

ASSESSING THE KITCHEN ERGONOMICS OF SELECTED RESTAURANTS IN
THE ACCRA METROPOLIS

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VOCATIONAL EDUCATION, submitted to the School of Graduate Studies,
University of Education, Winneba in partial fulfilment of the requirements for the
award of Master of Technology degree in Catering and Hospitality Education**

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DECLARATION

STUDENT'S DECLARATION

I, **Joyce Ohenewah Twum**, declare that this Dissertation with the exception of quotations and references contained in published works which have all been identified and duly acknowledged, is entirely my own original work, and it has not been submitted, either in part or whole, for another degree elsewhere

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SUPERVISOR'S DECLARATION

I hereby declare that the preparation and presentation of this work was supervised in accordance with the guidelines for supervision of Dissertation as laid down by the University of Education, Winneba.

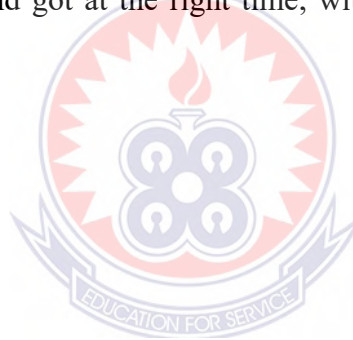
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DEDICATION

I dedicate this research work to dear husband, Mr. Kwasi Dade and my children
especially Elizabeth Afua Dade



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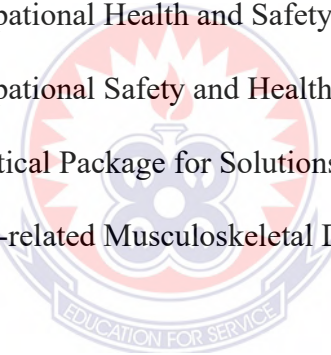
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ABBREVIATIONS

ASCC	Australian Safety and Compensation Council
CTDs	Cumulative Trauma Disorders
EMR	Experience Modification Rate
GFEN	Gas Foodservice Equipment Network
HAS	Health and Safety Authority
HSE	Health and Safety Executive
HVAC	Heating, Ventilating and Air-Conditioning
IEA	International Ergonomics Association
NIOSH	National Institute for Occupational Safety and Health
OHS	Occupational Health and Safety
OSHA	Occupational Safety and Health Agency
SPSS	Statistical Package for Solutions and Services
WMSD	Work-related Musculoskeletal Disorders



ABSTRACT

The study sought to examine the ergonomic practices in kitchens of selected restaurants in the Accra Metropolis. The sample for the study comprised 60 kitchen staff of the selected from 10 restaurants using the purposive sampling technique. A descriptive survey research design was used with mixed approaches of data analysis. Quantitative data were analysed using frequencies and percentages with help of SPSS whilst qualitative data were analysed descriptively. The study revealed that the layout of majority of the selected kitchens confirmed to an ideal kitchen layout as discussed in literature. The layout of the kitchen made it possible for the easy and smooth movement of workers and objects within the working area as indicated by slightly over half (54.0%) of the participants. It is observed that workers perform repetitive motions and abnormally stretched some parts of their body and muscles when performing some tasks as indicated by slightly below half (48.0%) of the participants. These actions and the lack of some necessary equipment and gadgets for performing some tasks instead of manual handling were deemed to pose ergonomic risks to workers with their attendant health and safety implications. It is recommended that management should regularly investigate risks in the kitchen, undertake regular assessment of risks to identify potential hazards and adopt measures to eliminate them.

CHAPTER ONE

INTRODUCTION

1.1 Background of the Study

It is believed that good ergonomics saves money and that is usually the main incentive for employers and business organizations. However, it must be noted that money is not the only reason for good ergonomics. Ergonomically designed workplace motivates the employee to work better and strengthen his/her performance. This results in higher job satisfaction and commitment to her/his work. A workspace that is designed with the safety and comfort of the employee in mind can positively affect productivity, efficiency, and reduce injuries.

Ergonomics is a science concerned with the 'fit' between people and their work (Health and Safety Executive, 2013). It puts people first, taking account of their capabilities and limitations. Ergonomics aims to make sure that tasks, equipment, information and the environment fit each worker. In today's workforce, losses incurred from musculoskeletal disorders and cumulative trauma disorders (CTDs) continue to be a growing problem. According to the Bureau of Labour Statistics (2002), musculoskeletal injuries are among the most prevalent and costly of all lost time injuries in almost every industry. These injuries have been known to cause a great deal of pain and suffering among affected workers that often lead to lost production and poor quality work. Therefore the essence of ensuring proper ergonomics in the design of workplaces such as kitchens in restaurant is becoming more important and should be of paramount concern to every industry.

Ergonomics emphasizes the prevention of work related musculoskeletal disorders through recognizing, anticipating and reducing risk factors in the planning stages of

new systems of work or workplaces such as kitchen in this context. In fact, to design operations and workplaces there is the need to ensure proper selection and use of tools, job methods, workstation layouts and materials that impose no undue stress and strain on the worker. Additional costs are incurred in redesigning or modifying work processes therefore, it is more cost effective to reduce risk factors at the design stage.

According to the Cambridge Advanced Learners Dictionary (3rd ed.), a kitchen is a room where food is kept, prepared and cooked and where dishes are washed. The kitchen is the single highest function room in a restaurant. Almost all the staff of a restaurant uses the kitchen at one point or the other, so it needs to be accessible by the least able and the most able person as well as the smallest and tallest. Therefore, when remodeling a kitchen or designing a kitchen from scratch, there are many things that must be taken into consideration in improving the comfort of your employees.

The kitchen is an integral part of a restaurant and without it; the restaurant will be no different from a movie cinema. A customer sits in the exquisitely furnished seating area of a restaurant where he or she enjoys delectable dishes that satisfy their cravings. Yet the real hard work is done behind the scenes where food is stored, prepared and cooked before being served to a hungry diner. Therefore, the layout and activities that place in kitchen their associated risks should be of paramount importance when building a restaurant. The kitchen should be user friendly to allow for walking back and forth a lot, with clear pathways between work centers.

In kitchen layout, the most basic concept is to minimize walking back and forth a lot, with clear pathways between work centers. In addition, when more than one person is in the kitchen, it is important that they do not step over each other when working. Consider each task and design work centers around them, taking into account the

associated major appliance and its surrounding work area. There is no definite rule on how to arrange equipment and tasks in the kitchen. It all depends on the available space and one's particular needs. In a purely ergonomic configuration, the kitchen equipment is arranged according to what is most comfortable and efficient for the chef and kitchen staff. For example, an ergonomically arranged kitchen might have an under counter freezer located directly beside the commercial deep fryer. Although this is not energy-efficient, it allows frozen products to be moved directly from the freezer to the fryer, without even taking a step (Gas Foodservice Equipment Network [GFEN], 2012).

The configuration of one's kitchen could depend heavily on maximizing employee mobility and worker efficiency. The design should be such that the culinary equipment and food ingredients easily accessible, allowing kitchen staff to move around as smoothly as possible in line with the ergonomic assumption that, the fewer the steps needed to complete tasks the better.

1.2 Statement of the Problem

Every year more people (between the ages of 18-64) are injured from repetitive motion injuries to the human musculoskeletal system than any other category of disorder. The average employee loses nearly two days of work each year as a result of these disorders. Work-related musculoskeletal disorders occur when there is an interface problem between the physical environment of a task and the physical capacity of the human body. Risk managers and ergonomic professionals have pinpointed musculoskeletal disorders and CTDs as a source of major loss in industry as a result of increasing worker's compensation costs that adversely affect a company's insurance-related experience modification rate (EMR). Despite the fact that there have been some research studies in workplace ergonomics in other parts of the globe though relatively inadequate, research in the area of kitchen ergonomics is lacking in the research

literature and most especially in Ghana. Most often management of restaurants in Ghana places much emphasis on customer sitting/dining spaces at the expense of a spacious and well-organized kitchen. Although kitchen ergonomics is becoming a bigger concern for restaurant operators in other parts of the world, it has not received the needed attention by both researchers and management of restaurants in Ghana. Nevertheless, it is generally known that nowadays ergonomics is something that cannot be ignored. It was therefore necessary to conduct this study to examine the current status of kitchen ergonomics in selected restaurants in the Accra Metropolis.

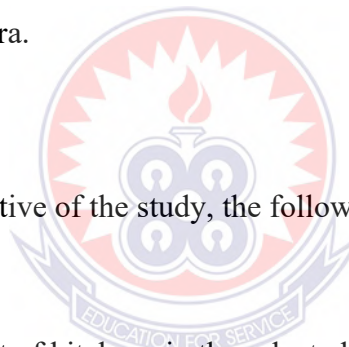
1.3 Main Objective

The main objective of the study was to examine the ergonomics practices in kitchens in selected restaurants in Accra.

1.4 Specific Objectives

In line with the main objective of the study, the following specific objectives were set to be achieved:

1. To assess the layout of kitchens in the selected restaurants.
2. To identify the ergonomic risks associated with working in kitchens in the selected restaurants in Accra.
3. To identify the measures adopted to ensure employee safety in the kitchen in the selected restaurants.



1.5 Research Questions

The following research questions were designed to provide answers to achieving the above stated objectives:

1. How does the layout of the kitchens of the selected restaurants relate to an ideal layout?
2. What ergonomic risks are associated with working in kitchens in the selected restaurants?
3. What measures are adopted to ensure employee safety in kitchen in the selected restaurants?

1.6 Significance of the Study

The importance of ensuring proper kitchen ergonomics in restaurants cannot be overemphasized. Therefore, this study is necessary because it will inform management of the selected restaurants of the need to ensure proper kitchen ergonomics. The findings of the study will be a useful guide in assisting management of the selected restaurants in the design of appropriate work systems, equipment and human-machine interfaces to promote productivity, efficiency and worker comfort and satisfaction. In addition, the safety of kitchen staff will be highly improved by the findings of the study and thereby improve productivity. Finally, the study will add to the limited literature on kitchen ergonomics in Ghana and serve a source of knowledge for future researchers in this area.

1.7 Limitations of the Study

The sample size for the study was not an adequate representation of restaurants in Ghana to guarantee generalizations of the study to the whole country. Therefore, ideally the study should have covered many restaurants in different areas across the country.

The questionnaire techniques of data collection could not make it possible to obtain responses of illiterate kitchen staff thereby limiting the number of respondents. During the process of collecting data, the researcher faced the limitation of meeting with the target participants (kitchen staff) because she realized they were busily working in the kitchen and so the number of participants who took part in the study was limited by this challenge. Therefore, the researcher increased the number of restaurants from the original number of five to 10 restaurants. In addition, the researcher could not personally observe the inner layout of kitchens of some selected restaurants because they were out of bounds to outsiders. Therefore, she relied on only the information provided by the participants.

1.8 Delimitations of the Study

The study was delimited in scope with respect to geographical location and the number of restaurants covered by the study. Thus, only 10 restaurants within the Accra Metropolis were considered out of the many restaurants across the country. The selection of participants for the study was limited to kitchen staff and the supervisors. In relation to content scope, the study was limited to only ergonomics in the kitchens of the selected restaurants. In addition, the collection of primary data was triangulated by using three data collection instruments namely questionnaire, interview and observational checklist.

