

Investigation of Compliance on Good Manufacturing Practices (Gmp) and Hygiene Conditions in Enterprises That Supply Mass Catering Services

Anıl Kizen^{1,2}, Prof. Dr. Güner Arkun¹

Abstract

Nutrition which is our basic need to be healthy and to survive has changed since the old days of human history. Mass food production and consumption has increased due to industrial revolution, rapid urbanization, rapid increase in the number of people and women's employment because of economic requirements. Due to these reasons, the number of companies that engage in mass food production has increased rapidly at the present time. In this research, mass food production in the province of İstanbul was inspected, in compliance with the ligibility for Good Manufacturing Practices (GMP) system and hygiene regulations, according to the two-stage audit forms. After the result of audits, 67% of companies were rated successful by getting a passing grade compliance with GMP and hygiene regulations. The remaining 33% of companies could not receive a passing grade in audits.

Keywords: *Hygiene, Mass Food Production, Good Manufacturing, Practices, Gmp*

Introduction

Nutrition is a process that has to be performed with awareness in order to acquire adequate and balanced amounts of nutrients that we need to maintain and improve our health and enhance the quality of life. The organizations which provide food for large amount of people outside of their homes are called catering companies and this type of nutrition can be called catering or collective nutrition [1].

Catering companies provide food at gatherings such as weddings, engagement ceremonies, birthday parties as well as some schools and work places. Hence, in order to provide food in such communities, catering firms are more practical and economical. From this point, catering companies may provide more practical and economic solutions [2].

Today, more than half of the population in industrialised countries and 30% of the population in Turkey eat at least one meal out of their home in their daily life. According to the data collected

from 9 EU Member States, the number of the meals eaten out is approximately 35.6 billion in a year. 44,7% of this was provided by catering industry and 55,3% were consumed in restaurants. Similer to EU, mass nutrition systems are developing rapidly in Turkey in parallel with the world [2]. The increasing level of expectations and food safety systems along the food production chain from farm- to -table have led to the continuous development of existing food safety systems. The catering companies should implement integrated food safety and quality management systems in order to ensure Good Manufacturing Practices (GMP) and to become a reputable organization by gaining consumer confidence [3].

The purpose of this study is to examine the suitability of kitchen planning, the amount of used tools, capacity, material, cleaning agents, maintenance frequency, warehouses and production areas with respect to Good Manufacturing Practices (GMP) and hygienic rules at several companies engaged in the production of mass food in İstanbul [3].

¹ İstanbul Aydın University, Engineering Faculty, Food Engineering Department.

² Corresponding author: anilkizen@hotmail.com

Catering Sector in Turkey

Based on the data about Turkey, in 2017, 4800 catering companies were affiliated to the Ministry of Food and Agriculture and many of these firms are known to provide services in the metropolitan areas. Public catering firms provide employment for approximately 400.000 people. According to the result of a study conducted by the Federation of Turkish Food Industrialists Association (YESIDEF), the half of the food produced is consumed by the ready-made food industry and that the sector turnover is approximately 66 billion TL [4].

Food Safety

The process to supply healthy and reliable food which is produced by suitable and environment friendly methods, checked at all the stages of production, traced starting from the field to the last step at our dining table, is defined as the Food Safety System [5].

The definition that is made by the Food Safety Expert committee is “the whole measures taken to eliminate the chemical, physical, biological and any other damages that may harm food and human health” [5].

Hygiene in Mass Food Production Companies

It's very important for the mass food production companies to strictly follow the hygiene rules and the reliable production methods as well as providing a balanced and adequate nutrition to the consumers. The production is to be stopped if the materials are found to be inadequate to consume or harmful to health [6].

To ensure food safety;

- 1) The production, processing, storage, distribution and sales phases are to be in compliance with normal conditions,
- 2) The information given on the label should contain about the ingredients and the possible harmful effects such as allergic effects [5].

Food hygiene defines the conditions and measures necessary to ensure the safety of food for the human consumption from production to consumption taking of the intended use into account [6].

