

Consumption pattern, processing, exporting status and policy prospects of fruit and vegetables in Ethiopia: A review.

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Abstract

The paper reviews the consumption, processing, export status and policy prospects of fruit and vegetables to assist policymakers in developing interventions to increase the agricultural sector's contribution. Diet plays an important role in controlling disease, improving health and maturing a generation. A high intake of fruit and vegetables has been linked to a lower risk of chronic diseases, according to the research report. Due to its wide variety of agro climatic conditions, Ethiopia is ideal for growing horticultural crops. There are many strategies and policies in development for the horticultural sector in Ethiopia, which is the fastest growing sector. The proximity of Ethiopia to neighbouring countries and the availability of the crop year round contribute to an increase in foreign exchange from time to time. As a result of their nature, these crops suffer postharvest losses from field to fork. Such losses affect the income and diets of growers in unindustrialized countries. The lack of know how about production and selling skills, drought and the infancy of processing plants limit productivity and production in Ethiopia. Horticultural crops can be processed to extend their shelf life. In Ethiopia, there are few fruit and vegetable processing industries. More than half of babyish and breastfeeding women suffer from anaemia due to micronutrient deficiencies. Production, processing and exporting quantity of fruit and vegetables have no contribution to farmers and countries. Many studies are undertaken in Ethiopia, none can address the consumption practice, processing, exporting status and policy prospects of fruit and vegetable.

Keywords: Consumption pattern, Ethiopia, Exporting, Fruit and vegetables, Policy prospects, Postharvest losses, Processing

Introduction

Remarkably Ethiopia is rich in agro biodiversity resulting from its natural features, cultural multiplicity and solid food arts. The weathers condition of Ethiopia has great variation due to the excessive difference in altitude ranging from sea level up to 4,500 m and also there is plentiful potential for irrigation [1]. This makes it possible for different crops to be grown, including all types of fruit and vegetables. However, the local, export demand and supply of fruit and vegetable are not balanced. This is because production is relatively inadequate. East Hararghe, East Shewa, West Shewa, Arsi, Gamo Goffa, Dire Dawa, Harari, Tigray and Amhara regions are the major fruit and vegetable producing areas in Ethiopia.

In the developing world, the gap between the human population and food supply is a significant challenge to human existence. In alleviating malnutrition and easing food insecurity; producing and in taking fruit and vegetables are the chances that have never been sufficiently prospected. Different types of indigenous and nonindigenous fruit and vegetables are

irregularly consumed by rural and urban societies in Ethiopia [2]. Since the production of fruit and vegetable has been underway for years; it is not a new division in Ethiopia. The subdivision embraces huge state owned farms providing fruits and vegetables to the home and foreign market. There are limited independent companies involved in producing fruit and vegetables for the foreign market mainly in European and also, many farmers are producing a small number of vegetables for the resident and the local export market [3]. According to Ethiopian-Netherlands horticulture partnership, the local demand for fruit and vegetable products is insignificant when compared with tropical fruits and certain vegetables like onions, cabbage and tomatoes around 2.7 million deaths a year worldwide from chronic disease, 31% from ischaemic heart diseases and 11% from strokes due to low fruit and vegetable intake and also low fruit and vegetable intake ranks as the sixth key danger factor for death globally [4].

Fruit and vegetable crops are valued for their sources of vitamins, minerals and proteins, particularly in developing countries, where people live with undernourishment due to

major dependence on cereals [5]. Fruit and vegetables are important for food security during drought and scarcity of food. Because, they produced within a short period, yielded more, provided a basis of earnings for all stakeholders, including the growers, created work opportunities and contribute to the national economy as pass on commodities [6]. The present speculation policy in the country is promising for the development and modification of fruit and vegetable crops both in the production and marketing sectors for export and foreign exchange earnings.

Besides, the losses of horticultural crops are more severe in the developing world than in the developed world. It is painful to the reminder that so much time is being dedicated to the values of the plant, money used up on irrigation; manuring and actions to protect crops are to be lost about a week after harvest [7]. This is due to the handling measures that are not yet fully recognized, agriculture is categorized as disjointed, production is not connected with marketing, lack of packaging, transport and storage technologies. It is, therefore, important to work on postharvest processes from the stages of planting until the products reach the consuming public by creating a common responsibility between growers and all stockholders [8]. Though inadequate studies were done in Ethiopia, deterioration of quality and postharvest loss of these crops are about 15 to 70%.

To minimize these damages the use of proper packaging materials, storage facilities and transportation is necessary. Moreover, to ensure sustenance and nutritional security; minimizing the loss of fruit and vegetable and maintaining product quality is significant [9]. On the other hand, the majority of rural poor societies in Ethiopia are suffered from nourishment and nutrition insecurity because of insufficient land and lack of resources; producing capable, low cost and indigenous technology minimizes postharvest loss of fruits and vegetables as sufficient income generation through the production of fruits and vegetables with combined postharvest technology [10]. Minimizing postharvest losses and quality worsening is crucial in increasing the availability of food from the present production, for the financial development and wellbeing of the people.

