Annex 1.

DIPLOMA THESIS

Food Safety and Quality Engineering in Republic of Georgia

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Annex 2.

HUNGARIAN UNIVERSITY OF AGRICULTURE AND LIFE SCIENCES
INSTITUTE OF FOOD SCIENCE AND CHEMISTRY
BUDAPEST

Food Safety System in Republic of Georgia

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1. Introduction

Public health depends critically on the safety of the food supply, and every government has to protect that supply. This is also true of the South Caucasus nation of the Republic of Georgia. Food plays a big part in the culture and economy of the country, which has a rich and varied culinary legacy.

The Republic of Georgia is struggling to join European Union due to the government's started implementation of international food safety systems. The country has improved its food safety system significantly over the past few years, which has had a beneficial effect on both the economy and the health of its citizens. Even though changes started there are still a lot of problems. Yet, with so many small-scale food producers, scarce resources, shoddy infrastructure, and being in the conflict-affected area Georgia still faces a difficult problem in assuring the safety of its food supply.

This thesis looks at the Republic of Georgia's system for ensuring food safety and identifies its advantages and disadvantages. The question is if a valid food safety system is appropriate and if people understand the need for a food safety system. The thesis will also look at possible solutions to strengthen the framework and guarantee the security and safety of food production.

The thesis will include an overview of the significance of food safety, the difficulties nations confront in ensuring the security of their food supply, a brief history of the nation's food system, and the difficulties it encounters in maintaining food safety. It will also provide an overview of Georgia's current system of food safety regulation. The analysis is going to be supported by a review of the current literature, interviews with significant Georgian food system players, and a survey of food consumers. There is also used personal experience during the study, internships, and work periods.

Overall, the purpose of this thesis is to add to the body of knowledge on food safety in developing nations and to provide insight into the challenges and possibilities for food safety improvement in the Republic of Georgia.

2. Literature Review

Food safety is the method used to make sure that food is on a controlled level free of toxins and other harmful compounds that could injure or sicken consumers. Food safety is one of the issues today around the world. There is some mechanism to control food safety. Also exists a lot of risk factors. Controlling them is an essential part of public health.

This evaluation of the literature aims to analyze the benefits and drawbacks of Georgia's system for assuring food safety. The overview of the current situation of food safety in the Republic of Georgia will come first, followed by a review of the regulatory environment, the function of governmental organizations and other international food safety organizations, and the frequency of foodborne illnesses. The evaluation will then look at the main issues affecting Georgia's food safety system, including issues with security and safety.

In addition to identifying these challenges, the literature review will also explore the current survey of consumer needs and their understanding of food safety's importance.

2.1 Republic of Georgia

Georgia is a country located at the meeting point of Europe and Asia and is home to both Black Sea beaches and settlements in the Caucasus Mountains. 3.6 million people are living in the 69,700 square kilometres (26,900 square miles) nation (BBC News, 6 March 2023). The capital is Tbilisi and the language Georgian. Georgia's eastern region has a dry, moderately continental climate, whereas the western region has a subtropical climate. It is bordered to the north and northeast by Russia, to the south by Turkey and Armenia, and the southeast by Azerbaijan. Georgia is famous for its delicious cuisine.

2.1.1 Food production

As a result of the Republic of Georgia's long history of agriculture and its good climate for cultivating a range of crops, the food production industry is a significant part of the country's economy.

Wine is an essential agricultural product in Georgia. Georgia produces a wide range of wines from local grape varietals and has a lengthy history of winemaking that dates back more than 8,000 years.

Georgia is known for producing fruits and vegetables, including tomatoes, apples, pears, cherries, apricots, and peaches, in addition to wine. A variety of nuts, including hazelnuts, walnuts, and almonds, are also produced in Georgia and are well-known both domestically and abroad.

Sheep, cattle, and pigs are the most frequently grown livestock in Georgia, which contributes significantly to the state's food economy. Georgia is famous for producing high-quality cheese, including kinds manufactured with ancient techniques such as Sulguni, Imeretian, and Guda. There is high consumption of meat and dairy products in the county.

With some fish farms opening up in recent years to produce species like trout and sturgeon, fish farming is also a growing industry in Georgia. Furthermore, mussels, oysters, and anchovies can be found along Georgia's Black Sea coast.

2.1.2 Import and export

It is important to be aware that the majority of the nation's supply of gas and oil products comes from imports. Georgia also imports grains, pharmaceuticals, equipment and components, metal building materials, mobile and wireless gadgets, cigarettes, and laptops. Turkey, Azerbaijan, China, Ukraine, and Germany are its primary commercial partners for the import of a variety of goods.

Russian Federation and Ukraine, Turkey, Azerbaijan, and Armenia are a few of the nation's top commercial partners. You can see a plot of Georgia import partner share in 2020 recorded by WITS (World Integrated Trade Solution) Figure 1.

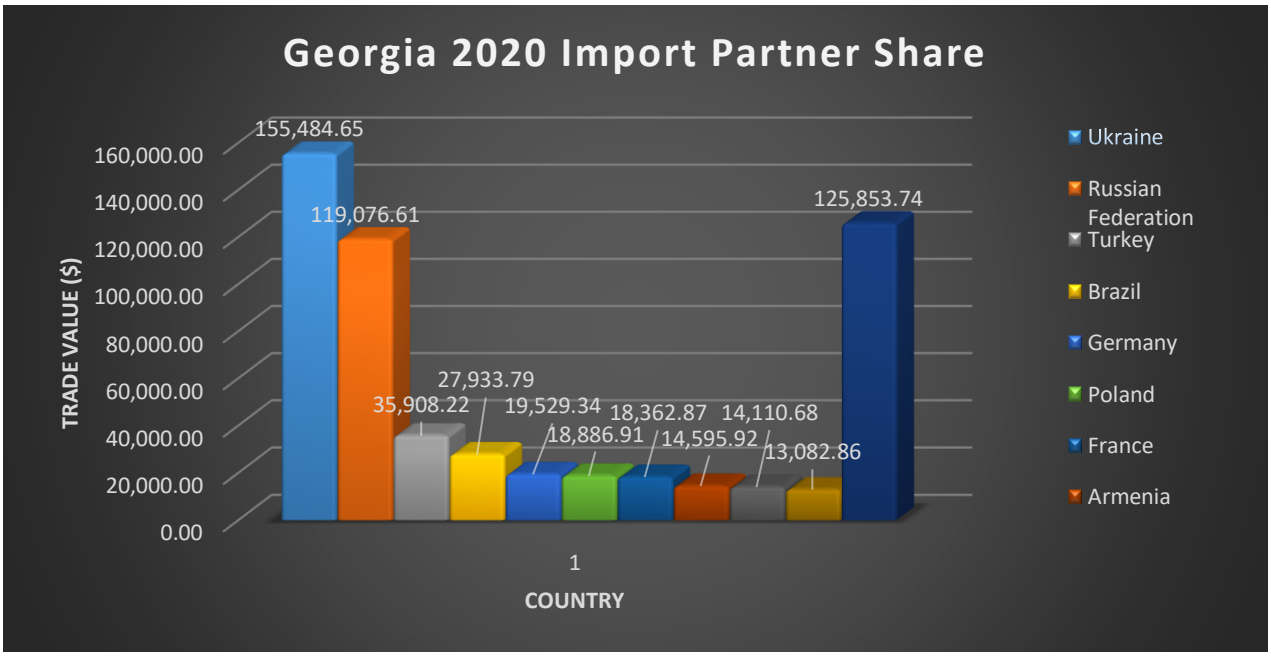

Figure 1 Georgia Food Products Imports by country in US$ Thousand 2020 (WITS (World Integrated Trade Solution) (Internet1)

According to statistics provided by the National Statistical Office (Geostat) on January 13, Georgia's foreign trade turnover climbed by 32.8% year over year in 2022, totalling USD 19.04 billion.

Georgia's exports climbed annually by 31.8% to $5.59 billion while its imports increased by 33.2% to $13.45 billion. The trade imbalance, which represented 41.3% of total revenue, stood at USD 7.85 billion. (Civil Georgia, 2022).

2.2 Food safety system

2.2.1 The need for food safety standards

According to estimates, food poisoning makes millions of people ill each year in OECD nations. Food industries have also expanded internationally quickly. No longer is market demand limited to nearby or regional suppliers. Retailers and the food business today get their goods from around the globe, changing the sector into a networked system with a wide range of intricate relationships.

The production, trading, and distribution of food goods have undergone a radical transformation as a result of these advancements. As a result, both national and international governments are enacting new laws and regulations to guarantee safe and animal-friendly production, limit pollution, and conserve resources. Examples include the EU-BSE rules, the General Food Law (EU 2002/178), and the Codex Alimentarius standards (FAO/WHO).

Standard quality assurance systems are being used by businesses all over the world more frequently to raise the caliber and security of their items and manufacturing procedures. Quality assurance systems enable the use of and verification of controls aimed to guarantee the safety and quality of food.

Food sector quality assurance is becoming a reality. Private safety and quality standards are developing and being put into practice based on the demands of the public sector. Compulsory standards like HACCP are a requirement for businesses to behave in a changing environment. The industry is also exposed to additional standards, such as Eurep-Gap. (Trienekens, Jacques, and Peter Zuurbier, May 2008)

The majority of food chain enterprises in industrialized nations adhere to fundamental requirements for food safety and quality. The situation is particularly challenging for producers in emerging economies and developing nations such as the Republic of Georgia. There is needed to go deep in details.

2.2.2 International Food Safety Authorities in Georgia

Food and Agricultural Organization of the United Nations (FAO):

An international institution called the Food and Agricultural Organization of the United Nations (FAO) coordinates efforts to end hunger and enhance nutrition and food security. Fiat panis, the Latin for "let there be bread" is the organization's motto. It was established on October 16, 1945. The eight departments that make up the FAO are Agriculture and Consumer Protection, Climate, Biodiversity, Land and Water Department, Economic and Social Development, Fisheries and Aquaculture, Forestry, Corporate Services, Technical Cooperation, and Programme Management. FAO has 194 Member Nations, two associate members, and one member organization, the European Union. (Internet 2)

FAO accepted Georgia as a member in 1995. Georgia's FAO Representative was accredited in 2004 as the FAO Sub-regional Representative for Central and Eastern Europe. Georgia's FAO has the mandate to assist with national initiatives to advance food security and sustainable

development. The goals and priorities of the government as outlined in the strategy papers for agricultural development are reflected in the FAO's priorities in Georgia. In essence, FAO helps the government establish and implement a legal, institutional, and regulatory framework. (Internet 3)

World Health Organization (WHO):

To work toward achieving the best level of health for all people, WHO was established in 1948. Together with 194 Member States, WHO sets norms and standards, formulates evidence-based policy alternatives, and provides leadership on issues about global health. Additionally, it offers technical assistance to Member States, keeps track of and evaluates health trends, finances medical research, and offers disaster relief. WHO also works to improve housing, sanitation, working conditions, and nutrition through its programs. Six regional offices are located all around the world, and its main office is in Geneva, Switzerland. (Internet 4)

Georgia joined the WHO on May 16, 1992, and a liaison office in Tbilisi was established the following year. The liaison office changed its name to the WHO Country Office, Georgia, in 2005. The administration, coordination, management, and improvement of WHO collaboration in the nation are all vital tasks performed by the national office. Additionally, it serves as a liaison between the government and WHO informs the government of WHO policies, develops plans and actions, and offers guidance on intersectoral health issues as well as sector development in the healthcare industry. The biennial cooperation agreement (BCA) between WHO/Europe and Georgia outlines the major aims of the National Office. Along with the Ministry of Health, other national organizations, and foreign partner organizations, it implements the BCA (Biennial Collaborative Agreement). (Internet 5)

2.2.3 Food safety authorities in the Republic of Georgia

Ministry of Environmental Protection and Agriculture of Georgia (MEPAG):

Creates and carries out a comprehensive sustainable agriculture policy. Ensures the security and safety of food. Promotes cooperative farming and land consolidation. Strengthens trade policy on both domestic and foreign markets.

