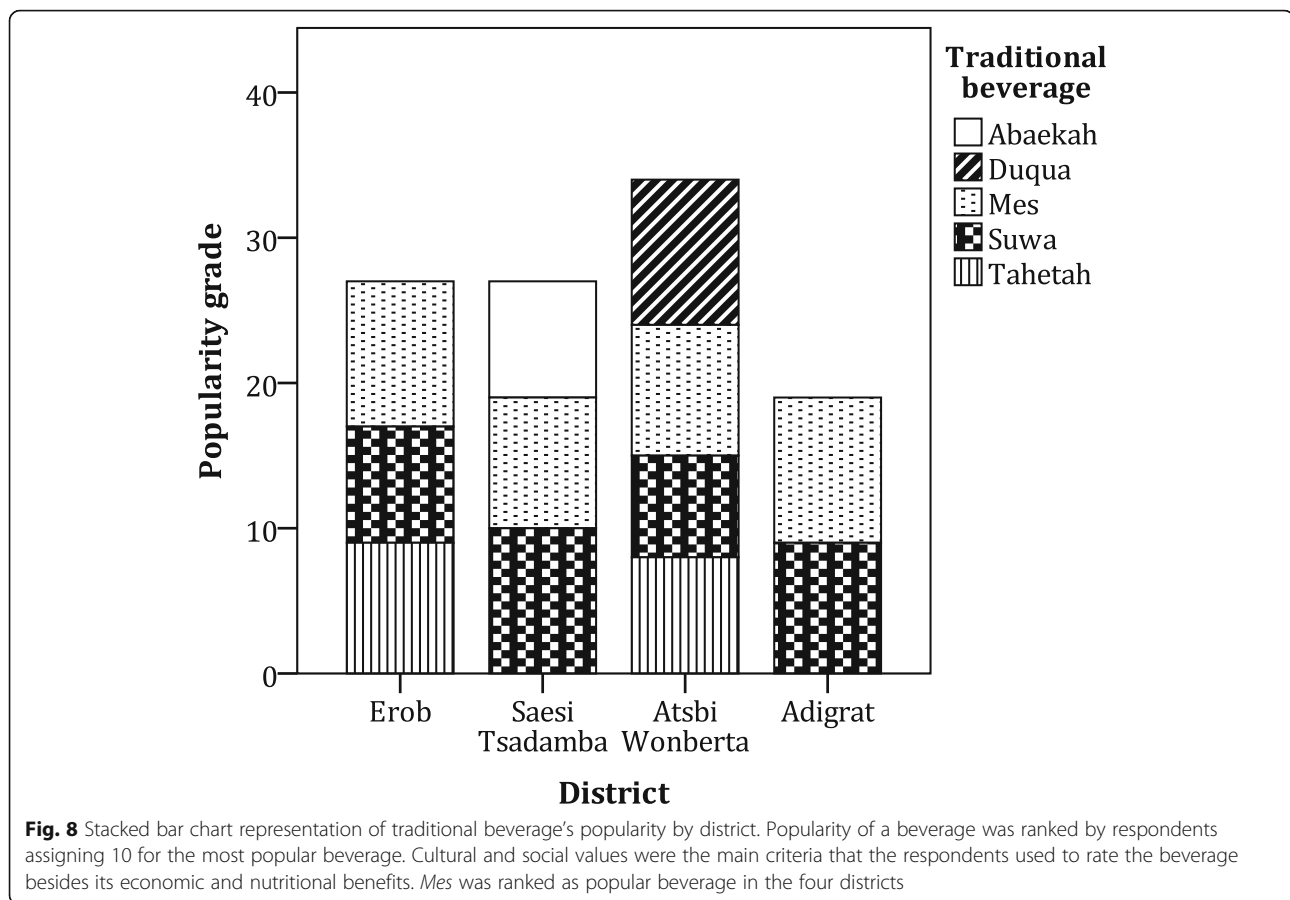
occasionally to celebrate events including wedding, funeral, graduation, and when they host respected guest. Comparison of the popularity of traditional food or beverage within the district is shown in Figs. 7 and 8, respectively.

**Constraints of traditional food/beverage preparation**

Informants claimed inflation is the main determinant factor to frequently prepare traditional food or beverage at home. They noted preparation of *Giezm*, *Hilumayt*, *Mes*, and *Tahetah* was decreased in last year, due to unaffordability of the price of animal meat sources and honey in the local market. They also notified preparation of *Tiqtiqo*, *Torosho*, *Zikizuko*, and *Birkuta* is decreasing through time because of urbanization, seeing as uncivilized, benefiting modernization, and introduction new religion. Figure 9 shows the relationships among the amount of money needed per event to prepare food/beverage, the minimum frequency of preparation in the past year, and the grade given by informants based on its popularity in the local community (10 for the most popular food or beverage).