On the other hand, farming is the backbone of the economy in unindustrialized countries. It should be no wonder that agricultural industries and related activities account for a considerable proportion of their output [11]. From the different types of activities that can be termed as agriculturally centred, processing of horticultural crops is vital. In Ethiopia, currently, the number of fruits and vegetables processing plants is few [12]. These industries process restricted types of products such as tomato paste, orange marmalade, vegetable soup, frozen vegetables and wine. Due to scarcity and lack of regular supply of the crop the factory is working at little capacity. At the country level, several research works and review papers have been done on the production pattern of horticultural crops, but no review was done on the consumption pattern, processing, exporting status and policy prospects of fruit and vegetable in Ethiopia [13]. The objective of this study was to assess the consumption pattern, processing, exporting status and policy

prospects of fruit and vegetable in Ethiopia with the specific objectives of studying the consumption pattern of fruit and vegetables in Ethiopia, assessing the processing status of fruit and vegetables in Ethiopia and to review the exporting status of fruit and vegetables in Ethiopia and to assess the policy prospects of these crop in Ethiopia [14].

Materials and Methods

Production of fruit and vegetable in Ethiopia

For many poor families variation in fruit and vegetable crops is pretty good looking worldwide. In the world, 868 million tons of fruit and 1089 million tons of vegetables were produced in 2018 [15]. Recently, the production of fruit and vegetables worldwide are rising by about half between 2000 and 2018. There are several reasons for this increment. Since producing fruit and vegetable are profitable, farmers involved in this activity usually earn greater farm returns than cereal producers and per capita, farm returns have been five times greater and also, producing these crops does not need skilled people, plays a big role in poverty minimization programmes and food security initiatives give occupational chances, simple for small scale production units and offer assistance for people at the individual household level, in health centres and refugee [16]. Even if abundant fruit and vegetable are produced in the world, still not enough to consume world people according to WHO's recommended daily allowance. Many factors reduce the productivity of this crop to encounter the WHO's recommended daily allowance; climate change, postharvest loss and a lack of water are the major ones [17].

Ethiopia has promising weather conditions for producing tropical, subtropical and temperate fruit and vegetables [18]. The country has around 2.6 billion cubic meters of groundwater potential, good quality lakes and perennial rivers with great potential for irrigation. Above 85% of Ethiopians rely on agricultural production for their supportable livelihood [19]. The types of soil in horticultural producing areas are well appropriate for production and have a large potential for an irrigable land area, currently, less than 5% is under irrigation [20]

In Ethiopia, horticultural crops are grown in diverse parts of the country by private farmers and other operators engaged in the business, both in marketable quantity as well as minor volumes [21]. Small scale production is focused in Hararghe (eastern high land parts and large commercialized cultivations are widely spread in central high land and the low land zones, mostly following the Awash and Gibe/Omo rivers [22]. As stated by the Ethiopian-Netherlands horticulture partnership, in contemporary years, marketable production of fruit and vegetables has been growing due to the expansion of state farms (e.g. Ethiopian horticulture development corporation and increasing private investment in the sector by national and international entrepreneurs. The government of Ethiopia is more and more reflected as the private sectors are the engine for economic development and the catalyst for providing employment and export increments. Due to this, the private

companies were permissible and assisted with an array of inspirations to take part in the area. According to Wiersinga and Jager, the current production of fruit and vegetable sector is subjugated by two state farms, namely, the Upper Awash Agro Industry Enterprise (UAAIE) and the Horticulture Development Enterprise (HDE, both are currently in the process of being transferred [23-25].

In Ethiopia, 1000 tons of fruit and vegetables were produced in 2018. The main fresh fruit and vegetables produced are okra, herbs, celery and leafy vegetables, cabbages, brassicas, garlic, mangoes, bananas, (chilli peppers, avocados, papaya, tomato and onions [26]. In addition to the above mention tones, 52,484 tons of undetermined tropical fruits are produced, which include passion fruit and cactus figs (Figure 1).

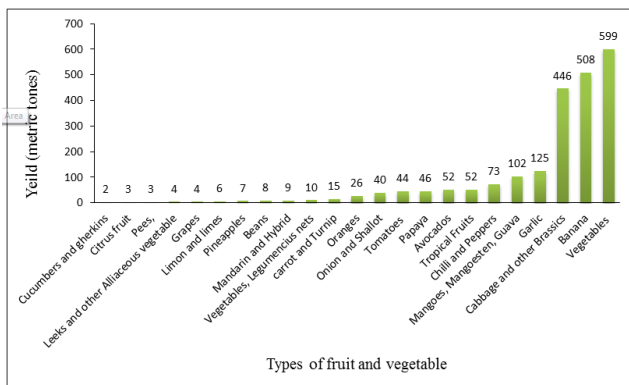


Figure 1. Fruit and vegetable production in Ethiopia (2005-2018), in 1000 tones.