Hygienic conditions provided in the kitchen prevent contamination of foods with microorganisms during obtaining and storing of the raw materials, and food preparation and serving stages [7].

In catering companies three factors are taken into consideration to ensure hygiene for producing safe food. The physical factors to provide the hygiene in the kitchen and the equipment used for preparing the food. Factors belonging to the production stage are: assuring hygiene of the food and the personnel, and the personnel factors are related to the training personnel about personnel hygiene [8].

Food Safety Management Systems and Infrastructure

The obligations to ensure the sustainable food quality and safety at the catering companies are determined by various legislations, standards and guidelines [9].

The hygiene rules in mass consumption areas are important together with the food safety management system in order to determine and affectively monitor the critical check points, set pre-requirement programs and applications with respect to the success of the industry ensuring the quality and safety in food production and compliance with the EU Norms [10].

(GMP) , which constitute the infrastructure of food production systems, are preventive measures related to the internal and external conditions of the company in order to prevent or reduce the possibility of product contamination from internal and external sources. The actions and activities required to prevent, eliminate or minimize hazards to an acceptable level are defined as control measures (preventive actions). The schematic representation of the relationship between the order and the steps or processes applied in the production of a particular product is important for the system. Therefore, flowcharts are prepared, and critical control points (CCP) are required for each flowchart [10].

Critical Control Point (CCP)

The critical control point (CCP) in the food chain is a place, procedure, process step or link where control can be applied and required to prevent, eliminate or reduce food risks and hazards [11].

It is defined for monitoring the sequence of control parameters, observations or measurements to be applied, to determine if a critical control point (CCP) in the business is under control and whether it complies with the Good Manufacturing Practice (GMP) procedure [11].

In order to control the relevant hazards within the scope of the GMP management system, the control plan must be prepared in accordance with the GMP principles. CCPs must be created for each hazard set in this plan. Critical limits are also determined in order to monitor CCPs and a monitoring system must be prepared [12].

Good Manufacturing Practices (GMP)

The increase in safe food expectations by consumers and producers has brought many applications in food preparation and processing areas. The oldest of these applications is the GMP systems. It is a series of techniques that are essential in the production and distribution of food products for providing and maintaining quality in products, processing, raw materials, product development, packaging, production, warehousing, and continuous implementation of all phases of distribution. GMP is a flexible system in which errors, deficiencies, remediation and additions are made as a result of audits [13].

The fulfillment of the general requirements of GMP and the establishment of systematic network is possible with the designing of the following 11 basic principles [10].

1. Quality management
2. Building, infrastructure, equipment and materials
3. Documentation
4. Personnel and organization
5. Raw product input, product processing, storage and distribution

6. Quality control and proficiency tests
7. Approval and authorisation of all transactions
8. Investigation of errors, clinical follow-up after use of manufactured products
9. Complaints and recalls
10. Storing samples, destroying of problematic and returned products
11. Internal and external auditing.

In line with these principles, GMP aims to establish a comprehensive tracking system for all production lines and organizations [13].

The ISO 22000 Food Safety Management System, one of the main management systems of a food business, is directly related to GMP system. If we want to do a benchmark on behalf of the two; GMP is a pre-requirement program for the ISO 22000 standard. In other words, for a food business that will use the ISO 22000 standard, the right way to start would be fulfilling the GMP requirements [13].

General Rules of Good Manufacturing Applications System

- Deciding on the details of the products to be produced (product types, controls, approvals)
- Write, save and copy everything to be done (standard application methods, laboratories, equipment, etc.)
- Apply everything what you wrote and noted (training, qualification, Process Control)
- Prove what you did with documents (records, audits)
- Identify nonconformities resulting from audits, fix and increase quality (track transactions, query and subtract results) [13]

Benefits of GMP Management System

Main benefits of the GMP system are summarised below:

- Provides compliance with international trade.
- It is a system that controls the processes necessary for the prevention of errors and contamination of various infections, risks, complications that may

occur during production and the organization established to manage the production.

