

PATIENT SATISFACTION WITH HOSPITAL FOOD SERVICE  
AND ITS ASSOCIATION WITH THERAPEUTIC DIET PLATE  
WASTE AMONG HOSPITALIZED PATIENT IN HOSPITAL  
PAKAR UNIVERSITI SAINS MALAYSIA

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## DECLARATION

I hereby declare that this dissertation is the result of my own investigations, except where otherwise stated and duly acknowledges. I also declare that it has not been previously or concurrently submitted as a whole for any other degrees at Universiti Sains Malaysia or other institutions. I grant Universiti Sains Malaysia the right to use the dissertation for teaching, research and promotional purposes.

.....

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Date: .....

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## LIST OF ABBREVIATIONS

ACHFPSQ	Acute Care Hospital Foodservice Patient Satisfaction Questionnaire
BMI	Body Mass Index
HPUSM	Hospital Pakar Universiti Sains Malaysia
SD	Standard Deviation
n	Mean
r	Coefficient Value

**KEPUASAN PESAKIT TERHADAP PERKHIDMATAN  
MAKANAN HOSPITAL DAN KAITANNYA DENGAN  
PEMBAZIRAN PINGGAN DIET TERAPUTIK DALAM  
KALANGAN PESAKIT YANG DIRAWAT DI HOSPITAL  
PAKAR UNIVERSITI SAINS MALAYSIA.**

**ABSTRAK**

Kajian ini telah dilaksanakan di Hospital Pakar Universiti Sains Malaysia (HPUSM), Kelantan yang bertujuan untuk menentukan perkaitan antara kepuasan pesakit dengan perkhidmatan makanan hospital dan pembaziran pinggan diet terapeutik. Spesifik objektif adalah untuk menilai tahap kepuasan pesakit, mengira kuantiti pembaziran pinggan diet terapeutik dan mengkaji perkaitan antara kedua-duanya. Pada bulan April sehingga awal bulan Jun 2025, seramai 99 pesakit dewasa yang telah menerima preskripsi diet terapeutik terlibat dalam kajian ini. Kepuasan pesakit telah diukur menggunakan borang soal selidik *Acute Care Hospital Foodservice Patient Satisfaction Questionnaire (ACHFPSQ)* versi Bahasa Melayu yang telah disahkan, dan pembaziran pinggan diet terapeutik dianggarkan dengan menggunakan kaedah standard visual Comstock dan mengambil gambar fotografi digital. Sampel kajian ini kebanyakannya terdiri daripada kaum Melayu (96, 97.0%) dan 57 orang peserta dalam kalangan wanita (57.6%), dengan purata BMI (26.35, SD= 5.16) (berat badan berlebihan). Keseluruhan kepuasan pesakit adalah daripada sederhana kepada tinggi (skor purata 3.76, SD= 0.33). Penilaian tertinggi yang diberikan adalah saiz hidangan (4.43, SD=1.12), suhu makanan (4.57, SD= 0.56), dan perilaku staf (4.80, SD= 0.66). Purata sisa pinggan diet terapeutik adalah 40.77% (SD=26.7%). Kacang adalah komponen yang paling sedikit dimakan iaitu seramai 17 orang (35.4%) pesakit membuang semua kacang) manakala protein adalah komponen paling banyak dimakan (50.0% tiada sisa protein). Perkaitan Pearson menunjukkan tiada hubungan yang signifikan secara statistik antara skor kepuasan pesakit keseluruhan dan prtausan sisa makanan. ( $r \approx 0.032$ ,  $p = 0.751$ ). Kesimpulannya, walaupun kepuasan pesakit terhadap perkhidmatan makanan hospital tinggi, sisa makanan yang banyak masih berlaku dan tida berkait secara signifikan dengan tahap kepuasan.

# **PATIENT SATISFACTION WITH HOSPITAL FOOD SERVICE AND ITS ASSOCIATION WITH THERAPEUTIC DIET PLATE WASTE AMONG HOSPITALIZED PATIENT IN HOSPITAL PAKAR UNIVERSITI SAINS MALAYSIA**