However, because of various constraints, the production of fruit and vegetable in the country has not played a substantial role in the diet and income generation. The challenge faced by farmers including smallholders and the large scale commercial farm is more or less the same as the difficulties faced by grain crop production [27]. The key challenge; are shortage of water, unpredictable climate conditions, lack of adequate pest and disease control, poor soil management, traditional growing systems, fragile agronomic practices, absence of care to produce value, avoidance of physical damage, as well as lack of storage, wrapping facilities and also lack of processing industries [28].

Trends in postharvest handling of fruit and vegetables in Ethiopia

Even if the production of fruit and vegetable is increasing, the eating pattern of fruits and vegetables is around 7 kg per person per year which is far below the minimum recommended level by the WHO and FAO (*i.e.* 146 kg per person per year [29]. This report showed Ethiopia's per capita intake of fruit and vegetable is eight times lower than the average amount for East Africa (55 kg per person per year and under nearby countries (e.g. 79 kg per person in Sudan and 55 kg per person at Kenya [30].

Even though the MOARD of Ethiopia focuses on market led agricultural expansion, the government initiates funding for market incorporation and agro innovativeness growth and also,

Ethiopia's Ministry of agriculture is struggling to reduce postharvest damages, triggering up to 20-40% losses in Sub-Saharan Africa. This is due to many challenges [31]. One of the main causes of a low per capita intake and availability is the enormous loss of fruits and vegetables. It's known that fresh perishable crop has a short shelf life and they are alive; they last their physiological and biochemical reaction postharvest. According to Rahiel, in Ethiopia farmers' knowledge of modern cultivation systems, postharvest management systems and deterioration of these crops is limited [32]. Most of the growers lost their crops due to an absence of appropriate cultural practices such as harvesting and handling equipment, lack of market link, access to roads and traditional postharvest management.

Besides, according to Kasso and Bekele, producer awareness is very low on infection of microbes, pollution, insecticides linked with collecting and management, crop maturity and proper care [33]. For this reason, they couldn't practice the suggested and appropriate tackle for collecting and handling. They have also the absence of enthusiasm and curiosity to advance and upgrade the collecting and handling systems from time to time [34-36]. The producer uses poor quality seed, harvesting and handling materials such as unsanitized sickle, spade, hoe, axe, ladder locally named 'ballad', old cloth old basket, canvas, old bag, unsanitized plastic bucket, palm oil container, aluminium or plastic bowl, old oil can, thatched and weaved baskets and containers. The packaging material used is an unsanitized wooden box, plastic box, sack, leaves and branches of different plants, old cloth, old rope and unsanitized track [37]. Improper transportation systems such as human labour, public transport with commodity, donkey, cart with pack animal, horse, truck, mule and horse cart, camel, Bajaj, minibus locally called 'Daina' and Isuzu trucks by overloading and unstacked are used [38].

It's known that a cool chain is an unremitting supply of produce from farm to fork at a definite temperature. Continuously using cool chains for fruit and vegetable crops from farm to consumer houses ensure the produce reaches without postharvest loss. Operative cold chain management starts in the field by precooling and carries on with cold storage, cool transportation, and cooled distributions [39]. As the International Institute of Refrigeration (IIR) report showed, 23% of the perishable foods were lost because of not using the cooler in unindustrialized nations.

In addition, the use of postharvest treatments such as cleaning, grading and sorting of the perishable crop is necessary to extend the storage life from a period to a few months. Due to using the postharvest operation shelf life of the product, marketing and consumption can be done leisurely [40]. Though the crop is stored in paramount situations, the value and wholesomeness of the crop are determined by the entire value chain.

In developed countries, the handling and storage of perishable products throughout the supply chain are provided similarly [41]. The shelf life of perishable foods is extended if cold storage is joined with postharvest tools such as controlled

atmosphere storage. On contrary in developing countries poor handling, lack of processing and storage facilities are the major cause of postharvest losses of these crops.

In Ethiopia, there is no improved storage method used by producers and wholesalers. Producers of fruit and vegetables store their produce in farm, under a big trees, in caves or buried under the soil and farmer resident for temporary storage which has poor quality. Wholesalers of fruit and vegetables in Ethiopia also lack awareness on sorting, grading, storage structure and compatibility of perishable crops [42]. They store climacteric fruit with non-climacteric ones and do not sort the diseased and healthy crops. In Ethiopia, such a trend aggravated the postharvest loss and deterioration of the quality of fruit and vegetables. Based on their physiological properties, different perishable products need different types of packages; heat, relative humidity and air movement, which play a significant role in defining postharvest life. Thus, the requirements of packaging for unprocessed fruit and vegetable produce are as follows:

- It should be safeguard from microbial infection.
- Safety from bruising and physical injury.
- It should avoid moisture/weight reduction.
- Given that air movement for respiration and conversation of gases.
- Minimizing of respiration rate, delay physiological development and extend shelf life.
- Ethylene concentrations should be controlled in the package [43].

