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Nutrition Care for the Transgender Population: A Retrospective Study to investigate relationships between the Nutrition Care Process Model and Patient Outcomes

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Nutrition Care for the Transgender Population: A Retrospective Study to investigate relationships between the Nutrition Care Process Model and Patient Outcomes

By

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Doctoral Study Submitted in Partial Fulfillment of the Requirements for the Degree of Doctorate in Clinical Nutrition University of North Florida

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Abstract

One of the most important roles of the registered dietitian nutritionist is to provide medical nutrition therapy that is fitting to an individual’s culture, reality, ethnicity, and dietary preferences. A review of existing literature exposes the lack of information available on LGBTQ (lesbian, gay, bisexual, transgender, queer) health, for transgender communities. The purpose of this research was to generate knowledge of the nutrition-related problems and barriers to adequate nutrition and health, and their impact in nutrition assessment in a sample of Hispanic transgender adult patients living in San Juan, Puerto Rico. A retrospective observational study was conducted, data from 114 electronic health records was collected and evaluated. Qualitative data was analyzed to identify major and minor themes. Quantitative data was analyzed by a series of paired sample t-tests. Major themes emerged around food insecurity, body image, nutrition knowledge and food access. Barriers to food access, food programs and healthy eating were identified. Results of the study found that the most common diagnosis documented was Food and Nutrition Related Knowledge Deficit followed by Limited access to food. This study reported a significant improvement in goal and diagnosis status documented in
Nutrition Care for the Transgender Population: A Retrospective Study to investigate relationships between the Nutrition Care Process Model and Patient Outcomes

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CHAPTER ONE: REVIEW OF LITERATURE

Background and significance

Over the past decade, the LGBTQ (lesbian, gay, bisexual, transgender, queer) community has gained significant acknowledgement, and as a result in 2016, the National Institutes of Health formally designated sexual and gender minorities as a health-disparate population.\(^1\) A review of existing literature reveals the lack of information available on LGBTQ and gender non-conforming communities.\(^2\) This problem holds even greater significance for those with less recognition, such as the case for the members of the transgender community.

Transgender patients have a gender identity that differs from the sex assigned to them at birth.\(^3\) Studies have shown that transgender communities experience unique health disparities but have been the subject of limited focused health research.\(^4\) Of the research on transgender health that is available, most work focuses on sexually transmitted diseases, especially HIV/AIDS.\(^2,4(p.1)\) Emerging research has indicated distinct nutrition-related considerations for sexual minorities of the LGBTQ population.\(^3(p.1)\) The few available research studies regarding nutrition-related health disparities that affect transgender communities, have identified themes regarding eating disorders, food insecurity, and chronic diseases.\(^3(p.1)\) Despite nutrition related clinical and psychosocial considerations, nutrition care guidelines for the transgender population do not exist.\(^5\)

Transgender patients may experience changes in weight status and body composition, altered lipid levels, hypertension, and changes in bone mineral density related to hormone therapy and gender-affirming surgeries.\(^6-9\) Transgender patients have also reported elevated rates of body dissatisfaction, disordered eating, compensatory behaviors, and self-reported eating disorders compared to the cisgender population.\(^10-13\) Addressing nutrition-related problems and
health disparities among this population is critical in guiding public health and policy efforts. Ultimately, nutrition therapy may play an important role in mitigating the known effects of hormone therapy and promoting overall health of transgender and gender non-conforming populations.

Given the lack of nutrition recommendations for the transgender population, nutrition assessment of clinical considerations and psychosocial considerations is the first step towards forming a framework of gender affirming care across the Nutrition Care Process.

The purpose of this research was threefold: 1) to gain insight into transgender patients’ nutrition-related problems, 2) evaluate the impact of nutrition interventions and 3) identify opportunities to enhance and promote positive nutrition and lifestyle behaviors in transgender patients. The Nutrition Care Process Model components were used as the theoretical framework for this study. This project aims to identify the most common nutrition-related problems and barriers within a sample of transgender patients living in San Juan Puerto Rico.

Pathophysiology and etiology

The term “transgender” encompasses a range of gender identities, including binary identities like female-to-male (FTM) or transgender men and male-to-female (MTF) or transgender women, as well as non-binary identities such as gender nonconforming, genderqueer, and gender variant. In the fifth edition of the Diagnostic and Statistical Manual of Mental Disorders: DSM-5 (SM-5), the American Psychiatric Association (APA) changed the diagnosis of gender identity disorder (GID) to gender dysphoria (GD).

Gender dysphoria (GD) is a condition that is marked by psychological suffering due to incongruence between an individual’s experienced or expressed gender and their biologically assigned sex. The manifestation of GD can be observed during childhood and adolescent
development both in the prepubertal and post pubertal stages. In gender dysphoric children and adolescent, puberty initiates the development of undesirable sexual characteristics, causing acute suffering due to discordance with their biologically assigned sex.\textsuperscript{16(p.1)}

\textit{Criteria for the diagnosis of Gender dysphoria}

The DSM-5 provides specific criteria for the diagnosis of GD for children, adolescents, and adults.\textsuperscript{17} The diagnosis involves a difference between one’s experienced/expressed gender and assigned gender, as well as significant distress or problems in everyday functioning. In adolescents and adults, GD diagnosis can be made when at least two features have been present for 6 months or more (Box 1).\textsuperscript{18}

For children, cross-gender behaviors may start between the ages of 2 and 4, the same ages at which most typically developing children begin showing gendered behaviors and interests.\textsuperscript{18(p.1)} The diagnosis of GD for children involves at least six of the criteria and an associated significant distress or impairment in function, lasting at least 6 months.

Box 1. Criteria for the diagnosis of gender dysphoria in adults

- A marked incongruence between a person’s experienced/expressed gender and primary and/or secondary sex characteristics.
- A strong desire to be rid of one’s primary and/or secondary sex characteristics.
- A strong desire for the primary and/or secondary sex characteristics of the other gender.
- A strong desire to be the other gender.
- A strong desire to be treated as the other gender.
- A strong conviction that one has feelings and reactions of the other gender.
Box 2. Criteria for the diagnosis of gender dysphoria in children and adolescents

- A strong desire to be the other gender or an insistence that one is the other gender.
- A strong preference for wearing clothes typical the other gender.
- A strong preference for cross-gender roles in make-believe play or fantasy play.
- A strong preference for the toys, games or activities stereotypically used or engaged in by the other gender.
- A strong preference for playmates of the other gender.
- A strong rejection of toys, games, and activities typical of one’s assigned gender.
- A strong dislike of one’s sexual anatomy.
- A strong desire for the physical sex characteristics that match the child’s experienced gender.

Health-related issues and considerations for transgender patients

Transgender people are affected by a variety of negative health indicators.17 Many studies have17(p.2) consistently documented high prevalence of adverse health outcomes in this population, including HIV and other sexually transmitted infections, mental health distress, and substance abuse, yet many other health areas remain understudied; population-based representative samples and longitudinal studies are lacking, and routine surveillance efforts for transgender population are scarce. Despite limitations, sufficient data highlighting the unique biological, behavioral, social, and structural contextual factors surrounding health risks and resiliencies for transgender people exists.17(p.3)
Decades of both clinical experience and medical research demonstrate that medical interventions for gender dysphoria can be essential to achieving wellbeing for transgender and gender non-conforming individuals.\textsuperscript{19} To date, literature on specific health outcomes for transgender individuals consists of several modest cross-sectional, studies, a series of large retrospective studies, small series, and multiple case reports.\textsuperscript{2(p.3)} While the gaps in knowledge are vast, the numerous observations from these studies are hypothesis generating.\textsuperscript{20}

**Mortality/Morbidity**

A retrospective VA study involving 5,117 veterans with medical records linked to the National Death Index found that the top two causes of mortality among the general US population (cardiovascular and oncological) were not increased in a transgender subgroup.\textsuperscript{21} However this study did not control for gender affirming interventions such as hormones or therapy. This sole US study specifically examining mortality did suggest increased overall mortality related to suicide compared to the general population.

European studies have found increased overall mortality in transgender populations who have undergone both hormone and surgical treatment.\textsuperscript{2(p.3)} These studies reported increased mortality rates due to suicide, but also found increases related to HIV, coronary artery disease (CAD), and substance abuse in comparison to the general population, notably among transgender women.\textsuperscript{22-23} A large retrospective study in 15 different centers, both US and European, of over 2000 transgender adults treated with hormones with or without surgeries found significant co-morbidity at the start of hormone treatment. In particular $>20\%$ depression was found among both transgender men and woman, HIV in 2.6\% of transgender woman, and type 2 Diabetes Mellitus in 3.2\% of transgender woman.\textsuperscript{24}
The findings of a large, nationwide study from the Amsterdam University Medical Centre (UMC) found mortality risk among the transgender population did not decrease between 1972 and 2018. The study included the data of 4,568 adult transgender individuals - 2927 transgender women and 1641 transgender men. The mean age of the patient population at the start of hormone treatments was 30 years for transgender women and 23 years for transgender men. This observational study showed an increased mortality risk in transgender people using hormone treatment, regardless of treatment type. This increased mortality risk did not decrease over time. The cause-specific mortality risk because of lung cancer, cardiovascular disease, HIV-related disease, and suicide had no indication to a specific effect of hormone treatment, but indicated that monitoring, optimizing, and, if necessary, treating medical morbidities and lifestyle factors remain important in transgender health care.

**Mental health issues in transgender patients**

A US study of suicide related mortality suggested an increased rate compared to the general population. In addition, in a VA study, transgender veterans had a more than 20 times higher rate of suicide-related events than the general VA population. Several studies show increased rates of psychiatric events and conditions among transgender persons overall, including increased rates of suicide, suicide attempts, depression, and anxiety. A European multi-center study (ENIGI) found a 30% rate of suicide ideation or attempt. A systematic review of low-quality studies showed reduction or stabilization in rates of suicide, depression, and general mood with hormone therapy independent of surgery.
Cardiovascular disease

While larger, older retrospective studies are mixed finding elevated risk of cardiovascular morbidity or mortality, more recent data show excessive mortality and morbidity, most notably among transgender women.\(^\text{30}\) A meta-analysis of 26 studies, with a total of 4,731 transgender patients, demonstrated that the rate of myocardial infarction is low in transgender patients who are on hormonal replacement therapy.\(^\text{31}\) This finding is not surprising as the mean age of transgender patients in these studies was only between 20 and 40 years old. More recently, using data of Behavioral Risk Factor Surveillance Systema (BRFSS) from 2014 to 2016, Downing and Przedworski\(^\text{32}\) demonstrated that transgender men have higher odds of having a myocardial infarction compared to cisgender women. However, this study did not adjust for myocardial infarction risk factors.