Scientific-Research Centre of Agriculture (SRCA):

Does risk analysis for plant health and phytosanitary standards, animal welfare, and feed safety. Develops methods for risk assessment and harmonizes international norms and guidelines. Provides scientific and technical assistance to risk management. Conducts scientific study and works to preserve and restore regional breeds of both plants and animals. Explores and modifies foreign breeds. Encourages and supports the development of certified organic farming systems. Researches on plant diseases and pests. Describes the integrated control measures in detail. Develops and promotes agricultural extension programs and cutting-edge technology.

Documents of SRCA aren’t available to the public it is governmental.

National Food Agency (NFA):

- Food/feed safety, veterinary and phytosanitary state control
- Risk management and communication
- Codex contact point
- Rapid Alert System for Food and Feed (RASFF) contact point
- The International Food Safety Authorities Network (INFOSAN) contact point
- The World Organization for Animal Health (WOAH, founded as OIE) contact point
- International Plant Protection Convention (IPPC) contact point

State Laboratory of Agriculture of Georgia (SLAG):

Identification of pest and plant diseases, as well as detection of chemical and microbiological contaminants in food and feed.

Revenue Service (RS) (Customs Department) of the Ministry of Finance of Georgia (MFG):

Border quarantine for animals (physical, identity, and document checks). Border controls that are phytosanitary (physical inspections, identity checks, and documentation checks).

(European Food Safety Authority (EFSA), et al. Nov. 2021)

Figure 2 European Food Safety Authority (EFSA) Food Safety Authorities in Georgia

2.2.4 Valid Food safety system

In recent years, the Republic of Georgia has taken significant steps toward creating and putting into practice a system for food safety.

As a result of the 2014 approximation agreement, Georgia must implement more than 250 EU food safety standards before 2027.

The EU's Association Agreements with Georgia:

On June 27, 2014, the European Union signed association agreements with Georgia, which will establish a Deep and Comprehensive Free Trade Area. The trade terms for products and services, including the broad establishment conditions for businesses, improved for both the EU and Georgia. This will make investment and trade easier.

By removing customs tariffs and quotas and by comprehensively approximating trade-related laws and regulations to the standards of the European Union, the Agreement offers Georgia a framework for boosting trade and economic growth. This will facilitate Georgia's progressive integration with the EU single market. (“Press Corner.” June 2014)

Even small producers must adhere to regulations and pay taxes following with new policies slated for implementation in 2020 to bring Georgia into compliance with EU standards. Farmers won't be able to sell their products at markets if they can't meet production standards.

Today food safety and quality are controlled by National Food Agency. The National Food Agency is a legal entity of public law under the Ministry of Environment and Agriculture.

Powers and Obligations of the National Food Agency (Order No. 2-107):

In the field of food/feed safety:

- Production, processing, and distribution stages of food/animal feed in Georgia implementation of state control over compliance with requirements defined by legislation;
- Verification of traceability requirements as determined by the legislation of Georgia to determine compliance with requirements;
- Based on Hazard Analysis and Critical Control Points (HACCP) principles checking the system for compliance with the requirements defined by the legislation of Georgia;
- Genetically modified organisms and genetically modified organisms produced from them Violation of product labelling rules established by Georgian legislation in case of non-correction, it is considered expired and/or unfit for use supervision of food/feed disposal;
- Timely informing the population about food/animal feed placed on the market regarding if it is confirmed that this food/animal food is human or animal harmful to health;

The Ministry of Environmental Protection and Agriculture controls the NFA (National Food Agency), which answers to the minister responsible for these two departments. The Georgian Parliament is another party to whom the agency must answer. Public reports on the finding of non-conforming items are also available. The frequency and dates of the NFA's inspections are not publicly available.

2022 Program of state control of food safety:

The purpose of the program is:

- State control of food safety towards business operator’s implementation by applicable normative acts;
- Food production, as well as primary production, processing, and distribution elimination of inconsistency of the business operator's activities with the applicable legislation in stages;
- Reduction facts of placing harmful/inconsistent food on the market;

- Protecting the interests of customers;

Implementation mechanisms:

1. Inspection - planned and unplanned inspection
2. Monitoring
3. Sampling
4. Document verification
5. Observations will be made during the supervision
6. Audit - planned and unplanned audit

Sub-program:

5 microbiological indicators were identified: Salmonella, Listeria monocytogenes, staphylococcal enterotoxin, histamine, and Brucella.

For laboratory research on microbiological indicators the following criteria were defined for determining the quantities of samples (Table, 1):

a) Microbiological hazard classification (probability of hazard detection considering the severity);

b) Analysis of the results of the previous year's food laboratory research;

c) Food poisoning in the population, intestinal infections due to food, cases of epidemics, and other foodborne diseases.

The amount of food consumed during 1 year by 1 person is also important to determine the number of food samples. - According to "Sakstat" data, in 2020, 1 person consumed an average of 512 kg.

An example, amount of sample to be tested for Salmonella:

Formula - N = K X A X n

N - The intake of food number of samples;

K – 0.25, coefficient of microbiological index. The coefficient of the microbiological index is different for each component. Three criteria are used to determine the coefficient k. 1 criteria - Probability of detecting a hazard based on its severity; 2 criteria - Analysis of the results of the food laboratory test of the previous year; 3 criteria - Cases of food poisoning, foodborne intestinal infections, epidemics, and other foodborne diseases among the population. The sum of these three criteria is the k coefficient.

A – 512, the amount of food consumed by 1 person during 1 year;

n – 5, Indicator determined according to the sampling plan of the technical regulations quantity. The number of water samples taken from a water supply system for examination is indicated by the "n" in "n-5". The greatest number of samples that can test positive for an indicator bacterium is five, as shown by the "5" in "n-5".

N = K X A X n = 0.25 X 512 X 5 = 640 samples for Salmonella.

Table 1 2022 program, Laboratory examinations ("2022 program of state control of food safety")

The name of the laboratory study	Estimated quantity of samples
Salmonella in Food	640
Research on Listeria monocytogenes in food	135
Staphylococcal enterotoxin	25
Histamine	90
Raw Milk Study on Brucellosis	175
Sanitary indicators in food, conditional pathogens research	70
Determination of biological and chemical indicators in non-animal origin food	503
Determination of pesticide residues in food	102
Determining the content of trans fats in food	87
Study of drinking water (including bottled water)	470
Determination of purity of fat in milk and milk products	100
Determination of GMO content in food	30
Specific research of meat and meat products	200
Determination of water content in frozen poultry meat	75
Research of residual substances veterinary drugs and other contaminants in honey	100
Determination of Physical and chemical parameters in alcoholic beverages	100
Determining the content of dyes in food	60
Determination of lead content in food (including for feeding infants and children of early age intended food)	544
Residue of veterinary drugs and other pollutants in food of animal origin (except honey and fish) Substance research	1199
Veterinary drugs and other contaminants in fish	30

Everything in the table is calculated using the same method. The quantity is acceptable according to previous experience.

The number of samples is updated once a year. The number changes depending on the previous year's data. For example, in contrast to 2021, research on salmonella in food has increased, and the determination of biological and chemical indicators in food of non-animal origin has been reduced.

2.3 Risk assessment activities for food safety area

The Republic of Georgia's government is focused on making sure that food items are safe for consumption, so food risk assessment is a continuous process. Consumers should be aware of potential concerns, though, and take steps to guarantee their safety, such as cleaning produce before eating it and cooking meat and poultry properly.

The Scientific-Research Centre of Agriculture (SRCA) risk assessment structure (RAS) consists of two units, the Risk Assessment Division, and the Scientific Group composed of both local and invited scientists providing their expertise on an ad hoc basis in the above fields. In terms of public health concerns, RAS food safety risk assessment initiatives have mostly focused on evaluating chemical and microbiological hazards in various food matrices, as well as new risks and risk pathways related to foodborne and zoonotic infectious pathogens. The early chemical risk assessment studies on food safety are an example of efforts to evaluate the hazards to the public's health posed by the presence of trans fats, acrylamide, palm oil, lead, and antibiotic residues in food.

The main focus of SRCA's microbiological risk assessment (MRA) efforts was to look into the prevalence of Salmonella, Listeria monocytogenes, Campylobacter, and Brucella spp. in various food products. RAS has been extending its research to evaluate the risk pathways underlying the continued emergence of fluoroquinolone-resistant strains of Campylobacter in poultry for the past two years. Other RAS research studies have focused on the public health risks associated with microbial contamination of drinking water and the presence of antimicrobial resistance genes (ARGs) in the recreational waters of the Black Sea coast of Georgia.

The main difficulties that RAS has had in evaluating the threats to food safety and achieving its objectives have been a severe lack of financial and technical resources, a very small staff, and generally limited professional resources in the nation. The following problems have partially contributed to the lack of information on food consumption and the scarcity of information on the occurrence and prevalence of food safety concerns in the nation. They are combined with the scant epidemiological information on foodborne illnesses in Georgia, which creates enormous uncertainty and, as a result, considerable obstacles that risk assessors must overcome on a daily basis.

To properly solve these difficulties, the SRCA administration and its current RAS leadership have established both short-term and long-term goals. The collection of Georgian food consumption data has been one of the most significant short-term objectives in this regard. In response to the Committee of Environmental Protection of the Parliament of Georgia's recommendation, RAS recently developed the national dietary and nutritional survey project in close collaboration with the experts from EFSA, NFA, and the National Statistics Office of Georgia, seeking international support and funding of this initiative.

In order to achieve its long-term objectives, the SRCA works together with its regional, national, and international partners to produce initiatives that will strengthen and sustain the RAS and infrastructure in the aforementioned sectors. One of the major steps toward resolving Georgia's RA difficulties has been thought to be modernizing local laws and regulations controlling risk analysis frameworks in the aforementioned areas, especially in relation to the

corresponding ones created in the EU. (European Food Safety Authority (EFSA), et al. Nov. 2021)

2.4 Food security problems in Georgia

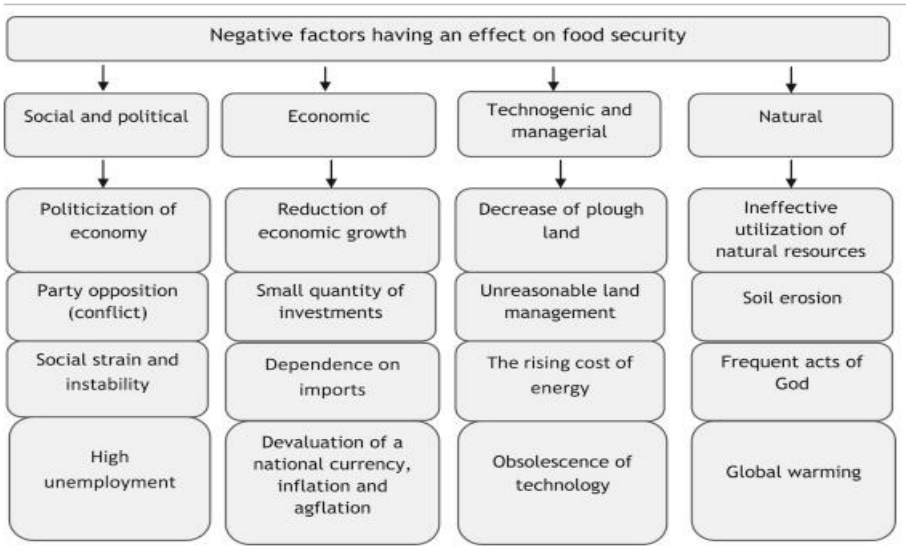

Figure 3 Negative factors on Food security in the Republic of Georgia (Meskhia, I. E. June 2016)

Currently, Georgia faces challenges to food security brought on by a variety of objective and subjective causes (Figure,3), including unfavourable meteorological circumstances, subpar manufacturing performance standards, lack of raw material resources, and more.