Therefore, to minimize the existing postharvest loss and ensure fruit and vegetable consumption in Ethiopia; adopting improved postharvest technology, improving transportation methods, packaging material and suitable storage conditions depending on the physiological properties of the crop and susceptibility to microbial decay of perishable crops is vital. Government and all the stakeholders should create awareness of postharvest technology such as precooling, cleaning, sorting, grading, appropriate handling and packaging material, transportation, storage and processing of these crops into different durable products.

Results

Consumption pattern of fruit and vegetable in Ethiopia

Due to the essential constituents of fruit and vegetable crops; the adequate intake of these crops could help in preventing our body from the most important diseases such as CVDs and cancers. A research report stated that the person who lives through food shortages and a diet of inferior quality have high wellbeing problem and death from communicable diseases including COVID-19. According to WHO report in 2017, in the world, 3.9 million deaths are recorded due to a lack of consumption of fruit and vegetables [44]. It is assessed to affect about 14% of deaths from gastrointestinal cancer, about 11% from heart disease, and around 9% by stroke worldwide.

If people's intake of fruit and vegetable were improved adequately; 2.7 million lives might be kept back every year.

Fruit and vegetables are the sources of vitamins, important micronutrients, fibre, some proteins and different bio functional constituents. Now a day's the world request for rising in the production of fruit and vegetables with population increase, living standards and awareness of the health benefits of fruit and vegetables and dietary patterns [45].

Malnutrition does not simply affect individual wellbeing and health nevertheless it puts substantial problems for peoples, societies and countries. Particularly in Sub-Saharan Africa, the major challenge is limited dietary diversity which causes under nutrition in rural societies. Yet this situation is persistent because a major part of societies depends on carbohydrate rich crops; merely minor amounts of animal products and horticultural crops are consumed. Consequently, nourishment has a deficiency in the spectrum of nutrients required for wellbeing [46]. According to Porto, fruit and vegetable consumption in Sub-Saharan Africa simply accounts for 1.18% of the whole caloric source. This is mainly linked with people favourite for heavy starch such as cassava and yam, which rapidly fulfil starvation and give the required energy and also, the incidence of regular droughts related to climate change can affect people's dietary diversity.

According to WHO/FAO recommendations consuming the lowest of 400 g of fruit and vegetables per daytime (exclusive of potatoes and other tubers) per individual the hindrance of diverse chronic diseases and as well as for mitigation of numerous micronutrient deficits, especially in developing countries are essential. Despite the rising documented in the international fruit and vegetables production and trade, Africa's food intake for each person are yet under the suggested 400 grams per daytime (=146 kg per person per year). FAO identified that Africa's yearly fruit and vegetable intakes are below 100 kg per individual, which are equivalent to 250 grams per individual per day. However, the intake of teenagers and females is higher than the quantities consumed by youngsters and males. In Sub-Saharan African countries the fruits and vegetable consumption level confirm the substantial shortages of utilization. A fact investigation done by Ruel in different African countries, such as Ethiopia, Rwanda, Kenya, Ghana and Uganda, shows, that the intake ranges are from 27 to 11 kg per individual annually, which is under the suggested quantities.

Ethiopia is familiar with its variety of traditional diets, as well as fruit and vegetables. However, horticultural crops' contribution to the diet, producer's income and all stakeholders are insignificant. The pattern of fruit and vegetable intake in the country still required advanced improvements. Ethiopia has numerous policies and agendas to minimize the stages of under nutrition as a share of its countrywide growth program. The major policies and programs that intend to terminate shortages of food, ensure food and nutritional security and encourage continuous agriculture by 2030 are the Growth and Transformation Plan (GTP), National Nutrition Plan (NNP), Malebo declaration, the Seqota Declaration (SD), National

Food Security Strategy (NFSS) Nutrition Sensitive Agriculture (NSA) plan, School health and Nutrition Strategy (ShNS), the Productive Safety Net Program (PSNP) and Food Safety and Quality related undertakings. The Seqota declaration implemented justifiable Development Goal 2 (SDG2). However, there are several hinder factors to ensuring food security, improving the population's nutritional status and dietary diversification. The key factors are availability, affordability, access, behaviour and lack of awareness. However, the burden of under nutrition is extreme in both urban and rural parts of the countries.

Grain crop contributes about 75% of the Ethiopian regime. The intake of fruit and vegetables in Ethiopia is 97 g per day on average. Compared with other countries, Ethiopia recorded last among 187 countries. According to EPHI, in comparison within the region in Ethiopia, fruit and vegetable intake was relatively greater in SNNP and Gambella in contrary to other regions. Hirvonen identified the mean Ethiopian family consumption of fruit and vegetable was less than 30% of the WHO's recommended in 2011.