1.9 Definition of Terms

Ergonomics: It refers to any attempt to prevent occupational disorders and to reduce the potential for fatigue, errors or unsafe acts through the evaluation and design of facilities, environments, jobs, tasks, tools, equipment, processes and training methods.

Kitchen: It is a room where food is kept, prepared and cooked and where dishes are washed. The kitchen is the single highest function room in a restaurant.

Musculoskeletal - Body structure that is comprised of muscles, tendons, ligaments, bones, joints, and nerves.

Musculoskeletal disorders: These occur when there is an interface problem between the physical environment of a job and the physical capacity of the human body.

1.10 Organization of the Study

The research work is presented under five chapters. Chapter One consists of the background of the study, statement of the problem, objectives of the study, research questions, significance of the study, limitations of the study, delimitations of the study and organization of the study. Chapter Two involves the review of related literature under general and thematic areas based on the research objectives. Chapter Three comprises the research design, population, sample and sampling technique, instruments for data collection, validity and reliability of instruments used, data collection procedures and data analysis are covered in this chapter. Chapter Four involves the presentation and analysis of data and the discussion of findings of the study. Chapter Five contains the summary of findings, conclusions, and recommendations.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

The purpose of the study was to assess the ergonomic conditions of kitchens in selected restaurants in the Accra Metropolis. This chapter presents a review of relevant literature relating to the workplace ergonomics and kitchen ergonomics in specificity. It comprises the conceptual framework of the study, and analysis of the general concept of ergonomics. The empirical review was categorized into five thematic areas to reflect the objectives of the study, thus planning the layout of a kitchen in the restaurant, activities in the kitchen, importance of ensuring proper kitchen ergonomics, , risks associated with working at kitchen, and measures to ensure employee safety at the kitchen.

2.2 Conceptual Framework of the Study

The study aimed at examining the ergonomic structure in the workplace and in this case the kitchen of a restaurant. The workplace design normally reflects the nature of job or tasks to be carried out in that particular place. The worker has individual capabilities and limitations with respect to the layout of his/her workplace and the tasks to be performed in such an area at a particular point in time. Therefore, workplace design determines the job design or tasks to be performed and mostly the worker has no control over these two elements. However, the design of the workplace can be undermined by poor job design and work organization. Figure 1 depicts the five main elements to be considered in ergonomic analysis of work in the workplace

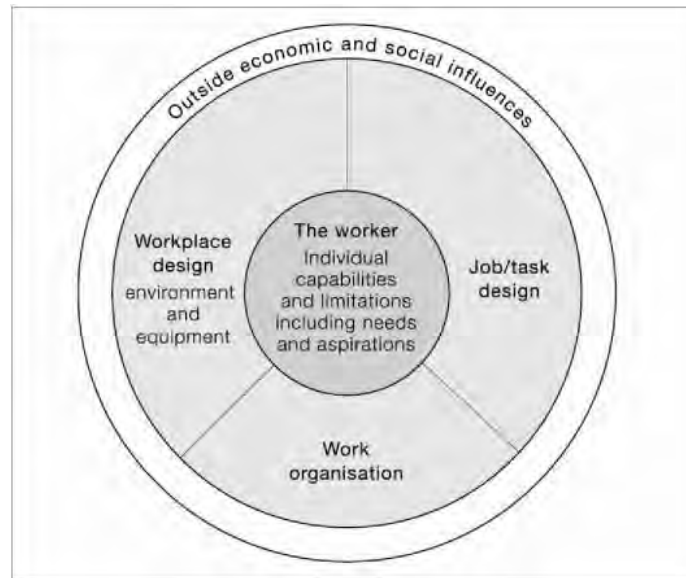


Figure 2.1 Conceptual Framework

(Source: McPhee, 2005)

To design better jobs we need to know about the work and how it will be done. We also need to know about the people who will do the work and their capabilities and limitations. Not only do we need to consider physical and cognitive aspects but we also need to take into account individual aspirations and needs - the social component. As work changes over time reviews and modifications are constantly required if systems and people are to work harmoniously and efficiently. No matter how well the workplace is designed it can be undermined by poor job design and work organization.

2.3 The Concept of Ergonomics

The term 'ergonomics' was derived from the Greek words 'ergon' (work) and 'domos' (law). According to the International Ergonomics Association (IEA), ergonomics is defined as 'the science of fitting the job to the worker'. OSHA (1992) defines ergonomics as "any attempt to prevent occupational disorders and to reduce the potential for fatigue, errors or unsafe acts through the evaluation and design of facilities, environments, jobs, tasks, tools, equipment, processes and training methods".

There are different kinds of definitions for ergonomics, some being very strict whilst others see ergonomics in wider perspective. However, more important than knowing the exact definition is to understand its meaning. Wilson and Corlett (1999) assert that it should be seen as an approach of ‘designing people’ and in this sense; ergonomics should be more of a process than anything else should.

McCormick and Saunders (1993) contend that “ergonomics applies information about human behaviour, abilities and limitations and other characteristics to the design of tools, machines, tasks, jobs and environments for productive, safe, comfortable and effective human use”. Dul *et al.* (1993) concur with McCormick and Saunders by stating that a number of factors play a role in ergonomics; these include body posture and movement (sitting, standing, lifting, pulling and pushing), and environmental factors (noise, lighting, temperature, humidity). Ergonomics can therefore be defined as the science about how to make work environment, tasks and work tools more comfortable to use by workers considering their human behaviour, abilities and limitations and other characteristics.

According to Stevenson (1999), ergonomics as a science can be commonly divided into three different sub categories that are as follows: Physical ergonomics - which is related to the physical activity such as safety, health, working postures and repeated body movements, Cognitive ergonomics - which includes the mental processes such as skilled performance, human reliability and human stress, and Organizational ergonomics - which concerns the optimization of socio-technical systems, for example the organizational structures and policies. However, this classification by Stevenson could be well described as elaborate explanation to the definition given by McCormick and Saunders (1993).

The Health and Safety Authority, HSA (n.d.) asserts that the goal of ergonomics is to provide maximum productivity with minimal cost; where cost in this context is expressed as the physiological or health cost to the worker. In a workplace setting, there is seldom a large number of tasks that exceed the capabilities of most of the workforce. There may be jobs that will include a specific task that requires extended reaches or overhead work that cannot be sustained for long periods, by using ergonomic principles to design these tasks; more people should be able to perform the job without the risk of injury. The primary focus is on the design of work activity that suits the person in that it takes account of their capabilities and limitations (HSA, n.d). Matching the requirements of a job with the capabilities of the worker is the approach to be adopted in order to reduce the risks of musculoskeletal injuries resulting from handling materials manually.

2.4 Workplace Ergonomics

According to ANSI, ergonomics is “a multidisciplinary activity dealing with the interactions between man and his total working environment, plus such traditional and environmental aspects as atmosphere, heat, light, and sun, as well as tools and equipment of the workplace”. Simply put, ergonomics is the science of fitting the job to the worker. When the combination of the job and worker mesh well and work in harmony, productivity, employee satisfaction, and a reduction in injuries is usually the outcome.

At the workplace, ergonomics is applied to the design of the workspace and tasks and to work organization. It is often referred to as occupational ergonomics within the Occupational Health and Safety (OHS) perspective. As such, it aims to promote health, efficiency and wellbeing in employees by designing the workplace for safe, satisfying and productive work (Bell & Weigall, 2009). As stated in Student Manual: Ergonomics

Essential, Bell and Wigall (2009, p.7) posit that positive performance factors such as worker comfort, well-being, efficiency and productivity are all considered in determining how to achieve an acceptable result in planning the ergonomics of a workplace. It states that in this respect ergonomics is different from many other areas of OHS hazard management, where the primary aim is to reduce risks of injury or disease. Good ergonomics in the workplace should therefore aim at improving productivity and morale and decrease injuries, sick leave, staff turnover and absenteeism.

According to Bell and Wigall (2009), when analyzing work and how it can be improved from an ergonomics point of view there are five elements that need to be addressed:

- i. **The worker:** The worker is the human element of the workplace. Employees have a range of characteristics that need to be considered including physical and cognitive capacities; experience and skills; education and training; age; sex; personality; health; residual disabilities. In analyzing work from ergonomic perspective an individual's personal needs and aspirations must also be considered.
- ii. **Job/task design:** This refers to what the employee is required to do and what they actually do. It includes job content; work demands; restrictions and time requirements such as deadlines; individual's control over workload including decision latitude, working with other employees; and responsibilities of the job.
- iii. **Work environment:** This includes the buildings, work areas and spaces; lighting, noise, the thermal environment.
- iv. **Equipment design:** This comprises the hardware of the workplace. It is part of ergonomics that most people recognize and includes electronic and mobile equipment, protective clothing, furniture and tools.

- v. **Work organization:** This refers to patterns of work; peaks and troughs in workload, shiftwork; consultation; inefficiencies or organizational difficulties; rest and work breaks; teamwork; how the work is organized and why; the workplace culture; as well as the broader economic and social influences.

In another development, HAS (n.d.) states that the goal for the design of workplaces is to design for as many people as possible and to have an understanding of the ergonomic principles of posture and movement which play a central role in the provision of a safe, healthy and comfortable work environment. It asserts that posture and movement at work will be dictated by the task and the workplace, the body's muscles, ligaments and joints which are involved in adopting posture, carrying out a movement and applying a force. The muscles provide the force necessary to adopt a posture or make a movement. According to HAS (n.d), poor posture and movement can contribute to local mechanical stress on the muscles, ligaments and joints, resulting in complaints of the neck, back, shoulder, wrist and other parts of the musculoskeletal system.

HAS (n.d.) in its manual entitled "Ergonomics in the workplace" outlines the following ergonomic principles that provide possibilities for optimizing tasks in the workplace:

- Joints must be in a neutral position
- Keep work close to the body
- Avoid bending forward
- Avoid twisting the trunk because it strains the back
- Alternate posture as well as movements
- Avoid excessive reaches avoid having to bend over or twist the trunk
- Avoid carrying out tasks above shoulder level

- Limit the weight of a load that is lifted
- Use mechanical aids to help lift and move loads
- Avoid carrying loads with one hand
- Use transport accessories such as roller conveyors, conveyor belts, trolleys and mobile raising platforms, which eliminate or reduce manual handling

From the foregoing, it can be deduced that the theory behind workplace ergonomics is that the fewer steps and moves your employees need to complete a task, the better. Therefore, an ergonomically designed restaurant/commercial kitchen is the one where employees can stand in one spot and do all of their work with minimal bending, reaching, walking or turning. Ergonomics can also reduce the amount of injuries, discomfort and fatigue in the kitchen.

2.5 Kitchen Ergonomics

The kitchen is integral to any restaurant's success. A customer sits in the exquisitely furnished seating area of a restaurant where he or she enjoys delectable dishes that satisfy their cravings. Yet the real hard work is behind the scenes where food is stored, prepared and cooked before being served to a hungry diner (www.culinarydepotinc.com). Ergonomics has an important role in the kitchen because of the high incidence of work-related injuries. This means that the workspace of worker in the kitchen should be changeable depending on their measures, height and weight among other things.

According to Croasmun (2004), a recent survey of professional kitchen staff in the United Kingdom found that 75% reported pain in the past year, over half sought medical treatment, and nearly as many noted that they had pain within the past week.

Croasmun asserts that the problem lay in fixed-height countertops and a “one-size-fits-all” approach which does not accommodate the multiple types of users.