## **ABSTRACT**

This cross-sectional study was conducted at Hospital Pakar Universiti Sains Malaysia (HPUSM), Kelantan, and aimed to determine the association between patient satisfaction with hospital food service and therapeutic diet plate waste. Specific objectives were to assess patient satisfaction levels, quantify therapeutic diet plate waste, and examine their relationship. Between April and early June 2025, 99 adult inpatients on prescribed therapeutic diets were enrolled. Patient satisfaction was measured using the validated Acute Care Hospital Foodservice Patient Satisfaction Questionnaire (Malay ACHFPSQ), and plate waste was estimated by the standard Comstock visual method with digital photography. The sample was predominantly Malay (96, 97.0%) and female 57 (57.6%), with mean BMI (26.35, SD= 5.16) (overweight). Overall satisfaction was moderate-to-high (mean score 3.76, SD= 0.33). Highest ratings were given to portion size (4.43, SD=1.12), meal temperature (4.57, SD= 0.56), and staff manners (4.80, SD= 0.66). Mean therapeutic diet plate waste was 40.77% (SD=26.7%). Beans were the least consumed component which only 17 patients (35.4%) of patients discarded all beans) and protein the most consumed (50.0% left no protein waste). Pearson correlation showed no statistically significant relationship between overall satisfaction scores and percentage of plate waste ( $r \approx 0.032$ ,  $p = 0.751$ ). In conclusion, despite generally high patient satisfaction with food service, substantial plate waste persisted and was not significantly associated with satisfaction levels.

# CHAPTER 1 : INTRODUCTION

## 1.1 Background of Study

Food waste is known as food that is not consumed or inedible from the human food supply chain. The latest statistic obtained from the UN Environment Programme (UNEP) reveals that the estimation of global food waste in 2022 is 1.05 billion tonnes of food from 3 major sectors which are retail, food service, and household sectors. This huge amount is derived from the 132 kg of food waste per capita per year, of which 79 kilograms per capita was wasted from households, 36 kg per capita from food service, and 17 kg per capita from retail. Food waste in hospitals is an important concern as it is one of the keys to improving the health status of patients as prepared food from the hospital is the source of obtaining nutrients and vitamins. Consequently, the increased amount of food wastage may lead to negative health complications such as the risk of malnutrition due to the reduced energy intake by the patients (BARTON et al., 2000) to meet nutritional needs. According to (Fadhel Alshqaqeeq et al., 2019), 497 hospitals and hospital institutions were involved in the study of the percentage of food plate waste globally (Europe, Middle East, North America, South America, Asia, and Canada) and the median rate for overall food waste collected was 31% weight percent of food waste from patient trays.

Patient satisfaction is critical to healthcare quality, influencing recovery, overall well-being, and the likelihood of returning to the same facility for future care. Among the various factors contributing to patient satisfaction, the quality and appropriateness of hospital food services play a significant role (Rapo et al., 2021). Hospital food not only serves to nourish patients but also impacts their psychological comfort and overall experience during hospitalization. The proposal present study explores the relationship between patient satisfaction with hospital food services and the waste generated from therapeutic diet plates among hospitalized adult patients. By investigating this association, the study seeks to identify potential areas for improvement in food service delivery, ultimately enhancing patient satisfaction and minimizing food waste. Understanding the dynamics of patient preferences, dietary restrictions, and the effectiveness of food service operations can lead to improved nutritional outcomes and a more positive hospital experience for patients.

## 1.2 Problem Statement and Study Rationale

Despite comprising a substantial component of many therapeutic diets, research on patient experiences with hospital food services and resulting plate waste has highlighted individual challenges associated with meeting these dietary needs that may compromise nutrition and experiences. A therapeutic diet plate is a structured meal plan designed to manage specific health conditions through dietary modifications. It focuses on nutrient composition, food textures, and caloric intake to support recovery or maintain health in specific patient populations (Olendzki, 2024). Furthermore, diet plate waste refers to the food that is served but not consumed by patients in healthcare settings, particularly hospitals. This matter holds considerable importance in Malaysia, as research has highlighted substantial food wastage within hospital settings. Moreover, in Malaysian hospitals plate waste is a critical concern as it not only reflects patient satisfaction but also impacts nutritional outcomes and healthcare costs. Recent studies show that hospital plate waste can range from 35% to 47.5%, with certain therapeutic diets showing even higher waste percentages, such as blended diets having a waste rate of 65% and minced diets having a waste rate of 56%. (Razalli et al., 2021).

Without a doubt, patient satisfaction with hospital food service in Malaysia is a vital component of healthcare quality, with studies indicating that around 70.3% of patients express satisfaction (Nur Zakiah, 2015). However, many patients report concerns regarding food quality, variety, and the ability to choose healthier options. The freshness and flavor of the food, the attitude of the servers, and the general eating atmosphere—which can be impacted by smells and noise—are important elements that affect customer satisfaction. About 32% of patients give their food service a good rating, according to research, while 14.7% express discontent, mostly because of the restricted menu options and repetitious meals during prolonged hospital stays (Aminuddin et al., 2018).