Conversely, as Minten stated that the consumption of these crops in Ethiopia is growing about 30-40% per individual in both urban and rural parts between 2011 and 2016. Now a day's supermarkets retailing fruits and vegetables; the numbers of jam processing companies are growing. Even though with the current intake rising, Ethiopia's intakes of these crops yet need additional scope to increase. In 2018, Ethiopia's average per person fruit and vegetable consumption remained eight times under the regional average and present forecasts shows the local food and beverage consumption will increase by 75% between 2020 and 2030. According to international institute of food policy research reports, sharing expenses of foods, including fruit and vegetable, increased from 2000 to 2016 (Figures 2 and 3)

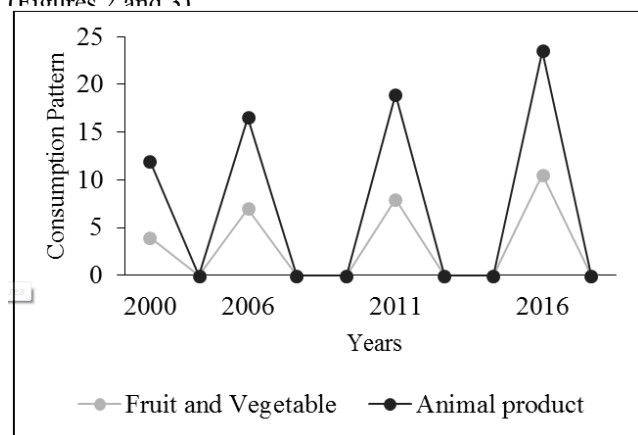


Figure 2. Fruit and Vegetable Consumption pattern in Ethiopia.

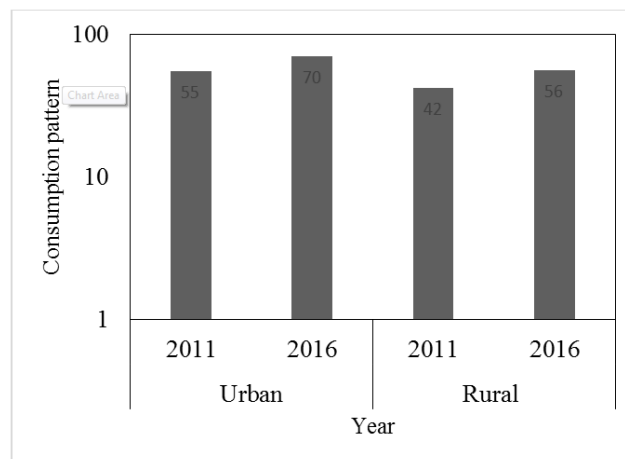


Figure 3. Fruit and vegetable consumption pattern in Ethiopia in rural and urban areas.

The status of unwholesome intake of food in Africa and Asia is falling slowly while the developed countries are performing raise. According to Gelibo, the predominance of fruit and vegetable ingestion in Ethiopia remained at 1.5%. Women's intakes of fruit and vegetable are greater (1.8% vs. 1.2%) than men's. Rural people's intakes are improved than their urban counterparts, 1.6% versus 0.9%, correspondingly. Only around 1% of residents in the age group 60-69 years consumed the suggested quantities of fruit and vegetable.

As Ethiopia journal of health development report exhibited that among the children assessed in nine regions, 38.1% couldn't eat any common vegetables (kale, spinach, cabbage, carrot, tomato and pumpkin) weekly. The ratio of index youngsters who couldn't eat any common vegetable was greater in Afar (85.0%), Tigray (77.6%), Amhara (61.8%) and Addis Ababa (59.3%) and moderately small in SNNPR (7.0%), Dire Dawa (15.6%) and Oromiya (18.6%). Of all teenagers assessed in nine regions, 36.5% couldn't eat common fruits (mango, papaya, oranges, avocado and banana) during the week. The ratio of teenagers who couldn't eat fruits remained great in Tigray (88.1%) and Afar (83.5%) and small in Harari (23.3%). The proportion of children who did not eat vegetables one time in the week is superior to 75% in Afar and Tigray areas. This is because, in the abovementioned regions, the availability of these crops in the market is worrisome, and need different interventions. According to FAO estimation, Ethiopian people consume under 100 grams of fruits and vegetables per day, a size of a medium carrot, which is under a quarter of the suggested fruit and vegetable intake. The percentage of teenagers who have taken fruits was significantly greater between the urban dwellers and rural dwellers. In contrast to this, in the eastern part of Ethiopia, the farmer has adequate production of these crops, but they don't consume instead, they focus on taking them to the market for cash. According to Walle, in Addis Abeba city, the intake of fruits and vegetables rich in vitamin A is minimum, however, the intake of other types of vegetables is high, this is due to the daily consumption of onions, tomatoes and garlic. WHO recommends that preschool age children should consume about 75% of vitamin A rich foods a minimum of three times a week. Otherwise, society should be

considered an at risk society. According to this recommendation, many communities in Ethiopia can be categorized 'at risk communities'. Therefore, declaring strategies and different policies on countries' development without implementation is not important in ensuring countries' food and nutrition security.