Bellis (2004) suggests that when looking for hazards in the kitchen environment, ergonomic risks are pretty much the same as in any other environment. She advises that specifically the following practices in the kitchen should be avoided in an effort to ensuring ergonomic standards in the kitchen:

- Awkward postures
- Repetition
- High force
- Mechanical compression
- Extended duration of task
- Vibration
- Temperature extremes (especially cold)


The layout of the kitchen should prove its worth in the day-to-day activities of workers in the kitchen. Good workflow, proper storage and comfort of motion for those working in the kitchen should be key aspects of the design. Also, employees working in improper ergonomic kitchens are prone to musculoskeletal disorders and cumulative trauma disorders as a result of elbow tendonitis, a pinched neck nerve, a torn rotator cuff, which are serious threat to their health.

2.6 Factors to Consider When Planning a Kitchen Layout

According to Stanton et al (2005), when designing an overall system, process or workplace, the design team need to decide on the best way to allocate system functions, jobs and tasks to human or automated components. To do this effectively, the design team needs to understand the capabilities of humans and machines and

allocate components effectively. This process of allocating systems is known as sociotechnical allocations (Clegg *et al.*), function allocation (Hollnagel), or allocation of system function (Chapanis) as (cited in Stanton *et al.* 2005).

A workspace that is designed with the safety and comfort of the employee in mind can positively influence productivity, efficiency, and reduce injuries (Stanton *et al.* 2005). The amount of workspace necessary for individual workers can vary based on the task performed. Stanton *et al.* (2005) assert that the factors such as the number of people working in the space, the amount and type of equipment, equipment door clearance, the number and types of meals prepared and served, necessary storage space (and its proximity to the work space), etc. should be considered when determining work space.



The UC Ergonomics Project Team (2012) reports that there is the need to plan for various serving styles and recognize future renovations, additions, and expansions of the facility when designing a kitchen. According to the Team's report, the flow of materials and personnel among the various storage, preparation, cooking, serving, and cleaning functions must be carefully studied to provide maximum flow and efficiency. Also, travel distances should be kept short and there should be minimal crossover of circulation paths. Again, open sight lines should be maintained as much as possible. The movement of food through the facility should follow a logical sequence beginning with receiving and ending with waste disposal. Flow considerations such as the movement of employees from one area of the facility to another, flow of dishes, pans, and utensils through the dishwashing area and back to the service area, flow of customers from the entrance through the service area, to the dish drop-off area, flow of raw foods through the main traffic aisles of the kitchen to the prep area, and flow of

materials from the loading dock to storage areas must be taken note of when planning the layout of a kitchen (UC Ergonomics Project Team, 2012).

The Gas Foodservice Equipment Network (GFEN), (2012) asserts that when planning the layout for a commercial kitchen, there are several factors that need to be considered such as:

- **Available Space:** Available space is an important consideration regardless of whether you are building from the ground up or placing your commercial kitchen in an existing building. Either way, you want to make the most of your available space without sacrificing work flow or speed. A general rule-of thumb is to allow five square feet of kitchen space for every seat in your restaurant so a 60-seat restaurant will need a minimum 300 square foot kitchen.
- **Employee Mobility:** A well-arranged commercial kitchen will allow employees to easily move around without bumping into one another. This is vital to maintaining a smooth-running kitchen, especially during rush periods.
- **Health Codes:** Local health codes have certain stipulations when it comes to commercial kitchen layout and design. For example, most health departments require a floor drain within six feet of a commercial ice machine.
- **Ergonomic consideration:** The theory behind ergonomics is that the fewer steps and moves your employees need to complete a task, the better. An ergonomically designed commercial kitchen is one where employees can stand in one spot and do all of their work with minimal bending, reaching, walking or turning. Ergonomics can also reduce the amount of injuries, discomfort and fatigue in the kitchen.
- **Energy efficiency:** Efficiency should be a primary consideration for any commercial kitchen layout, because it saves money on utility costs. In an energy

efficient setup, refrigeration and cooking equipment are kept as far apart as possible while still being practical. In addition, cooking equipment should be strategically placed to maximize the efficiency of the ventilation hood.

- **Flexibility.** Regardless of the final layout, flexibility of design is important for any commercial kitchen. A change of chefs or management or food trends could completely change the menu, which can affect equipment usage and placement. Remember to include quick disconnects for your gas cooking equipment to make mobility and cleaning a quick and trouble-free task.

To improve equipment arrangement in the kitchen, GFEN (2012) contends that there is no definite rule on how to arrange your commercial kitchen equipment. It all depends on the available space and your particular needs. It states that the size of ones menu will be a major influence on how cooking equipment is arranged. However, GFEN (2012) opines that basically there are four different arrangements that are common to many kitchens as stated below:

- **Ergonomic Configuration:** In a purely ergonomic configuration, the kitchen equipment is arranged according to what is most comfortable and efficient for the chef and kitchen staff. For example, an ergonomically arranged kitchen might have an under counter freezer located directly beside the commercial deep fryer. Although this is not energy-efficient, it allows frozen product to be moved directly from the freezer to the fryer, without even taking a step.
- **Assembly-Line Configuration:** This design is ideal for a restaurant that mostly produces large quantities of the same foods, like pizzas or sandwiches. In an assembly-line configuration, the kitchen is laid out according to the order of use and the pieces of equipment are generally in a line, sometimes linked together battery-style. For example, a pizza shop might start with the refrigerator, move

to the dough shaping area, then to the pizza prep table, then to the gas deck oven, and finally to the warming and holding station or into a pizza box.

- **Zone-Style Configuration:** In a zone-style layout, the kitchen is divided into different zones or blocks. Generally, there is a block for food preparation, a block for cooking, a block for refrigeration and ice machines, a block for sanitation and ware washing, and a block for the kitchen-to-server transition. There may even be multiple blocks. For example, a large kitchen may need two food preparation blocks: one near the refrigeration zone and one near the cooking equipment zone.
- **Island-Style Configuration:** Island-style kitchens are popular designs for today's restaurants and foodservice facilities. It is similar to the zone-style configuration but there is one main block in the middle. Typically, kitchens with an island-style configuration place the cooking equipment in the middle with the food prep, storage and kitchen-to-server transition areas on the outer walls. The reverse is also common, with prep equipment in the center and cooking equipment on the outer walls.

The UC Ergonomics Project Team (2012) states that kitchen equipment such as ranges, refrigerators, carts, racks, etc. and service components should be modular to allow for changing conditions such as different methods of services, new menu items, or a new preparation method. Using quick-connect utility lines is another example of flexible, modular design.

The factors to be considered when planning a kitchen layout may not necessarily be universal as it has been already admitted by Stanton *et al.* (2005); GFEN (2012). Stanton *et al.* (2005) assert that the factors such as the number of people working in the

space, the type of equipment, the type of meals need to be considered when planning work space whilst GFEN (2012) stated that “when planning the layout for a commercial kitchen, there are several factors that need to be considered” and “there is no definite rule on how to arrange ones commercial kitchen equipment”. Berberoglu (n.d) asserts that ideally, kitchens should be planned according to the menu envisaged. This he said will allow proper equipment selection, spacing, determination of capacity and purchase accordingly. Berberoglu further posits that today’s high rents and construction costs dictate wise use of every square inch of space hence restaurateurs should be knowledgeable about both cooking and space allocation. Therefore it is only appropriate that one considers many factors from ergonomics, humanistic (safety and health) and financial perspectives when planning the layout of his/her kitchen.

2.7 Activities in the Kitchen

According to the UC Ergonomics Project Team (2012), the activities that take place in a kitchen includes food preparation (scooping, stirring, chopping, cutting, peeling, making sushi, bakery, making pizza, etc.), manual material handling (transporting mixing bowls, pans/pots, liquid containers for dispensing stations, small kitchen equipment, trays of food, large containers of food, and changing fryer oil), stocking storeroom and retrieving items from storeroom, transporting food to the dining room, and dishwashing (washing dishes, pots, pans).

Among all the activities outlined above by UC Ergonomics Project Team (2012), it can be deduced that they all involve manual handling of the use of some part of the human body in one way or the other. Manual handling has been defined by ISO 11228-1 (2003) as “any activity requiring the use of force exerted by a person to lift, lower, push, pull, carry, or otherwise move, hold or restrain an object”. Manual handling also describes repetitive actions with or without force, sustained work postures, exposure to

whole-body or hand-arm vibration, bending, twisting and reaching. Manual handling occurs intermittently in most tasks in the kitchen.

Manual handling in the kitchen involves a lot of repetitive work thus repeated muscle activity involving the use of the same muscles in a range of apparently different movements or using different muscles in repeated movements that look similar. Repetitive work processes are often described as monotonous and boring, with individuals performing this type of work often experiencing dissatisfaction. However, different individuals will experience different responses to repetitive work. A few will enjoy the routine nature of repetitive work and find this type of work relaxing, straightforward and free from responsibility.

2.8 Ergonomic Problems in the Kitchen

According to Health and Safety Executive (HSE), (2013) the following examples highlight some ‘typical’ ergonomic problems found in the workplace (kitchen):

a) Design of tasks

- Work demands are too high or too low.
- The employee has little say in how they organize their work.
- Badly designed machinery guards (awkward to use or requiring additional effort) slow down the work.
- Conflicting demands, e.g. high productivity and quality.

b) Manual handling

- The load is too heavy and/or bulky, placing unreasonable demands on the person.
- The load has to be lifted from the floor and/or above the shoulders.
- The job involves frequent repetitive lifting.

- The job requires awkward postures, such as bending or twisting.
- The load cannot be gripped properly.
- The job is performed on uneven, wet, or sloping floor surfaces.

c) Workstation layout

- Items that are used frequently are out of convenient reach.
- Inadequate space under work surface for legs.
- Work surface height inappropriate for the tasks causing awkward and uncomfortable postures.
- Lighting inadequate causing eyestrain when inspecting detail on work items.
- Chair not properly adjusted to fit the person and workstation.

d) Managing the working day

- Not enough recovery time between shifts.
- Poor scheduling of shifts.
- Juggling shifts with domestic responsibilities.
- Employees working excessive overtime.

HSE (2013) reports that problems associated with design of task can lead to employees failing to follow procedures or removing guards, causing accidents, injury and ill health. This is because the job is performed under time pressures and does not include enough rest breaks.

Also manual handling of tasks and objects in the kitchen may lead to physical injuries, such as low back pain or injury to the arms, hands, or fingers. They may also contribute to the risk of slips, trips, and falls. HSE found that these problems may lead to tiredness or exhaustion, which can increase the likelihood of accidents and ill health.

2.9 Improving Health and Safety in the Kitchen through Ergonomics

HSE (2013) found that applying ergonomics to the workplace could lead to the following health and safety benefits:

- reduce the potential for accidents;
- reduce the potential for injury and ill health - Ergonomics can also reduce the potential for ill health at work, such as aches, pains and damage to the wrists, shoulders and back, noise induced hearing loss and work related asthma;
- improve performance and productivity;
- the location of switches and buttons – switches that could be accidentally knocked on or off might start the wrong sequence of events that could lead to an accident;
- expectations of signals and controls – most people interpret green to indicate a safe condition. If a green light is used to indicate a ‘warning or dangerous state’ it may be ignored or overlooked;
- information overload – if a worker is given too much information they may become confused, make mistakes, or panic. In hazardous industries, incorrect decisions or mistaken actions have had catastrophic results.