Wierckx et al\(^\text{33}\) revealed in a small study that the rate of myocardial infarction (MI) in transgender women and transgender men was not significantly different when compared to cisgender men and cisgender women, respectively. In 2018, a nationwide US survey was distributed across 22 states; the study found that transgender women reported higher MI than cisgender women (OR 2.9; 95% CI, 1.6 to 5.3; \(p<0.001\)) but with no differences when compared to cisgender men.\(^\text{34}\)

In addition, a survey conducted by the Centers for Disease Control and Prevention, with 1.8 million participants, also observed that all transgender individuals receiving gender affirming hormone therapy (GAHT) had significantly higher rates of MI compared to their cisgender counterparts; after adjusting for CVD risk factors, transgender women had more than a two-fold increased risk in MI compared to cisgender women. Transgender women had no significant difference in MI risk compared to cisgender men.\(^\text{35}\)
A Dutch study of 2517 transgender women using estrogen followed for an average of 9 years found twice as many strokes and MIs as in cisgender women and almost twice as many strokes and no difference in MIs compared to cisgender men.\textsuperscript{36} Findings for cardiovascular health in transgender patients suggest that a multifaceted approach that integrates best practices into research, health promotion, and cardiovascular care are needed for this understudied population.

\textit{Diabetes Mellitus}

According to a study in the \textit{Journal of Clinical Endocrinology & Metabolism}\textsuperscript{37} prevalence and incidence of type 2 diabetes (T2D) risk may be higher among transgender women compared to cisgender women but is not higher in cisgender men. The cohort included 2,869 transgender women matched to 28,300 cisgender women and 28,258 cisgender men on age, race/ethnicity, calendar year, and site, and 2,133 transgender men similarly matched to 20,997 cisgender women and 20,964 cisgender men. No data exists on the prevalence or incidence of diabetes among the US transgender population overall relative to non-transgender controls. With hormone therapy, transgender women are reported to have increased insulin resistance, increased or neutral fasting glucose, and increased subcutaneous fat.\textsuperscript{38} Transgender men are reported to have a slight increase in insulin resistance, a decrease in fasting glucose, and an increase in visceral fat.\textsuperscript{39} Wierckx et al.\textsuperscript{33(p.2)} reported an increase in type 2 diabetes among both transgender women and men, but notably with most of the diagnoses occurring prior to hormone therapy.

\textit{Hypertension}

Studies show mixed reports on blood pressure impact from hormone therapy among transgender men and women\textsuperscript{30} A systematic review and meta-analysis of multiple low-quality studies did not identify significant blood pressure changes.\textsuperscript{30(p.1)} Short term (6-12 months) prospective studies show no significant change with estrogen plus spironolactone and no or small
increase in systolic blood pressure with testosterone therapy in young, healthy sample populations.\textsuperscript{6,2} However, in one cross-sectional European study, 22\% of patients who had been using feminizing hormones and 28\% of those who had been on testosterone for an average of ten years had elevated blood pressure or treated hypertension.\textsuperscript{40}

In 2021, Banks and colleagues followed 470 transgender adult patients blood pressure levels for up to 5 years. The average systolic blood pressure levels in transgender females significantly decreased within a few months of starting gender-affirming hormone treatment.\textsuperscript{41} Conversely, the systolic blood pressure levels in transgender males who were treated with testosterone increased over the same period. Although the American Heart Association issued a 2020 Scientific Statement addressing the heart disease risk, evidence on the effects specifically on blood pressure in transgender patients has been inconsistent.

\textit{Lipids}

Short term (6-12 months) prospective studies of estrogen therapy among transgender women show an increase in HDL cholesterol and triglycerides, a finding also reported in cross-sectional and retrospective cohort studies.\textsuperscript{40,44} Similar studies of testosterone therapy in transgender men report a decrease in HDL cholesterol, increase in triglycerides and either no change or increase in LDL cholesterol.\textsuperscript{6,43,45,46} Cross-sectional studies, retrospective cohort studies, and a systematic literature review all have similar findings.\textsuperscript{40,30,44,47}

The mechanism behind the observed changes in plasma lipid levels after administration of hormone therapy remains unknown, as well as whether this will affect cardiovascular risk, as several large cardiovascular outcome trials concluded that HDL-altering treatment did not affect cardiovascular outcome.\textsuperscript{48,49} HDL metabolism rather than circulating HDL concentrations
appear to determine atherogenicity.\textsuperscript{50} Studies on transgender people are again inconclusive.\textsuperscript{51,39(p.2)}

\textit{Oncological risk}

Cancer among transgender patients is listed among research priorities.\textsuperscript{52} Most of the concerns pertaining to the occurrence and outcomes of malignant tumors in this population are based on anecdotal evidence or on the general considerations of possible disease mechanisms.\textsuperscript{53} The high-quality empirical data assessing cancer incidence and mortality among transgender patients is lacking primarily because large scale prospective studies of this population have not been implemented.\textsuperscript{54}

Transgender patients tended to be diagnosed with more advanced stage lung cancer and were less likely to receive treatment for kidney and pancreas cancers than cisgender patients.\textsuperscript{55} Further, transgender patients with non-Hodgkin lymphoma, prostate cancer, and urinary bladder cancer had worse survival rates compared to cisgender patients.\textsuperscript{55(p.1224)} These disparities persisted even after adjusting for health insurance and excluding individuals who refuse treatment.\textsuperscript{55(p.1224)}

Cancer screening among transgender patients is lower than cisgender counterparts due to several barriers to care. In transgender women, the prostate is not removed as part of gender-affirming surgery because of possible complications, such as incontinence.\textsuperscript{56} Although the incidence of prostate cancer may be lower in transwoman than cismen, a growing body of research indicates that prostate cancer could be more aggressive among transwomen, which may explain an increased mortality rate among transgender patients with prostate cancer.\textsuperscript{57} Lower levels of serum testosterone may paradoxically increase the risk for aggressive prostate cancer.\textsuperscript{58}
Gender affirming hormone therapy includes the sex steroid hormones in transgender men and women and medications to lower testosterone such as spironolactone in transgender women. Gonadotropin-releasing hormone (GnRH) agonists can also be used to delay puberty in youth and lower testosterone in transgender women. Both these therapies can impact bone health, which has been a concern in transgender populations. Hormone therapy is associated with increases in bone mineral density (BMD) in transgender women. A recent meta-analysis demonstrated a statistically significant increase in BMD in transgender women at 12 and 24 months in the lumbar spine compared to baseline across nine studies.

The clinical significance of this change in BMD on fracture risk is unknown; however, estrogen has been shown to increase bone density and reduce fracture risk in postmenopausal cisgender women. No observed difference in fracture rates between trans women compared to control men has been observed. Current studies on feminizing hormone therapy and BMD are mixed, and some reports are limited methodologically by their use of a comparison group of non-transgender men rather than non-transgender women. The bone density data may depend on the specific hormone regimen. No long-term studies of fracture risk exist, especially in elderly transgender individuals.

Role of nutrition in transgender individuals

The unique nutrition needs of individuals who are transgender have been increasingly recognized by professional nutrition organizations. While current guidelines exist to inform medical and psychological care for transgender individuals, most gender studies in the field of food and nutrition emphasize sexual and reproductive differences, accounting for only the
binary conception of man and woman. However, gender is involved in the development of obesity, in determining food insecurity and in eating behaviors among others.

Food and nutrition issues are affected by gender in transgender and gender nonconforming communities. Gender studies in the field of food and nutrition are still very recent and reveal the need for further studies.

Trends in studies on gender, food, and nutrition

Studies on food and nutrition for transgender people, although few, can serve as a guide for future research on the subject. Available studies reveal three principal trends: (1) the binary division of genders between male and female in dietary and nutritional recommendations is insufficient for transgender care; (2) many studies have limited conceptions about transgender communities and (3) the stage of a gender transition can interfere with food and nutritional outcomes.

Weight and Body image

The concept of body image is something beyond just a perception of body. Numerous studies have examined body image in transgender persons and found higher dissatisfaction in this group compared to cisgender persons. Some have even considered body dissatisfaction to be the main concern of transgender persons, which could steer them towards suicide or eating disorders. Studies confirm the relationship between gender dysphoria and eating disorders, especially among transgender women. Eating disorders caused by body dissatisfaction usually manifest as a desire for weight loss in transgender women, which could be seen as a way to suppress the physical characteristics assigned with gender and better present those of the preferred gender identity.
Studies which have examined body satisfaction in different treatment stages of gender dysphoria have shown that gender confirmation treatments, such as hormone therapy and sex reassignment surgery, have been effective in increasing body image satisfaction.\textsuperscript{73,76,77} Many studies have compared body satisfaction between transgender women and transgender men and report a difference in dissatisfaction intensity and type between the two groups.\textsuperscript{10} The intensity of dissatisfaction is usually higher in transgender women.\textsuperscript{74(376)} As for dissatisfaction type, eating disorders and body dissatisfaction were more likely in transgender women.\textsuperscript{10(p.366)}

In transgender women, body concerns are mostly related to their voice and hair, while in transgender men they are related to their musculature and posture.\textsuperscript{78} Transgender women checked their bodies more often,\textsuperscript{74(p.376)} and unlike transgender men, hormone therapy was effective on their body image satisfaction.\textsuperscript{79} These differences seem to be caused by the individual’s preferred gender identity, which influences the person’s eating style and bodily preferences.\textsuperscript{75(p.1022)}

Food insecurity and food access

Food security is defined as access by all people at all times to enough food for an active, healthy life and, at minimum, includes the availability of nutritionally adequate and safe foods, and the assured ability to acquire food in a socially acceptable way.\textsuperscript{80} People who are able to meet these standards on a daily basis are considered food secure, and those who cannot are considered food insecure.\textsuperscript{80} Food insecurity disproportionately affects certain groups of people, and transgender communities are a diverse group that experience some of the highest risk for food insecurity.\textsuperscript{81}

Based on the 2015 U.S. Transgender Survey (USTS),\textsuperscript{82} Transgender and gender non-conforming patients are 4 times more likely to have incomes below $10,000/year, are 3 times
more likely to be unemployed, and 2.5 times more likely to experience homelessness in their lifetimes, compared to cisgender (gender identity is concurrent with sex assigned at birth) counterparts.82

Eating disorders

Food is often used as a strategy for seeking comfort, yet this strategy can give rise to problematic relationships to food consumption.64(p.6439) A link between body dissatisfaction and eating disorders diagnoses, such as anorexia and bulimia, has been demonstrated by several authors.64,83 Food restriction, even when not diagnosed, is more frequently used as an instrument to fit into body and gender standards.74(p.2) In general, accessing treatment for eating disorders services that do not discriminate against transgender people is too difficult,84 leading many in this community to the internet for tips and information on diet, exercise and dietary supplements.5(p.341)

The effects of gender transition have been demonstrated not only to reduce eating disorders,85 but also to increase the risk of becoming overweight and obese. as well as the increased consumption of energetic foods,86 which makes nutritional therapy necessary. Transgender adults and adolescents report higher incidences of fasting more than 24h,86 laxative usage, diet pill usage, steroid usage without prescription, dietary restraint, bingeing, purging, and general disordered eating behaviors compared to cisgender peers.87 In one study, almost 70% of the transgender adult participants reported dissatisfaction in their eating patterns, and 67.2% reported basing their self-worth on their weight status.88

Transgender and gender non-conforming youth appear to be at particular risk for disordered eating behaviors.89 For example, one study reported that transgender and gender non-conforming adolescents were more likely to be bullied for their weight or size and were less
physically active compared to cis gender youth. Other studies have presented contradictory evidence, with findings that disordered eating among transgender individuals was either less than their cisgender counterparts (transgender males reported lower levels of binging and excessive exercise compared to cisgender males, and transgender females reported less excessive exercise than cisgender females), comparable to that of their cisgender counterparts, or were rarely experienced.