Low levels of agricultural productivity characterize Georgia's undeveloped agricultural industry. The little amount of land in the nation, the subpar infrastructure, and the restricted use of contemporary agricultural methods all contribute to this. Georgia, therefore, has trouble producing enough food to feed its people, let alone export.

In Georgia many citizens struggle to buy enough food to meet their dietary needs. With 20% of the population reportedly facing moderate to severe food insecurity. “In the 2022 Global Hunger Index, Georgia ranks 22nd out of the 121 countries with sufficient data to calculate 2022 GHI scores. With a score of 5.7.” (Global Hunger Index (GHI) - “Georgia”, 2022)

Georgia is extremely dependent on foreign food, especially wheat, and other grains. As a result, the nation may be more susceptible to changes in prices and disruptions in the supply chain.

Georgia's agriculture industry is being impacted by climate change, which is causing crop failures and lower yields. Because of its hilly geography and reliance on rain-fed agriculture, the nation is more vulnerable to climate change.

Georgia has a serious issue with environmental degradation, notably in the dry and semi-arid areas, which includes soil erosion and desertification. As a result, there is less land accessible for farming, which lowers agricultural production.

2.5 Survey

Survey of consumers was performed by me to identify issues with food safety that needed to be solved. 103 people participated in the survey, 56.8% female and 43.2% male. The majority of participants, 63.1%, are from the city (Urban) and 36.9% from the countryside (Rural).

Evaluation of answers:

How often do you eat meat products?

The majority of responses, with “Four times a week" being the most popular response (39.8%), show that the respondents consume meat products on a regular basis. "Everyday" comes in second place (27.2%), followed by "twice a week" and "once a week." A few comments also include the words "once every two weeks" and "other." There is high consumption of meat products in the country.

How often do you eat dairy products?

According to the study results, the majority of respondents eat dairy products every day (57.3%), four times per week (28.2%), or twice per week (8.7%). Few respondents said they consumed dairy products once a week, and another few said they did so once every two weeks. It's important to note that only few respondents chose "Other," making it difficult to determine how frequently they consume dairy products.

How often do you eat rural food products?

According to the feedback, it appears that most individuals frequently (57.3%) purchase food from small producers, however some people said they only rarely (11.7%), sometimes (15.5%), or always (11.7%) do so. A tiny percentage of respondents indicated they never (3.9%) buy food from small producers.

Consumers might prefer rural goods more, or it could be because the little business is more affordable than the store.

How often do you buy food products from small producers?

Based on the study results, 41.7% of respondents said they often buy food from small farmers, while 29.1% said they do so sometimes. On the other hand, only 4.9% of respondents claimed they always buy from small producers, while 22.3% of respondents indicated they rarely do so. Notably, 1.9% of respondents chose "Never," indicating that they do not purchase food products from small farmers.

It appears that most people have faith in small business owners. The majority of respondents buy food products from small producers at least occasionally, indicating that there is a lot of interest to do so.

Where do you prefer to buy food products?

A summary of the study results, 55.3% of respondents prefer to purchase food items from small producers living in the village and producers, while 34% prefer to shop in supermarkets. Only 10.7% of respondents said they preferred to purchase food items at a market, while no respondents said they preferred to purchase from street sellers.

There is a significant interest among respondents in purchasing food items from local small producers, suggesting a potential preference for artisanal and/or regionally sourced goods. The smaller number of respondents who preferred to buy from a market may be related to variables like trust issues or limited access, while the preference for purchasing food products from a supermarket may be explained by factors like convenience and availability.

Which one do you prefer to eat?

According to the poll response, a sizable majority of respondents, 77.7%, prefer to consume meat and dairy products from rural sources over those purchased at supermarkets, which were preferred by only 22.3% of respondents.

Due to reasons including perceived quality, flavor, and/or health advantages, there is a considerable interest among respondents in consuming meat and dairy products that are supplied from rural areas. On the other hand, the lower proportion of respondents who said they preferred meat and dairy products purchased in the supermarket may reflect worries about the methods used in industrial farming or a preference for local suppliers.

How accessible the rural product is to you?

According to the survey results, the majority of participants (55.3%) found rural goods to be highly accessible, while 25.2% perceive them to be somewhat accessible. Only 2% of respondents claimed that rural items are completely unavailable, compared to 17.5% who said that they are not very accessible.

According to the majority of respondents, it is easy to find rural goods. This may be because those who live in or close to rural areas may easily reach farmers' markets or specialty shops that sell local goods. The fact that a sizable portion of respondents still find rural goods just slightly or not at all accessible may be attributed to issues like poor access to transportation or a lack of availability in their region or trust issues.

How often do you eat home-made canned food (vegetable marinades, fruit juice)?

It seems that the majority of people (51%) consume homemade canned food often, followed by 21.4% who do sometimes and 20.4% who do less often. Only 1.9% never eat homemade canned food, compared to 4.9% who usually do. These ratios imply that a sizable portion of people frequently or occasionally consume handmade canned food, whereas just a small portion never do.

If correct food safety procedures are not followed during the canning process, it is crucial to be aware that there may be risks involved with eating home canned food. In order to prevent any potential health problems, it is essential to make sure that the canning procedure is carried out properly.

How often do you eat home-made tkemali?

According to the data given, the bulk of people (64.1%) consume homemade tkemali often, while only a small proportion (4.9%) or 2.9% consume it only occasionally. No one in the sample reported never eating homemade tkemali, however a sizable minority of persons (28.2%) said they always eat it.

It is important to note that tkemali is a traditional Georgian sauce made from sour plums. As a result, these percentages indicate that it is a well-known and liked sauce among the respondents.

How aware are you of food quality risks?

According to the percentages given, just a tiny portion of people (19.4%) are very aware, and a somewhat greater portion (26.2%) are somewhat aware. A large majority of people (49.5%) claimed to be not very aware, while only 4.9% claimed to be not aware at all.

It is challenging to offer more context because the statement doesn't make clear what the people are aware of or ignorant of. But based on these ratios, it appears that a sizable portion of people lack sufficient knowledge of the subject at hand. There is need to increase consumers awareness in food safety system and hazards.

2.6 Food safety problems

For the determination of food safety problems, the survey and National Food Agency (NFA) reports were used.

2.6.1 Consumer understanding

Standards for food safety are established and enforced by regulatory organizations in many nations, including the European Food Safety Authority (EFSA) and the U.S. Food and Drug Administration (FDA). Customers might not be familiar with the precise rules and criteria that these organizations employ to assess food goods' safety. The implementation of these criteria and the maintenance of the security of the food they offer may not be understood by consumers as well.

There are several main food safety problems in Georgia. One of them is a low understanding of food safety's importance and quality risks. As you can see from the figure 4 majority thinks that they are no very aware of food quality risks. There is a high amount of consumers who prefer to buy products from small producers (Figure 5). “Small

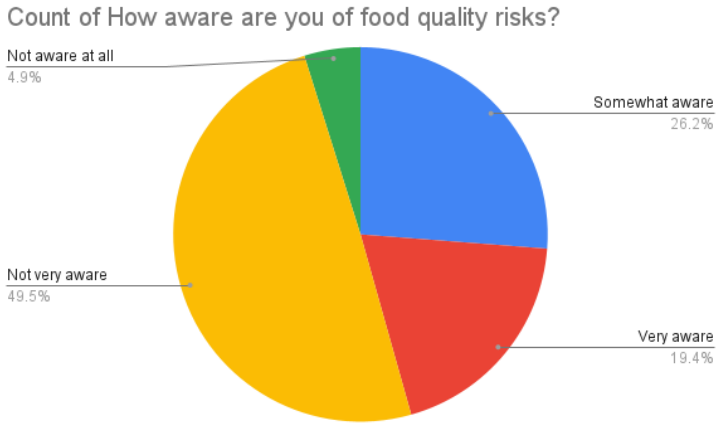

Figure 4 Consumer awareness of food quality risks according to 103 people survey

producers until new measures planned for 2020 weren't regulated. Moreover, farm-level production is common in Georgia, where about 350,000 families own at least one animal" (Nino Topuridze Aug. 2019). In villages, people usually buy products such as meat, milk, etc. from each other that are totally uncontrolled. Georgia's rural population (as a percentage of the overall population) was 40.13% in 2021, according to data from the World Bank. Even people from urban areas prefer to buy products from independent farmers. Georgia is a small country and it is easy to find a farmer in the village who wants to sell his products and it is easy to trade without markets.

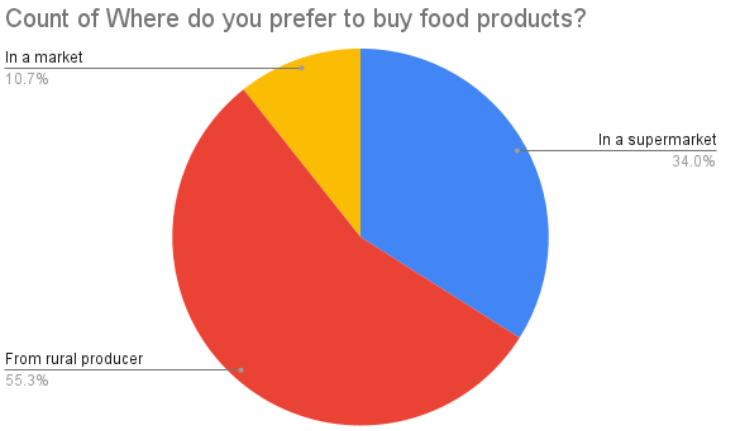

Figure 5 The consumers' choice of where to buy the food products according to 103 people survey

Theoretically, everyone who manufactures and markets goods must register. But, in practice, the state has limited power to find or keep an eye on unregistered businesses.

Customers who have not been informed about the risks to food safety might not fully appreciate the significance of safe food handling procedures.

Incidents and scandals involving food safety in Georgia and other emerging nations have weakened public confidence in the food system and increased demand for stricter laws and enforcement. Customers who have been subjected to food safety scandals or events may lack confidence in the food safety system and may question the efficiency of safe food handling procedures. In response, some governments have started public education efforts to increase knowledge of the hazards to food safety and motivate people to use safe food handling techniques.

My suggestion:

To educate the public about food safety risks, including how to handle and store food properly, how to spot signs of food spoilage or contamination, and how to reduce the risk of contracting foodborne illnesses, governments, non-profit organizations, and food safety authorities can launch education and awareness campaigns.