According to HSE (2013), making sure protective measures such as extraction hoods or respirators are easy and comfortable to use means they are more likely to be effective at reducing exposure to hazardous substances. It is asserted that if ergonomics principles are not adhered to in the workplace, there may be serious consequences for people and

whole organizations. HSE found that many well-known accidents might have been prevented if ergonomics and human factors had been considered in designing people's jobs and the systems they worked in.

2.10 Ergonomic Risks related to the Kitchen

Employee health and safety issues often are greater in central kitchens than in on-site kitchens (OSHA, 2001). OSHA reports that the work in central kitchens such as that of a restaurant often is much more physically demanding. There is heavy lifting, twisting and turning required of employees. There also are more repetitive motions, which may result in boredom. Some of these job characteristics may have negative health impacts on employees, especially work-related musculoskeletal disorders (WMSD). According to OSHA, examples of WMSD include back pain, wrist tendinitis, and carpal tunnel syndrome. OSHA asserts that WMSD occur when there is a mismatch between the physical capabilities of the human body and the physical requirements of the job.

There are many ergonomic risk factors that might be present in the kitchen, including force, awkward postures, contact stress, repetition, static postures, and cold temperatures. Physical work activities and conditions that might create these risk factors according to (OSHA, 2001) include:

- Exerting considerable physical effort to complete a motion.
- Doing the same motion over and over.
- Performing motions constantly without short pauses or breaks.
- Performing tasks that involve long reaches.
- Working on surfaces that are too high or too low.
- Maintaining the same position or posture while performing tasks.
- Sitting for a long period of time.

- Using hand and power tools.
- Working at stations where edges or objects press hard into muscles or tendons.
- Moving objects that are heavy.
- Reaching long distances horizontally.
- Reaching below knees or above shoulders.
- Moving objects a significant distance.
- Bending or twisting during manual handling.
- Standing on floor surfaces that are uneven, slippery, or sloped.

According to the Bureau of Labor Statistics (2002), musculoskeletal injuries are among the most prevalent and costly of all lost time injuries in almost every industry. These injuries have been known to cause a great deal of pain and suffering among affected workers that often lead to lost production and poor quality work. Across the developed world, work related musculoskeletal disorders account for approximately 30-40% of workers compensation claims (European Agency for Safety and Health at Work, 2000)

Buckle and Devereux (2002) consider back disorders resulting from bad sitting spaces as the most common causes of workers' compensation claims, sick leave and early retirement in the developed world. They argued that back disorders are usually painful and no truly effective medical or surgical treatment exists for a large number of cases. These they said are believed to arise from damage to the spine and surrounding structures brought about by an accumulation of strains placed on the back over time. Therefore, kitchen staff who uses improper sitting spaces are prone to such risk of back disorders.

Frost, Bonde, Mikkelsen, Andersen, Fallentin, Kaergaard, and Thomsen (2002) conducted a study quantifying ergonomic exposures associated with the occurrence of shoulder disorders. In the beginning of the experiment, researchers hypothesized that repetitive work might contribute to the onset of tendonitis in the shoulder. The findings of the study indicated that shoulder tendonitis was two to three times higher among workers who performed repetitive tasks. It also found that a combination of repetition, force, and lack of adequate rest between tasks was associated with the onset of tendonitis (Frost, et al., 2002). Thus, repetition has been found to be a significant risk factor in the development of shoulder tendonitis.

2.11 Importance of Proper Kitchen Ergonomics

The overall aim of ergonomics is to promote efficiency and productivity and ensure that the capacities of the human in the system are not exceeded (Stanton et al, 2005). According to Dul and Weerdmeester (1998), ergonomics have a great social significance. It is stated that many of work-related accidents are caused by an “inadequate relationship between operators and their task”. Many of the accidents can be also acclaimed to a human error and improper workplace layout. They claim that the two most common reasons for sick leaves from one’s workplace are lower back pains and psychological illnesses often caused by stress. Some of these can be partly caused by the poor ergonomics, such as poor design of equipment and tasks. Moreover, that well designed equipment and tasks and thus good ergonomics in one’s workplace may prevent the inconveniences occurring.

It is often stated that good ergonomics saves money and that is usually the main incentive for the employers. However, it must be noted that money is not the only reason for good ergonomics. Ergonomically designed workplace motivates the employee to work better and strengthen his/her performance. This results in higher job

satisfaction and commitment to her/his work. Ergonomic changes may be made to alleviate a mismatch and reduce the number of WMSD that occur in the workplace (OSHA, 2001).

A kitchen should be well thought-through and perfectly organized. In an intelligent kitchen, you can save a lot of time and work while cooking and doing other jobs. You can make optimum use of available storage space and keep everything in easy reach. Therefore, a well-organized kitchen is more of a pleasure and less stressful to work in. (www.intelligent-kitchens.com)

2.12 Measures to Ensure Employee Safety in the Kitchen

The design guidelines outlined by the Dining Services Project (2012) state that storage needs of restaurants should increase over time and this growth should be considered during the design phase. Having sufficient storage space allows workers to move more easily to access products. This can reduce the risk of injury by reducing awkward posture, extended reaches, and handling distances. Sufficient space for the use of material handling equipment use should also be considered.

Also height adjustable work surfaces (such as pedal assist) should be put in place to improve productivity and comfort. The installation of these in strategic locations helps to accommodate employee height differences and to make heavy tasks (i.e. Using meat slicers and cheese graters) and light work (i.e. slicing, peeling, and cleaning foods) easier to perform. It is recommended that such work surfaces should have a range of at least 28-44 inches in height. The facility design should include storage space for material handling equipment, such as Carts, Hand trucks, Skate wheel conveyors, Forklifts. The storage location should also provide easy accessibility to the equipment as well as power to charge the equipment.

The report further states that temperature and humidity levels can influence the risk of musculoskeletal injuries. For this reason, it recommends that Heating, Ventilating and Air-Conditioning (HVAC) systems in the dishwashing and pot washing areas should be designed to provide a sufficient amount of air supply and exhaust to maintain the moisture level as low as possible and the temperature within the comfort zone. It noted that considerations should also be given to areas with higher temperatures such as a bakery or rotisserie. It has also been revealed per the design guidelines that high levels of noise in a work setting can cause fatigue, accidents, and low productivity. However, the design of some techniques to such as sound-reducing materials placed onto the underside of tables and counters and the separation of areas in the food facility, especially dishwashing can help reduce noise levels. The designing of conveyors to create a sound barrier between dish drop-off points and dishwashing, the use of acoustic ceilings which are grease and moisture-resistant and the use of remote refrigerator compressors are measures which can be adopted in reducing noise levels.

2.13 Summary

From the review of literature, it was found that the primary focus of ergonomics is the design of work activity that suits the person in that it takes account of their capabilities and limitations. It was revealed that ergonomics applies information about human behaviour, abilities and limitations and other characteristics to the design of tools, machines, tasks, jobs and environments for productive, safe, comfortable and effective human use. Therefore, the goal for the design of workplaces is to design for as many people as possible and to have an understanding of the Ergonomic principles of posture and movement which play a central role in the provision of a safe, healthy and comfortable work environment. By assessing people's abilities and limitations, their jobs, equipment and working environment and the interaction between them, it is

possible to design safe, effective and productive work systems. It was asserted that matching the requirements of a job with the capabilities of the worker is the approach to be adopted in order to reduce the risks of musculoskeletal injuries resulting from handling materials manually.



CHAPTER THREE

METHODOLOGY

3.1 Introduction

This chapter describes the research methodology that was used to assess the ergonomic practices in the kitchens of selected restaurants in the Accra Metropolis in Ghana. It presents the research design, population, the sample and sampling techniques and data collection instruments. It further describes the data collection procedures and methods of analyzing data.

3.2 Research Design

From the review of related literature and the analysis of studies conducted on kitchen ergonomics of restaurants, it was revealed that the appropriate research design for this kind of study will be a descriptive survey. Descriptive survey research design is usually used to gather information about the respondents' feelings, attitude, opinion, interests, and problems (Orodho and Njeru, 2004). The reason for the choice of this research design was that it presents a picture of the specific details of a situation and collects data, test hypotheses, or answer research questions concerning the status of the subject of study. The relatively inexpensive nature of the data collection instruments especially researcher-designed questionnaires used in conducting descriptive surveys made this design cost effective to researcher. Also these instruments have the potential of providing a lot of information obtained from a large sample of individuals and are useful in describing the characteristics of a large population (Fraenkel & Wallen, 2000), that is suitable making generalizations to the rest of the population.

3.3 Study Area

The Accra Metropolitan Assembly (AMA) was established by the Local Government Act, 1993, (Act 462) and Legislative Instrument 1615 which also established the six (6) Sub-Metropolitan District Councils. The LI 1718, subsequently, increased the Sub-Metropolitan District Councils to thirteen (13). Following the creation of the Ledzokuku-Krowor Municipal Assembly (LEKMA) in 2008, the AMA operated under a new L.I. 1926 which reduced the 13 (Thirteen) Sub-Metros to Eleven (11). These are Ablekuma Central, Ablekuma North, Ablekuma South, Ashiedu Keteke, Ayawaso Central, Ayawaso West, Ayawaso East, La, Okaikoi North, Okaikoi South and Osu Klottey. The LI 2034 further reduced the number of Sub-Metros to 10 because La Sub-Metro District Council became a Municipal Assembly. AMA covers an area of 137sq km and is located on longitude 05 35' and on latitude 00 06'. The Metropolis is bounded on the East by the La Dadekotopon Municipal Assembly, on the South by the Gulf of Guinea, on the West by Ga South and Central Municipal Assemblies, and on North by the Ga West and La Nkwatanang Municipal Assembly. The 2010 population and housing census estimated the population of the AMA as approximately 1.7 million. In addition to this figure, it is estimated that on daily basis there is an influx of population of 1 million to the City for various socioeconomic activities. The AMA has almost 42% of the total population of the Greater Accra Region with a population density for 112 per kilometre squared. Migration from rural areas to the cities is a major driver of urban growth of 3.1% which is higher than the national rate. Accra's population like any other urban population is youthful with 65 78% being 18 years or older whilst. The capital of the Metropolis is Accra, which is both the regional capital of the Greater Accra Region and the national capital of the Republic of Ghana. The Metropolis hosts a number of manufacturing industries, oil companies, financial, telecommunication, tourism,

education, health institutions and other important establishments. These institutions provide employment opportunities to the residents of the City. Their presence continues to attract people from all parts of the country and beyond to transact various businesses. They also contribute massively to internally generated revenue of the Assembly in the form of business operating permit, property rate, etc. In spite of the seemingly economic boom, there exist a number of challenges: for example, high unemployment levels estimated at 10.6% and increasing urban poverty.

(Source: Accra Metropolitan Assembly, 2014)

3.4 Population

The study population comprised all restaurants in the Accra Metropolis and their kitchen staff and supervisors. Therefore, the list of all restaurants or foodservice centres operating from recognized and standard locations in the Accra Metropolis was used as the target population.

3.5 Sample and Sampling Techniques

The sample for the study was made up of 10 restaurants namely Las Palmas Food Centre, Ashanti Home Touch, Macjoy, Frankies, Odo Rise, Papaye, Mr. Biggs, On the Run, Casa Diva, and Next Door Restaurant. These restaurants were selected from the list of all the restaurants in Accra using the simple random sampling technique. Firstly, the name each registered restaurants in the metropolis was written a piece of paper, folded, poured in a container and mixed up. The researcher then picked at random without replacement 10 restaurants. This was to ensure that every registered restaurant in the Metropolis had an equal chance of been selected. After selecting the 10 restaurants, the researcher purposively selected five kitchen staff and one kitchen supervisor from each of the 10 restaurants to form the participants for the study.