## Discussion

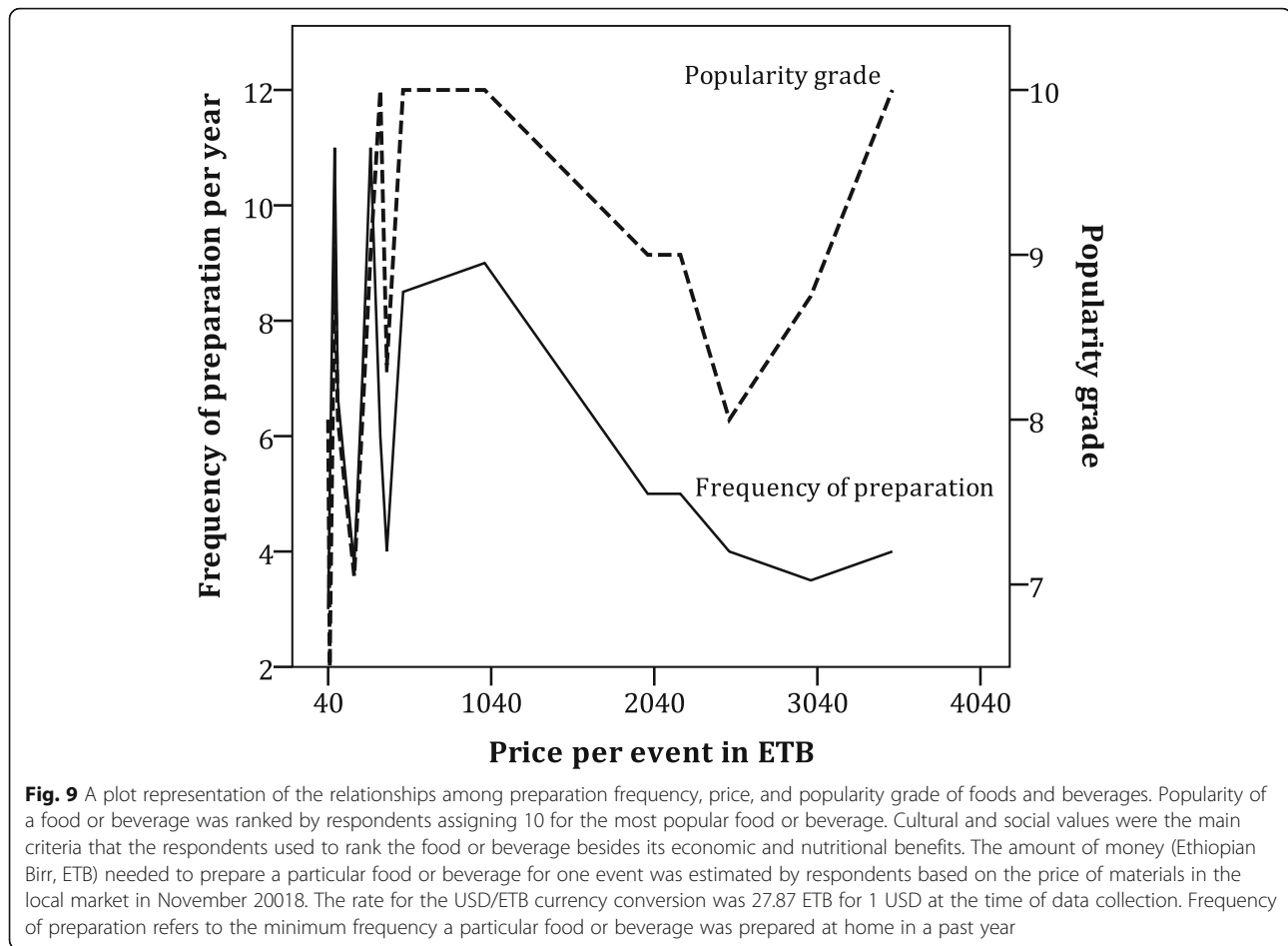
The results of this survey come up with a list of distinctive traditional foods and beverages with their associated community knowledge which are suggested to be typical to the cultural values of the local people in East Tigray Zone (in particular the four districts: *Erob-Wereda*, *Saesi Tsadamba-Wereda*, *Atsbi Womberta-Wereda*, and *Adigrat/Town/-Wereda*) of Tigray Regional State of Ethiopia.

With their condiments, *Giezm*, *Hilumayt*, *Gaa't* (porridge), *Tihelo*, *Beso* (roasted barley flour), *Tiqtiqo* (boiled wheat, corn, or beans), *Torosho* (thin bread), and *Birkuta* (thin dry bread) are non-fermented traditional foods. They are prepared from cereal crops except *Giezm* and *Hilumayt* which are meaty foods. *Ebist* (thick celebrity bread) and *Ambasha* (thin pancake-like bread) are popular fermented wheat flour breads. *Abaekah* (low alcoholic beverage), *Duqua* (unfiltered homemade beer), *Suwa* (filtered homemade beer), and *Mes* (honey wine) are fermented alcoholic beverages; however, *Tahetah* is non-fermented homemade honey drink. The community uses salting, drying, boiling, roasting, frying, baking, cooking, fermenting, or combinations of these to prepare the foods or beverages. Although the frequency of preparation per year is decreasing, due to socioeconomic issues, the dishes and beverages are regularly prepared

following yearly or monthly coming ceremonial days such as religious holidays or occasional cases (e.g., to honor guests).