**Summary**

Areas of concern are present for the transgender population that include disordered eating second to body dissatisfaction; disparate health outcomes associated with gender-based stigma, lack of access to healthcare and potential nutrition-related side effects related to gender-affirmative therapies, practices, and surgeries, including hormone therapies. Recent guidance on nutrition care for individuals who are transgender has focused on providing culturally sensitive care in a safe environment. This guidance includes the recognition and use of culturally appropriate language and counseling techniques, and the recognition that the use of gender-affirmative therapy may minimize harm within the context of health care. Research regarding transgender specific problems is needed to guide nutrition practitioners on appropriate and effective nutrition screening, assessment, and interventions.
CHAPTER TWO: THEORETICAL FRAMEWORK

Limited data is available on nutrition-related health disparities and barriers to adequate nutrition and health that are experienced by transgender patients. Consequently, the purpose of this research was to explore the common nutrition-related problems and barriers to health among transgender patients in San Juan, Puerto Rico.

Acquaviva\textsuperscript{94} draws attention to the role of health-care providers in modifying their practice to provide inclusive care to all their patients and do so in a way that is both nonjudgmental and accessible. Her strategic choice is to move away from identifying lesbian, gay, bisexual, transgender, questioning, and queer (LGBTQ) individuals as “special populations” and instead to advocate for a paradigm shift where inclusive care is provided for all people. To move away from the common process of “othering” LGBTQ individuals, Acquaviva\textsuperscript{94} provides concrete steps aligning with the life course theoretical perspective and highlighting the need to understand the social and historical contexts of patients.

Conceptual framework for transgender nursing care

In 2018, two experienced nurses studied the implementation of a conceptual framework for transgender nursing care.\textsuperscript{95} They found a way to apply The World Professional Association for Transgender Health (WPATH) published Standards of Care (7th edition) in 2012 to nursing, which focused on the medical and psychological approaches that foster the highest quality of care for this vulnerable population.\textsuperscript{96} As they explained, these standards support an understanding of surgical, hormonal, cosmetic, and psychological care; however, they did not identify nursing care and nursing related etiologies for transgenderism. Using a combination of the critical\textsuperscript{97} interactional paradigms,\textsuperscript{98} they created a model entitled ‘Care without Assumption’.
The proposed framework supported inclusive gender-neutral educational preparation, relationship building, self-assessment, process management, and a culture of ongoing research that will establish evidence-based protocols and dispel the myths associated with transition. They proposed that by using the framework, the profession could move the domains along a continuum from assumption to non-assumption.95

**Nutrition Care Process and Model**

In 2003, the Academy of Nutrition and Dietetics developed the concept of a common Nutrition Care Process and Model (NCPM) to describe the dietetics profession’s structure and framework used to provide nutrition care to clients/patients.99 The ultimate outcome of implementing the NCPM was to further improve quality care and promote outcomes management.100 Although most of the constructs included in the NCPM were not new to the profession of dietetics, the most relevant one is the introduction of the nutrition diagnosis criteria. To provide a nutrition diagnosis, dietitians independently synthesize the data gathered in the nutrition assessment into the nutrition diagnoses of nutrition problems that dietitians can treat and resolve.

The Nutrition Care Process101 is presented as a framework for critical thinking and decision-making in nutrition care. The use of the Nutrition Care Process Terminology (NCPT) becomes particularly visible in the medical records of patients. The NCPM (Figure 1) consists of four distinct, interrelated steps:102.

- **Nutrition Assessment**: systematic approach to collect, classify, and synthesize important and relevant data needed to identify nutrition-related problems and their causes. This step also includes reassessment for comparing and re-evaluating data from previous
interaction to the next and collection of new data that may lead to new or revised nutrition diagnoses based on the client’s status or situation.

It is an ongoing, dynamic process that involves initial data collection and continual reassessment and analysis of the client’s status compared to accepted standards, recommendations, and/or goals.

• **Nutrition Diagnosis**: during this step the nutrition and dietetics practitioner identifies and labels an existing nutrition problem(s) that the practitioner is responsible for treating. Nutrition diagnoses (e.g., inconsistent carbohydrate intake) are different from medical diagnoses (e.g., diabetes). During this step nutrition and dietetic practitioners use standard nutrition diagnostic terminology to label the client’s nutrition diagnosis(es) through organized nutrition assessment data that are clustered for comparison with defining characteristics listed on the reference sheets.

• **Nutrition Intervention**: the purpose of a nutrition intervention is to resolve or improve the nutrition diagnosis or nutrition problem by provision of advice, education, or delivery of the food component of a specific diet or meal plan tailored to the patient/client’s needs. The nutrition diagnosis and its etiology determine the selection of a nutrition intervention. Nutrition intervention strategies are selected to change nutritional intake, nutrition-related knowledge or behavior, environmental conditions, or access to supportive care and services. Nutrition intervention goals provide the basis for monitoring progress and measuring outcomes.
**Nutrition Monitoring/Evaluation**: The final step of the process is monitoring and evaluation, the purpose of this step is to determine and measure the amount of progress made for the nutrition intervention and whether the nutrition-related goals/expected outcomes are being met.

**Figure 1. The Nutrition Care Process Model**
Theoretical framework

Based on available data, no evidence exists of a study that has explored the application of the NCPM and its practical outcomes with this population. Nutrition therapy may play a significant role in lessening the effects of hormone therapy and supporting better nutrition health for the transgender population. Because of a lack of nutrition recommendations for transgender patients, considerations in the application of the nutrition care process are the first step towards providing nutrition care that aligns with transgender patients’ needs.

The purpose of this research was threefold: 1) to gain insight into transgender patients’ nutrition-related problems, 2) evaluate the impact of nutrition interventions and 3) identify opportunities to enhance and promote positive nutrition and lifestyle behaviors in transgender patients. The Nutrition Care Process Model components were used as the theoretical framework for this study.
CHAPTER THREE: METHODS

Statement of the problem

Transgender patients are a vulnerable community characterized by the disadvantaged distribution of social goods and services that affect health outcomes. A review of existing literature illuminates the lack of information available on LGBTQ (Lesbian, Gay, Bisexual, Transgender, Queer) health outcomes.

Although specific research on transgender and the Nutrition Care Process Model is not available, in general, transgender patients experience health disparities at significantly higher rates than the general U.S. population. Addressing nutrition-related problems among this population is important because previous studies done in LGBTQ communities have found that increased access to nutrition education can lead to increased food security, decreased homelessness, and the ability to afford health care costs.

Few studies on nutrition-related health disparities and barriers faced by transgender patients to adequate nutrition are available currently. Consequently, the aim of this research was to generate knowledge of the nutrition-related problems and barriers to adequate nutrition and health, and their impact in nutrition assessment in a sample of Hispanic transgender adult patients living in San Juan, Puerto Rico.

Purpose of the study

The purpose of this retrospective study was to document and describe the nutrition-related problems and barriers to adequate nutrition and health that transgender patients from San Juan, Puerto Rico, experience by exploring the application of the Nutrition Care Process components (assessment, diagnosis, intervention, monitoring and evaluation).
Problem statement and justification

Minimal scientific evidence exists to identify the diet and nutrition-related considerations of transgender individuals. No systematic reviews or evidence-based practice guidelines exist to guide nutrition professionals working with transgender patients. Studies are needed that focus on nutrition care for transgender patients and generate knowledge on nutrition-related problems and disparities.

Study design and participants

The study method consisted of an observational, longitudinal, and retrospective study examining the application of the NCPM in nutrition interventions for transgender patients. Participants were recruited from an outpatient clinic in San Juan, Puerto Rico. Participants in the study were any adult transgender patient (ages 18 or older) who had at least three nutrition interventions documented by a licensed dietitian between September 20, 2017, and December 31, 2019. Exclusion criteria were based on the following: (1) less than 18 years of age, (2) patients without a nutrition diagnosis identified, (3) patients with less than two nutrition interventions.

Sample size

The sample size was fixed by availability and was composed of all participants who met inclusion criteria for the study; the number was estimated to be approximately 114 participants. The study sample was a convenience sample.
**Research questions**

RQ1. What were the most common nutrition-related problems in transgender patients receiving care at an outpatient clinic in San Juan, Puerto Rico?

RQ2. What were the most common barriers to health in transgender patients receiving care at an outpatient clinic in San Juan, Puerto Rico?

RQ3. Did nutrition interventions provided by a registered dietitian nutritionist improve patients’ health outcomes?

RQ4. Which interventions were more effective?

**Aims of the study**

1. Identify the most common nutrition diagnoses documented for a transgender population sample in San Juan, Puerto Rico.

2. Identify the most common nutrition etiology categories for a transgender population sample in San Juan, Puerto Rico.

3. Determine if there is a relationship between nutrition interventions and goal status for a transgender population sample in San Juan, Puerto Rico.

4. Determine if there is a relationship between nutrition intervention and diagnosis status for a transgender population sample in San Juan, Puerto Rico.

**Research hypotheses**

1. A significant relationship between nutrition interventions and goal status will be observed.

2. A significant relationship between nutrition intervention and diagnosis status will be observed.
Institutional Review Board

Institutional Review Board (IRB) approval was obtained for this study from the UNF Office for Protection of Human Research Subjects IRB. Approval number: 1568096-1.

Data collection and variables of the study

The study used data collected from transgender participants in Centro Ararat between Fall 2017 and Fall 2019. To protect the subject’s privacy, all the data needed to complete the study objectives were collected anonymously and entered on an Excel spreadsheet on a secure computer of Centro Ararat and saved on the principal investigator (PI) password protected computer, only accessible to the PI. The researcher stratified data by gender classification.

The study procedure consisted of data collected from previous in-person interviews with the researcher. The interview included a questionnaire (given to all the participants in Centro Ararat during nutrition interventions) with questions relating to demographics, general health, nutrition related habits and open-ended questions, (Appendix B). All data was collected by the researcher, in a private office, neutral location in Centro Ararat. All interviews and questions were presented in Spanish, the primary language in Puerto Rico.

Demographics characteristics and health

The variables in this study included demographic information (age, biological sex, ethnicity), height, and weight. For the collection of gender classification, participants were asked to select among the following options: male or female. The dependent variables of the study were documented as changes in the monitoring and evaluation component and measured by the improvement or progress on the goal and diagnosis status. The independent variables were application of the NCPM components diagnosis and intervention. Table 1 describes the study variables and codification.
Anthropometric measurements

Participants were weighed in light clothes and without shoes. The instrument used to weigh the patients was a Tanita segmental body composition analyzer. The Tanita BC 418 MA Segmental Body Composition Analyzer (Tanita, Japan) is a single-frequency BIA device that uses eight polar electrodes. Height was determined using a fixed wall-scale measuring device to the nearest 0.1 cm. Weight was determined within 0.1 kg for each subject using an electronic scale calibrated before each measurement session. Body Mass Index (BMI) was calculated as weight (kg) divided by the square of the height (m)². BMI was categorized as underweight (BMI <18 kg/m²), healthy weight (BMI<25 kg/m²), overweight (BMI ≥ 25 kg/m²) and obese (BMI > 30 kg/m²). Percentage of body fat was estimated with an algorithm incorporating impedance, age, and height in the Tanita device. The classification of the athletic mode was established using the guidelines suggested by the Tanita: standard and athlete. The Tanita manual categorizes the athletic mode as follows: the person must be at least 17 years old, should be involved in intense aerobic exercises for at least 10 h a week, and the person's heart pulse rate at rest should be <60. Classification of athletic mode in this study was self-reported.