Factor that influences the eating pattern of fruit and vegetables in Ethiopia: In most countries, the availability and intake of Fruit and vegetable are under WHO suggestion. Particularly in Sub-Saharan Africa, the part of the total budget allocated to fruit and vegetable intake is about 3% to 13% and the entire food budget share is about 4.5% to 16%. The request and intake of fruit and vegetables are associated with many factors such as level of education, income, lack of land and awareness/habit of people WHO and FAO.

In Ethiopia, barred household foods are subject to major seasonal stress and price variations, with smaller caloric intake and inferior food variety in lean seasons. Though, in better nourishing families placed nearer to indigenous food markets, youngsters' body weight and food change significantly through the seasons. This is associated with the production of these crops being dependent on the rainy season and a lack of awareness of people on home gardening of fruit and vegetable and also a place of residence, marital status, employment status, education level, production quantity, values, spiritual food customs or prohibitions, lack of efficiency in the implementation of the nutritional strategy by government and non-government organizations, the income of the people and lack of awareness are among the major factor linked with lower fruit and vegetable intake.

On the other hand, this day's war and the COVID-19 plague made supply and demand tremors in the world food systems. The crisis disturbed the poor and nutritionally susceptible groups of people in Africa including Ethiopia. This condition has an impact on fruit and vegetable quality, availability and affordability due to lockdowns and fresh market closures.

In addition to the above mentioned factor, the perishable nature of fruit and vegetable, the seasonality of these crops, limited infrastructure (road, refrigerated vehicles and traditional pre cooling method) and the infancy of preservation and processing technology in Ethiopia can also lead to lower consumption of these crops. Therefore, to improve a healthy diet and improve nutrition, the interventions targeted toward a healthy lifestyle as a national nutritional program and improving access such as road, refrigerated vehicles, preservation and processing technology that helps reduce postharvest loss and extend shelf life of such crop should be at the first government agenda and also creating awareness for society in home gardening can minimize the effects of shortage of consumption of these crops.

Processing pattern of fruit and vegetables in Ethiopia

FAO defines postharvest losses as quantifiable damages in eatable food quantity or quality (nutritional value) of nourishment planned for human consumption. The postharvest system involves different activities, from field to handling,

selling, preparation and finally eating choices at the end user level. Every year, huge masses of foodstuff are missing at each stage throughout the voyage to users. FAO commissioned study report shows, that about one third (1.3 billion tonnes) of food produced for human feeding is lost internationally. Particularly in Sub-Saharan Africa (SSA), losses are higher when compared with other continents. In the world; the factors that contribute to postharvest loss of perishable crops are; the nature of perishable crops (high moisture content (65-95%), pre harvest disease, insect invasion and injury during postharvest management (harvesting, handling, packaging, storage and transportation) are the major one. Predominantly in Ethiopia, farmers depend only on the traditional growing system and postharvest management in their undersized sort of lands. According to Panhwar, in some situation producer couldn't get the two way shipping price, for this reason, they would leave their products in the market place than bear the shipping price needed for taking the product back. Due to this, in Ethiopia, producers of this crop face greater financial damage as of the shortage of proper approaches to minimize postharvest damages and increase the storage life of these crops.

For fruit and vegetable, changing them from fresh to processed products enhances the value of the produce, improves the quality of fresh products, increases acceptability, reduces postharvest damages and increases the storage life of perishable products. The fruit and vegetable processing industry offers a source of employment and supports the development of the countries' manufacturing capabilities. Especially, Agro processing has a great tendency to generate employment and inspire rural finance through targeted venture and growth. Job creation is a significant engine for government strategies in this area. Nevertheless, market forces drive private enterprises to adhere to coherent business plans optimally using resources.

Ethiopia takes a proportional benefit in many fruit and vegetable produces due to its favourable weather condition, availability of land and water for irrigation, cheap labour cost and nearness to European and Middle Eastern markets. Ethiopian rural development policy emphasises market led agricultural development and the government initiates funding market combination and agro enterprise growth and also, the Ethiopian Government provides greater importance to the expansion of the horticultural sector and in 2008, the horticultural development agency was recognized with a particular emphasis to encourage and sustenance the additional expansion of the horticultural sector.

The population of Ethiopia are presently expected around 120 million. This shows the presence of a great possibility domestic market request for processed and unprocessed fruit and vegetable is drastically higher than the exported volumes. In addition, the buyer of Ethiopian fresh and processed products are processing plants, *i.e.* wineries, tomato processing and vegetable canning plants, which need grapevine, tomato and numerous kinds of vegetables for processing. However, yet, the amount of fruit and vegetable processing manufacturing is inadequate. Nowadays, in the countries, there are only 30 fruit

and vegetable processing plants. These processing plants currently process restricted types of crops such as tomato paste, orange marmalade, vegetable soup, frozen vegetables and wine.