- It is ensured that the product is continuously monitored thus it reaches the consumer with the best quality and healthiest standards.
- Increases the awareness and understanding of food safety within the company.
- Enhances the image of reliability in public and for the consumer.
- Provides competitive advantage in the sector market.
- Ensure that customers are satisfied with existing or future requests.
- Comply with legal requirements.
- Reduces legal penalties in criminal situations that can be supernatural.
- Helps employees to be proud and motivated with the company in which they work.
- Information from third-party auditors provides added value to the company.

As a result; The good manufacturing applications system is a quality approach for food production and provides reliable and effective production by ensuring the professional work of food industry workers [13].

Kitchen Planning in Mass Food Production Companies

Kitchen planning should cover the basic purpose of the kitchen. The main purpose of the kitchen is to produce high quality and hygienic food at a low-cost as much as possible. Kitchen planning contributes to the realization of this objective by enabling the arrangement of the workflow and the methods of providing the working staff with a comfortable working environment. All planning, work and movements must be seated on specific international professional standards based on policies and procedures [14].

Some of the issues to be considered in the planning of kitchen and cafeteria in the companies of mass food production are as follows: [14]

- The amount of food to be produced and the number of people to be served,

- The shape of the food presentation to be prepared (school, dormitory, barracks, hospital etc.),
- The average age, number of the group to be served,
- Presentation time, number of meals and form of presentation,
- The type of menu to be presented (optional, tabldot, etc.),
- The way in which food is purchased, frequency and storage conditions,
- The types and capacities of devices, machines, tools and equipment to be used for preparation, cooking and service of food,
- Number of personnel working in the kitchens of the companies (special needs of personnel, shower, toilet, dressing cabinets),
- Size of the area allocated to the kitchen in companies,
- Budget allocated for the application of kitchen plan in companies.

If appropriate, conditions are provided at the entrance of food enterprises; hygiene turnstiles must be present. If this condition cannot be achieved at the entrance of the business, there should definitely be a hygiene tourniquet area in the kitchen entrances [15].

The order of these tourniquet systems should be as follows:

- Boot washing system,
- Washbasin for hand washing and disinfecting,
- Hand Wash – disinfecting part,
- Input and output turnstiles,
- The disinfectants must be located in the mop section [15].

MATERIAL and METHODS

Material

In this research 6 catering companies in Istanbul district have been subjected to investigation. These companies have been grouped two by two as small, medium and large size companies. The production capacities of these companies vary between 500 and 1000 serving/day.

Two factors were effective for the selection of Istanbul as the research site: there are several mass food production companies and a similar research has not been performed before in Ctering companies located in Istanbul.

Methods

In this study, the general planning of the kitchen, storage facilities and the tools used for the production have been audited with respect to the suitability and adequacy with the standards. Audits are the results of long-term observations in firms by the researcher himself, and the relevant documentation (inventory list and maintenance planning and forms), including the responsible cook, warehouse supervisor and food engineer or technician, who are personally seen in the place of the equipment. Item list and maintenance repair form were reviewed.

The standards used in the research were based on an average of 1000 servings/day production capacity and 50 m² production area [16].

The suitability of the kitchen capacities of the companies that were investigated has been examined and evaluated according to the standards of GMP and the Food Hygiene Regulation published in the Official Gazette numbered 28145 [14].

In this study, units and physical properties of the units that should be present in the mass food production facilities have been examined and evaluated according to the standards of good manufacturing practices and the Regulation of Supervision and Control of Food Safety and Quality published in the Official Gazette numbered 27009 [14].

In line with the standards, the existence of the facilities which should be present at all mass food production companies (personnel recreation room, toilet, shower, cold and dry air depots, chemicals and cleaning agents storage, vegetable products washing and preparation, meat products preparation, preparation of pastries, baking and dishwasher), and the physical conditions of the

kitchen (wall, ceiling, floor, doors and windows, electricity and water installations, ventilation, lighting, drain, mosquito nets) have been evaluated [16].