Therefore, a total of 60 participants comprising 50 kitchen staff and 10 kitchen supervisors used for the purpose of data collection. The purposive sampling technique was adopted because they were deemed by the researcher to have the capacity and knowledge to provide the needed information due to their respective positions and characteristics.

3.6 Data Collection Instruments

The study was triangulated by using more than one method of data collection. The data collection instruments for this study were questionnaire, interview schedule, and observation checklist which were self-administered by the researcher to the respondents at their workplaces. Questionnaire and interview schedules are said to be very relevant in cases where the respondents are the persons on whom facts are being gathered or whose attitudes, feelings or beliefs are being explored and are used to collect data that is not directly observable from the participants in a sample about their characteristics, experiences and opinions (Grinnel, 1993).

3.6.1 Questionnaire

Koul (2002) posits that questionnaire is a device consisting of series of questions to address psychological, social and/or professional topics with the objective of obtaining data on the problem(s) under investigation. Therefore, the researcher designed one set of questionnaire to be administered to the selected kitchen staff of the various restaurants. The questionnaire was made up of structured dichotomous and close-ended questions based on the research questions. The responses to the closed ended questions were ranked on a three-point Likert scale where 1 – Disagree, 2 – Undecided and 3 – Agree. The questionnaire consisted of four sections named as Section A, B, C and D. The Section A of the questionnaire captured the demographic characteristics of the

participants. However, the remaining sections were designed based on the three pertinent research questions with the following respective headings: design and layout of kitchen, risk associated with work in the kitchen, and measures adopted to ensure employee safety in the kitchen.

3.6.2 Interview

A common constraint of using the questionnaire method for data collection is the difficulty in getting respondents to respond promptly and fairly to the questionnaire. For instance, due to the tight work schedules of kitchen staff, it is only necessary that the researcher leave the questionnaire with them so that they can answer them at a time deemed convenient to them. However, in situations like this it becomes difficult for the researcher to ensure that there will be no consultation among the respondents during the process of answering the questions. Therefore, in order to triangulate the results of the study, the researcher conducted an interview with the kitchen supervisors. The interview was meant to obtain qualitative and more detailed data to support the quantitative data from the questionnaire. The interview guide was designed based on the three research questions and comprised 40 response items.

3.6.3 Observation Checklists

It is believed that checklists can be used to identify specific ergonomics risks inherent in a task, job or work environment; or to check a product or system against a bank of set criteria. While checklists can be adapted and modified for specific situations, it is important that an understanding of the checklist and how it has previously been used is undertaken. Using a 32-item observation checklist, the researcher observed the facilities of the selected kitchens as well as the activities of kitchen staff. The data collected

through the observation though qualitative in nature was used to compare the results from both the questionnaire and the interview.

3.7 Validity and Reliability of Instruments Used

Borg and Gall (2003), defines content validity as the degree to which the sample test items represent the content that the test is designed to measure. According to Mugenda and Mugenda (2003), validity is the degree to which results obtained from the analysis of the data actually represent the phenomena under study. The validity of the instruments, that is questionnaires and interview schedules were determined by the researcher by making sure that the question asked were appropriate in collecting for the relevant information to permit better generalization of the findings. In addition, the design of the research instruments was in line with the research questions and was self-administered by the researcher.

Mugenda and Mugenda (2003), defines reliability as a measure of the degree to which a research instrument yields consistent results or data after repeated trials. Therefore, in order to ensure the reliability of the questionnaires, they were pre-tested with five kitchen staff and one officer of the stores department in of the restaurants. After the pre-testing the questionnaires the necessary corrections were made and the final questionnaires were designed. The respondents used in the pre-testing stage were not included in the actual data collection.

3.8 Data Collection Procedures

The researcher made a familiarization visit to the two restaurants one week before the survey was to commence to ensure that the respondents were made aware of the intended study before the actual research commenced. This was to seek their consent, explain the purpose of the study and the relevance of their participation. After agreeing

on the convenient date for the administration of the instruments, the researcher became certain of the respondents cooperation and time. The instruments were finally administered as scheduled.

3.8.1 Questionnaires

The researcher self-administered one set of questionnaire to 50 kitchen staff in their various restaurants within five working days. She explained the questionnaire in the Akan language to some of the respondents who had difficulties in understanding some of the questionnaire items. The participants were given two and half-hours to answer the questionnaires after which the completed questionnaire were being collected.

3.8.2 Interview

After collecting the administered questionnaires from the respondents, the researcher conducted a semi-structured interview with 10 kitchen supervisors who were the head of the kitchen in their respective restaurants. The interview schedules gave an opportunity to obtain comprehensive and self-explained information from the respondents instead of relying solely on the face value information from the questionnaires. Interviews were relevant for this study because; the respondents felt part of the study since no rigidity was displayed and they freely participated in the research. In addition, it allowed the interviewer to be responsive to individual differences and situational characteristics. The interview involved on kitchen supervisors because they were deemed to be in a better position to provide the appropriate responses since the questions were related to activities in the kitchen.

38.3 Observation Checklist

With the permission of the various kitchen supervisors, the researcher observed the activities that took place in the kitchen and the layout of the kitchens. This gave the

researcher a practical view of what actually takes place in the kitchens. During the observation, the researcher used a checklist of items and activities she was interested in and recorded her observations on a paper according to the checklist.

3.9 Data Analysis

The data collected from the research instruments were organized, coded and analyzed qualitatively and quantitatively. The advantage of organizing data during analysis is that, it reveals themes, patterns and similarities which enhance easy analysis interpretation. Qualitative data from the interview schedule and observation checklist were organized into themes according to the respective research questions on the ongoing process. Quantitative data from closed ended sections of the questionnaire were edited, coded and analyzed using the Statistical Package for Solutions and Services (SPSS) version 18. After entering the quantitative data into SPSS, the results were analyzed using descriptive statistics such as frequency and percentages. The results of the quantitative data were presented in the form of tables whilst the qualitative data were presented in prose. Every table was given a suitable heading developed from the research question it seeks to answer and the information tables were subsequently interpreted appropriately below each table.

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CHAPTER FOUR

RESULTS AND DISCUSSION

4.1 Introduction

The main objective of the study was to examine the ergonomic practices in kitchens of selected restaurants in the Accra Metropolis. The chapter comprises the presentation of background characteristics of the respondents who took part in the study. It also presents the responses received from the research instruments administered in a tabular form under suitable themes developed from the research questions. Again, it contains the analysis of the findings from the research instruments, which were made in prose with references from the tables, and discussion of the findings with reference to the relevant literature review.

4.2 Background Data of Participants

This section contains background information of the participants who were involved in the study namely kitchen supervisors and kitchen staff. The presentation of the background information of the participants was aimed at informing readers of the nature of people who participated in the study. It includes gender, age, education level, and work experience. The participants were selected from 10 restaurants in the Accra Metropolis namely Las Palmas Food Centre, Ashanti Home Touch, Macjoy, Frankies, Odo Rise, Papaye, Mr. Biggs, On the Run, Casa Diva, and Next Door Restaurant. In all, 60 workers comprising 50 kitchen staff and 10 kitchen supervisors were selected to participate in the study. However, only 40 out of the 50 questionnaire administered to the kitchen staff were usable whilst all the 10 kitchen supervisors were able to participate fully in the interview. Therefore, 50 participants were considered in the final presentation of data as presented in Table 4.1 as follows:

Table 4.1: Background Data of Participants

Characteristics	Supervisors		Kitchen Staff		Totals	
	f	%	f	%	f	%
Gender						
Male	3	30.0	8	20.0	11	22.0
Females	7	70.0	32	80.0	39	78.0
Age						
Below 30 years	2	20.0	5	12.5	7	14.0
30 – 39	5	50.0	22	55.0	27	54.0
40 – 49	3	30.0	10	25.0	13	26.0
50 - 59	0	0	3	7.5	3	6.0
Educational Level						
WASSCE/NVTI	0	0	5	12.5	5	10.0
HND/Diploma	6	60.0	32	80.0	38	76.0
Bachelor's Degree	4	40.0	3	7.5	7	14.0
Work Experience						
Below 2 years	1	10.0	5	12.5	6	12.0
2 - 4	2	20.0	7	17.5	9	18.0
5 - 7	2	20.0	14	35.0	16	32.0
8 - 10	4	40.0	10	25.0	14	28.0
More than 10 years	1	10.0	4	10.0	5	10.0

Source: Researcher's Fieldwork, 2014

Table 4.1 indicates that 39 (78.0%) of the participants were females whilst 11 (22.0%) were males. This implies that both sex were adequately represented in the study even though the females outnumbered the males. This might be as a result of the age old mentality that females belong to the kitchen. With respect to the age distribution of the participants it could be observed from Table 4.1 that more than half of the participants 27 (54.0%) were within the 30 – 39 age group whilst 13 (26.0%) belonged to the 40 – 49 age group. Looking at the age distribution it could be inferred that all the age

groups had some degree of representation however the majority of the participants were within the 30 – 39 age group. It could be inferred from Table 4.1 that all the participants had attained some level of secondary or tertiary education. As was indicated in Table 4.1, 38 (76.0%) of the participants stated that they have HND or other diploma qualifications whilst a relatively smaller number of 7 (14.0%) had attained bachelor's degree and 5 (10.0%) had acquired WASSCE/NVTI certificates. Also a relative majority of 6 (32.0%) of the participants stated that they have garnered 5 – 7 years in the kitchen work whilst another significant number of 14 (28.0%) had worked for 8 – 10 years. This implies that all participants had some level of work experience in the kitchen and therefore were in a better position to provide the appropriate responses to the questions posed to them.

4.5 Analysis of Research Questions

This section comprises the presentation of data summaries from the research instruments, analysis of the findings grouped under suitable themes developed from the research questions as follows: 1) How does the layout of the kitchens of the selected restaurants relate to an ideal layout? 2) What risks are associated with working in the kitchens of the selected restaurants? and 3) What measures are adopted by management of the restaurants in ensuring employee safety in the kitchen? The responses from the questionnaires were presented in the form of tables and were ranked on a three-point Likert scale ranging from Disagree (1) Not sure (2), Agree (3). The responses from the interview and the observation checklist were presented in an essay or prose form.