Food labelling is essential in assisting people in making knowledgeable decisions about the food they purchase and consume. The date of manufacture, use-by dates, and nutritional information are just a few examples of the clear and succinct labelling that food companies can employ to convey the safety and quality of their products.

The National Food Agency (NFA) needs to have a website or application that allows users to stay up up-to-date on any issues they find. Due to the fact that there are only a few reports

produced each year, the current website is insufficient. Customers can become more active in and aware of the threats to food safety in this way.

2.6.2 Home-made canned food and sauces

Canned food:

In the Republic of Georgia, food preservation methods like canning are very common. In Georgian homes, homemade canned food—also known as "marinated" or "pickled" food is a staple that is frequently offered as a side dish with meals. (Figure, 6)

Georgians can a variety of fruits and vegetables in jars with vinegar or a salt brine solution to preserve them. Pickled vegetables like cucumbers, tomatoes, peppers, eggplant, green beans, and cabbage are among the most popular canned foods in Georgia. According to personal choice, these can be seasoned with garlic, dill, coriander, or other herbs and spices.

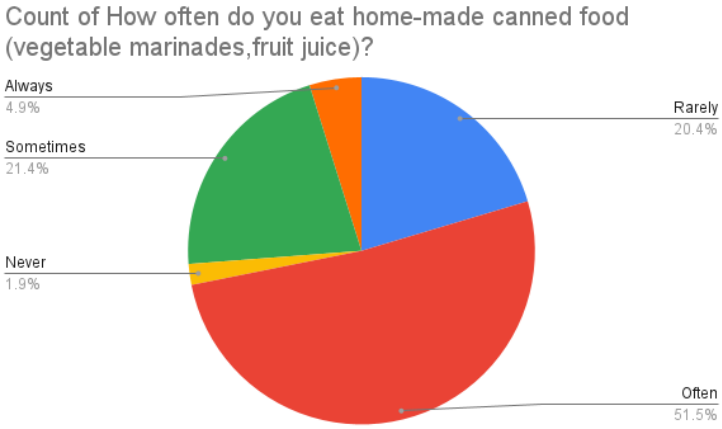

Figure 6 Home-made canned food consumption according to 103 people survey

Georgians can fruits like peaches, plums, and cherries in addition to vegetables, frequently in a sweet syrup. Pork and beef, which can be served as a main dish or added to soups and stews, are other meats that some households also can.

It's important to adhere to the correct food safety procedures while home canning to avoid contamination or deterioration. This entails using clean canning jars and lids, boiling the contents in the cans to create a tight seal, and keeping the cans in a cool, dark place.

This method of food preservation includes some hazards as well. Foods that are canned may promote the growth of the bacteria that causes botulism if they are not properly prepared or kept. Unprepared canned food can potentially go bad and encourage the growth of dangerous bacteria or fungi. Food poisoning, which can result from contaminated food, can produce symptoms like nausea, vomiting, diarrhoea, and stomach cramps. Furthermore, if fruits and vegetables are overdone or kept for extended periods of time, canning might result in nutrient loss.

Tkemali (Georgian sauce):

Figure 7 Cherry plum and green Tkemali (Internet 6)

Tkemali (Figure, 7) is a key component of Georgian cuisine. In the Republic of Georgia, it is a well-liked sour plum sauce (Figure, 8). Tkemali, a type of sour plum that grows in the Caucasus region of Eurasia, is used to make it. The plums are usually picked in the summer and then cooked in a broth with salt, coriander, dill, and garlic.

The mixture is often canned or bottled for later use once it has been reduced to a thick sauce. Tkemali is frequently used as a topping for meat meals like kebabs and grilled chicken, as well as a bread dip.

Tkemali comes in a variety of colours, with red and green being the most popular. Whereas the green version uses unripe plums, the red version uses ripe plums. The red type is slightly sweeter than the green variety, which tends to be more acidic and tart.

Tkemali might provide significant food safety issues if it is not handled properly during preparation or storage, just like any other food product. Handling fresh plums and various spices during the production of tkemali has the potential to spread dangerous pathogens like Salmonella or E. coli. Before and after handling the materials, make sure to properly cleanse your hands, equipment, and work surfaces.

To avoid spoiling, tkemali should be refrigerated and consumed quickly after being opened. The sauce should be thrown away if it has soured and has developed mold or an unpleasant odour.

It's critical to use the correct canning procedures to reduce the risk of botulism and stop bacterial growth. The recipe should be tested, jars sterilized and processing them should be according to the suggested time, and pressure.

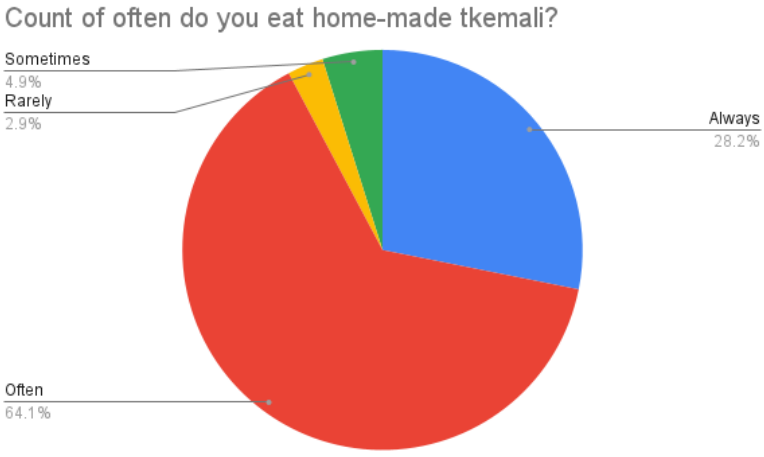

Figure 8 Home-made Tkemali consumption according to 103 people survey

My suggestion:

Damaged or dented cans can undermine the cap and let bacteria inside. Avoiding purchasing or ingesting cans that are obviously damaged is the best course of action. Cans that protrude outwards may be a sign of internal bacterial growth or gas formation. Bulging cans should not be consumed, and they should be disposed of appropriately.

Although canned foods have a long shelf life, they ultimately go bad. Food poisoning can be contracted by eating expired cans. Always check the expiration date on canned foods before purchasing or consuming them. People should make labels for homemade canned food as well.

Cans should be kept out of direct sunlight in a cool, dry location. The can may corrode when exposed to heat or moisture, which could result in contamination. To keep cans safe, store them correctly.

TV and social media commercials can be used to raise awareness of producing high-quality tkemali. For instance, by highlighting the health advantages of utilizing fresh, natural ingredients and avoiding the preservatives and additives that are typically included in sauces purchased from stores. Work together with bloggers or influencers who are experts in traditional Georgian cooking to show off their interpretations of the sauce and to share their knowledge. TV programs can be used to teach people how to prepare food better safely and efficiently.

2.6.3 Meat products

There is high consumption of meat products as shown in figure 9 in Georgia. According to NFA (National Food Agency) controlling meat products are critical nowadays. As we can see from agency reports a huge amount of meat products are nonconforming during the year. For instance, in 2022 the status of several enterprises was suspended and more than 6 tons of meat were destroyed due to unknown origin.

Figure 9 Meat products consumption according to 103 people survey

Meat fraud

Georgia has several cases of food fraud, particularly in the meat sector. When it was discovered that meat items marketed as beef were manufactured from horsemeat, a scandal broke out in 2017. (NFA "Identified violations")

According to the legislation of Georgia, the meat of donkeys and horses is not prohibited. Horse meat, if it is prepared according to the rules, is not harmful to human life. However, the main thing is that we know that this or that product is made of horse meat, and this animal must be slaughtered in a slaughterhouse. May be they use the meat of a horse that died of some diseases.

In 2022 National Food Agency, with the involvement of the patrol police, discovered an illegal, artificially arranged slaughterhouse in Vashlovani village, where horses were slaughtered. (NFA "Identified violations")

The main issue in Georgia is that unreliable traders utilize animals that have already died and were not slaughtered under specific circumstances or subjected to the necessary regulations.

Slaughterhouses

The absence of sufficient hygiene and sanitary conditions in many slaughterhouses, which can result in the spread of diseases and the tainting of meat products, has been one of the main causes of worry. As a result, there have been some occurrences of foodborne diseases in the nation, which can be particularly deadly for weaker demographics like children and the elderly.

Several slaughterhouses in Georgia fail to provide their workers with proper safety training, which can result in catastrophic mishaps and injuries. Employees make mistakes such as putting dirty parts and clean parts of animals together which can cause cross-contamination. There have been reports of mistreatment and inhumane treatment of animals before their slaughter. (Personal experience, all errors appeared in 2018 while visiting several slaughterhouses in Georgia for the project)

Control of animal and poultry slaughterhouses is carried out throughout the country. In 2018, 290 state controls were carried out, as a result of which 31 business operators were fined. (NFA "Identified violations")

My suggestion:

To protect the health and safety of consumers, a variety of food safety issues associated with meat products and slaughterhouses must be taken seriously. Regulation of antibiotics and hormones, good sanitation and hygiene techniques, and quality control procedures can all significantly lower these hazards.

Slaughterhouses are required to adhere to stringent hygienic standards. For instance, they must have protocols for thoroughly cleaning and sanitizing all tools and surfaces, as well as ways to avoid cross-contamination. All employees who handle meat products should also receive training in good hygiene habits and food safety procedures.

2.6.4 Dairy products

The Republic of Georgia's cuisine is not complete without dairy products. According to figure 10 there is high consumption of dairy products in the country. The nation is renowned for its extensive selection of dairy goods, which includes sour cream, cheese, and yogurt. Several dishes in Georgian cuisine also contain butter, cream, and sour cream. Dairy is a staple in many traditional Georgian meals and is a crucial component of the Georgian diet.

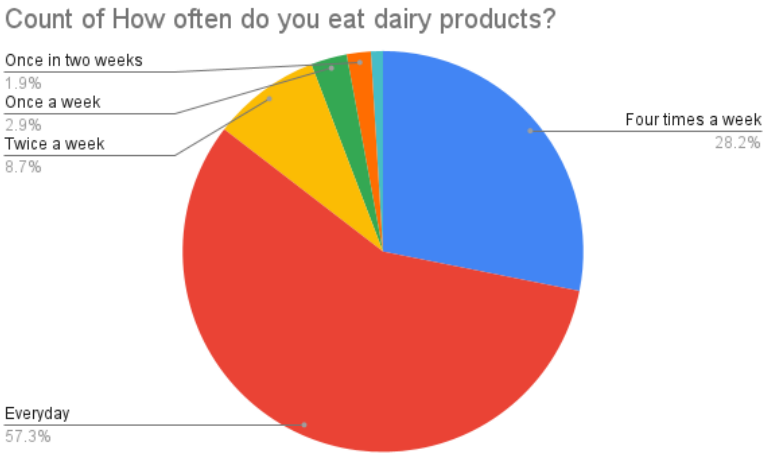

Figure 10 Dairy products consumption according to 103 people survey

All dairy products marketed in Georgia must first pass a test for dangerous bacteria under new restrictions that went into effect in 2018. The regulations also demand that dairy products be produced under hygienic circumstances and that farmers and producers follow specific guidelines for handling and storing milk.

Georgia still has a problem with tainted dairy products despite these efforts. Consumers frequently have limited access to information about the quality of the dairy products they are purchasing, and many small-scale dairy producers continue to operate without the required tools or expertise in food safety procedures.