Laboratory values

All participants serum samples at four points (i.e., baseline, three-months, six-months, and 12-month follow up point) were taken in the morning between 7:00 am and 9:00 am after an overnight fast. Routine parameters, including fasting glucose (FBG), total cholesterol (TC), HDL Cholesterol, LDL Cholesterol, and Triglycerides (TGs), were measured using standard methods in a certified laboratory (Centro Ararat, San Juan, Puerto Rico).

Nutrition assessment and nutrition diagnosis
To assess nutrition knowledge and eating behavior, Centro Ararat had previously created a nutrition assessment questionnaire, typically used with all their patients. The clinic questionnaire was prepared using the 24-hour Dietary Recall (24HR) method as a model which provides comprehensive, quantitative information on individual diets by querying respondents about the type and quantity of all food and beverages consumed during the previous 24-hour period. A preliminary literature review was conducted to document the science base surrounding nutrition assessment and nutrition within the transgender population. Although limited, available information on transgender patients from Puerto Rico and material from national expert groups working with transgender patients were considered to gain insight into unpublished, but current, approaches and views in this area.

These initial steps guided the development of 3 questions that were added to the nutrition assessment questions used at the clinic. The three added questions were related to weight and nutrition: (1) Would you like to be weighed and/or measured today for a body composition assessment? Yes/No; (2) Have you had any recent changes in your weight? Yes/No; (3) If more nutrition interventions were available, would you be interested in receiving more nutrition consults? Yes/No (See Appendix B) To answer the study research questions, a total of 10 questions were used to explore dietary behaviors (frequency of consumption and use of food items). These questions provided information on general food patterns rather than specific energy and macronutrient intake. The questions were self-reported and included 4 open-ended questions and 6 questions with yes or no answers, with a ‘not applicable or do not know’ option (yes = 1; no =2; not applicable/do not know = 3).

Categorical variables were also created to compare the frequency of consumption of specific dietary behavior by combining “less than once a week” or “never” compared to “1-2 times per
week” or more. These categories were selected to represent possible nutrition diagnosis. Items relating to eating and choice of foods were dichotomized as “never/rarely” and “sometimes/usually/always”. Based on literature review, the following nutrition diagnosis were expected to be identified among the participants: (1) Limited access to food; (2) Food-and nutrition related knowledge deficit; (3) Altered nutrition related laboratory values; (4) Disordered eating pattern; (5) Excessive Alcohol intake; (6) Inappropriate diet and eating habits; and (7) Excessive Fat Intake. Table 1 presents the information collected in the study to determine the nutrition diagnosis and intervention that was used with the participants. This study only recollected information already available in the medical records.

Table 1. Study Variables collected from Nutrition Documentation on NeoMed Platform.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Type of variable</th>
<th>Description/Codification</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>Demographics</strong></td>
<td></td>
</tr>
<tr>
<td>Age, patient</td>
<td>Quantitative, Continuous</td>
<td>Number of age</td>
</tr>
<tr>
<td>Biological sex, patient</td>
<td>Categorical</td>
<td>(1 = male; 2 = female)</td>
</tr>
<tr>
<td>Body Mass Index (BMI), patient</td>
<td>Quantitative, Continuous</td>
<td>Number of body mass index</td>
</tr>
<tr>
<td>Actual Body Weight (ABW), patient</td>
<td>Quantitative, Continuous</td>
<td>Number of actual body weight</td>
</tr>
<tr>
<td>Fat Percentage (%), patient</td>
<td>Quantitative, Continuous</td>
<td>Number of fat percentage</td>
</tr>
<tr>
<td>Fasting Blood Glucose (FBS), patient</td>
<td>Quantitative, Continuous</td>
<td>Number of fasting blood glucose</td>
</tr>
<tr>
<td>Total Cholesterol (TC), patient</td>
<td>Quantitative, Continuous</td>
<td>Number of total cholesterol levels</td>
</tr>
<tr>
<td>Triglycerides (TG), patient</td>
<td>Quantitative, Continuous</td>
<td>Number of triglyceride levels</td>
</tr>
<tr>
<td>Low Density Lipoprotein (LDL), patient</td>
<td>Quantitative, Continuous</td>
<td>Number of low-density lipoprotein levels</td>
</tr>
<tr>
<td>High Density Lipoproteins (HDL)</td>
<td>Quantitative, Continuous</td>
<td>Number of high-density lipoprotein levels</td>
</tr>
<tr>
<td>--------------------------------</td>
<td>--------------------------</td>
<td>------------------------------------------</td>
</tr>
</tbody>
</table>

**Assessment questions**

<table>
<thead>
<tr>
<th>Item1: Prior nutrition intervention</th>
<th>Categorical</th>
<th>(1 = yes; 2 = no)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Item 2: Use of medications for gender affirmation treatment</td>
<td>Categorical</td>
<td>(1 = yes; 2 = no)</td>
</tr>
<tr>
<td>Item 3: Nutrition concerns</td>
<td>Quantitative, Continuous</td>
<td>Nutrition concerns reported</td>
</tr>
<tr>
<td>Item 4: Meal plan or Special Diet</td>
<td>Categorical</td>
<td>(1 = yes; 2 = no)</td>
</tr>
<tr>
<td>Item 5: Eating pattern</td>
<td>Categorical</td>
<td>(1 = yes; 2 = no)</td>
</tr>
<tr>
<td>Item 6: Beverages</td>
<td>Quantitative, Continuous</td>
<td>Type of beverages reported</td>
</tr>
<tr>
<td>Item 7: Meal environment</td>
<td>Quantitative, Continuous</td>
<td>Meal settings reported</td>
</tr>
<tr>
<td>Item 8: Body composition assessment</td>
<td>Categorical</td>
<td>(1 = yes; 2 = no)</td>
</tr>
<tr>
<td>Item 9: Recent changes in weight reported</td>
<td>Categorical</td>
<td>(1 = yes; 2 = no)</td>
</tr>
<tr>
<td>Item 10: Future nutrition interventions</td>
<td>Categorical</td>
<td>(1 = yes; 2 = no)</td>
</tr>
</tbody>
</table>

**Nutrition Care Process documentation**

<table>
<thead>
<tr>
<th>Nutrition Diagnosis</th>
<th>Categorical</th>
<th>Nutrition problem identified (free text)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nutrition Etiology</td>
<td>Categorical</td>
<td>Cause of nutrition problem identified (free text)</td>
</tr>
<tr>
<td>Nutrition Intervention</td>
<td>Categorical</td>
<td>Goal established with patient (free text)</td>
</tr>
<tr>
<td>Nutrition Goal Status</td>
<td>Categorical – goal not met, goal met, progress shown</td>
<td>(0 = not achieved; 1 = achieved, 2 = progress shown)</td>
</tr>
<tr>
<td>Nutrition Diagnosis Status</td>
<td>Categorical – resolved, unresolved, improvement shown</td>
<td>(0 = unresolved; 1 = resolved, 2 = improvement shown)</td>
</tr>
<tr>
<td>---------------------------</td>
<td>---------------------------------------------------</td>
<td>---------------------------------------------------</td>
</tr>
</tbody>
</table>

**Table 2.** Information collected to determine nutrition diagnosis and nutrition interventions in this study

<table>
<thead>
<tr>
<th>Nutrition Diagnosis</th>
<th>Assessment criteria</th>
<th>Intervention strategy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Excessive Fat Intake</td>
<td>Cholesterol levels &gt; 200 mg/dL, LDL100 mg/dL, HDL levels &lt; 40 mg/dL, Triglycerides &gt;150 mg/dL</td>
<td>Nutrition education materials with food groups and portions recommended for each group</td>
</tr>
<tr>
<td>Inadequate Energy Intake</td>
<td>Estimated energy intake from diet less than needs based on estimated or</td>
<td>Nutrition education materials with food groups and portions recommended for each group</td>
</tr>
</tbody>
</table>

*Intake (NI) Actual problems related to intake of energy, nutrients, fluids, bioactive substances through oral diet or nutrition support*
<table>
<thead>
<tr>
<th>Measure</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>measured resting metabolic</td>
<td>Restriction or omission of energy-dense foods from diet</td>
</tr>
<tr>
<td>rate</td>
<td>Food avoidance and/or lack of interest in food</td>
</tr>
<tr>
<td></td>
<td>Limited ability to independently consume foods/fluids</td>
</tr>
<tr>
<td></td>
<td>Excessive consumption of alcohol or other drugs that reduce hunger</td>
</tr>
<tr>
<td></td>
<td>Medications that affect appetite</td>
</tr>
</tbody>
</table>

| Excessive Alcohol Intake      | Intake of > 2 drinks*/day (men)                                             |
|                              | Intake of > 1 drink*/day (women)                                            |
|                              | Binge drinking                                                              |
|                              | *1 drink = 5 oz (150 mL) wine, 12 oz (350 mL) beer,                         |

| Coordination of care          | Nutrition education materials provided with Alcohol (type and estimated amounts) |
|                              | Coordination of care for Alcohol control programs                           |
Clinical (NC) *Nutritional findings/problems identified that relate to medical or physical conditions*

<table>
<thead>
<tr>
<th>Altered Nutrition related laboratory values</th>
<th>↑ Serum lipids</th>
<th>↑ Plasma glucose and/or HgbA1c levels</th>
<th>Nutrition education materials with expected laboratory ranges</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Inadequate blood glucose control</td>
<td>Meal plan to promote improvement in altered laboratory values</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Anorexia, nausea, vomiting</td>
<td></td>
</tr>
<tr>
<td>Overweight/Obesity</td>
<td>BMI classification more than normative standard for age and sex. (Overweight: 25-29.9) (Obesity:30-39.9)</td>
<td>Body fat percentage &gt; 25% for men* and &gt;32% for women*</td>
<td>Estimated excessive energy intake</td>
</tr>
<tr>
<td>-------------------</td>
<td>-----------------------------------------------------------------------------------------------------</td>
<td>-------------------------------------------------</td>
<td>---------------------------------</td>
</tr>
<tr>
<td>Underweight</td>
<td>BMI &lt; 18.5 (adults)</td>
<td>Estimated intake of food less than estimated or measured needs</td>
<td>Limited supply of food in home</td>
</tr>
</tbody>
</table>