Tigray is a well-known region of Ethiopia by its diversity of culture with distinctive recipes to prepare foods and beverages which are native to the local community. Archaeological evidences from this region suggest food producing societies were living in the area before the third millennia BC, and the geomorphologic, palynological, and archaeological studies in the region also provide the dynamic relationships between human and environment during the Holocene [5]. This survey highlights that traditional food or beverage preparation practice is the most important part of the local community, and most likely strongly linked to their cultural identity. Such practices describe the stances, identities, values, norms, and believe of the community by creating a unique atmosphere of familiarity, togetherness, belongingness, and comradeship [14, 15]. The cultural dishes and drinks establish a ground to exchange experiences and beliefs which are the basis of a cohesive community; they are considered to be nutritious and safe to address food security issues [14, 16].

Although the knowledge of a special skill is limited to the local community, preparation and consumption of



traditional dishes/beverages such as *Gaa't*, *Beso*, *Ebist*, *Tiqtiqo*, *Torosho*, *Abaakah-Habesh*, *Duqua*, *Suwa*, and *Mes* were also reported in different parts of Ethiopia [7, 17–19]. These dishes/drinks including their practices have sociocultural, nutritional, medical, and economic significances. Some of the noted practices can be the best experience to solve communities' problem, especially the poor. For example, a field experience analysis reported that Afar pastoralists prepare *Birkuta* from corn flour by baking on a flat stone set on firewood. They use it as a survival food for a long journey or for a looming drought because it can be kept for a long time if made with butter [20]. *Besso* is a popular public food that people carry with them (commonly called "*Sinq*") to ensure food security during long-distance travel or depart from family. Others like *Gaa't*, *Tihelo*, and *Zikizuko* are well known for their medicinal health benefits including remedy for anti-inflammatory, postpartum diet, and to treat fracture [6, 7]. Additionally, the foods/beverages such as *Ambasha*, *Tihelo*, *Duqua*, *Suwa*, *Mes*, and *Tahetah* are commercially available in the local market, and selling them is a source of income for some community members not only in East Tigray but also in other parts of Ethiopia [18].

Unfortunately, economic problems, urbanization, benefiting modernization, seeing as a primitive method, and the introduction of new religions are posing pressure on the preparation of the dishes or beverages. Particularly, the economic problem is becoming a major determinant factor to frequently prepare the dishes at home. Say, preparing *Giezm*, *Hilumayt*, and *Mes* was becoming challenging in past year in *Erob* district, as animal meat sources and honey are expensive in the local market. These and the absence of an attempt to modernize the process may lead to loss of traditional practices from cultural landscapes [9, 21].

On the other perspective, traditional food or beverage processing under primitive conditions is tedious and labor-intensive, consuming much energy and time with low yield and poor quality [22]. It imposes negative impacts on biodiversity due to deforestation for fuel and cultivation. However, improving the practices through modification and transformation may enhance biodiversity conservation, food security, and economic development. In Ethiopia, the effort to optimize the knowledge in modern technology is very limited: except attempts on *Injera* and *Mes*. The American Brotherhood Winery

produces and distributes Ethiopian organic honey wine (called *Sheba Tej*) using indigenous knowledge of Ethiopian women, and it is one of America's favorite Ethiopian honey wine [23]. Like *Mes*, Ethiopia has immense indigenous knowledge associated with traditional fermented or non-fermented food/beverage preparation which can be upgraded in technology to enhance production efficiency, food security, and to achieve sustainable development goals. For instance, *Suwa* can be a potential traditional beverage to commercialize in modern beverage industries. It has almost similar sugar and acidity content to that of modern beers [24]. *Suwa* is commonly prepared from buckthorn (*Rhamnus prinoides*) and malted barley (*Hordeum vulgare*) having many alternative crops: wheat (*Triticum aestivum*), maize (*Zea mays*), millet (*Panicum miliaceum*), sorghum (*Sorghum bicolor*), teff (*Eragrostis tef*), and rice (*Oryza sativa*) giving good opportunity to produce in quality and quantity [25]. Generally, advancing the culinary art in modern technology for global healthy diet and inspiring their commercialization in the global market help to address food security, public health, and biodiversity issues.

To conclude, the results of this survey publicize typical traditional foods, beverages, and practices which have cultural, social, and economic roles for the local community of East Tigray. The foods and beverages are potentially applicable in modern food or beverage industries. However, they are underutilized resources in Ethiopia may be due to lack of awareness, negligence, and/or undermining. Therefore, further detail studies are needed to advance the processes in modern technology.

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#### Authors' contributions

N.S.T. and G.F.B. conceived and designed the study. N.S.T., T.B.H., and A.A.H. performed the computations and verified the analytical methods. All authors discussed the results and contributed to the final manuscript. The manuscript has not been submitted, in whole or in part, to other journals. The author(s) read and approved the final manuscript.

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#### Availability of data and materials

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#### Competing interests

We, the authors, declare that we have no conflict of interest on the research, authorship, and publication of this article.

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