According to the capacity of the companies involved in the research, the coefficients were found based on the standard of the tools and equipment required to be present in each section of the company's kitchens. The number of tools to be found is determined by multiplying these coefficients [13].

These coefficients are as follows:

- 1. Company: Standard x 10 = (10000 servings/day)
- 2. Company: Standard x 10 = (10000 servings/day)
- 3. Company: Standard x 5 = (5000 servings/day)
- 4. Company Standard x 4 = (4000 servings/day)
- 5. Company Standard x 1 = (1000 servings/day)
- 6. Company Standard x 1 = (1000 servings/day)

The statistical evaluation of the findings was not possible due to insufficient number of instruments present in the companies. The results were evaluated as numbers and percentages [16].

Control Form Method A control form has been prepared to evaluate the conformity to the standards of GMP and the hygiene rules of the 6 food companies at different sizes, which were scaled according to the number of daily serving meals.

Data Collection and Evaluation

Data Collection the studies were carried out in 3 stages.

Stage 1: 12 control forms were used at this stage. Each audit form was evaluated over 100 points and the minimum 60 points were considered as the limit for qualification [13].

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The audit forms consist of the following headings; general hygiene, general cleaning and sanitation, personnel hygiene, warehouses, goods acceptance and handling, water supply and water, ice, steam quality, food waste and waste management, dishwasher, in-house, toilets and other areas, pest control, food production, cooking and preparation, quality management system documents, registrations and training.

After these 12 forms are filled in separately and evaluated over 100 points, all results are collected and divided into 12. If the resulting average score is 60 and above, this indicates that the business has received a passing grade in the first stages.

Stage 2: At this stage, the company was inspected for a second time. This time the rectification status of the findings of the first stage had been checked by using the form entitled “Kitchen and Operation Plan Control List”.

The form includes a total of 100 questions under various headings. If businesses receive a score of 60 and above, they are deemed to have received enough points from the audit.

Stage 3: At this stage, the resulting points from the first and the second stages are collected and divided into two. If the result is a score of 60 and above, the company is considered to have passed good production practices and hygiene competence.

Evaluation by Production Capacities

In the research, the mass food production companies are grouped into large 33.3% (N:2), medium 33.3 (N:2) and small 33.3 (N:2) size enterprises according to their daily production (servings/day) capacities. The following chart (table 1) shows the production capacities, production areas and personnel numbers of the companies participating in the study [9].

Table 1: Daily production capacity, production area and the number of personnel of the enterprises

Company Size	Daily Production Capacity (Servings/Day)	Production Area (m ²)	Number of Personnel
Big			
1.Firm	10000	450	150
2.Firm	10000	400	120
Medium			
3.Firm	5000	250	70
4.Firm	4000	200	60
Small			
5.Firm	1000	100	20
6.Firm	1000	50	15

According to Table 1, the number of personnel employed in the enterprises increased the size of the operation together with the number of employees.

Kitchen Areas

In Table 2, the qualification statuses of the food companies participating in the audit are given according to the daily serving capacity of the kitchen areas [5].

Table 2: Production information of the enterprises studied in.

Company Size	Daily Production Capacity (Servings/Day)	Production Area size (m ²)	Required Area (m ²)	Field evaluation (%)
Big				
1.Firm	10000	450	500	10% insufficient
2.Firm	10000	400	500	20% insufficient
Medium				
3.Firm	5000	250	250	Adequate
4.Firm	4000	200	200	Adequate
Small				
5.Firm	1000	100	50	Adequate
6.Firm	1000	50	50	Adequate

According to GMP standards, 50 m² area is enough for a business with a production capacity of 1000 servings/day [13].

According to the results of this study (Table 2), the production capacity of large enterprises has been confirmed to be insufficient. Production areas are enough for the daily production capacities of all medium and small enterprises. The production area of the 5th Firm has a 50% excess size compared to the amount given in the standard. This indicates the existing excess of unnecessary area. The wider production area than necessary can lead to increased dead area, unnecessary workforce, electricity and other expenses.