**Behavioral-Environmental (NB) Nutritional findings/problems identified that relate to knowledge, attitudes/beliefs, physical environment, access to food, or food safety**
| Food-and-Nutrition related knowledge deficit | Verbalizes inaccurate information  
No prior knowledge of need for food-and-nutrition related information  
Verbalizes unwillingness in learning information | Nutrition education materials that include benefits of optimal nutrition status  
Supermarket tour  
Discussion of healthy food choices recommended from each food group |
|--------------------------------------------|----------------------------------------------------------------------------------|
| Unsupported beliefs about food              | Estimated intake that reflects an imbalance of nutrients/food groups  
Avoidance of foods/food groups  
Intake of nonfood items  
Intake of complementary and alternative medicine products and dietary supplements that may be unsupported for health | Nutrition education materials that include benefits of optimal nutrition status  
Nutrition education material for Mindful eating strategies  
Supermarket tour  
Discussion of healthy food choices recommended from each food group |
| Disordered eating pattern                   | ↓ or ↑ cholesterol, abnormal lipid profiles  
Hypoglycemia  
BMI < 17.5 | Nutrition education material for Mindful eating strategies  
Meal plan |
<table>
<thead>
<tr>
<th><strong>Limited access to food</strong></th>
<th><strong>Hunger</strong></th>
<th><strong>Coordination of care to food programs</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Underweight: BMI &lt; 18.5 (adults)</td>
<td>Supermarket tour</td>
</tr>
<tr>
<td></td>
<td>Overweight/obesity: BMI &gt; 25 (adults)</td>
<td>Nutrition education</td>
</tr>
<tr>
<td></td>
<td>Limited resources for food</td>
<td>material on budget food shopping</td>
</tr>
<tr>
<td></td>
<td>Limited knowledge or</td>
<td></td>
</tr>
<tr>
<td></td>
<td>skills on how to use food</td>
<td></td>
</tr>
<tr>
<td>Significant weight fluctuation</td>
<td>Referral to psychology counselling</td>
<td></td>
</tr>
<tr>
<td>Significant weight loss or significant weight gain</td>
<td>Supermarket tours</td>
<td></td>
</tr>
<tr>
<td>Frequent weighing or measuring of oneself</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Body image disturbance</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Self-evaluation is based upon body shape and/or weight</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Feeling unpleasant emotions, such as, guilt, disgust, shame, anger, or depression after eating</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Study procedures

All nutrition documentation in Centro Ararat is done electronically through the NeoMed® platform. All nutrition interventions are collected in a nutrition template (initial/follow-up) which includes all the NCPM steps and components. Nutrition interventions are written using the standard terminology. The following were the steps for gathering information.

Step 1: Obtained a Summary Report via the NeoMed program of all transgender patients that received a nutrition intervention. The report included patients evaluated from September 20, 2017, through December 31, 2019.

Step 2: Revised all the nutrition documentation from the initial nutrition interventions, including the diagnosis identification up to when the diagnosis was resolved or until December 31, 2019. Initial and two follow-up notes were analyzed, for a total of three nutrition interventions evaluated. Data from participants was obtained from the medical records of the selected sample. Data regarding demographics, general health, health habits and open-ended questions were collected and analyzed.

Only one nutrition diagnosis was considered in each initial nutrition evaluation, and only one goal was established for each diagnosis identified. In follow-up visits, the goal previously established was monitored and categorized.
Goal monitoring and evaluation

Each patient was reviewed in chronological order. Categorization was based on the change or improvement noted by the investigator. Nutrition-related changes for goal status were categorized as not achieved, progress shown, or goal achieved. Nutrition-related changes for diagnosis status were categorized as resolved, unresolved, or improvement shown.

Step 3: All variables listed in Table 1 were collected and documented on the data collection worksheet.

Step 4: Data were analyzed using IBM SPSS Statistics for Windows, Version 25.0.100 (Chicago, SPSS Inc).

Statistical analysis

Data analysis was conducted using the software IBM SPSS Statistics for Windows, Version 26.0. Statistical significance was set at the conventional level of p<0.05 (two tailed) for all analyses. All data were assessed for normality. All available data was included in the analysis. All data were assessed for statistical assumptions. Summary statistics were expressed as mean ± standard deviation for quantitative variables, frequency, and percent for all categorical measures.

Mean and standard deviation is reported for normally distributed data. Differences between groups were assessed using independent Mann Whitney U tests for continuous variables, and a series of chi-squares were run to assess relationships between categorical values and nutrition goal and diagnosis status. Table 3 describes the ranges that would be considered as normal for some of the variables evaluated in the study. Table 4 presents the association questions and statistical tests that were evaluated in the study. Table 5 includes a description of how goals
established in each nutrition intervention were assessed. Graphical displays, tabular descriptions and summary statistics were arranged to summarize and present the data.

Table 3. Description for the documentation of variables in the monitoring and evaluation step.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Type of variable</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Documentation in monitoring and evaluation component</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fasting Blood Glucose (FBS), patient</td>
<td>Quantitative, Continuous</td>
<td>Values for fasting blood glucose were considered normal or expected within the range of 77-99 mg/dL</td>
</tr>
<tr>
<td>Total Cholesterol (TC), patient</td>
<td>Quantitative, Continuous</td>
<td>Values for total cholesterol were considered normal or expected for levels less than 200 mg/dL</td>
</tr>
<tr>
<td>Triglycerides (TG), patient</td>
<td>Quantitative, Continuous</td>
<td>Values for Triglyceride levels were considered normal for levels less than 150 mg/dL</td>
</tr>
<tr>
<td>Low Density Lipoprotein (LDL), patient</td>
<td>Quantitative, Continuous</td>
<td>Values of Low-density lipoprotein were considered normal for levels less than 100 mg/dL</td>
</tr>
<tr>
<td>High Density Lipoproteins (HDL)</td>
<td>Quantitative, Continuous</td>
<td>Values for High-density lipoproteins were considered</td>
</tr>
<tr>
<td>Variable</td>
<td>Type of variable</td>
<td>Statistics that were used</td>
</tr>
<tr>
<td>----------</td>
<td>------------------</td>
<td>--------------------------</td>
</tr>
<tr>
<td><strong>Determine relationship between the nutrition intervention and nutrition goal status.</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intervention</td>
<td>Categorical (multiple)</td>
<td>Chi-square</td>
</tr>
<tr>
<td>Goal Status</td>
<td>Categorical (goal not achieved, goal achieved, progress shown)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Dependent variable</td>
<td></td>
</tr>
<tr>
<td><strong>Determine relationship between the nutrition intervention and diagnosis status.</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intervention</td>
<td>Categorical (multiple)</td>
<td>Chi-square</td>
</tr>
<tr>
<td>Diagnosis Status</td>
<td>Categorical (resolved, unresolved, improvement shown)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Dependent variable</td>
<td></td>
</tr>
</tbody>
</table>

Table 4. Statistical tests used in the study.
Table 5. Description of Nutrition Monitoring and Evaluation in the study.

<table>
<thead>
<tr>
<th>Monitoring (goal status)</th>
<th>Outcome goals</th>
<th>Achieved</th>
<th>Not achieved</th>
</tr>
</thead>
<tbody>
<tr>
<td>Excessive Fat Intake</td>
<td>Improvement in laboratory values</td>
<td>Cholesterol levels &lt; 200 mg/dL, LDL &lt; 100 mg/dL, HDL levels &gt; 40 mg/dL Triglycerides &lt;150 mg/dL</td>
<td>No changes reported</td>
</tr>
<tr>
<td></td>
<td>Reports intake of items from high fiber list</td>
<td></td>
<td>No items from list reported</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>No changes in laboratory values</td>
</tr>
<tr>
<td>Inadequate Energy Intake</td>
<td>Estimated energy intake from diet less than needs based on estimated</td>
<td>Reports adequate energy intake based on estimated</td>
<td>No changes reported</td>
</tr>
<tr>
<td></td>
<td>Restriction or omission of energy-dense foods from diet</td>
<td></td>
<td>No omissions or restrictions of energy dense foods</td>
</tr>
<tr>
<td></td>
<td>Food avoidance and/or lack of interest in food</td>
<td></td>
<td>from diet reported</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Ability to independently</td>
<td>No Food avoidance or lack of interest in food</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Ability to</td>
<td>Ability to</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Ability to</td>
<td>independently</td>
</tr>
<tr>
<td>Issue</td>
<td>Resolution</td>
<td></td>
<td></td>
</tr>
<tr>
<td>------------------------------------------------</td>
<td>-------------------------------------------</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Limited ability to independently consume foods/fluids</td>
<td>No alcohol consumption reported</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Excessive consumption of alcohol or other drugs that reduce hunger</td>
<td>No use of stimulant suppressors</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Medications that affect appetite</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Excessive Alcohol Intake</td>
<td>Reduced consumption of alcohol reported</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Altered nutrition related laboratory values</td>
<td>Laboratory values within expected ranges</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Overweight/Obesity</td>
<td>BMI below (25/30)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Reduced estimated energy intake</td>
<td>Improvement in BMI classification</td>
<td>BMI &gt; 18.5 Adequate food intake</td>
</tr>
<tr>
<td>--------------------------------</td>
<td>--------------------------------</td>
<td>-----------------------------------</td>
<td>---------------------------------</td>
</tr>
<tr>
<td>Underweight</td>
<td></td>
<td>Improved estimated intake of food</td>
<td>Improved supply of food in home</td>
</tr>
<tr>
<td>Food-and-Nutrition-related knowledge deficit</td>
<td>Reports correct information related to food and nutrition</td>
<td>Attendance to nutrition interventions</td>
<td>Patient can discuss nutrition recommendations and habits</td>
</tr>
<tr>
<td>Unsupported beliefs about food</td>
<td>Improved portions of foods consumed</td>
<td>Adequate food consumptions</td>
<td>No consumption of nonfood items</td>
</tr>
</tbody>
</table>

|                                |                                  |                                  |                                  |                                  | No changes reported |

48
<table>
<thead>
<tr>
<th>Factor</th>
<th>Changes reported</th>
<th>No consumption of complementary or alternative medicine and dietary supplements</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reduced intake of nonfood items</td>
<td>Improved cholesterol values, abnormal lipid profiles, improved glucose levels, improved BMI classification, reduced weight fluctuation</td>
<td>Cholesterol, glucose, and lipid profile within expected values, adequate BMI classification, no weight fluctuations</td>
</tr>
<tr>
<td>Disordered eating pattern</td>
<td>No changes reported</td>
<td></td>
</tr>
<tr>
<td>Limited access to food</td>
<td>Improved BMI classification, increased resources for food</td>
<td>Participation in food programs, no changes reported</td>
</tr>
<tr>
<td>Monitoring (Problem/Diagnosis Status)</td>
<td>Problem resolved</td>
<td>Nutrition problem no longer exists.</td>
</tr>
<tr>
<td>--------------------------------------</td>
<td>------------------</td>
<td>-------------------------------------</td>
</tr>
<tr>
<td>Problem - improvement identified</td>
<td>Nutrition problem continues, but evidence of improvement has been identified.</td>
<td></td>
</tr>
<tr>
<td>Problem - unresolved</td>
<td>Nutrition problem continues and no improvement has been identified.</td>
<td></td>
</tr>
</tbody>
</table>

**Anticipated Challenges for Data Collection**

This study identified the following challenges: number of participants that met inclusion criteria; patients had one or more nutrition-related problem identified at the initial nutrition intervention; goals or diagnoses did not have any progress or improvement and food availability was restricted due to a hurricane. All these challenges were taken into consideration and are described in the methods and results chapter.
CHAPTER FOUR: RESULTS

This retrospective observational study analyzed electronic health record documentation of a sample of Hispanic transgender adult patients living in an urban area of Puerto Rico that received nutrition interventions during the years 2017-2019. The nutrition interventions consisted of one initial evaluation and two follow-up evaluations, during which all the components of the Nutrition Care Process Model were applied.