In Ethiopia, there are many challenges raised by food processors, particularly by fruit and vegetable processing plant that prevent their effectiveness and confirm that they work with spare processing volume despite a quickly rising market. For instance, poor input supply, non-affordability of packaging material and standard packaging material which acceptable by international buyers, cold chain facilities, lack of skilled human resources from producer to processor, limitation of infrastructure such as electricity, irrigation, transport, unavailability of cold storage, lack of sufficient and regular supply, access to loan, high capital investments, modern infrastructure and assistance needed to accomplish industrialization events are the key.

Exporting status of raw and processed fruit and vegetable in Ethiopia

Ethiopia exports high quality flowers, fresh and processed fruits and vegetables to the intercontinental markets Table 1.

Table 1. Major exported fresh fruit and vegetable from Ethiopia (all destinations), in 1000 euros.

No	Types of Fruit and Vegetables	Year				
		2015	2016	2017	2018	2019
1	Fresh or chilled vegetable	226562.00	232036.00	213595.00	43637.00	2218.00
2	Tomatoes	8518.00	8086.00	7972.00	2929.00	26.00
3	Potatoes (excluding seed)	14966.00	16251.00	19660.00	3319.00	
4	Strawberries	890.00	2191.00	2227.00	3620.00	2223.00
5	Onion and shallots	2161.00	2371.00	2577.00	2163.00	2.00
6	Seed potatoes	2673.00	1804.00	1538.00	1263.00	
7	Plantains	428.00	505.00	834.00	1257.00	3.00
8	Bananas	1340.00	2066.00	1261.00	767.00	1.00
9	Orange	1065.00	888.00	939.00	674.00	
10	Garlic	185.00	362.00	709.00	495.00	
11	Cabbage lettuce	1455.00	1570.00	1593.00	467.00	
12	Carrot and turnip	841.00	998.00	1015.00	380.00	
13	Mangoes (Guava and mangosteens)	550.00	466.00	498.00	316.00	4.00
14	Salad, beetroot	360.00	431.00	463.00	281.00	
15	Beans	1620.00	1625.00	1575.00	268.00	4750.00
16	Cabbages, Khirabi, Kale and similar edible brassicas	273.00	298.00	295.00	259.00	
17	Leeks and other alliaceous vegetable (Onion, shallot and garlic)	123.00	178.00	141.00	201.00	3736.00

For Ethiopian fresh fruit and vegetables, the main markets are the European Union, Netherland, Germany, Belgium, the United Kingdom, Poland, Norway, Arab countries, Djibouti and Somalia. The processed and preserved fruit and vegetables are exported to the United Arab emirate. Ethiopia is popular in Europe and Germany for its green beans, climbing beans, cut flowers, okra, melon and passion fruits. This shows as there is a trustworthy request for produced fruit and vegetable throughout the year, and a high volume is re-exported. On the other hand, the demand for Ethiopian wine is also great in local and export markets. Nowadays, the winery takes unprocessed grapes from Guder, Nura Era, Merti and Zewai Vineyard. Production of Grapes for the local market is a pretty great area of an asset in the country and was produced in high volume for winery plants. According to Alemayehu, the export status of fruit and vegetable in Ethiopia is increasing. This shows the possibility of a solid industry image for Ethiopian fresh and processed fruit and vegetables in the international market.

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18	Lemons and Limes	136.00	159.00	145.00	185.00	
19	Papayas	129.00	177.00	136.00	182.00	
20	Globe Artichoke			0	161.00	
21	Pumpkins, Squash and gourd	168.00	38.00	52.00	157.00	
22	Avocados	16.00	44.00	112.00	137.00	35.00
23	Peas " <i>Pisum sativum</i> "	331.00	253.00	435.00	130.00	1150.00
24	Grapes	3.00	0	0	0	248

Yet, the export status of this crop from Ethiopia to European countries is very low compared to demand. This is due to the European market's need to import fruit and vegetable with a great import value or high import growth rate. However, in Ethiopia, there are instabilities of supply because of many challenges faced by producers such as differences in cultivar, farming price, disease, postharvest loss and other CBI.

Discussion

Opportunities and policy prospects for processing of fruit and vegetables in Ethiopia

Ethiopia has a favourable climate, the largest asset to producing a perennial supply of horticultural crops. The demands for importing fresh and processed fruit and vegetable by the regional and international markets such as Europe and the Middle East are great and rising. Slight labour prices create laborious farming (such as organic) and handling moderately good looking suppliers from developing countries.

According to ministry of agriculture, governments of Ethiopian is working hard concerning updating the horticulture subdivision by establishing the legal, policy and monitoring situation and also minimizing blockage that hold back production, yield and market necessities.

From the active industrial policy established in Ethiopia; carefully planned strategies such as the advertisement of exports and creative assets, business sustenance and the use of public enterprises (SOEs) to shape strategic sectors are the major. The policy emphasis is meat processing, food and horticulture is the main ones. According to the strategy, an external stakeholder can start investment either as an individual or jointly with internal investors with small capital investment (Investment Opportunity in Fruit and Vegetable, 2014). Therefore, contributing to such job essential to the development of the country by using this opportunity.