Physical Requirements of the Kitchen

The physical conditions of the kitchens; the floor (tiles waste dirty water drains), walls (2 meters or more tiles at height), doors and windows (corrosion resistant, easy to clean), ventilation (natural and mechanical ventilation sufficiency), lighting (suitable illumination level for the purpose), water (continuous hot water system), as well as the physical design of Good Manufacturing Applications according to the standards and compliance status of hygiene regulation have been investigated [10].

Among the companies representing large-scale named as, firm 1. and firm 2. demonstrate full compliance with physical standards. Medium scale establishment, firm 3 is complying in terms

of floor design, illumination adequacy and water supply. The floor is designed with light colored, nonslip, easy to clean and quick-wear-resistant tiles as written in standards and regulations. In addition, the waste water drains on the floor are at adequate sizes and located where they should be. The partially or completely inadequate points in the firm 3 are as follows; wall, door and window designs. The wall design is partly inadequate because of the absence of protective metal coatings at the level of hand carts on the walls.

Door and window designs are completely inadequate and inappropriate according to standards and regulations. The doors in this firm are not self-closed. Another reason for non-conformance is that they are produced from a rapidly worn substance. The windows also did not have opaque glass where necessary, thus direct sunlight hit the production area [5].

It has been observed that insufficient fields are more than used areas in the firm 4 which is grouped as medium scale enterprise. In this case, it shows that the facility is inadequate both in terms of GMP standards and the regulations. It was also found that dark colored tiles were used in most areas of the floor. This situation causes difficulty for the detection of contaminated areas. Doors and

windows are not manufactured from corrosion resistant material. There is no opaque glass used on the windows. The flynet is not available in all opening windows. There is no protective equipment in case of refraction of illumination fixtures. For this reason, although illumination is adequate, it is found to be inappropriate. Since a refraction of illumination fixtures may lead to contamination of the food that is being produced [7].

The firm 5, grouped as a small size company, can be shown as a good example for its category. The most prominent error in design is that the floor is designed from a dark tile. In addition, the floor of the cold and dry storage areas is covered with parquet [8]. In this case, storage areas are not acceptable. There are no other unacceptable points except the floor design.

The firm 6, grouped as a small business, is partially inadequate because although the wall is tiled in dark colors, it does not contain metal preservatives at the level of carts. Doors and windows are not made of corrosion-resistant material and the doors are not self-closed. The use of opaque glass in windows generally shows compliance with the standards. However, there is no fly-net at any opening window [9].

Considering the physical design of the companies involved in the audit, most firms generally comply with GMP standards and regulations. The fourth business, grouped in medium scale, has remained far behind of other companies in terms of physical design competence. In addition, the physical design of the fourth business does not generally conform to GMP standards and regulations. It is inevitable that the company should have a move in its physical redesign and modifications which will have a positive effect on the company in the future [11].

Results of the First Stage Audits

6 companies that are participating in the audit were subjected to 12 inspection forms in the first stage. These 12 inspection forms are prepared according

to the rules of GMP standard and regulations. In the first phase, the deficiencies of the enterprises have been reported with results from the 12 audit forms. For the elimination of these deficiencies, firms are given a week of time. How successful businesses are in the first audit phase is given in Table 3.

Table 3: Average results of the first stage audit forms of enterprises

Company Size	Qualification Score*	Points received**
Big		
1. Firm	60-100	74
2. Firm	60-100	76
Middle		
3. Firm	60-100	61
4. Firm	60-100	53
Small		
5. Firm	60-100	68
6. Firm		
7. Firm	60-100	48

* 60-70 score enough, 70-80 score successful, 80-90 score very good, 90-100 score is excellent

** According to the GMP standard inspection form of good manufacturing applications, 60 points have been regarded as the limit in terms of qualification [16].

Results of the Second Stage Audit Forms

At the end of the first audit, the report is prepared to resolve the deficiencies for the businesses participating in the audit. After enough time (approx. 1-2 weeks), the companies were re-inspected in order. The results of the second stage controls are given in Table 4.