The main goal of this study was to describe how the Nutrition Care Process Model components were applied to nutrition-related problems identified in transgender patients and evaluate whether a relationship existed between the nutrition diagnosis and the nutrition intervention that was used with each participant. The problems identified were monitored in each follow-up visit. An additional goal of the study was to determine any association between the nutrition intervention and the nutrition diagnosis status.

The electronic health records of the transgender patients that met most of the criteria (n =137) were evaluated by the principal investigator (PI) to be used for the study. Twenty-three patients, however, did not meet inclusion criteria as they did not have at least one follow-up visit to evaluate nutrition outcomes (Figure 2); all the transgender patients evaluated did have criteria to qualify for a nutrition diagnosis (n =114). A total number of 114 patients were evaluated for this study; this number is a strong number considering the limited studies available for the transgender population.

All the patients included in the study received a minimum of three nutrition interventions that were obtained during a twelve-month period. All patients had criteria for more than one nutrition diagnosis and etiology, but since this was the first nutrition intervention for many of the participants, the PI determined to only consider one nutrition problem, etiology, or intervention.
for each patient. Figure 2 outlines the recruitment and procedure for collecting the data on the 114 patients.

**Figure 2.** Recruitment and inclusion procedures for data collection.

Nutrition Assessment: Step 1

Demographic characteristics

Study participants ranged in age from 20-71 years of age (mean = 35.18, median 32 years, range = 51, SD = 11.3 years). Most participants (102 or 89.5%) were assigned at birth as males (Table 8), while 12 participants were assigned as female. All participants were born in Puerto Rico, had US citizenship, and were classified as Hispanic or Latino at 100% (n = 114). Regarding income, 100% (n = 114) of the participants reported an annual income of less than $20,000. Of the 114 participants, 24% (n = 27) were 18-25 years of age, 34% (n = 39) were 25-35 years of age, 29% (n = 33) were 36-45 years of age and 13% (n = 15) were 46 years of age or older. Demographics for all participants are reported in Table 6.
Table 6: Demographic characteristics of the participants. (n = 114)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sex assigned at birth</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>102</td>
<td>89.5%</td>
</tr>
<tr>
<td>Female</td>
<td>12</td>
<td>10.5%</td>
</tr>
<tr>
<td>Age</td>
<td></td>
<td></td>
</tr>
<tr>
<td>20-25</td>
<td>27</td>
<td>24%</td>
</tr>
<tr>
<td>26-36</td>
<td>39</td>
<td>34%</td>
</tr>
<tr>
<td>37-47</td>
<td>33</td>
<td>29%</td>
</tr>
<tr>
<td>48 or older</td>
<td>15</td>
<td>13%</td>
</tr>
<tr>
<td>Ethnicity</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hispanic or Latino</td>
<td>114</td>
<td>100%</td>
</tr>
<tr>
<td>Other</td>
<td>0</td>
<td>0%</td>
</tr>
<tr>
<td>Income</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Less than $20,000</td>
<td>114</td>
<td>100%</td>
</tr>
<tr>
<td>More than $20,000</td>
<td>0</td>
<td>0%</td>
</tr>
</tbody>
</table>
Figure 3. Sex assigned at birth.

Anthropometric characteristics of sample studies

The mean BMI reported in the study was 25.3 kg/m² at baseline, with a final mean of 25.1 kg/m², both classified as normal weight. The mean fat percent at the beginning of the study was 22%. Both weight and body fat percentage exhibited changes before and after the nutrition evaluations. Table 7 illustrates the changes found when analyzing all the participants in the study, including the changes from the initial to the last intervention for actual body weight, body mass index and fat percentage.
Table 9. Participant documented changes of ABW, BMI, fat percentage and age. (n =114)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Minimum</th>
<th>Maximum</th>
<th>Mean</th>
<th>St. Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>ABW initial</td>
<td>89.0</td>
<td>256.0</td>
<td>166.0</td>
<td>38.1</td>
</tr>
<tr>
<td>ABW final</td>
<td>91.0</td>
<td>254.0</td>
<td>164.7</td>
<td>38.6</td>
</tr>
<tr>
<td>ABW changes</td>
<td>-54.0</td>
<td>39</td>
<td>-</td>
<td>-1.3 (± 16.2)</td>
</tr>
<tr>
<td>BMI baseline</td>
<td>15.6</td>
<td>41.3</td>
<td>25.3</td>
<td>25.3 (± 5.5)</td>
</tr>
<tr>
<td>BMI final</td>
<td>15.5</td>
<td>39.0</td>
<td>25.1</td>
<td>25.1 (± 5.4)</td>
</tr>
<tr>
<td>BMI changes</td>
<td>-9.0</td>
<td>6.0</td>
<td>-</td>
<td>-0.95 (± 2.5)</td>
</tr>
<tr>
<td>Fat percentage (%) baseline</td>
<td>8.5</td>
<td>46.2</td>
<td>-</td>
<td>22.1(± 7.8)</td>
</tr>
<tr>
<td>Fat percentage (%) final</td>
<td>7.1</td>
<td>47.0</td>
<td>-</td>
<td>22.0 (± 8.0)</td>
</tr>
<tr>
<td>Fat percentage (%) changes</td>
<td>-8.9</td>
<td>6.0</td>
<td>-</td>
<td>-0.49 (± 2.4)</td>
</tr>
</tbody>
</table>

Table 8 shows the weight by age distribution of the selected sample. Based on WHO classification of BMI, 16 percent of the subjects were underweight. Among the selected 114 transgender participants, 48% and 18% belonged to the age group 20-30 years who had normal weight and overweight respectively. Table 9 shows the number of participants that had prior exposure to nutrition education. The researcher found that all the subjects (n =114; 100%) selected for this study reported no prior nutrition intervention. The results for the use of hormone therapy as part of the treatment for gender affirmation are shown in Table 10.
Table 8. BMI distribution by age of the selected sample (n = 114)

<table>
<thead>
<tr>
<th>Age (years)</th>
<th>Underweight (&lt;18.5)</th>
<th>Normal (18.5-24.5)</th>
<th>Overweight (24.5-29)</th>
<th>Obese (&gt;30)</th>
</tr>
</thead>
<tbody>
<tr>
<td>20-30</td>
<td>13</td>
<td>27</td>
<td>3</td>
<td>9</td>
</tr>
<tr>
<td>31-40</td>
<td>5</td>
<td>8</td>
<td>13</td>
<td>8</td>
</tr>
<tr>
<td>41-50</td>
<td>1</td>
<td>9</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>51-60</td>
<td>0</td>
<td>8</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>&gt; 60</td>
<td>0</td>
<td>3</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>

Table 9. Prior nutrition education of the selected sample (n =114)

<table>
<thead>
<tr>
<th>Prior nutrition education or intervention</th>
<th>No.</th>
<th>Percent (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>0</td>
<td>0%</td>
</tr>
<tr>
<td>No</td>
<td>114</td>
<td>100%</td>
</tr>
</tbody>
</table>

Table 10. Hormone therapy for gender affirmation treatment of the selected sample (n = 114)

<table>
<thead>
<tr>
<th>Hormone therapy for gender affirmation treatment</th>
<th>No.</th>
<th>Percent (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>106</td>
<td>93%</td>
</tr>
<tr>
<td>No</td>
<td>8</td>
<td>7%</td>
</tr>
</tbody>
</table>
Table 11 describes the nutrition concerns reported by the subjects. Over 40% of the participants reported body dissatisfaction as their major nutrition-related concern, followed by 27.2% for food insecurity. Other concerns included diabetes management and weight gain. Questions regarding eating pattern (Table 12), beverage intake and changes in weight showed that 76% of the participants had experienced some recent weight changes. Table 15 highlights that 66.7% of the participants would be interested in future nutrition interventions if they were available.

Table 11. Nutrition concerns reported by the selected sample (n = 114)

<table>
<thead>
<tr>
<th>Nutrition concerns</th>
<th>No.</th>
<th>Percent (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Body dissatisfaction</td>
<td>50</td>
<td>43.9%</td>
</tr>
<tr>
<td>Diabetes management</td>
<td>4</td>
<td>3.5%</td>
</tr>
<tr>
<td>Food insecurity</td>
<td>31</td>
<td>27.2%</td>
</tr>
<tr>
<td>Weight gain</td>
<td>2</td>
<td>1.7%</td>
</tr>
<tr>
<td>None</td>
<td>27</td>
<td>23.7%</td>
</tr>
</tbody>
</table>

Table 12. Eating pattern reported by the selected sample (n= 114)

<table>
<thead>
<tr>
<th>Eating pattern</th>
<th>No.</th>
<th>Percent (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>6</td>
<td>7%</td>
</tr>
<tr>
<td>No</td>
<td>108</td>
<td>93%</td>
</tr>
</tbody>
</table>
Table 13. Beverage consumption reported by the selected sample (n = 114)

<table>
<thead>
<tr>
<th>Beverages</th>
<th>No.</th>
<th>Percent (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Beer</td>
<td>12</td>
<td>10.5%</td>
</tr>
<tr>
<td>Hard Liquor</td>
<td>3</td>
<td>2.6%</td>
</tr>
<tr>
<td>Juice</td>
<td>47</td>
<td>54.4%</td>
</tr>
<tr>
<td>Soda</td>
<td>32</td>
<td>28.1%</td>
</tr>
<tr>
<td>Water</td>
<td>20</td>
<td>17.5%</td>
</tr>
</tbody>
</table>

Table 14. Recent weight changes reported by the selected sample (n = 114)

<table>
<thead>
<tr>
<th>Weight changes</th>
<th>No.</th>
<th>Percent (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>76</td>
<td>66.7%</td>
</tr>
<tr>
<td>No</td>
<td>38</td>
<td>33.3%</td>
</tr>
</tbody>
</table>

Table 15. Interest in future nutrition interventions by the selected sample (n = 114)

<table>
<thead>
<tr>
<th>Future nutrition interventions</th>
<th>No.</th>
<th>Percent (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>98</td>
<td>66.7%</td>
</tr>
<tr>
<td>No</td>
<td>10</td>
<td>8.8%</td>
</tr>
<tr>
<td>Do not know</td>
<td>6</td>
<td>5.3%</td>
</tr>
</tbody>
</table>

**RQ1.** What were the most common nutrition-related problems in transgender patients receiving care at an outpatient clinic in San Juan, Puerto Rico?