4.3.1 Layout of Kitchen

Responses from the participants and the observation checklist on the layout of kitchens in the selected restaurants in are presented in Table 4.2 and in essay form respectively as follows:

Table 4.2: Layout of Kitchen

Characteristics	1	2	3
	%	%	%
Ease of movement of products through the facility	36.0	10.0	54.0
Fitted pull-out shelves	18.0	0	82.0
Easy-to-clean floors and work surfaces	12.0	14.0	74.0
Shallow drawers	8.0	6.0	86.0
Proper ventilation and lighting system	14.0	8.0	78.0
Installed sound-absorbers and partitions to limit noise	46.0	14.0	40.0
Average or adjustable worktop heights	10.0	6.0	84.0
Short distances required for reaching within a work stations	36.0	8.0	56.0
Display of recipe on wall for easy reading when cooking	36.0	4.0	60.0
Hobs cools quickly after being turned off to reduce risk of burning oneself	10.0	4.0	86.0
Installed under cupboard lights or table lamps with switches	74.0	0	26.0
Tables or perching stool for lower work surfaces	10.0	0	90.0
Motorized work surface for easy movement	16.0	0	84.0
Oven placed at waist height	10.0	10.0	80.0
Light-check of hot dishes without opening	36.0	4.0	60.0
Trolley to help transfer items between kitchen and dining room	10.0	6.0	84.0

Characteristics	1	2	3
	%	%	%
Installed dishwasher	4.0	0	96.0
Smaller kettle that can be lifted more easily	22.0	0	78.0
Availability of hot water unit to provide hot water 'on tap'	10.0	0	90.0
Automatic shut off of electrical gadgets when left on for too long	72.0	6.0	22.0

Source: Researcher's Fieldwork, 2014

With reference to the layout of the kitchens in restaurants under review, Table 4.2 shows that the design of majority of the kitchens made it easy for the movement of objects through the facility. Thus, more than half of the participants 54.0% agreed to this issue in the questionnaire whilst 36.0% disagreed. Majority of the participants (82.0%) agreed that there are fitted pull-out shelves in their kitchens even though 18.0% disagreed with this assertion. This implies that they do not bend too low or reach out too high to pick items from shelves. Almost three-quarter (74.0%) of the participants indicated that floors and work surfaces in their kitchen were tiled to make sure they are easy to clean as indicated. However, slightly above one-tenth (12.0%) of the participants stated that their kitchen floors and work surfaces were not tiled. A large number of the participants (86.0%) indicated that the drawers in the kitchen are shallow and this makes it easy to pick items from them with ease though below one-tenth (8.0%) stated otherwise.

The ventilation and lighting system of majority of the kitchen were deemed to be up to the required standard as indicated by a high response rate of (78.0%), however, 14.0% of the participants disagreed that their kitchen had standard ventilation and lighting system. Participants were very much divided on the issue of sound absorbers and

partitions to limit the level of noise in the kitchen. Whilst 46.0% of the participants disagreed that there are no such gadgets to help in reducing the level of noise in the kitchen, 40.0% agreed that their kitchens have these gadgets. Workers in the kitchen have different heights and for that matter, the heights of worktops should be adjustable to ensure that workers are comfortable when using them. Therefore, it was found that many kitchens had average or adjustable worktop heights as indicated by 84.0% of the participants though some few (10.0%) reported otherwise.

Movement between workstations is enhanced when short distances are required to move from one workstation to another. Table 4.2 shows that more than half of the participants 56.0% agreed that the layout of their kitchen enhances the easy movement between workstations, whilst 36.0% disagree with this assertion. For convenience sake cooks display major recipes on walls for easy reading when preparing dishes as indicated by 60.0% of the participants though above one-quarter (36.0%) indicated otherwise. Majority of the participants (86.0%) indicated that hobs in their kitchens cool quickly when turned off but some few (10.0%) disagreed on this point. This implies that workers are not exposed to hot hobs which can burn their body when they touch them.

It was found that, workers were provided with tables or perching stools sit on and perform such tasks as indicated by 90.0% of the participants. In order to enhance easy movement of work surfaces, majority of the participants (84.0%) indicated that their kitchens have motorized workstations whilst 16.0% of the participants disagreed that they kitchens had these facilities. To ensure that cooks do not bend too low when using the oven, ovens in a lot of kitchens as indicated by 80.0% of the participants are placed at waist level though the situation was different in some kitchen as reported by one-tenth (10.0%) of the participants. To avoid burns when checking hot dishes a lot of kitchens have light-check gadgets used for checking dishes on fire without opening the

dishes as indicated by 60.0%. However, above one-quarter (36.0%) of the participants answered in the negative. Again, majority of the participants (84.0%) indicated that they have trolleys in their kitchens which help them to transfer items between the kitchen and the dining room, but some few kitchens lacked this equipment as revealed by 10.0% of the participants.

To avoid the practice of workers dipping their hand into hot water when washing dishes, a significant majority of the participants (96.0%) indicated that there are installed dishwashers in their kitchens which does such task. With respect to the lifting of heavy kettles containing hot water, majority of the participants (78.0%) agreed that they were provided with smaller kettles in the kitchen. However, the case was different in some kitchens as indicated by 22.0% of the participants. Majority of the kitchens have installed hot water units to provide hot water 'on tap' as shown in Table 4.2 by 45 participants representing 90.0%. Despite the many positive responses received from participants in terms of the general layout of the kitchens under study, majority of them disagreed that there are installed under cupboard lights or table lamps with switches. This is indicated by the responses received from 37 participants representing 74.0%. Also, 36 participants representing 72.0% disagreed with the availability of automatic shut off technology of electronic gadgets when left for too long.

Majority of the kitchen supervisors in the interview revealed that they do have good lighting in their kitchens and bulbs are replaced immediately it detected that they are not functioning. They admitted that there are ventilation hoods over cookers, griddles, deep fryers and dishwashers to ensure that workers are not exposed to hot vapour from these gadgets when they open them. Majority of the interviewees (participants) indicated that the kitchen floor and other work surfaces in their kitchens are neatly tiled

and always clean to avoid slippery or falls. Some of the participants confirmed their response in the questionnaire by restating that they do not have enough trolleys and some even none to carry items such as crates of drinks and other heavy items and therefore such tasks are performed manually by the kitchen staff. It was noted by the participants that work surfaces in their kitchens are adjusted according to suit different users. Also majority of the participants indicated that their kitchens are equipped with carbon dioxide extinguishers and fire blankets close to frying surfaces and deep fat fryers.

In conducting a personal observation of activities and layout of the kitchens under review, the researcher observed that a lot of the kitchens had good lightening and ventilation systems. In addition, it was observed that there were fire extinguishers installed at vantage positions. The floor and work surfaces in almost all the kitchens visited by the researcher were clean without any water being spilled on the floor. The researcher found out that the height of work surfaces was adjustable to suit different users. She also observed that workers manually handle many tasks such as lifting heavy objects in the kitchen. Workers also bend down too low and reach out too high to perform some tasks when the need arises.

4.3.2 Ergonomics Risks in the Kitchen

Responses with regard to ergonomics risk factors in the kitchens of the selected restaurants are presented in Table 4.3 as follows:

Table 4.3: Ergonomic Risk in the Kitchen

Risk Factors	1	2	3
	%	%	%
Repetition	34.0	18.0	48.0
Temperature extremes (hot temperature)	24.0	10	66.0
Exerting considerable physical effort to complete a motion	10.0	16.0	74.0
Bending down too low or reaching up too high to perform tasks	16.0	4.0	80.0
Performing motions continuously without short pauses or breaks	10.0	6.0	84.0
Performing tasks that involve long reaches	26.0	14.0	60.0
Maintaining the same posture while performing tasks	14.0	4.0	82.0
Working at stations where edges press hard into muscles or tendons	18.0	12.0	70.0
Moving heavy objects manually	8.0	0	92.0
Reaching below knees or above shoulders	24.0	14.0	62.0
Moving objects at a significant distance	38.0	4.0	56.0
Exposure to wet and slippery floor	74.0	6.0	20.0
Exposure to air contaminated with chemicals and other gaseous particles	64.0	16.0	20.0
Exposure to faulty electrical sockets	84.0	4	12.0

Source: Researcher's Fieldwork, 2014

Even though not all accidents and work-related risks in the kitchen can be attributed to ergonomic failures. However, workers in the kitchen perceive majority of such risks as ergonomic related. As shown in Table 4.3, majority of the participants (48.0%) indicated that performing repetitive motion or doing the same action over and over again pose a major threat to the human body. The temperature levels in majority of the kitchens were extremely hot as indicated by 33 participants representing 66.0%. This implies that workers were exposed to hot temperatures as a result of the heat emitted from the stoves and other electrical gadgets.

It is observed from Table 4.3 that majority of workers exert a lot of physical force to complete motions as indicated by (74.0%) of the participants. The exertion of physical force affects the muscle which may lead to musculoskeletal disorders. Most tasks performed in the kitchen require the workers to bend down too low or reach out too high as shown in the response rate of (80.0%) of the participants. Workers in the kitchen work for several hours without intermittent breaks as indicated by majority of the participants (84.0%). Though maintaining the same body posture for long hour when performing tasks may have health implications, majority of the participants (82.0%) indicated that they perform tasks involving long hours by maintaining the same body posture.

Despite the health repercussions of edges of work stations of objects pressing hard into the human muscles and tendons, the results from Table 4.3 indicate that majority of the participants (70.0%) reported that they work on such conditions. A majority of 46 participants representing 92.0% attested to manual handling of heavy objects or loads in the kitchen. From Table 4.3 it can be observed that slightly over half of the participants (56.0%) indicated that they move objects at a long distance in the kitchen. This implies that workers in the kitchen suffer from fatigue.

However, almost three-quarter (74.0%) of the participants reported that they do not work under wet and slippery floors. Therefore, they are not prone to accidents such as falls, though 10.0% indicated otherwise. Over half (64.0%) of the participants reported that their workplaces are not contaminated with chemicals and other gaseous particles though one-tenth (10.0%) indicated that the air in their kitchens is contaminated with these substances. More than three-quarter (84.0%) of the participants disagreed that they were exposed to faulty electrical sockets and cables though 12.0% reported otherwise.

The results of the interview show that the kitchen staff are exposed to ergonomic risks due to the repetition of the same motion without frequent breaks, hot temperatures, bending and twisting the spinal cord and other parts of the body. In addition, the participants admitted that they move objects at long distances and carry heavy load using physical force and therefore were exposed to fatigue and other musculoskeletal disorders. Again the kitchen supervisors reported that workers in the kitchen hardly take their regular breaks especially when there are more food orders and during peak seasons such as Christmas festivities.

From the observation conducted by the researcher, it was revealed that a lot of kitchen staff work continuously for more than four hour without taking breaks. The researcher had a feel of the hot temperatures in some of kitchens during her observation of activities. Male kitchen staff in some of the kitchens were turned into “human trucks” because they were always called upon to carry loads from one end of the kitchen to the other. There was a lot of bending and twisting of the body during the performance of certain tasks in the kitchen. The researcher observed that during this process some of the workers exhibited some signs of feeling pains in their body. An inspection of electrical sockets and cables in some of the kitchens show that they are in good shape

without any faults and the air blowing through the kitchen was not contaminated with chemicals or gaseous particles.