In addition, of African countries, Ethiopia is the first with an industrial policy. Numerous industrial parks are established all over the country and the government was forwarding additional steps with the expansion of incorporated agro industrial parks which focused on agricultural raw materials.

On the other hand, Malabo declaration on accelerated agricultural growth and transformation for shared prosperity and improved livelihoods is serious policy initiative for

African economic development and decreasing of poverty is adopted in 2014 by Ethiopian government has set of tangible agriculture aims to be accomplished by 2025. This declaration includes obligation to terminate Starvation in Africa by 2025 by hastening agricultural development, reducing the present stages of postharvest losses, by the year 2025, improving nutritional prestige and the deduction of child under nutrition in Africa to reducing stunting to 10% and underweight to 5% by 2025.

At the commencement of 2021, the government of Ethiopia launched the ten years standpoint growth plan (2021-2030) whose objectives are to minimize the number of people existing under the poverty line to 7% by 2030. The plan also pursues to minimize the part of the agricultural sector in GDP to 22% and make around 14 million jobs per year. The movement from agriculture to manufacturing and industry rises occupation opportunities and allows the nation to accomplish its goal of rising production and productivity to upgrade the export earnings and replace imports. Increasing the productivity of the agricultural sector is the main concern of the innovative strategy. Besides, Ethiopian industry park establishment policy directions are also a good opportunity for fruit and vegetable processing plant implementations.

Since, Ethiopia is challenged with weather fluctuation and environmental deprivation. The climate change and environmental degradation has contribution in food and nutritional insecurity. To prevent the collapse of economy and to ensure food and nutritional security, Ethiopian Prime Minister Dr. Abiy Ahmed, announced the launch of green legacy initiative in 2019. This program is important for Ethiopians hopes to form a green and climate resilient economy and has many advantages for countries development. Especially for young entrepreneurs it can provide more job opportunity because they can gain income from the green legacy initiative by nurseries and supply great amounts of sprouts to government agencies at good fees and also stimulate privatization of planting tree and fruit seedling and also this program has initiative in greening urban by planting fruit and vegetable roadside. Therefore, such program has significant advantages in increasing production of fruit and vegetable thereby improving consumption pattern these crops and livelihood of people.

Conclusion

Fruit and vegetables are the sources of a different, biochemical compounds including vitamins and minerals. They add variety, taste and texture to our diets. However, the perishable nature and different physiological properties of fresh fruit and vegetables need specific attention from farm to fork. In Ethiopia, many factors contribute to postharvest losses such as traditional farming practices, poor harvesting and handling method, use of unsanitized material from farm to fork, inadequate processing factories and lack of facilities such as road and refrigerated transport.

Adequate consumption of fruits and vegetables, 400 g per individual per day, can increase mental ability and health and minimize the problem of numerous non-communicable illnesses. Inadequate intake of fruit and vegetables is estimated to cause about 14% of deaths from different chronic diseases. In Ethiopia, the present intake of fruits and vegetables is inadequate and inferior to other Africa. Lack of awareness of home gardening, weather condition and lack of know how about the nutritional benefit of these crops, income level, education level and genders, war, COVID-19 are the main factors contributing on the inadequate in taking of fruit and vegetables.

Nowadays, in Ethiopia, fruits and vegetables are produced by numerous individual, commercial farms and small holding farmers for both domestic and export markets. The supplying of raw materials in the countries is promising for food processing factories such as wineries, tomato processing plants and vegetable canning. Even though the production, processing and exporting of fruit and vegetable is increasing in Ethiopia, producers, processors and exporters have criticized the lack of experience in activities all over the supply chain, as well as awareness of farming arrangements and postharvest management practices. Besides, there is no significant contribution to the diets of people, income of farmers and country development. The hindering factors like infancy of the processing technology, knowledge of specifications and codes of practice, awareness of selling and absence of advertisement display additional difficulties and also the awareness about the value chain, the involved actors' accomplishments and responsibilities are limited.

To improve the export status and consumption pattern of fruit and vegetables; minimise postharvest losses, create awareness on home gardening, farming practices, and postharvest management of these crops essential. Therefore the government of Ethiopia, policymakers and all concerned bodies should critically work on implementing the declared policy including Green legacy initiative has important in improving livelihood and creating several opportunities for Ethiopian people.

In addition Governments of Ethiopia should implement a Food system policy for healthy diets in the condition of war and COVID-19 which is indicated; making sure of the accessibility and affordability of wholesome foods over supply chains, Familiarizing social aid plans to maintain the diets of nutritionally susceptible clusters, guarantee diversified and

nutritious diet are accessible for youngsters, care the attachment of manners change and nutrition schooling in food and farming reactions, simplify a policy of surroundings to encourage multisectoral activity and the use information and evidence to evaluate the influence of COVID-19 on healthy diets are the major one.

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