Nonetheless, given the strong correlation between "patient satisfaction with hospital food services" and "therapeutic diet plate waste among hospitalized adult patients," it is imperative to explore strategies to enhance the quality of hospital food services while simultaneously reducing the waste associated with therapeutic diet plates. Understanding this relationship between these factors is essential because reducing food waste may preserve the healthcare costs and be more sustainable, while increasing patient pleasure with hospital meals to ensure appropriate nutrition delivery in hospital settings. In order to efficiently meet patients'

4 dietary needs comprehensive initiatives that target both the improvement of food service quality and the decrease of therapeutic diet plate waste are urgently needed.

### **1.3 Significance of Study**

Assessing patient satisfaction with hospital foodservice and therapeutic diets has important clinical, nutritional, and operational implications. Clinically, high satisfaction often correlates with better dietary intake and adherence to prescribed therapeutic diets, which can support patient recovery and improve treatment outcomes. Nutritionally, understanding patients' preferences and sensory experiences (such as taste, temperature, and presentation) are essential for ensuring that hospital meals meet individual needs and encourage adequate consumption. Operationally, measuring satisfaction provides feedback that can guide improvements in menu quality, portion size, and service efficiency. For example, achieving a low plate-waste benchmark (often cited as below 20%) is recognized as a marker of high-quality food service (Manimaran et al., 2025). In practice, improved satisfaction can lead to less uneaten food and cost savings, benefiting both hospital resource management and patient care. From a broader perspective, reducing plate waste has significant implications for sustainability and resource efficiency. Food waste is a pressing global issue, aligned with United Nations Sustainable Development Goals (e.g. SDG 12.3 targets a 50% reduction in food waste by 2030) . In healthcare settings, hospitals can contribute up to half of total institutional waste through uneaten meals and leftovers. By identifying factors that influence satisfaction and waste (such as menu variety, portion control, and patient preferences), the present study can inform strategies to minimize food loss. The findings are expected to benefit Malaysian hospital food service management by highlighting opportunities to enhance efficiency and sustainability, for instance by refining menu planning to match patient taste and cultural preferences, thereby reducing unnecessary waste. Understanding the dimensions of patient satisfaction including food quality, portion adequacy, service timeliness, and staff interactions will help dietitians and food service managers tailor meals that patients are more likely to consume. Ultimately, this contributes to more efficient use of resources and supports environmental sustainability goals.

## **1.4 Research Question**

1. What is the rate of patients' satisfaction towards hospital food service?
2. What is the proportion of therapeutic diet plate waste among hospitalized adult patient in HPUSM?
3. What is the correlation between hospital food service satisfaction level and therapeutic diet plate waste among hospitalized adult patient in HPUSM?

## **1.5 Research Objectives**

### **1.5.1 General Objective**

To determine the correlation between patient satisfaction level of hospital food service and its association with therapeutic diet plate waste among hospitalized adult patients in Hospital Pakar USM (HPUSM).

### **1.5.2 Specific Objectives**

1. To assess patient satisfaction level on hospital foodservice
2. To examine the proportion of therapeutic diet plate waste among hospitalized adult patient in HPUSM.
3. To determine the correlation between hospital food service satisfaction level and therapeutic diet plate waste among hospitalized adult patient in HPUSM.

## **1.6 Research Hypotheses**

### **Hypothesis 1 :**

Ho: There is no correlation between hospital food service satisfaction level and therapeutic diet plate waste among adult patients.

H<sub>A</sub>: There is correlation between hospital food service satisfaction level and therapeutic diet plate waste among adult patients.

## 1.7 Conceptual Framework



**Figure 1.0 Conceptual framework of the study**

Patient satisfaction level is influenced by four different types of food service dimension which include meal service quality, food quality, staff/ service issues and physical environment from hospital. Therefore, patient satisfaction level give impact to therapeutic diet plate waste. Hence, patient satisfaction level may influence therapeutic diet plate waste as the output. Overall, this study will be conducted to observe the association between patient satisfaction level and therapeutic diet plate waste among hospitalized adult patient in HPUSM.