4.3.3 Measures to Ensure Employee Safety in the Kitchen

Responses from the participants and the observation checklist on the measures adopted by management of the restaurants to ensure the safety of employees who work in the kitchen are presented in Table 4.4 as follows:

Table 4.4: Measures to Ensure Employee Safety in the Kitchen

Safety Measures	1	2	3
	%	%	%
Management takes action to reduce noise in the workplace	18.0	6.0	76.0
Management offer hearing aids and periodic hearing tests	68.0	18.0	14.0
Availability of trucks to move heavy objects	72.0	0	28.0
There is a regular check on all electrical circuits and cables to detect any fault/defect	18.0	16.0	66.0
Adequate emergency exit routes with clearly visible signs	22.0	8.0	70.0
Kitchen doors are always unlocked and walkways are cleared during working hours	26.0	0	74.0
Availability of sufficient and accessible firefighting equipment	20.0	8.0	72.0
Management responds quickly to injured/sick employees	4.0	10.0	86.0
Management thoroughly investigate the cause of work injuries in order to prevent other people from being injured	14.0	12.0	74.0
There is regular assessment of risks to identify potential hazards and adopt measures to eliminate them	56.0	18.0	26.0

Safety Measures	1	2	3
	%	%	%
Kitchen staff are given time for stretch breaks, which helps to minimize injuries and musculoskeletal disorders	64.0	0	36.0
Management provides safety training and education to all kitchen staff	68.0	4.0	28.0

Source: Researcher's Fieldwork, 2014

When participants were asked to state their responses to measures adopted by management to ensure their safety in the kitchen, majority of the them (76.0%) indicated that management takes action to reduce noise in the kitchen whilst 34 participants representing 68.0% indicated that they disagree with the assertion that management offer hearing aids and periodic hearing tests. Thirty-six participants representing 72.0% indicated that there are no available trucks for moving heavy object in the kitchen. A relative majority of the participants (66.0%) indicated that management hires a team of electricians who regularly check all electrical circuits and cables to detect and repair faults if any.

There are adequate emergency exits for workers in the kitchen of majority of the restaurants in case of any fire outbreak or disaster as reported by 35 participants representing 70.0%. Thirty-seven participants representing 74.0% indicated that by instruction from management all doors leading to the kitchen are unlocked while passageways are always cleared to ensure that workers inside can easily escape any disaster indicated it in Table 4.4. Almost three-quarter of the participants (72.0%) reported that they have adequate and accessible firefighting equipment to remedy any fire outbreak in the kitchen. A majority of 43 participants representing 86.0% stated that they were impressed by the rate at which management respond to injured or sick

workers in the kitchen. Management of restaurants thoroughly investigates the occurrence of any injuries in the kitchen with the aim finding the cause of the injury in order to avert further injuries. This was indicated by 37 participants representing 74.0% of the total participants.

As risk preventive measure, there is the need to carry out a periodic assessment of risks in the kitchen in order to identify potential hazards and eliminate them. However, the responses in Table 4.4 as indicated by 56.0% of the participants show otherwise but 26.0% agreed that the management of their restaurants undertake regular assessment of risk in the kitchen. It is quite surprising to note that workers in some kitchens do not enjoy intermittent breaks when they are performing their various tasks as indicated by 64.0% of the participants even though over one-quarter (36.0%) of the participants indicated that they enjoy such breaks. This implies that workers in more than half of the kitchens under review are prone to fatigue and musculoskeletal disorders. It was revealed by 68.0% of the participants that management do not provide safety training for kitchen staff to acquaint them the measures that need to take to avoid injuries. However, slightly above one-quarter (28.0%) of the participants stated that they went through training involving health and safety in kitchens and other work areas.

During the interview, some kitchen supervisors indicated that management of the respective restaurants have put in measures with the aim of ensuring that workers in the kitchen were safe from any potential harm or ergonomic risks. Some few participants indicated that there is a periodic physiotherapy session for all kitchen staff to help avoid potential musculoskeletal disorders. Also, workload in the kitchen is divided among the various kitchen staff to make sure that no single worker is overburden with workload. It was revealed in the interview that newly recruited employees are taken through an orientation programme which involves how to operate some equipment and gadgets in

the kitchen. However, the participants indicated in the interview that there was no formal policy kitchen ergonomics.

The researcher observed that as part of measures to ensure the safety of workers in the kitchen there were adequate fire extinguishers and first aid box in the kitchen to take control of any emergency in the kitchen. She noted that there were at least two emergency exit points in almost all the kitchens she visited. This was to make sure that workers were not trapped in the kitchen in case of emergency such as fire outbreak.

4.6 Discussion of Findings

The major findings of the study were discussed in accordance to the respective research questions and with reference to related previous studies as reviewed in the literature. The discussion was done under the following themes developed from the research questions:

4.4.1 Layout of Kitchen

It was observed that slightly over half of the participants indicated that the layout of their kitchens enhanced easy movement of products through the facility with proper ventilation and lighting systems. Also, tasks work surfaces were adjusted to make them user friendly and basic kitchen equipment and fittings such as dishwashers, oven, shelves and drawers were arranged in such a way that workers can get access to them easily. In addition, work surfaces in some kitchens were motorized to enhance easy movement. These kitchen design partly confirms some of the ergonomic principles outlines by HAS (n.d.) in its manual entitled “Ergonomics in the Workplace”. However, the unavailable of trolleys and other gadgets for lifting heavy loads in majority of the kitchens contradicts the some ergonomic principles of HAS (n.d.) such as the use mechanical aids to help lift and move loads and avoid carrying heavy loads by manual

handling. Again, Stanton *et al.* (2005) asserts that when designing an overall system, process or workplace, the design team need to decide on the best way to allocate system functions, jobs and tasks to human or automated components.

4.4.2 Ergonomic Risks in the Kitchen

The responses from all the research instruments indicate that workers mostly perform repetitive tasks over and over again which may affect the muscles and other parts of their body. In addition, they bend and twist their muscles during these repetitive motions. These confirm an earlier finding by HAS (n.d) workers are usually exposed to ergonomic risks resulting from repetitive motions, bending and twisting body parts and reaching out too high to perform some particular tasks. It was observed that workers were exposed to hot temperatures in almost three-quarter of the kitchens considered. This affirms an earlier report by Dining Services Project (2012) when it states that temperature and humidity levels can influence the risk of musculoskeletal injuries. Bellis (2004) also made mention of awkward postures, repetition, high force, mechanical compression, and temperature extremes as some of the possible risk factors in the kitchen and findings of the study have confirm these assertions. The findings of OSHA (2001) about ergonomic risks factors in the kitchen have been confirmed by the findings of the study such as workers exerting considerable physical effort to complete a motion, doing the same motion over and over, performing motions constantly without short pauses or breaks and performing tasks that involve long reaches.

4.4.3 Measures to Ensure Employee Safety in the Kitchen

The findings of the study indicate that management of most of the restaurants respond quickly to injured/sick workers and thoroughly investigate the cause of work injuries in order to prevent other people from being injured. This confirms the assertion of Stanton *et al.* (2005) that the design team of the kitchen needs to understand the capabilities of

humans and machines and allocate components effectively because work space that is designed with the safety and comfort of the employee in mind can positively impact productivity, efficiency, and reduce injuries.



CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

The chapter presents the summary of the major findings of the study and the conclusions drawn from the findings of the study. It also comprises the necessary recommendations made by the researcher to improve upon the current situation.

5.2 Summary of Findings

The major findings of the study as shown in the analysis of findings in the immediately preceding chapter are presented under suitable headings developed from the respective research questions as follows:

5.2.1 Layout of Kitchen

With respect to the layout and design of the various kitchens under review, the following observations and revelations were made:

- i. The design of majority of the kitchens made it easy for the movement of objects through the facility
- ii. There were fitted pull-out shelves in most of the kitchens
- iii. Floors and work surfaces in most kitchens are tiled to make sure they are easy to clean
- iv. The ventilation and lighting system of majority of the kitchen were deemed to be up to the required standard
- v. The heights of worktops were adjustable to ensure that workers are comfortable when using them
- vi. Movement between work stations in most kitchens required short distances
- vii. The layout of the kitchens enhanced easy movement between workstations

- viii. For convenience sake major recipes were displayed on walls for easy reading by cooks when preparing dishes
- ix. For easy performance of lower tasks a lot of the kitchens had tables or perching stools for workers to sit on and perform such tasks
- x. Kitchens had motorized work stations to ensure their easy movement
- xi. Ovens in a lot of kitchens were placed at waist level ensure that cooks do not bend too low when using the oven
- xii. To avoid burns when checking hot dishes a lot of kitchens have light-check gadgets were provided for checking dishes on fire without opening the dishes
- xiii. Some kitchens had trolleys which help them to transfer items between the kitchen and the dining room.

5.2.2 Ergonomic Risks in the Kitchen

From the responses to the questionnaire and interview, and from the researcher's own observation in the kitchens, the following activities and practices were identified as possible risks factors, which will have adverse effect on the health and safety of kitchen staff:

- i. Workers performed repetitive motion or did the same action over and over and this posed a major threat to the human body
- ii. The temperature levels in some of the kitchens were extremely hot
- iii. Workers exerted a lot of physical force to complete motions
- iv. Most tasks performed in the kitchen required the workers to bend down to low or reach out too high
- v. Workers in the kitchen worked for several hours without intermittent breaks

- vi. Workers handle heavy loads manually without the help of any mechanical aids

5.2.3 Measures adopted to ensure Employee Safety in the Kitchen

The health and safety of workers is very necessary for the smooth operation of every business organization. Therefore, it is only right and important to ensure that workers are protected against all forms of risks and hazards in the workplace. The following are some of the measures adopted by management of some restaurant to ensure the safety of their kitchen staff:

- i. There was a regular check on all electrical circuits and cables to detect and repair faults if any
- ii. There were adequate emergency exits for workers in the kitchen in case of any fire outbreak or disaster
- iii. There were adequate and accessible firefighting equipment to remedy any fire outbreak in the kitchen
- iv. Management responded quickly to injured or sick workers in the kitchen
- v. Management of restaurants thoroughly investigated the occurrence of any injuries in the kitchen with the aim of finding the cause of the injury in order to avert further injuries.
- vi. Workers in the kitchen did not enjoy intermittent breaks when they are performing their various tasks

5.3 Conclusions

It could be inferred from the findings of the study that the layout of kitchens in restaurants in the Accra Metropolis follows the ideal layout standard of kitchens. Though not all accidents and work-related risks in the kitchen can be attributed to

ergonomic failures however, majority of work related risks in the kitchen bothered on the bad ergonomic practices of workers though the layout of the kitchen might be in accordance with the ideal standard. Therefore, it could be deduced that though the physical layout of the kitchen can help improve the ergonomic situation in the kitchen, nevertheless the behaviour and activities of the workers even expose them to more ergonomic risks than the physical layout of the kitchen.

5.4 Recommendations

Based on the findings of the study, the researcher makes the following recommendations for necessary action:

5.4.1 Constructing Blocks for various Activities

- i. Before embarking on the design of your kitchen, it is important to establish the concept and menu of your restaurant and then tailor the design of your kitchen accordingly. The type and variety of foods served will dictate the sort of culinary equipment in your kitchen and, subsequently, how you place it. Therefore, kitchens should be planned according to the menu envisaged.
- ii. Dividing your kitchen into stations is crucial in organizing your restaurant. Depending on the scale of your restaurant, you can design your kitchen layout so that there are multiple specialized stations, or just a few stations with combined features.
- iii. Generally, there should be a block for food preparation, a block for cooking, a block for refrigeration and ice machines, a block for sanitation and ware washing, and a block for the kitchen-to-server transition.

5.4.2 Stretch Breaks

- i. Kitchen staff should be given time for stretch breaks, which helps to minimize injuries and musculoskeletal disorders

5.4.3 Risk Assessment and Prevention

- i. Management of restaurants should investigate regularly what risks exist in the workplace, e.g. risks of accidents, work injuries and mental stress. In order to find the risks in the work environment, management should go on safety rounds and take up work environment issues both at workplace meetings and during individual discussions with employees
- ii. There should be regular assessment of risks to identify potential hazards and adopt measures to eliminate them
- iii. The carrying of heavy or unwieldy objects up or down stairs strains the legs, knees, feet, back and shoulders. Therefore there should be trucks to move heavy objects
- iv. Also height adjustable work surfaces (such as pedal assist) should be put in place to improve productivity and comfort
- v. Management of restaurants should provide safety training for kitchen staff to acquaint them the measures they need to take to avoid injuries
- vi. It was found that application of ergonomic principles relating personal health and safety were lacking in majority of the kitchens. Therefore, management of restaurants in the Accra Metropolis should ensure that the health and safety of their kitchen staff is paramount by applying the necessary ergonomic principles.