As a result of the laboratory research of 96 samples in 2021, vegetable fat content was detected in 8 samples of Sulguni (type of Georgian cheese), Imerian cheese, factory cheese, sour cream, cottage cheese, and sour cream. (NFA "Identified violations")

<u>My suggestion:</u>

When handling dairy products, it's crucial to implement basic hygiene habits, like thoroughly washing your hands and surfaces. Additionally, dairy products must be kept at the proper temperature for storage.

Dilution is prohibited in milk. It can cause contamination that's why the origin of the milk should be checked.

To make sure that dairy products are produced, processed, packaged, and labelled in a way that meets particular safety and quality criteria, governments might establish rules and regulations. Additionally, these rules can aid in preventing the sale of tainted or adulterated dairy products.

2.6.5 Pesticides residues

Georgia's Ministry of Agriculture oversees pesticide use, and the nation has passed a variety of laws and regulations to guarantee the safe and responsible use of pesticides. Georgia still has issues with pesticide residues in food and the environment, much like many other nations.

Chemicals called pesticides are employed in agriculture to control pests. Pesticides can protect crops well, but they can also leave residues on fruits and vegetables that could be dangerous to human health. Acute poisoning can result from exposure to excessive pesticide residue levels, while chronic health issues like cancer, neurotoxicity, and reproductive issues have been related to long-term exposure.

According to a report released by the Food and Agricultural Organization of the United Nations (FAO) in 2018, Georgian fruits, vegetables, cereals, and meat have all been proven to contain pesticide residues. According to the paper, some issues, such as improper pesticide application, the use of restricted or illegal pesticides, and a lack of effective monitoring and enforcement, all contribute to the accumulation of pesticide residues.

My suggestion:

The use of pesticides in agriculture can be restricted, and maximum residual levels for pesticides in food can be set by governments.

The purchase and consumption of pesticides should be controlled by governments. For example in Hungary the price of pesticides is higher, this may be one way to elude overuse of pesticides.

Governments can encourage sustainable agricultural approaches that can lower the use of pesticides, such as crop rotation, integrated pest management, and organic farming.

2.6.6 Poor food handling and storage practices

Improper methods for handling and storing food can seriously endanger the public's health. There are some issues in Georgia. Food may be kept in unhygienic circumstances or at the wrong temperature, which might encourage the development of dangerous bacteria. Refrigeration systems may not be present or may not be operating properly in many restaurants and warehouses. Food poisoning may result from this as hazardous germs may grow in the food. Food handlers might not properly wash their hands, which can cause viruses and germs to spread. Moreover, the risk of contamination may be increased by irregular cleaning and sanitization of surfaces and equipment. Insecure food-handling techniques may result from some food handlers' insufficient training in food safety procedures. Unsafe methods of handling and storing food may be used in informal food markets due to a lack of control and regulation.

The inspection groups of the Kvemo Kartli regional division of the National Food Agency, while carrying out state control, in Gardabani municipality, village Karajala a large amount of expired, insect-contaminated, and unlabeled 36 types of products (sweets, tea, coffee, honey, and spices) were revealed in 2021. (NFA “Identified violations”)

My suggestion:

It is essential to train and educate food handlers on proper food handling and storage techniques. Information on how to wash hands correctly, sanitize surfaces, and keep food at the proper temperature can be included in this.

Create a program for food safety that outlines best practices for handling and storing food. To maintain compliance, this program should also involve routine inspections of the kitchen and storage spaces.

2.6.7 Safety regulations problem

Some cultural activities, including open-air markets and street food vendors, might not be adequately regulated or monitored, which could cause problems with food safety. In Georgia cultural activities, and open air-markets are very common.

Georgia started improving food safety regulations but there are still a lot of things to do.

Regulatory organizations may lack the technical know-how and knowledge necessary to create and implement food safety standards.

To make sure that all food manufacturers adhere to strict safety requirements, governments, and food regulatory organizations might strengthen existing food safety legislation. This may involve requiring recurring inspections, requiring recall procedures, and enforcing severe penalties for noncompliance.

Risks can also be reduced by educating customers about the best procedures for handling food safety. This can involve educating people on correct food storage techniques, the value of monitoring expiration dates, and safe food handling procedures.

The tracking of food products from farm to table can be aided by the implementation of sophisticated traceability systems. This can minimize the effects of food safety events and assist in swiftly identifying the source of contamination.

Creating an atmosphere of safety in the food sector can be facilitated by increasing public knowledge of the significance of food safety. Public service announcements, media campaigns, and alliances with consumer advocacy groups can all fall under this category.

Traditions are difficult to change. Additionally, people have more faith in their neighborhood sellers than they do in government-regulated store goods. As shown in figure 11, people frequently consume rural goods that are easily available to them (Figure, 12).

The NFA works collaboratively with other governmental organizations to create and implement food safety laws and policies, including the Ministries of Agriculture and Health. Establishing standards for food production, processing, and storage as well as policies for food labelling and packaging are all included in this.

It may take several generations for people to adapt and understand the need for regulations.

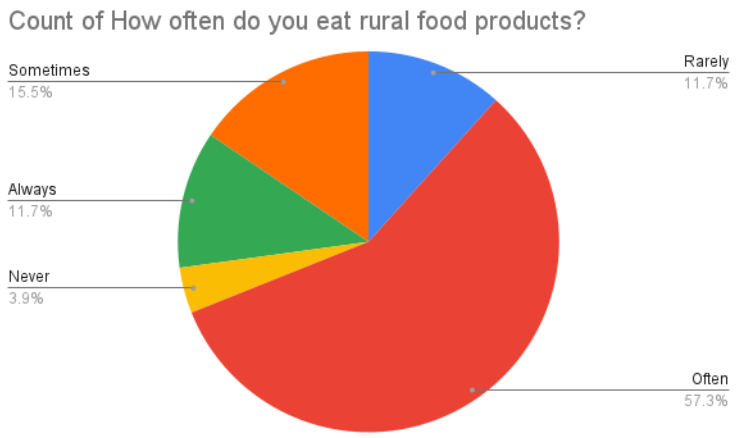

Figure 11 Rural food products consumption according to 103 people survey

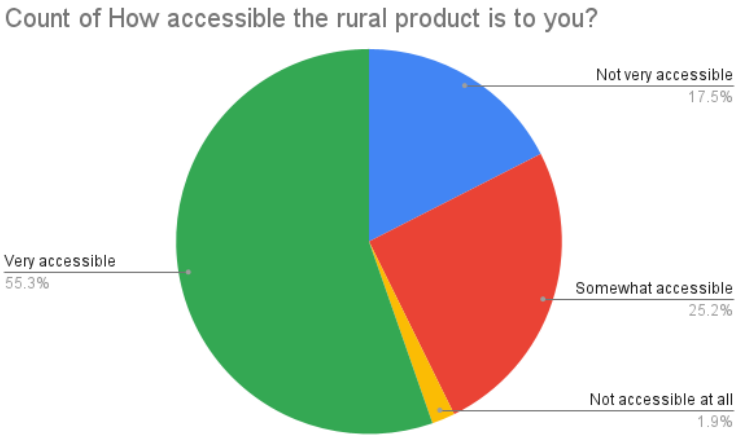

Figure 12 accessibility of the rural products according to 103 people survey

2.7 Foodborne diseases

Foodborne illnesses can cause a variety of symptoms, including nausea, vomiting, diarrhoea, fever, and stomach discomfort. They are brought on by consuming contaminated food or water. Foodborne illnesses have the potential to be fatal, necessitate hospitalization, and cause long-term health issues.

Georgia doesn't have high rate of foodborne disease. Campylobacteriosis and Salmonellosis were the most frequently reported foodborne illnesses in the Republic of Georgia, according to a report released by the World Health Organization (WHO) in 2015. Inadequate food safety laws and a lack of resources for testing and monitoring food safety were among the issues the nation faced, according to the report.

Georgia has a prevalence of foodborne illnesses due to several variables. The lack of appropriate sanitation and hygiene procedures in food production and processing is one of the main causes. Food is made and sold in many areas of the nation's open-air markets or roadside kiosks, where few rules or laws are ensuring that it is stored and cooked safely. By doing this, the danger of pathogens including bacteria, viruses, parasites, and others is increased.

The widespread availability of food produced and distributed informally is another aspect. In Georgia, a large number of people cultivate their fruits, vegetables, cattle, and dairy products. While this can be a sustainable and healthful way of life, there are no laws or inspections to guarantee that the foods are safe to eat, so there is an increased risk of foodborne illness.

Like any other nation, the Republic of Georgia could have varying degrees of food safety and rules in place to protect its citizens against foodborne illnesses. Additionally, it's possible that some regions or geographic areas within the nation may have greater rates of foodborne diseases than others. Due to their environment or way of life, some populations may have developed some level of resistance to specific diseases.

Regardless of location or altitude, foodborne diseases can happen anywhere. Access to clean water, good hygiene and sanitation practices, and methods of handling and preparing food are only a few of the elements that affect the frequency of foodborne infections.

2.7.1 Outbreaks

A number of things, such as improper food handling and preparation procedures, tainted food items, and insufficient food safety standards, can lead to foodborne outbreaks. Regrettably, there has been a recent outbreak of a foodborne illness in the Republic of Georgia that has affected a sizable number of people.

Foodborne Botulism:

Eating food containing botulinum toxin in its prepared form results in foodborne botulism, the most prevalent type. Botulism that is transmitted by food is frequently seen in improperly processed foods. Homemade canned foods, for instance, vegetables, meat, and fish, homemade sauce, garlic in oil, green beans, soups, and salad dressings, could be contaminated if the sterilization process wasn't done correctly or if the product was consumed without heat treatment.

Making homemade conserves is very common in Georgia. People are making them usually for winter. Especially people were doing it in the 90s when there were not many opportunities in Georgia, the majority couldn't buy various food in markets. People were doing conserves to survive during the winter. Still, now homemade conserves are very famous in the country. Home-preserved vegetable fruits and smoked fish are the most commonly recognized sources of botulism.

The spore-forming, gram-positive rod Clostridium botulinum produces toxins that cause the severe, paralytic sickness known as botulism. Makes exotoxin. Spores can survive at 100°C for several hours in an anaerobic environment. Nevertheless, they are killed by heating at 120 °C for 5 minutes at a pH of 4, 6 to 9. Ingestion of 70 g results in a lethal dose. Inhalation: between 0.7 and 0.9 g. (WHO, Jan. 2018)

Huge outbreaks of foodborne botulism, a potentially lethal paralytic disease, are possible. In Georgia, 879 instances of botulism were discovered between 1980 and 2002. The world's highest documented national rate of foodborne botulism occurs in Georgia. 80% of the botulism cases of 706 hospitalized patients between 1980 and 2002 were attributable to home-preserved vegetables. A total of 39 cases, or 0.9 cases per 100,000 people, were identified in 2002. Between 1980 and 1990, the median yearly incidence climbed from 0.3 per 100,000 people (median case count: 15) to 0.9 per 100,000 people (median case count: 41) between 1991 and 2002. The incidence increased in 1994 (3.6 per 100,000 people) when 173 guests at a wedding contracted an illness after consuming tainted fish. Botulism was blamed for 58 deaths, resulting in an average fatality rate of 7%. (Varma, Jay K., et al. Sept. 2004)

The largest occurrence rate was in the country's east, particularly in the region around Tbilisi. Three locations of the nation—the city of Poti, the regions of Samagrelo, and Racha-Lechkhumi—were not linked to any cases of botulism. We speculate that some regions of the country may not regularly conserve food or may have created safer methods as a result of the large geographic differences in incidence.