**Aim of the study (1):** Identify the most common nutrition diagnoses documented for a transgender population sample in San Juan, Puerto Rico.
**Nutrition Diagnosis: Step 2**

Nutrition-related problems identified.

The patients’ medical records revealed nine themes surrounding nutrition-related problems. The most used diagnosis documented in the EHR was *Food and nutrition related knowledge deficit* (39%) followed by *Limited access to food* (17%); *Disordered eating pattern* (11%); *Overweight/Obesity* (9%); *Excessive alcohol intake* (7%); *Underweight* (7%); *Excessive fat intake* (6%); *Altered nutrition related laboratory values* (4%) and *Inadequate energy intake* (0.5%). Table 16 reports nutrition diagnosis labels identified in the participants of this study.

**Table 16.** Nutrition diagnoses identified in the selected sample (n =114)

<table>
<thead>
<tr>
<th>Nutrition related problems (diagnoses)</th>
<th>No.</th>
<th>Percent (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Limited access to food</td>
<td>19</td>
<td>17%</td>
</tr>
<tr>
<td>Food and nutrition knowledge deficit</td>
<td>44</td>
<td>39%</td>
</tr>
<tr>
<td>Overweight/Obesity</td>
<td>11</td>
<td>9%</td>
</tr>
<tr>
<td>Excessive alcohol intake</td>
<td>8</td>
<td>7%</td>
</tr>
<tr>
<td>Underweight</td>
<td>8</td>
<td>7%</td>
</tr>
<tr>
<td>Altered nutrition related laboratory values</td>
<td>4</td>
<td>3.5%</td>
</tr>
<tr>
<td>Excessive fat intake</td>
<td>7</td>
<td>6%</td>
</tr>
<tr>
<td>Inadequate energy intake</td>
<td>1</td>
<td>0.5%</td>
</tr>
<tr>
<td>Disordered eating pattern</td>
<td>12</td>
<td>11%</td>
</tr>
</tbody>
</table>
RQ2. What were the most common barriers to health in transgender patients receiving care at an outpatient clinic in San Juan, Puerto Rico?

**Aim of the study (2):** Identify the most common nutrition etiology categories for a transgender population sample in San Juan, Puerto Rico.

**Nutrition etiologies**

The application of the NCPM instructs that a nutritional diagnosis should include a statement with a description of a possible etiology based on signs and symptoms reported by the patient. Most of the participants in this study (51%) identified *Harmful beliefs/attitudes about food* as their principal barrier to healthy eating. Minor themes surrounding barriers to healthy eating and health include *Lack of prior exposure to accurate nutrition education* (25%), Lack of financial resources (23%) and *Endocrine dysfunction* (4%). Table 17 reports etiologies identified by the participants of this study.

<table>
<thead>
<tr>
<th>Etiology</th>
<th>Frequency</th>
<th>N (%)</th>
<th>Etiology Category</th>
<th>Diagnosis identified</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lack of financial resources</td>
<td>23</td>
<td>23</td>
<td>Access</td>
<td>Excessive fat Intake (NI-5.6.2)</td>
</tr>
<tr>
<td>Harmful beliefs/attitudes about food</td>
<td>58</td>
<td>51</td>
<td>Beliefs-Attitudes</td>
<td>Excessive energy intake (NI-1.5)</td>
</tr>
<tr>
<td>Lack of prior exposure to accurate nutrition-related information</td>
<td>29</td>
<td>25%</td>
<td>Knowledge deficit</td>
<td>Food and nutrition-related knowledge deficit (NB-1.1)</td>
</tr>
<tr>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>Endocrine dysfunction</td>
<td>4</td>
<td>4</td>
<td>Physiologic/Metabolic</td>
<td>Altered nutrition-related laboratory values (FBS) (NC-2.2)</td>
</tr>
</tbody>
</table>

- Excessive alcohol intake (NI-4.3)
- Excessive fat intake (NI-5.6.2)
- Underweight (NC-3.1)
- Food and nutrition-related knowledge deficit (NB-1.1)
- Unsupported beliefs about food or nutrition-related topics (NB-1.2)
**Nutrition interventions: step 3**

The NCPM proposes that nutrition interventions should be selected and tailored to the client’s needs by planning and implementing appropriate interventions. Quantitative data (Table 18) revealed six nutrition intervention themes regarding behavioral changes needed with nutrition diagnoses identified with the participants. The interventions were *Guided Supermarket visits* (37%); *Motivational interviewing* (37%); *Structured meal plan* (17%); and *Content related nutrition education intervention* (9%).

**Table 18.** Nutrition interventions documented in the study. (n = 114)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nutrition interventions</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Guided supermarket visit</td>
<td>42</td>
<td>37%</td>
</tr>
<tr>
<td>Motivational interviewing</td>
<td>42</td>
<td>37%</td>
</tr>
<tr>
<td>Individualized meal plan</td>
<td>20</td>
<td>17%</td>
</tr>
<tr>
<td>Content related nutrition education</td>
<td>10</td>
<td>9%</td>
</tr>
</tbody>
</table>

**Aim of the study (3):** Determine if a relationship exists between nutrition interventions and goal status for a transgender population sample in San Juan, Puerto Rico.

**Nutrition monitoring and evaluation (goal status): Step 4**

Quantitative results (Table 19) regarding the participants’ changes in goal and diagnosis status revealed the following: a total of 114 participants had documentation of the goal status in each follow-up visit. In the first follow-up visit, 60 participants (54%) exhibited an improvement
towards the established goal, while 64 participants’ (56%) goals were not met. At this point of the study, none of the participants had met the goal established. For the first visit, p values were more than the alpha of .05, and the results were not significant, but chi-square results indicate that the variables *Individualized meal plan, Motivational interviewing* and *Guided supermarket visit* had a strong positive relationship with goal status of the participants.

**Table 19.** Nutrition intervention vs Goal status visit 1 (n =114)

<table>
<thead>
<tr>
<th>Intervention</th>
<th>Goal status progress</th>
<th>Goal status not achieved</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>shown</td>
<td>not achieved</td>
<td></td>
</tr>
<tr>
<td>Nutrition content</td>
<td>8</td>
<td>2</td>
<td>10 (9%)</td>
</tr>
<tr>
<td>Education intervention</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Individualized meal plan</td>
<td>8</td>
<td>12</td>
<td>20 (17%)</td>
</tr>
<tr>
<td>Motivational interviewing</td>
<td>23</td>
<td>19</td>
<td>42 (37%)</td>
</tr>
<tr>
<td>Guided supermarket visit</td>
<td>11</td>
<td>31</td>
<td>42 (37%)</td>
</tr>
<tr>
<td>Total</td>
<td>50 (44%)</td>
<td>64 (56%)</td>
<td>114</td>
</tr>
</tbody>
</table>

**Chi-Square Tests**

<table>
<thead>
<tr>
<th>Value</th>
<th>df</th>
<th>Asymptotic Significance (2-sided)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pearson Chi-Square</td>
<td>239.441a</td>
<td>52</td>
</tr>
<tr>
<td>Likelihood Ratio</td>
<td>52</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>N of Valid Cases</td>
<td>114</td>
<td></td>
</tr>
</tbody>
</table>

- 64 cells (91.4%) have an expected count of less than 5. The minimum expected count is .01.
Symmetric Measures

Value Approximate Significance

Nominal by Nominal Phi .395 .058
Cramer's V .395 .058
N of Valid Cases 114

For the second follow-up visit (6 months), 1 patient (1%) had achieved the goal determined in the nutrition intervention. Seventy-five participants (66%) presented progress towards their goals, and 38 (33%) did not meet their goals. Results from the second nutrition intervention are displayed in Table 20. Results for the second intervention were significant for the following nutrition interventions: Individualized meal plan, Motivational interviewing, and Guided supermarket visits.

Table 20. Nutrition intervention vs Goal progress shown in visit 2 (n =114)

<table>
<thead>
<tr>
<th>Intervention</th>
<th>Goal status progress shown</th>
<th>Goal status not achieved</th>
<th>Goal achieved</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nutrition content</td>
<td>6</td>
<td>3</td>
<td>1</td>
<td>10 (9%)</td>
</tr>
<tr>
<td>education</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Individualized meal</td>
<td>14</td>
<td>6</td>
<td>0</td>
<td>20 (17%)</td>
</tr>
<tr>
<td>plan</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Motivational interviewing</td>
<td></td>
<td>26</td>
<td>16</td>
<td>42 (37%)</td>
</tr>
</tbody>
</table>
Guided supermarket visit

<p>| | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>29</td>
<td>13</td>
<td>0</td>
<td>42 (37%)</td>
</tr>
</tbody>
</table>

Chi-Square Tests

<table>
<thead>
<tr>
<th></th>
<th>Value</th>
<th>df</th>
<th>Asymptotic Significance (2-sided)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pearson Chi-Square</td>
<td>48.631a</td>
<td>20</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Likelihood Ratio</td>
<td>20.136</td>
<td>20</td>
<td>.449</td>
</tr>
<tr>
<td>N of Valid Cases</td>
<td>114</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

a. 27 cells (81.8%) have an expected count of less than 5. The minimum expected count is .01.

Symmetric Measures

<table>
<thead>
<tr>
<th></th>
<th>Value</th>
<th>Approximate Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nominal by Nominal Phi</td>
<td>.653</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Cramer's V</td>
<td>.462</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>N of Valid Cases</td>
<td>114</td>
<td></td>
</tr>
</tbody>
</table>

The results from this study revealed that after receiving nutrition interventions, the nutrition problem identified was resolved for 21 patients (18.4%), 71 (62.3%) of diagnoses showed progress towards goal and 22 (19.3%) were unresolved. Results for goal status after nutrition interventions are presented in table 21. The researcher expected outcome was achieved; results do confirm an improvement in goal and diagnosis status in the sample selected for the study.
Table 21. Nutrition intervention vs Problem status (n =114)

<table>
<thead>
<tr>
<th>Intervention</th>
<th>Goal achieved</th>
<th>Problem unresolved</th>
<th>Problem resolved</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nutrition content</td>
<td>5</td>
<td>1</td>
<td>4</td>
<td>9 (9%)</td>
</tr>
<tr>
<td>education</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Individualized meal</td>
<td>8</td>
<td>6</td>
<td>6</td>
<td>20 (17%)</td>
</tr>
<tr>
<td>plan</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Motivational</td>
<td>11</td>
<td>3</td>
<td>28</td>
<td>42 (37%)</td>
</tr>
<tr>
<td>interviewing</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Chi-Square Tests

<table>
<thead>
<tr>
<th></th>
<th>Value</th>
<th>df</th>
<th>Asymptotic Significance (2-sided)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pearson Chi-Square</td>
<td>32.025a</td>
<td>20</td>
<td>.043</td>
</tr>
<tr>
<td>Likelihood Ratio</td>
<td>31.940</td>
<td>20</td>
<td>.044</td>
</tr>
</tbody>
</table>

N of Valid Cases 114

a. 26 cells (78.8%) have an expected count of less than 5. The minimum expected count is .18

Symmetric Measures

<table>
<thead>
<tr>
<th></th>
<th>Value</th>
<th>Approximate Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nominal by Nominal Phi</td>
<td>.530</td>
<td>.043</td>
</tr>
<tr>
<td>Cramer's V</td>
<td>.375</td>
<td>.043</td>
</tr>
</tbody>
</table>

N of Valid Cases 114
CHAPTER FIVE: DISCUSSION

Results from the study fill a critical knowledge gap and characterize the unique health inequities faced by the transgender population in Puerto Rico. The primary focus of this study was to identify the nutrition-related barriers to health among a sample of transgender patients at a clinic. The secondary focus of this study was to analyze the application of the Nutrition Care Process to nutrition interventions that could improve the health and nutrition status of transgender patients. Based on the results, many intervention delivery formats should be used to try to reach as many transgender patients as possible. Interventions should promote inclusive strategies and take place in a space where the patients feel safe and comfortable.