Table 4: Results of the second phase control forms of the enterprises

Company Size	Qualification Score*	Points received**
Big		
1. Firm	60-100	70
2. Firm	60-100	74
Middle		
3. Firm	60-100	65
4. Firm	60-100	53
Small		
5. Firm	60-100	65
6. Firm	60-100	50

* 60-70 score is enough, 70-80 score is successful, 80-90 is very good and 90-100 score is defined as excellent

** According to the GMP standard inspection form of good manufacturing applications, 60 points have been regarded as the limit in terms of qualification [16]

Results of the Final (Third) Stage Audits

In the third stage i.e. the final stage, the results were obtained by averaging the two phases of the first and second audits. In the following table (Table 5), the average results are given for the scores that firms have received from the final inspection .

Table 5: The results of the third (Final) audit forms of the enterprises

Company Size	Qualification Score	Points received
Big		
1. Firm	60-100	72
2. Firm	60-100	75
Middle		
3. Firm	60-100	63
4. Firm	60-100	52
Small		
5. Firm	60-100	66
6. Firm	60-100	49

According to the result of two-stage auditing, 2 firms' audits have passed and 2 firms were found to be sufficient. The remaining two firms did not receive a pass in the first and second controls. Among the companies studied in, the most successful one was the second firm with the result of 75 points. In general, 67% of the participating firms in the audit have scored a pass through the inspection.

Conclusion and Discussion

In parallel with the increasing of mass food production and consumption, more companies are involved in this business every other day. It is very important that the companies and the employees should follow the personal and the environmental hygiene and cleanliness prerequisites as well as the suitability of the food produced by these companies for human health [10].

As consumers, most of us can define the meaning of quality. However, we may face with difficulties in determining the quality and quality assessment as an individual. In literature, the word "quality" is defined as the 'excellence level'. Since everyone has a different level of excellence, it is not possible to be in line with everyone's personal standards. For this reason, certain standards are created for the food production and consumption areas by people who are accepted as experts in the food industry. The main purpose of these standards can be defined as producing food products in the highest hygiene conditions with the lowest cost of consumer appreciation. However, the use of the word 'control' in combination with the term quality makes it a better meaning. The use of these two words together emphasizes the hygiene and sanitation control during the creation of food quality [13].

For this reason, "Food quality control" services play an important role in the control of harmful substances and diseases that are transmitted to human through food. The control is for ensuring whether the food is produced under hygienic conditions using techniques adequate for human

consumption together with the accepted conditions of production, process, storage, marketing places and the hygiene of the people working at these stages [16]. If food hygiene, cleanliness and sanitation rules are not provided adequately starting from production to the presentation of the product to the consumers, toxic substances occurring in the foods and the proliferation of microorganisms cause food contamination which puts human health at risk [10].

Infectious diseases that are becoming a preventable health problem in the world and Turkey. The problem also found at significant degrees in the food sector, which pose an important risk. Since various problems in the production, storage and distribution stages of food supply chain still exist in our country, the level of hygiene and sanitation conditions are important research subjects to be investigated. It has been shown by many research studies that are conducted in recent years that a significant portion of food poisonings may arise due to the lack of personal and environmental hygiene habits of staff working food manufacturing, consuming and selling facilities where adequate importance is not given to the environmental hygiene [13].

In this study, it should be emphasized that the mass food production companies commonly disregard the GMP standards and regulations. It should be also expressed the facts of our country with respect to food poisoning which poses a big threat to human life [5].

In addition to these objectives, the study was strengthened scientifically by investigating the degree to which mass food production companies are in line with the relevant regulations and good manufacturing standards in Turkey. Besides, to which degree the GMP and the regulations follow the facts of Turkey and how much work is done to comply with the hygiene rules were also investigated.

6 firms in Istanbul which has allowed auditing in their establishments and production areas has participated in this research. Comparing the production capacity of each business, the qualification status of the kitchen and production area design, tools, equipment and units has been inspected. In addition, quantity capacity assessment has been made for the units required to be present in the business. The degree of functional use of the materials such as cleaning materials, chemical disinfectants, the operator's maintenance and repair frequency, general appearance, usage instructions and physical sufficiency, and their conformity to GMP standards and regulations were assessed [10].