Georgia's current public health message urges people to fully reheat home-conserved veggies and emphasizes the availability of free medical care for botulism. To increase food safety in Georgia, an efficient, affordable, and culturally relevant intervention is required.

2.8 The comparison of the food safety system of the Republic of Georgia and another small European country

Since attaining independence in 1991, the Republic of Georgia's food safety system has undergone significant modifications. The nation has put in place a management system for food safety that consists of legislative and regulatory frameworks, monitoring and inspection systems, and educational and training initiatives.

In comparison, tiny European nation like Luxembourg have put in place a system for ensuring the safety of food that consists of regulatory frameworks, monitoring and inspection systems, and educational and training initiatives. Food safety in Luxembourg is overseen by the Ministry of Agriculture, Viticulture, and Rural Development (MAVDR).

The level of regulation is one significant distinction between the Republic of Georgia's food safety standards and other tiny European nation. Georgia's food safety system is still being developed, it has difficulty enforcing laws and performing inspections. On the other hand, little European nation like Luxembourg have put in place strong enforcement systems to guarantee adherence to food safety laws.

Small-scale, conventional farming methods dominate Georgian agriculture, which might make it difficult to ensure the safety of the food. Contrarily, industrialized agriculture in many European nations has moved toward stricter quality control norms.

An additional significant distinction between Georgia and other European nations is their institutional ability to control food safety. Georgia's National Food Agency is in charge of managing food safety, although other European nations have more specialized institutions and resources for managing food safety.

While the Republic of Georgia and other minor European nations have developed comparable food safety systems overall, variations in resources and enforcement practices can impact these systems' efficacy.

2.9 Effect of a Pandemic on Food Safety System

2.9.1 The COVID-19 pandemic

The SARS-CoV-2 virus is to blame for the current global health disaster known as COVID-19. The pandemic started in Wuhan, China, in December 2019, and since then it has grown to become a global outbreak. When an infected individual talks, cough, or sneeze, respiratory droplets are essentially how the virus is transmitted. A surface that has the virus on it can also be touched before being contacted on the face. (Ciotti, Marco, et al. Jul 2020)

Governments and public health experts from all around the world have put in place a number of measures to stop the virus from spreading, such as social isolation, mask use, hand washing, and lockdowns. In order to avoid infection and serious sickness, vaccines have also been produced and approved for use in emergency situations.

2.9.2 Effects of food safety

The global food safety system has been significantly impacted by the COVID-19 epidemic.

Food supply systems have been affected by the epidemic, causing shortages of specific items in particular regions. Due to this, some consumers have started turning to alternative sources, such as locally produced food, which might not always adhere to the same requirements for food safety as imported food.

The demand for meal delivery services to homes has increased as more people stay away from busy public locations. Due to this, it has become difficult to maintain temperature control and implement safe delivery procedures.

During lockdowns and social segregation measures, several restaurants and food businesses were forced to close. Due to this, it has been difficult to meet food safety standards while reopening and there has been a loss of revenue.

Food establishments are forced to implement more strict cleaning and sanitation procedures as a result of the pandemic's increased awareness of the significance of hygiene and sanitation.

Consumer behaviour has changed as a result of the epidemic, and packaged and processed foods which could be less fresh and have a longer shelf life are now more popular. This has made it more difficult to guarantee the safety of these items.

2.10 Effect of the War on the food safety system

Depending on the particular circumstances of the war, it can have a significant impact on the food safety system. The effects of war on food safety can be devastating and can have long-lasting impacts on the health and well-being of affected populations.

Transporting food to places in need may be challenging if transportation networks are disrupted and infrastructure is damaged as a result of war. Food shortages may result from this, and it may also be more challenging to deliver food in a safe manner.

Water and sanitation infrastructure are frequently damaged during times of war, which can cause water supplies to become contaminated. Food contamination may occur as a result of crops and livestock being watered with contaminated water.

Food supply chains could also be affected if farms and processing units that are used to produce food are destroyed as a result of war.

People are frequently displaced during the war, which can result in overcrowding and unhealthy living circumstances. Due to this, there is a higher chance of contracting an infectious disease and getting a foodborne sickness.

Resources may be diverted during a war to other purposes, such as military operations or emergency response initiatives. As a result, resources for food safety inspections and other regulatory procedures may be reduced, raising the possibility of contracting a foodborne illness.

During the war, products can be stored for a long time which can cause microbial growth.

A high degree of complexity and contextualization describe the relationships between food insecurity and violent conflict, which frequently coincide with multi-layered crises like, for instance, the spread of terrorist organizations and small guns, criminal networks, and state fragility. Violent conflicts not only result in food shortages and malnutrition but also have negative short- and long-term effects on nutrition. For instance, research in many regional contexts shows that children affected by conflict are shorter than children born in countries that are not affected by violence (Akresh et al., 2011). Also, if a mother was exposed to conflict while pregnant, unfavourable impacts were seen on the weight of the child at birth (Camacho, 2008). Conflict exposure in adolescence has been linked to physical and cognitive effects in adults.

In "The Logics of War and Food (In) Security," was explored four elements of how these conflicts affect food security (Figure, 13).

Devastation, displacement brought on by conflict, food control, and hunger as a weapon of war. These factors play a significant role in amplifying the vicious cycle between food insecurity and armed conflict. The intentional use of the four logics of conflict increases food insecurity and increases structural vulnerability in the societies that are affected.

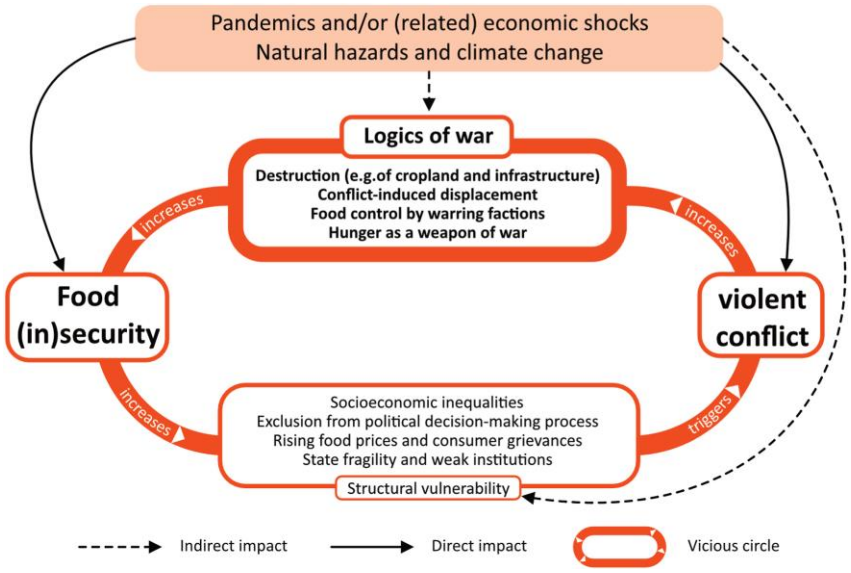

Figure 13 The vicious circle of violent conflict and food insecurity by Article "The logics of War and food (in) Security"

2.10.1 Georgia struggling with food safety problems during the war

During its history, Georgia has seen a number of wars and conflicts, most notably the early 1990s hostilities with Abkhazia and South Ossetia, the 2008 Russian-Georgian War, and ongoing conflicts in the territories of Abkhazia and South Ossetia. The security and safety of Georgia's food supply have been significantly impacted by these conflicts.

Georgia had a period of a severe economic downturn in the 1990s, much like many other post-Soviet nations did. Georgia served as a major provider of food items, minerals, and tourist attractions throughout the Soviet era. Also, the nation was reliant on imports for the provision of essential goods for industrial support. While the Soviet Union was ruled by instability, Georgia lost access to reliable suppliers of those goods.

Georgia's economy before the revolution (1991–2003) was unclear and unstable. Georgia experienced economic decline throughout the course of the 12 years due to economic neglect, followed by 4 years of progress and reforms that were once more overtaken by depression and corruption. Political conditions, delicate relations with Russia, corruption, rackets, and other factors are viewed as reasons for failures. (Gursoy, Faruk, 2012)

Access to food and clean water may be restricted or disturbed during times of conflict, increasing the risk of malnutrition and foodborne infections. Food safety problems can also be made worse by damage to infrastructure, especially food processing facilities.

It is challenging to guarantee the security of food and water supplies for individuals impacted by the conflicts in Georgia because they have caused population movements and displacement as well.

Moreover, Georgia's capacity to trade and import food goods has been significantly impacted by the ongoing political tensions and territorial conflicts with Russia, resulting in food shortages and higher costs.

2.10.2 War in Ukraine

All economic operations in Ukraine have suffered severe harm as a result of the war, which broke out on February 24, 2022. This includes agriculture, which is a major engine of the economy at all levels.

The conflict has forced people to flee their homes, destroyed public infrastructure, and impeded the movement of people and goods, making it difficult for farmers to maintain their fields, harvest, and sell their crops and livestock products. Also, it has caused disruptions in crucial public services like banking, markets, transportation, and the distribution of water and energy. The shutdown of Black Sea ports, the lack of enough capacity on alternative export routes, and the country's low grain storage capacity all cause FAO considerable concern.

Between 20 and 30 percent of the region where winter crops were sowed is expected to remain unharvested as a result of the fighting. Also, compared to last year, the fighting led farmers to cut back on the amount of spring agricultural acreage that was sown. Overall, it is anticipated that the decreased harvested area and restricted access to inputs will lead to a loss in yields and a 40% decrease in cereal production compared to the remarkable results of the previous year.

Ukraine's grain storage capacity will soon be depleted as the harvest season gets underway. Given the above-average production in 2021 and the sudden closure of marine export routes, the nation's silos won't have enough space to store the winter and spring crops that will be gathered in 2022. Winter crop harvest begins in July, and spring crop harvest begins later in the year, thus it is urgent to address the current shortage of suitable storage.

The following sowing and growing seasons will be negatively impacted by the availability and access to essential agricultural inputs such as seeds, fertilizer, fuel, and plant protection goods. This will eventually be reflected in food costs, pushing them further higher.

The FAO suggests taking the following steps to address these issues: a rapid increase in supply chain and storage investment; diversification of export options and processing efforts; increased support for agricultural production, storage, and marketing for small and medium holders, taking into consideration the various needs of women and men; and improved and regular monitoring of food security and agricultural value chains. (FAO, 20 July 2022)

The Georgian and Ukrainian trade relationship war in Ukraine had an impact on Georgia as well.

Georgia, which borders Ukraine, has had business ties with both Russia and Ukraine. The trading environment in the region as a whole, as well as the movement of goods and products between Georgia and Russia, may have been impacted by the sanctions placed on Russia. As a result of changes in the trading environment, the Georgian system for ensuring the safety of food may have been damaged in some way.

The ongoing crisis in Ukraine and its effects on the general political and economic stability in the area may also have had wider effects on Georgia's food safety system, such as the quantity and quality of food imports or the resources available for food safety inspections and enforcement.

Some raw materials are coming from Ukraine in Georgia. During the war, as we can see from the FAO article there is a storage problem in Ukraine. During the storage probability of

Aflatoxin increases. If they aren't controlled strictly in borders there is a risk of receiving contaminated raw materials.