## **CHAPTER 2 : LITERATURE REVIEW**

### **2.1 Definition of therapeutic diet**

Therapeutic diet refers to the structured diet that has been adjusted through nutrients and other aspects of a regular diet to achieve patient's nutritional needs due to specific conditions or underlying illness (Stanfield, 2009). Therapeutic diet consists of variant types that emphasize into significant diseases such as diabetic diet (diabetes patients) , low sodium diet (hypertension patients), low purine diet (arthritis patients), low fat diet (hyperlipidemia, cardiovascular diseases) , low potassium diet and low phosphate diet (renal patients) (Moorthy et al.,2024). However, overall therapeutic diet includes in different categories such as modified- texture, finger foods, renal suitable, food allergy, gluten free, low FODMAP, Catering for Immune-suppressed Patients , liver diseases and others as well (BDA, 2024). Moreover, the effectiveness of therapeutic diet has capability in enhancing the nutritional status especially when highlighting on double burden malnutrition problem also malnutrition syndemic (Stanfield, 2009, WHO,2002). However, as therapeutic diet is proposed due to its nutrient rich components to support achieving adequate nutrients, it provides less intense flavour than foods with poor nutrients (Van Langeveld et al., 2018; Martin et al., 2014).

### **2.2 Definition of food waste**

Food waste is defined as food that has been eliminated from food supply chain during the phase of pre-consumer and post-consumer (Phooi et al., 2022). Food waste from pre-consumer is the waste produced during the food processing, production and distribution where the food is not reaching the customer yet to be consumed. Meanwhile, food waste from post-consumer refers to the food that have been purchased and prepared by the consumer however the food remains uneaten and discarded by the consumer. According to Food and Agriculture Organization (FAO), certain contributors of the food waste are because of inappropriate method of food storage, excessive of prepared food, large portion of food consumption, over purchase and improper planning in buying food. Several factors affecting

the food waste due to sensory features such as visual presentation of food, texture, flavour and temperature have been related to patient satisfaction.

Socially, food is wasted on the level of overproducing, consumers, and poor management of the supply chain. Some contributory factors in households include poor meal planning, misinterpretation of food expiration labels, and buying excess. Moreover, in the retail and food services, aesthetic standards regarding fresh produce and overstocking, as retailers were found to stock up supplies in order to satisfy consumer varieties, have resulted in large rates of unsold food being discarded. According to Mirabella et al. (2024), potential initiatives that could be implemented at both household and retail/food-service levels in order to reduce food wastage include food redistribution, public awareness, and circular economy approaches, including food waste valorization.

Food waste due to food service in a hospital has special challenges and consequences. In the healthcare setting, a large amount of waste results from food service because meal delivery logistics, patient dietary restrictions, and food preferences impede food consumption. Research estimates the food waste in hospitals to be around 35-47.5% of the food that is served, while that number is typically much higher for therapeutic diets (Razalli et al., 2021). These food wastes not only indicate operation inefficiencies but also suggest critical issues about satisfaction and nutritional adequacy of patients. Discarded food at the hospital may contribute to inadequate calorie and nutrient intake, which hampers recovery and health outcome improvement (Williams & Walton, 2011).

The various reasons related to high levels of food waste in hospitals include dissatisfaction with the sensory aspects of food on aspects such as taste, texture, and temperature; unsuitable portion size; and strictly designed meal schedules that do not match the patients' needs (Forde & De Graaf, 2022; Nur Zakiah, 2015). Furthermore, therapeutic diets, which are curative diets prescribed by nutritionists or doctors to manage a patient's disease process, are unappealing to taste because of the stringency in nutritional modification they must adhere to (Stanfield, 2009; Martin et al., 2014).

Food waste in the hospitals may be minimized by two methods: through the improvement of food service and by serving more meal options, which closely conform to the patients' preferences. Some strategies toward minimizing plate waste include flexible portion sizes, customization of meals to the needs of a particular individual, and enhancing the sensory attractiveness of food (Rapo et al., 2021). Also, the tracking of waste and the sharing of excess

food within the community through redistribution are other positive steps forward (Smith et al., 2024).

The consequences of food wastage in hospitals go beyond the single place of healthcare delivery. Wasted food is an economic cost to the healthcare system and an environmental detriment (Manimaran et al., 2025). More importantly, the reduction of food waste at hospitals is very important toward ensuring proper nutrition among patients, which supports their recovery and health outcomes (Rochmah, 2020). From the perspective of imperatives for sustainability, the reduction of food waste in this sector is very important for the overall development in the quality of healthcare delivery.