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seminaari.



APPENDIX A: QUESTIONNAIRE

UNIVERSITY OF EDUCATION, WINNEBA

COLLEGE OF TECHNOLOGY EDUCATION, KUMASI

QUESTIONNAIRE FOR KITCHEN STAFF

Dear Sir/Madam

I am pleased to inform you that you have been selected to take part in this survey as a respondent to this questionnaire. This questionnaire is intended to assess the ergonomic situation of the kitchen in your restaurant. The researcher is a final year postgraduate student pursuing Master of Technology in Catering and Hospitality Education in the above stated institution. In this questionnaire, the word ergonomics refers to the physical environment of the kitchen including tools and equipment and its effect on workers' health and safety. Respondents are treated anonymously and responses are used only for the purpose of academic work. Your responses are therefore greatly appreciated.

Please read the questions carefully and tick where appropriate and state where necessary:

SECTION A: BACKGROUND DATA OF PARTICIPANTS

1. What is your gender?

Male Female

2. Please select your age group

Below 30 years

30 – 39

40 – 49

60 – 59

60 and above

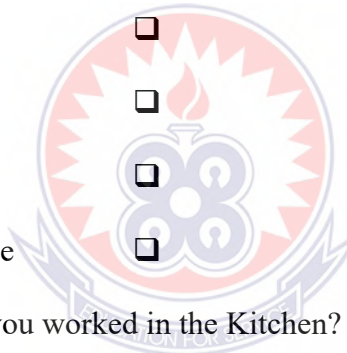
3. Please indicate your level of education

WASSCE/NVTI

HND/Diploma

Bachelor's Degree

Postgraduate Degree



4. How many years have you worked in the Kitchen?

Below 2 years

2 – 4 years

5 – 7 years

8 – 10 years

Over 10 years

SECTION B. DESIGN AND LAYOUT OF KITCHEN

5. Please indicate whether you agree or disagree with the availability of the following layout and design facilities in your kitchen on a scale of: *Disagree (1), Not sure (2) and Agree (3)*.

Layout of Kitchen

	1	2	3
Ease of movement of products through the facility			
Fitted pull-out shelves			
Easy-to-clean floors and work surfaces			
Shallow drawers			
Proper ventilation and lighting system			
Installed sound-absorbers and partitions to limit noise			
Average or adjustable worktop heights			
Short distances required for reaching within a work stations			
Display of recipe on wall for easy reading when cooking			
Hobs cools quickly after being turned off to reduce risk of burning oneself			
Installed under cupboard lights or table lamps with switches			
Tables or perching stool for lower work surfaces			
Motorized work surface for easy movement			
Oven placed at waist height			
Light-check of hot dishes without opening			
Trolley to help transfer items between kitchen and dining room			
Installed dishwasher			
Smaller kettle that can be lifted more easily			
Availability of hot water unit to provide hot water 'on tap'			
Automatic shut off of electrical gadgets when left on for too long			

SECTION C: RISKS ASSOCIATED WITH WORK IN THE KITCHEN

6. Please indicate whether you agree or disagree with the following as possible ergonomic risks associated with activities in the kitchen on a scale of: *Disagree (1), Not sure (2) and Agree (3)*.

Ergonomic Risks in the Kitchen

	1	2	3
Repetition (doing the same motion over and over)			
Temperature extremes (hot temperature)			
Exerting considerable physical effort to complete a motion			
Bending down too low or reaching up too high to perform tasks			
Performing motions continuously without short pauses or breaks			
Performing tasks that involve long reaches			
Maintaining the same position or posture while performing tasks			
Working at stations where edges or objects press hard into muscles or tendons			
Moving heavy objects manually			
Reaching below knees or above shoulders			
Moving objects at a significant distance			
Exposure to wet and slippery floor			
Exposure to air contaminated with chemicals and other gaseous particles			
Exposure to faulty electrical sockets and cables			

SECTION D: MEASURES ADOPTED TO ENSURE EMPLOYEE SAFETY

7. Please indicate whether you agree or disagree with the following as measures adopted by management in ensuring your safety at the kitchen on a scale of: *Disagree (1), Not sure (2), Agree (3)*.

Measures to Ensure Employee Safety in the Kitchen

	1	2	3
Management takes action to reduce noise in the workplace			
Management offer hearing aids and periodic hearing tests			
Availability of trucks to move heavy objects			
There is a regular check on all electrical circuits and cables to detect any fault/defect			
Adequate emergency exit routes with clearly visible signs			
Kitchen doors are always unlocked and passageways are cleared during working hours			
Availability of sufficient and accessible firefighting equipment			
Management responds quickly to injured/sick employees			
Management thoroughly investigate the cause of work injuries in order to prevent other people from being injured			
There is regular assessment of risks to identify potential hazards and adopt measures to eliminate them			
Kitchen staff are given time for stretch breaks, which helps to minimize injuries and musculoskeletal disorders			
Management provides safety training and education to all kitchen staff.			

THANK YOU

APPENDIX B: INTERVIEW GUIDE

UNIVERSITY OF EDUCATION, WINNEBA

COLLEGE OF TECHNOLOGY EDUCATION, KUMASI

INTERVIEW SCHEDULE FOR KITCHEN SUPERVISORS

Dear Sir/Madam

I am pleased to inform you that you have been selected to take part in this survey as a respondent to this interview guide. The interview is intended to assess the ergonomic situation of the kitchen in your restaurant. The researcher is a final year postgraduate student pursuing Master of Technology in Catering and Hospitality Education in the above stated institution. In this interview, the word ergonomics refers to the physical environment of the kitchen including tools and equipment and its effect on workers' health and safety. Respondents are treated anonymously and responses are used only for the purpose of academic work. Your responses are therefore greatly appreciated.

Please state 'Yes' or 'No' where appropriate and explain when necessary:

1. Do you have a formal policy on ergonomics in the kitchen?
2. Are there routines in place for investigating risks in the work environment, e.g. work safety rounds, workplace meetings or staff discussions?
3. Do you assess how serious the risks are?
4. Do you arrange a physiotherapy session for your kitchen staff?
5. Do you produce plans of action if it is not possible to carry out improvements immediately?
6. Are work activities in the kitchen divided up among kitchen staff?
7. Do you report and investigate the causes of ill health, accidents and serious incidents?

8. Do new employees have an introductory course in using, for example, kitchen machines?
9. Is there good lighting in every part of the kitchen?
10. Are there light bulbs and florescent tubes which do not work?
11. Are there ventilation hoods over cookers, griddles, deep fat fryers and dishwashers?
12. Are the floors slippery, damaged or worn?
13. Does water collect on the floor?
14. Do kitchen staff manhandle crates of drinks, beer kegs and other heavy items which may cause harmful working postures?
15. Are work heights adjusted for various uses and different users?
16. Can you open the freezer room from the inside?
17. Are power cables and electrical equipment undamaged and earthed?
18. Is it possible to load and unload goods and returned goods in an ergonomic manner?
19. Are there trolleys, hand trucks and carts for heavy raw materials and refuse?
20. Do workers need to lift things above shoulder height to do the washing up?
21. Is it difficult to handle the dirty dishes due to cramped spaces and lack of handling aids?
22. Is there enough space for proper cleaning equipment?
23. Are there safety information sheets where harmful detergents and cleaning fluids are stored?
24. Do you use personal protective clothing, e.g. goggles and rubber gloves when handling chemicals?
25. Is there an emergency eyewash station?

26. Do workers have to assume harmful or unsuitable work postures to do cleaning work?
27. Do you have instructional manuals for all kitchen equipment and tools?
28. Is it possible to start the slicer when the slice thickness is adjusted upwards from zero when the feeder tray is not in place?
29. Does the vegetable peeler stop when the lid is opened a little?
30. Are mixers/dough kneaders equipped with electrically controlled protectors?
31. Does the tilt protector work on the griddle?
32. Does the deep fat fryer have a lid and does it stand steadily in a suitable place not to close to a water tap?
33. Are there circuit breakers on machines connected to the electricity supply by plugs in wall sockets?
34. Are there carbon dioxide extinguishers and fire blankets close to frying surfaces and deep fat fryers?
35. Are there rules for how much a worker can carry when serving?
36. Do workers use trolleys to transport food and dirty dishes from place to place?
37. Do workers transport food and/or dirty dishes up and down stairs?
38. Are there windows in the swing doors leading to the dining area?
39. Do workers have time to take their scheduled breaks?
40. Is it possible for workers to take short breaks when necessary?

THANK YOU

APPENDIX C: OBSERVATIONAL CHECKLIST

The following is the list of items and activities the researcher sought to observed and take note of during the personal observation conducted by her in the kitchens:

1. Are there routines in place for investigating risks in the work environment, e.g. work safety rounds, workplace meetings or staff discussions?
2. Is there a physiotherapy session for kitchen staff?
3. Are work activities in the kitchen divided up among kitchen staff?
4. Is there good lighting in every part of the kitchen?
5. Are there light bulbs and florescent tubes which do not work?
6. Are there ventilation hoods over cookers, griddles, deep fat fryers and dishwashers?
7. Are the floors slippery, damaged or worn?
8. Does water collect on the floor?
9. Do kitchen staff manhandle crates of drinks, beer kegs and other heavy items which may cause harmful working postures?
10. Are work heights adjusted for various uses and different users?
11. Are power cables and electrical equipment undamaged and earthed?
12. Is it possible to load and unload goods and returned goods in an ergonomic manner?
13. Are there trolleys, hand trucks and carts for heavy raw materials and refuse?
14. Do workers need to lift things above shoulder height to do the washing up?
15. Is it difficult to handle the dirty dishes due to cramped spaces and lack of handling aids?
16. Is there enough space for proper cleaning equipment?

17. Are there safety information sheets where harmful detergents and cleaning fluids are
 - a. stored?
18. Do workers wear personal protective clothing, e.g. goggles and rubber gloves when handling chemicals?
19. Is there an emergency eye wash station in the kitchen?
20. Do workers have to assume harmful or unsuitable work postures to do cleaning work?
21. Are there available instructional manuals for all kitchen equipment and tools?
22. Are mixers/dough kneaders equipped with electrically controlled protectors?
23. Does the tilt protector work on the griddle?
24. Does the deep fat fryer have a lid and does it stand steadily in a suitable place not to close to a water tap?
25. Are there circuit-breakers on machines connected to the electricity supply by plugs in wall sockets?
26. Are there carbon dioxide extinguishers and fire blankets close to frying surfaces and deep fat fryers?
27. Are there required quantity of how much meals a worker can carry when serving?
28. Do workers use trolleys to transport food and dirty dishes from place to place?
29. Do workers transport food and/or dirty dishes up and down stairs?
30. Are there windows in the swing doors leading to the dining area?
31. Do workers have time to take their scheduled breaks?
32. Is it possible for workers to take short breaks when necessary?