Aflatoxin:

Aflatoxins are toxic substances produced by specific fungi, such as Aspergillus flavus and Aspergillus parasiticus. These fungi can contaminate crops like corn, peanuts, and tree nuts, and their toxins can linger even after the crop has been harvested and while it is being stored.

Aflatoxin - contaminated products that are stored for an extended period of time enhance the risk of exposure to these poisons. Temperature, humidity, and insect infestations are some of the conditions that might cause aflatoxin contamination during storage. Even under ideal storage settings, aflatoxins are stable substances that can last for a very long time in the goods being stored.

Aflatoxin exposure can have harmful impacts on a person's health, such as liver damage, immune system suppression, and a higher risk of developing liver cancer. Aflatoxin is another substance that is poisonous to animals and can harm or kill cattle by impairing growth rates and reproduction.

Aflatoxin exposure risk can be decreased by correctly storing vulnerable crops, which includes maintaining the right temperature and humidity levels as well as keeping the storage facilities dry and clean. Aflatoxin levels in stored goods should be regularly checked in order to detect tainted goods and stop them from being used or consumed. (Panel, Efsa Contam, et al. Mar. 2020)

3. Findings

In order to get information about the problems in the country and the consumer's attitude towards food products, I recorded an interview with one of the best companies in the field of food in Georgia.

3.1 Interview with a company Nutrimax

Nutrimax is one of the most successful companies in Georgia. Since 2009, Nutrimax has been operating on the Georgian market with an emphasis on providing small and medium-sized livestock and poultry producers with premium feed, feed additives, and cutting-edge feeding techniques. ISO 22000 is the company's European standard. You can the find whole interview with the employees in Annex 3.

Due to difficulties and problems importing raw ingredients from Europe, Nutrimax's food supply chain has faced major challenges as a result of the COVID-19 epidemic, which has raised shipping costs and periods. Despite these difficulties, the business has upheld its dedication to food safety by establishing internal laboratory checks on all goods and abiding by current food safety laws.

In one instance, lower-quality urea was imported from Azerbaijan in Nutrimax as a result of delayed imports from Europe, which somewhat reduced the food's quality.

The crisis between Russia and Ukraine significantly impacted the company's food supply chain, according to Natia's (Procurement and logistics manager) interview. The business imports a lot of raw materials from Russia and Ukraine, mostly grains. Raw material shortages and a decline in Russian exports were caused by the conflict. Importing raw materials became considerably more difficult when an explosion closed the border between Georgia and Ukraine. The Black Sea Basin also affected the price of raw materials in Europe, which resulted in a global shortage of raw materials. The business was still able to import raw supplies but was always at risk.

There were illegal cases in the market during the conflict, and some raw materials with unknown origins arrived at low costs. Since the source of the raw materials was never determined, Natia believed that some of them may have been taken during the battle. However, it is against business policy to engage in dishonest behavior.

Fortunately, because they had dependable suppliers, the organization had no instances throughout the conflict when they got raw supplies that were useless.

The creation of underground markets and theft are frequent during times of war. It is challenging to regulate product origin, and in my opinion, receiving any raw materials without the necessary certification is wholly unacceptable.

The Republic of Georgia forbids the growth of genetically modified plants, including GMO soybeans, but permits the import and export of GMO goods. It also means that there are no limits on importing GMO soybean produced in other nations into Georgia before exporting it to other nations. That’s why during the conflict there was deficit of some raw materials. In my point of view this kind of rules should be reviewed by competent people.

According to Revaz (Head of Business Development), the state should coordinate the development of private associations like the Association of Grain Growers, the Association of Believers, and the Association of Processors since they will be useful in working with high quality. It is a great idea since these associations will be competent and share their knowledge.

The "Farmers School" project by Nutrimax intends to inform small, medium, and big farms in Georgia on all pertinent issues in agriculture. Farmers might become more skilled and develop solutions to certain problems.

The "Farmers School" project's introduction of current knowledge to Georgia is one of its primary objectives. The project also planned to create a "community" where farmers could share knowledge and exchange information, but due to the farmers' lack of action, this goal was mostly unfulfilled.

Instead of focusing on prevention, which may significantly lower the material loss on their farms, farmers typically only contact Nutrimax's vets when they have a problem.

According to an interview with Mitheil (Veterinarian), the hygiene and sanitation practices of small enterprises can be summed up as follows: Farmers do not pay adequate attention to hygiene conditions, which may be due to a lack of time, negligence, or lack of education about the need of proper hygiene practices.

To guarantee the security and quality of their goods, small enterprises must raise their standards of hygiene. They need to be made more aware of the risks associated with purchasing inferior goods and the value of following sanitary regulations. Small farmers who want to learn about the best practices for hygiene and sanitation and apply them to their operations can benefit from visiting model farms.

Unfortunately neither pandemic nor war has not resulted in any significant changes to official rules or directives governing the safety of food. Although the border crossing product control should have been tightened more in a circumstance like this. due to potential long storage periods and probable unknown origin.

4. Discussion

Georgia is a small developing country. The country has to deal with many problems such as war, economic problems and so on. The country is developing and moving towards Europe. However, this path is quite difficult and requires many changes and time. However, in recent years, there has been a big change in the good side. Among other challenges, the country needs to improve the quality of food.

4.1 Discussion of interview and survey

Interview:

The Nutrimax issue in Georgia shows how important it is to maintain food safety standards during emergencies like the COVID-19 epidemic and conflicts. Nutrimax maintained food safety despite difficulties importing raw ingredients by establishing internal laboratory inspections on all products and abiding by current food safety legislation. However, the crisis brought to light the need for more regulation and oversight of product certification and origin, particularly in times of war or conflict when there is a larger risk of theft and illegal conduct.

The case also shows how crucial it is to inform small and medium-sized farmers about the best hygiene and sanitation standards in order to preserve the safety and quality of their products. The "Farmers School" project by Nutrimax aimed to educate farmers on all important agricultural issues, but the project's objective of creating a community where farmers could exchange expertise and information was delayed by the lack of response from farmers. As a result, there is a need for more knowledge and instruction about the dangers of buying poor goods and the importance of following by sanitary laws.

The instance also emphasizes the need for improved coordination between private organizations and the government in the creation of high-quality food items. In order to encourage the exchange of knowledge and best practices, it could be a good idea to coordinate the growth of private organizations like the Association of Grain Growers, the Association of Believers, and the Association of Processors.

Overall, the Nutrimax incident in Georgia shows how crucial it is to adhere to food safety standards even in emergency situations and emphasizes the need for more regulation, cooperation, and education to guarantee the safety and quality of food items.

Survey:

There is less education regarding the quality of food in Georgia. The survey shows how often consumers eat meat products and dairy products, how much they consume products from small producers, and how aware they are of the risks caused by food products.

Based on the survey, it can be concluded that meat products and dairy products are eaten quite often in Georgia. Also, home-made products such as canned food is very popular.

Homemade tkemali that is already mentioned above and canned food is an important part of the Georgian kitchen. That’s why the survey showed high consumption of that kind of

product. The main issue is to what extent everyone is aware of the risks of food quality and how well they prepare according to all rules.

According to data, it can be inferred that this population is more likely to prioritize purchasing meat and dairy products that are nearby and easily accessible, indicating that they value supporting local businesses and the environmental advantages of consuming food that has a lower carbon footprint due to shorter transportation distances. The reason may also be that they trust more small producers who grow food in their own backyards. Moreover, they feel the taste difference between rural and supermarket products.

Rural products are very affordable for most people. Also interesting is the fact that people living in the village always buy products from other small entrepreneurs. Unlike in rural areas, people living in cities tend to consume more supermarket meat and dairy products. It is also interesting that mostly young consumers gave preference to the products bought in the supermarket.

According to the survey, a significant number of participants felt underinformed about the risks related to poor food quality. Most participants may have an excellent understanding of several typical dangers associated with poor food quality, such as bacterial or viral food poisoning. But many people can be less aware of other dangers, like exposure to hormones, pesticides, or antibiotics. Only a small number believe they are well aware of the risks. This further reinforces the idea that there is a need to increase education in the population in terms of food quality. Many people may not feel very knowledgeable about food quality risks and may rely on general knowledge and personal experience rather than seeking out reliable information sources. Steps should be taken to reduce their risk, and suggestions to improve public education and awareness.

In conclusion, Georgians typically eat a lot of homemade goods. The majority of people prefer to purchase rural products from small farmers and they believe they are less knowledgeable about food safety. However, it is important to note that this conclusion is based on limited information, and it may not be representative of the wider population.

4.2 Discussion of the literature

These studies imply that even though the Republic of Georgia has improved its method for ensuring food safety, more needs to be done to ensure the security of the food supply. To guarantee a safe and wholesome food supply in Georgia, measures must be taken including better monitoring and control of the food production processes, better training and instruction for food handlers, and ongoing efforts to strengthen the regulatory system.

Advantages of the food safety system in the Republic of Georgia:

HACCP implementation: A globally recognized approach to managing food safety, the Hazard Analysis and Critical Control Points (HACCP) system aims to find and eliminate potential risks during the food production process. Georgia has adopted HACCP throughout the food production sector, which has significantly decreased the number of foodborne illnesses.

Increased inspection: To make sure that food companies adhere to safety standards and regulations, the Georgian government has increased the number of food safety checks conducted across the nation.

Cooperation with international organizations: The Georgian government has improved its food safety system through cooperation with international bodies like the World Health Organization (WHO) and the Food and Agriculture Organization of the United Nations (FAO).

Rapid Response to Outbreaks: The NFA has developed a system for quickly and efficiently responding to outbreaks of foodborne illness. This entails carrying out epidemiological studies, locating the outbreak's origin, and putting precautionary measures in place to stop the disease from spreading further.

Disadvantages of the food safety system in the Republic of Georgia:

Lack of Resources: The NFA, the organization in charge of enforcing food safety laws, frequently lacks the money and resources required to effectively perform its responsibilities. This may lead to insufficient testing, inadequate testing, and inadequate training for industry employees.

Limited capacity: The NFA, particularly in rural regions, has a limited ability to oversee and control small-scale food producers and vendors. This may result in the sale of tainted or unsafe food items, which poses a serious risk to the general public's health.

The enforcement of food safety laws can be patchy, with some producers and sellers receiving fines while others are allowed to continue doing business as usual. The public's confidence in the food safety system may be weakened by this absence of consistency.

Lack of Public Awareness: Despite the NFA's outreach and education initiatives, many Georgians are still ignorant of the significance of food safety and the best ways to avoid contracting foodborne illnesses. This could result in a lack of desire for safe food products and help unsafe practices continue.

4.3 Suggestions

In recent years, the quality of food in the country has improved significantly, but there are still some things that need to be changed and developed. From the materials I found, it can be seen that there are several main problems in the country that need to be solved. From my point of view, the main suggestions are the following:

Education and Training: It's important to educate and train small producers about food safety procedures. Workshops, seminars, and training courses that concentrate on secure food preparation, storage, and handling may achieve this. In addition to small producers, it is necessary to raise the level of education among the population in order to increase the demand for quality products. Programs for community outreach can be designed to enlighten the public about food safety procedures and the origins of their food. This can encourage the use of food grown close to home and help establish confidence between consumers and small farmers.

Consumers may be sure that the food they are eating is safe by exchanging knowledge about food safety procedures. The customer and the food sector may become more trusted as a result. Consumers can learn about the potential dangers and hazards linked with food consumption by reading reports regarding food safety. This can assist customers in making more educated choices regarding the food they purchase and eat.