### **2.3 Definition of patient satisfaction with hospital food service**

In healthcare quality, patient satisfaction with hospital food service plays an important role and influenced both nutrition and recovery. It discusses the common factors of food waste in hospitals that influence patient satisfaction and plate waste, especially for patients on therapeutic diets. Several studies show that the quality of food is one of the factors greatly affecting hospital patient satisfaction. Research has demonstrated that sensory characteristics (taste, appearance, temperature) of food impact patients' food intake (Forde & De Graaf, 2022). For example, a prior study has reported that patients receiving texture-modified diets showed moderate levels of satisfaction (Razalli et al., 2021) with food service-related aspects being more satisfied than food quality. Dissatisfaction with food is additionally associated with greater plate wastage; patients are unlikely to eat meals they find not appealing.

Patient satisfaction with hospital food is influenced by multiple factors including food quality, staff service, and physical environment. Food quality aspects like taste, presentation, preparation and variety are the most influential predictors of satisfaction (Nur Zakiah, 2015). Studies show patients who stay longer in hospitals tend to be more critical of food quality and become less satisfied over time. The catering system type also impacts satisfaction - patients are generally more satisfied when food is prepared in-house in smaller hospitals versus outsourced systems (Aminuddin et al., 2018).

Patient satisfaction with hospital foods significantly impacts eating habits and contributes to a huge generation of food waste in healthcare facilities. Research has shown that

dissatisfaction with hospital food among patients often stems from various reasons: poor quality of food, inadequate variety of food, unsatisfying serving size, and unappealing sensory attributes of meals in terms of taste, temperature, and texture. These deficiencies in food service will discourage patients from consuming served food, and uneaten portions will be discarded (Yusof & Ruzalee, 2018; Aminuddin et al., 2018).

The most essential determinants of patient satisfaction and intake are the sensory characteristics of the hospital food. Usually, a tasteless, cold, or unappealing meal leads to more plate leftovers because patients would not prefer the consumption of foods that fail to meet their liking (Razalli et al., 2023). Most therapeutic diets, particularly those involving strict changes for the reason of a medical condition, present lower sensory acceptance and consequently higher dissatisfaction and plate leftovers (Shafiee & Saad, 2021). An example of this would be the texture-modified diet, which has been blamed for moderate to high rates of dissatisfaction because it tends to be very tasteless and not withstanding good swallowing consistency (Razalli et al., 2021).

These are further moderated by environmental and service-related factors that affect satisfaction and, consequently, waste. Cleanliness, timeliness of food delivery, and staff interactions all go into making up the patients' dining experience. Poor experiences of this nature, such as delay in meal service or staff attitude, dent the perceived value of the food service and lead to patients rejecting meals altogether (Zainal & Ruzalee, 2020). Similarly, menu monotony during extended lengths of stay is a frequent cause of discontent that leads patients to leave large portions of food uneaten (Aminuddin, 2020).

High plate waste resulting from dissatisfaction indicates inefficiency not only in the provisions of food services within hospitals but also has a significant impact on patient nutrition and recovery. Each meal not eaten would symbolize inadequacies in dietary intake, which may further prolong recovery periods, enhance the risk of malnutrition, and raise healthcare costs accordingly (Manimaran et al., 2023). Such studies, therefore, denote that the factors causing dissatisfaction need to be addressed by the hospitals in order for food waste to be reduced. Interventions such as enhancement of meals, incorporation of patient food preference into menu planning, and improvement of the dining environment have been promising in mitigating these issues (Jonathan et al., 2023; Mohd Ali & Mohd Noor, 2021).

## **2.4 Relationship between patient satisfaction with hospital food service and its association with therapeutic diet plate waste**

Overall, this relationship between patient satisfaction and food waste shows that quality hospital food service plays a very critical role not only in catering to the nutritional requirements of patients but also in food waste minimization. Hospitals will need to adopt patient-centered approaches that include feedback mechanisms and customizable menus to make sure that meals are appealing yet compliant with the therapeutic requirements, hence reducing waste and better patient outcomes (Manimaran et al., 2025; Williams et al., 2021).