The production area which was available in 4 of the 6 companies participating in the audit, had enough size according to the production capacity and the number of employed personnel. The second of the production areas of the two remaining firms were found to be insufficient by 20% of the first 10%. 66,6% of the companies had enough capacity in terms of production areas. It has been found that the physical conditions that must be in accordance with the Good Manufacturing Standard were in line with the standards in 67% of the firms. Areas where physical conditions were found appropriate in all enterprises are 33% of the floor design and 33% of the wall design were found to be at 17% of illumination in 50% of doors, windows and mosquito nets. Hot water and ventilation installations were capable of adequate capacity in all firms [16].

In all the companies participating in the research, the units with the most deficiencies with respect to the capacity of vehicles and equipment, respectively, are 80% in the vegetable preparation unit, 75% in dishwashing units, 70% in meat and pastry preparation units, purchasing and the control unit was determined to be 65%, 60% in the depot units and 40% in the cooking unit. When the vehicle and equipment capacities of enterprises were generally assessed in terms of quantity, it was determined that 66% of all businesses were inadequate [6].

The results of the inspection forms used in the first stage were successful except for 2 companies. The success rate at the first stage was 67%. In this case, 67% of enterprises have succeeded in obtaining general hygiene, cleanliness and sanitation, personnel hygiene, warehouses, goods acceptance and transport, water supply, and used water, ice and steam, food waste and waste management, dishwashing, in-house toilets and other areas, pest control and combatants, food production, cooking and preparation, quality management system documents, records and training [13].

During the second inspection, the deficiencies were not corrected. In addition, the results of the combined result of companies taking note of the positive and negative changes from the first inspection to the second audit were observed in the next control i.e. in the final inspection. According to the results of last inspection, 4 firms have received a pass score while 2 firms have failed. The companies that fail are generally lacking in terms of general physical requirements, the necessary tools and equipment, general hygiene rules, food warehouse order and rules, personnel hygiene and personal cleanliness. After the second inspection, some companies were observed to have an increase in these points and some of them have not fulfilled their requirements [13].

As a result of the research, most of the food production companies that participated in the audit were successful in their GMP standards and the qualifications they had to carry on the basis of the regulations in a well-demonstrated and applied manner. The 6 companies engaged in the production of collective food were determined to be lower in small and medium sized enterprises in compliance with standards and hygienic aspects. The main reasons for this situation are as follows; manufacturers and employees do not comply with the personal cleaning, hygiene and sanitation rules at adequate levels, the raw materials used in

production not comply in terms of quality GMP and hygiene standards, the general production is not in accordance with the rules specified in the standards, employees do not know the rules of hygiene and sanitation at adequate levels.

It was also deduced as a result of our research that the following measures should be taken in order to increase the hygienic qualities of the establishments engaged in mass food production. The risk and critical points must be concentrated in all phases, from production to consumption. Hygiene rules and controls and microbiological studies do not always provide the reliability of food. For this reason, hazard analyses should be developed at critical control points (CCP) in enterprises and using control systems to produce, prepare, cook, refrigerate, reheat, prepare and prepare for the service. Failures and nonconformities in the basic stages such as holding, storing, etc. In addition, the cold chain, deep freezing process and the equipment cleaning should be taken care of. Personnel hygiene and cleanliness of the operation should be emphasized, cleaning and disinfection of surfaces in contact with food should be effectively done, cross contamination sources and their causes should be avoided. In addition, employees should be educated and be conscious in terms of hygiene, personal cleaning, operation cleanliness and hygiene rules. Health checks and porter analyses of personnel in contact with food and food equipment are required periodically. Effective and periodic food control must also be carried out by the official organizations.

Finally, GMP system is a system that provides, protects and improves food safety. Mass food production companies must apply this system and fully implement it for eliminating or minimizing the problems that may occur in their businesses. In summary, GMP system is an effective tool in production and preparation of safe and quality foods .

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