It is crucial to teach and train schoolchildren about food safety since it can aid in the development of wholesome habits and the prevention of foodborne illnesses. To help students understand the significance of food safety, schools might add lessons on it into their curricula. These courses may touch on issues including proper hand washing, handling of food, and food storage. Trainings similar to those used in Hungary may be used. When food quality experts visit schools and educate kids in a playful manner on fundamental behaviors like correct hand washing and product storage conditions.

Regulatory Support: Laws should be passed to make sure that all food producers, regardless of size, abide by the rules governing food safety. This can be accomplished by setting up regulatory organizations that keep an eye on procedures for food safety and give advice to small producers. The state should be the regulator, but a controlling body should be formed. Development of existing organs may occur. Which will provide proper control of the existing quality system in the country. In addition, they have to adjust the standards in different circumstances, such as during the war or pandemic. In such situations, it is necessary to tighten the control over the products imported into the country, for example, to increase the number of samples to be tested and so on.

Collaboration: Collaboration is key to creating an effective food safety system, especially between small farmers, governmental organizations, and other stakeholders. This can be accomplished by developing cooperative networks that promote interaction and coordination between all parties. Due to the fact that Georgia is very small and economically poor, it is quite difficult for small entrepreneurs to have unlimited activities or to ask for additional costs to take care of quality. In that case, many of them will stop their production. That's why it would be good to unite small producers to a certain extent from the point of view that they will cover the costs required by quality control. They can manage to require conditions if they will join.

Technical Support: Small producers should receive technical support to aid in the creation and implementation of food safety plans. Partnerships with governmental, academic, and non-governmental organizations can be used to accomplish this.

Access to Resources: In order to guarantee the safety of their products, small producers must have access to resources including testing facilities, laboratories, and equipment. By creating networks of shared resources that small producers can use, this can be accomplished. It is possible to create associations such as, for example, a livestock association, a grain growing association, and so on. They will be very competent and will be able to help peasants and big entrepreneurs.

War effect: To assure the safety and quality of the raw materials coming from a war zone, it is necessary for the government to inspect them during the conflict. Long-term stored raw materials may be hazardous to the public's health and safety.

Due to supply chain disruptions and a lack of suitable storage facilities, raw materials originating from conflict zones might not fulfill the necessary quality standards. Before use, the raw materials should be examined to make sure they are secure for use in labs.

Long-term storage of raw materials increases the risk of bacterial, fungal, or other hazardous pathogen contamination. The public's health and safety could be put at risk by the usage of such materials. The government can assist in halting the spread of diseases by inspecting the raw materials.

During a war, it is essential to inspect raw materials arriving from zones of conflict to verify their safety and quality. To put in place efficient monitoring and control measures, the government should collaborate with regional and global partners.

5. Conclusion

The Republic of Georgia's system for assuring food safety has benefits and drawbacks, along with associated risks and potential solutions.

The National Food Agency was established as part of recent major improvements and reforms to Georgia's food safety system. The geographical position of the nation makes a variety of fresh produce, including fruits, vegetables, and meat, readily available. The best natural ingredients and cooking techniques are used in traditional Georgian food.

The thesis emphasizes the difficulties that Georgia experiences as a growing nation and the requirement to raise food quality. Despite improvements, the food safety system in Georgia still faces challenges, such as inadequate resources, weak enforcement, and a lack of public awareness. The analysis of the interview and survey reveals the significance of upholding food safety standards even in difficult times, the necessity of raising public knowledge of the hazards to food safety, and consumers' preference for local food items.

The country's agricultural sector is largely made up of small, subsistence farmers who may lack access to the knowledge and resources needed to produce safe food. There are issues with contamination and adulteration of food products, particularly in the informal sector. The country is also facing problems due to the war and pandemic which are global problems.

In order to assure food safety, the literature study highlights the value of putting the HACCP system into practice, expanding inspections, and working with international organizations. To ensure a secure and wholesome food supply, additional work must be done. This work must include greater monitoring and control of the food production processes as well as continual initiatives to fortify the regulatory framework.

Improving the regulatory environment and funding food safety organizations can help with oversight and enforcement. Farmers, food producers, and the general public can be made more aware of safe food handling and production procedures, which can help prevent contamination. Standards for food safety and quality can be raised by supporting small-scale producers and promoting the formalization of the food industry.

Overall, the thesis emphasizes how crucial it is for Georgia to increase food safety as part of its development and journey towards Europe.

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Annex 3.

Interview with employees of the company Nutrimax

Interview with Natia Borashvili

Natia work at Nutrimax for 9 years. She is a Procurement and logistics manager.

How has the pandemic (COVID-19) impacted your company's food supply chain?

It was a new challenge for the whole world and had a huge impact on the supply chain. Roads were blocked and raw materials were not easily available. During the pandemic, it became very difficult to import raw materials, especially the raw materials we get from Europe. Shipping time and prices have increased.

What procedures has your company implemented in order to guarantee that food goods are safe throughout the pandemic?

The company has its own laboratory that works 24 hours. Every product we receive or distribute is checked according to our internal standards.

How have laws or policies regulating food safety changed as a result of the pandemic?

The standard has not changed throughout the epidemic thanks to regular laboratory control performed by our company. There was no additional governmental control either.

What impact has the conflict between Russia and Ukraine had on your company's food supply chain?

When the war between Russia and Ukraine started, our company was also under the threat of raw material shortage. We import a lot of raw materials, primarily grains, from Russia and Ukraine. We, fortunately, were able to obtain soybeans from Ukraine once the war began, but after an explosion, the border was closed. Moreover, Russia decreased its exports, which raised prices. The Black Sea Basin also had an impact on European raw material costs, which led to a shortage of raw materials worldwide. Even though it was challenging, we were still able to import raw materials, but it was always at risk.

Did raw materials of unknown origin appear on the market during the war?

There were some illegal cases in the market. They called me and told me that there is a ship in Photi (a port city in Georgia), they have wheat and the price is quite low. When we started to reason, we suspected that this raw material might have been stolen during the war. We have never received such kind of raw materials and I have no information whether they were entering the country or not. The origin of raw materials that had low prices was always unknown. I don't know if anyone was buying, going to re-export, or what was going on. Our company policy is against engaging in fraudulent activities.

Did you have a case during the war when you received raw materials that were unusable?

Fortunately, we did not have such a case during the war, because we have our reliable suppliers.

According to your information, does the raw material that is imported undergo any kind of inspection?

We have our own laboratory and all the raw materials that come in, regardless of whether they are imported or from within the country, undergo laboratory inspection on the spot, and if necessary, they are sent to an external private laboratory. In this regard, we are insured for all the raw materials that we use to make food.

Imported raw materials are issued with a phytosanitary certificate (includes: checking the documents accompanying the goods, finding information about previous inspections at the place of production of the goods, visual inspection of the goods, taking samples for analysis in case of doubt (certificate is issued in case of a negative answer to the analysis) ("On approval of phytosanitary certificate and re-export phytosanitary certificate forms and issuing procedure." JSC "Legislative Herald of Georgia")) at the border. Raw materials entering the border also undergo GMO control according to the law. "Rule of border control of living genetically modified organisms moved across the customs border of Georgia" (JSC "Legislative Herald of Georgia").

However, the raw materials coming in at the border do not pass the falsification test, and there was a case where we received a soybean meal mixed with sand. However, we determined by our in-house laboratory deductions and did not obtain the raw material.

Interview with Revaz Laphachi

Revaz works at Nutrimax for 10 years. His first position was as a technical Consultant – Veterinary and Nutrition. Now he is Head of Business Development

How has the pandemic (COVID-19) and war between Russia and Ukraine impacted your company's food quality?

Fortunately, none of them had an impact on our food quality system. The company was able to deal with problems and manage high quality.

There was one case after the start of the pandemic, due to the fact that the import from Europe was delayed, we had to import urea from Azerbaijan. Unfortunately, the quality turned out to be lower, which affected the quality of the food to some extent.

The state imports genetically modified soybean, but the production of GMO soybeans is prohibited in the country, which makes it even more difficult to buy soybeans in case of unforeseen circumstances.

How have laws or standards governing food safety altered since the conflict started?

There was no change in the law or standard.

In my opinion, it will be good if private associations as an example, such as the Association of Grain Growers, the Association of Manufacturers, and the Association of Processors will

exist. The state should organize the formation of associations. I think they will be more competent and help companies to work with high quality.

Interview with Mikheil Samkurashvili

Mikheil works at Nutrimax for 3 years. He is Veterinarian.

In addition to the production of animal feed, Nutrimax takes care of raising the education of farmers. The company has a project "Farmers School".

Tell us about the project "Farmers School".

The goal of the Farmers' School, as an educational project, is to disseminate information on all the issues that are relevant in the field of agriculture in Georgia, both for small, and medium and large farms.

Through the Farmer School, any farmer (even a beginner or already experienced) has the opportunity to increase competence in his field, and independently find solutions to specific difficulties, such as disease recognition and management, farm or production management, biosecurity, animal care, and feeding issues.

Also, one of the main goals of this project is to introduce modern knowledge in Georgia. At Farmer School, we share information on products, genetics, equipment, and more from nearly all of the leading companies in agriculture.

The idea of creating a farmers' school also included the establishment of a "community" that would allow farmers to share their knowledge, exchange information, and more. However, this point could not be fulfilled to a great extent, because the activity of the farmers themselves was not so great.

What problem do small entrepreneurs contact you with most often?

The reality is, farmers most often turn to our veterinarians only when they are faced with a problem. For example, a serious health condition of animals on a farm or even a fatal outcome. Emphasis is not placed on prevention, which would drastically reduce the material loss in specific farms, which includes - medical costs, losses from reduced productivity of animals, and in the worst case, losses from lethal results of animals or birds.

In other cases, most often farmers contact me regarding recommendations, the most frequent questions are about nutrition such as how to feed, how much to feed, or if a particular feed can be changed for better productivity. There are also frequent questions regarding maintenance, for example, what kind of lighting should be on the farm (luxury, location of lighting), what temperature should be on the farm, how many animals and poultry should I place in the building of the mentioned space, etc.

How well do small businesses maintain hygiene and sanitation in your experience?

Issues related to hygiene are really complex, every farmer protects hygiene according to his own experience and financial ability. However, I believe that farmers do not pay proper attention to hygiene conditions. There are many reasons for this such as lack of time, carelessness, or simply stupidity because they see animals only as financial benefits and not as

living beings. There is always a way to improve something, and I think the first step should be to improve hygiene standards.

In your opinion, what measures should be taken to make the products of small producers more qualitative?

First of all, it is necessary to raise awareness of how dangerous the consumption of low-quality products is for health. Considering all this, attention should be paid to sanitary norms. Farmers do not communicate with each other very often and do not share their experiences. Therefore, they themselves do not know what a good farm looks like. It would be good if in Georgia, in the regions, there would be model farms that would be available for a visit, and anyone would have the opportunity to visit and, as an example, transfer different equipment or principles to their own farm.

Annex 4.

STATEMENT ON CONSULTATION PRACTICES

As a supervisor of Tinatin Chachanidze (NEPTUN ID: BHYVHA), I here declare that the final essay/thesis/master's thesis has been reviewed by me, the student was informed about the requirements of literary sources management and its legal and ethical rules.

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Year of publication: 2023

Department: Food Chemistry and Analytical Chemistry

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