## **CHAPTER 3: METHODOLOGY**

### **3.1 Research Design**

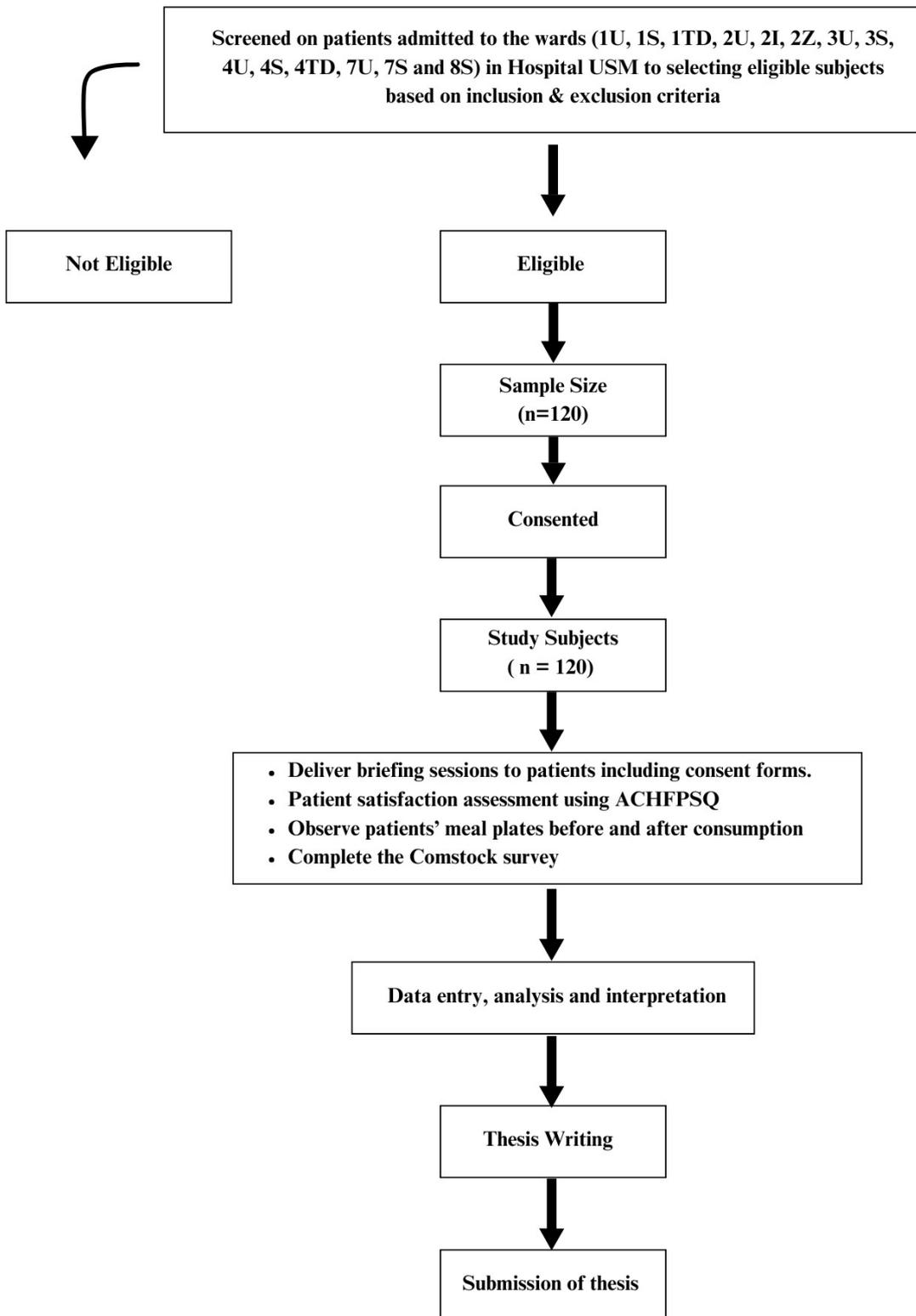
This was a cross-sectional study with the aim to identify relationship between meal acceptance of hospital diet and therapeutic diet plate waste among hospitalized patients.

### **3.2 Sampling Method**

Study subjects were selected through a purposive sampling across different wards in HPUSM. Eligible study subjects that fulfil all the inclusion criteria were chosen from the name list of diet indent patients obtained for the study and invited them to participate.

### **3.3 Study Period**

Data collection began after the ethical approval had been obtained from the Human Research Ethics Committee USM with the JEPeM Code: USM/JEPeM/KK/25010133 and the director of Hospital Pakar USM. Data collection period ranges from April 2025 until early of June 2025 on every weekday and weekend from 11.00 a.m. until 7.00 p.m..



**Figure 2.0: Flow Chart of the study**