The subjects in this study were selected by the investigator using the convenience sampling technique; 114 subjects were selected. The demographic and socio-economic background revealed the study participants ranged in age from 20-71 years of age. Of the 114 participants, 24% (n = 27) were 20-25 years of age, 34% (n = 39) were 25-35 years of age, 29% (n = 33) were 36-45 years of age, and 13% (n = 15) were 46 years of age or older. Most of the sample were between the ages of 18-25 and considered young adults. These results were consistent with the only survey available for Latino/a transgender patients. Most of the participants were assigned at birth as male, while 12 were assigned as female. Gender classification was very similar to most of the studies available, which have generally focused on transgender females.

Participants in the study reported their annual individual income and household income levels from 2017-2018, the last full year prior to the study. Regarding income, 100% (n = 114) of the participants reported an individual annual income of less than $20,000, and all the participants were living in poverty. Compared to the 2015 U.S. Transgender Survey Latino
respondents, income results from this study were alarming. In the U.S., 43% of the Latino respondents were living in poverty. Employment status was not evaluated in this study, but more than one in five (21%) Latino respondents from the U.S. survey were unemployed. The unemployment rate among Latinos tends to be more than four times higher than the unemployment rate in the U.S. population overall (5%).

General health and health habits

With respect to body mass index (BMI), the average participant had a BMI of 25.3 kg/m² classified as normal weight. Results in the study are surprising considering that in 2020, the adult population living in Puerto Rico had a 33.2 percent obesity rate. The researcher was aware of two studies that examined the prevalence of obesity among sexual minorities; both studies found that transgender individuals had higher BMI when compared with cisgender individuals.

Questions regarding prior exposure to nutrition education revealed that until the study, subjects had not received nutrition intervention. These results are consistent with outcomes from the Behavioral Risk Factor survey. In 2018, results from this examination exposed that transgender Hispanic populations had limited health care access compared to other populations. Other tools that provide information on transgender health, like the U.S. Transgender Survey, have tailored items for the transgender community, but they do not incorporate information from gender majority respondents, so they cannot be used to identify drivers of inequity across groups.

At the time of the study, approximately 93% of participants were using hormone therapy as part of their gender affirmation treatment. The search of databases for this study identified 146 full-text peer-reviewed studies; 64 studies reported nutrition-related health disparities in the transgender population compared to cisgender individuals, and 126 studies reported on the health
effects of hormone therapy. Study designs were primarily prospective and retrospective cohort studies, with sample sizes as large as 3,100 transgender subjects. While most studies included both MtF and FtM adult transgender participants, more researchers overall observed participants treated with feminizing hormone therapies.

For transgender adults being treated with feminizing hormone therapy, the most frequently reported intermediate outcomes were anthropometric, BMI or body composition measures and bone density. For transgender adults being treated with masculinizing hormone therapy, the available research follows a similar pattern.

The most frequently reported outcomes were regarding anthropometric changes, body mass index or body composition measures. Long-term effects of masculinizing hormone therapies were most often studied for the health outcomes of CVD and events of cancer and mortality. This study only evaluated adult participants but evidenced-based literature among studies with adolescents receiving puberty blockers also showed reported outcomes associated with anthropometric measurements and bone density, with fewer studies reporting relevant laboratory values.

Feminizing and masculinizing hormone therapies are partially irreversible treatments to facilitate development of secondary sex characteristics of the experienced gender. Not all transgender patients will require or seek hormone treatment; however, those who receive treatment generally report improved quality of life, self-esteem, and anxiety. Patients should consent to therapy after being informed of the potentially irreversible changes in physical appearance, fertility potential, and social circumstances, as well as other health and nutrition-related benefits and risks. Anticipated changes include acne, hair loss, voice deepening, vaginal
atrophy, weight gain, facial and body hair growth, and increased muscle mass. The benefits and risks of treatment should be weighed against the risks of inaction.

Nutrition-related health barriers and problems identified.

Qualitative analysis regarding nutrition concerns revealed three main themes: participants viewed their body negatively, participants needed more free/low-cost food access resources, and participants had an interest in nutrition counseling and education resources on diabetes management and weight gain. One area of disparity in health that had relatively little investigation concerns body size, weight, and nutrition in LGBT patients. A systematic review of research in 2017, exploring weight-control behaviors, eating habits, BMI, and physical activity among minority youth highlighted that little research in the field has been conducted outside the USA and that only one cited study included transgender individuals. Future studies with more comprehensive measurement of body image and satisfaction are needed to extend current findings.

Previous studies on self-described LGBTQ+ young adults reported individuals experiencing food insecurity. The proportion of food insecurity was 64.8% for transgender males compared with 58.7%, 46.6% and 48.1% for gender non-conforming, female, and male respondents respectively. The general health of transgender people is the last researched aspect of transgender global burden of disease. These findings may inform future research aimed at addressing known nutrition-related health disparities related to physical and socio-economical health outcomes for transgender individuals.
Eating pattern

A few studies have explored differences in dietary intake by sexual orientation, but they have primarily assessed fruit and vegetable intake. In this study, 93% of the participants reported that they didn’t follow an eating pattern. This study did not evaluate specific food groups consumption. Results from the Youth Risk Behavior Survey (YRSB) highlighted that sexual minority youth as a group were more likely to not meet recommendations for fruits and vegetables compared to heterosexual youth.\textsuperscript{103}

Similar results were published by Kirby and Linde\textsuperscript{47} in 2020. Their study considered students from a large public western university whose dietary intake was evaluated for 7 days. Results revealed that over 50% of participants did not drink 100% fruit juice, diet soda, sweetened drinks, or coffee drinks with added sugar. This is important to note because limiting the consumption of these food items is recommended.\textsuperscript{104} Approximately 46% of participants did not eat fruit daily, which is below the recommendation of two cups of fruit a day, and 42% did not eat vegetables, which is also below the recommendation of 2.5-3 cups per day. Finally, 58% of participants did not eat whole grain food products daily during the 7-day period, which falls below consumption recommendations of whole grain foods daily. In this study, participants reported eating less due to not having enough money for food.\textsuperscript{47}

Beverage consumption

Over 50% of the participants reported drinking fruit juice; the study did not observe if the beverages were 100% fruit juice or sweetened drinks with added sugar. Around 28% participants drank soda daily, followed by water (17.5%), beer (10.5%) and hard liquor (2.6%). Alcohol use is a leading cause of morbidity and mortality in the United States.\textsuperscript{105} Unhealthy alcohol use,\textsuperscript{106} particularly heavy episodic drinking and alcohol use disorder, increases risk of acute and chronic
conditions. Minority populations often experience disparities in patterns of alcohol use, but research regarding alcohol use among transgender patients is limited\textsuperscript{107} because of a lack of or unstandardized inclusion of gender identity information in most data sources.

Prior studies of alcohol use among transgender persons have largely been conducted in small convenience based or regional samples, samples limited to patients with specific health conditions (e.g., HIV), or specific age groups. This study’s findings revealed many patients experiencing alcohol use, highlighting the importance of offering universal evidence-based alcohol-related care. Because transgender persons have heightened risk for adverse alcohol-related events (e.g., via increased exposure to violence and discrimination, which heighten risk for adverse alcohol-related outcomes, including injury and sexually transmitted infections),\textsuperscript{108} evidence-based alcohol-related care should be targeted to transgender patients with unhealthy alcohol use, in addition to being broadly available, consistent with a vulnerable populations approach.\textsuperscript{109}

Assessment questions from this study revealed that most of the participants experienced weight changes (66.7%). Since most of the participants in the study reported treatment with feminizing and masculinizing hormone therapies, there could be a relationship. For transgender adults being treated with feminizing hormone therapy\textsuperscript{63} (p.50), the most frequent reported outcomes were anthropometric, BMI and body composition measures, this study follows a similar pattern.

Among the 114 participants, the vast majority reported were interested in receiving future nutrition interventions. This is an important contribution in this study, to demonstrate the interest this population has in improving their nutrition knowledge.
Application of the Nutrition Care Process Step 1: Diagnosis

A second important contribution of this study was to identify the nutrition-related problems and barriers to health among transgender patients living in San Juan Puerto Rico. This study applied all the components of the Nutrition Care Process in each intervention. The Nutrition Care Process Model and terminology has been introduced and used around the world.110

The NCPM provides a structure for systematic evaluation of outcomes, which can be used to demonstrate the effectiveness of dietetics practice as well as in dietetics research.102 (p.2003)

Results from a 2016 Survey117 evaluated 305 RDNs (experience range 0–10 + years), 73 from general population (20% working in healthcare), and 77 healthcare providers currently undergoing diversity, equity, and inclusion training. Results from the survey showed that only 46.5% were aware of transgender health disparities; 35% had training on terminology and 16.4% had training on transgender health issues. Alarmingly, less than 17% of RDNs agreed strongly in feeling confident explaining potential health outcomes related to hormone therapy.

This research highlights limitation in knowledge of RDNs interacting with transgender patients, emphasizing the need for research, training, and continuing education to provide the transgender community with proper nutrition and health care.

At the time of this study, there were 166 different terms for the nutrition diagnostics labels. No codification was required in this step of the process, and free text was used for this section. Descriptive statistical analysis was used to determine the most common nutrition diagnosis used in the study. The application of specific nutrition diagnosis responds to a variety of factors, such as setting, policy, personal preference, or in this case, specific characteristics of a population.
Common nutrition-related diagnoses identified in a transgender sample in San Juan, Puerto Rico

The study sample medical records revealed nine themes regarding nutrition-related problems. The most documented diagnosis in the electronic health record were *Food and nutrition related knowledge deficit; Limited access to food, followed by Disordered eating pattern; Overweight/Obesity; Excessive alcohol intake; Underweight; Excessive fat intake; Altered nutrition related laboratory values and Inadequate energy intake*. To the researcher’s knowledge there are no previous studies that examine the application of the NCPM components in transgender patients, therefore, accurately determining the factors for the use of each nutrition diagnostic label is difficult at this point.

The U.S. Transgender survey\textsuperscript{110} revealed that one in four respondents (25\%) experienced a problem with their insurance related to being transgender, one-third (33\%) of those who saw a health care provider reported having at least one negative experience related to being transgender, 23\% did not see a doctor when they needed to because of fear of being mistreated and 33\% did not see a doctor when needed because they could not afford it. Although, the 2015 survey did not consider nutrition evaluations or nutrition education, limited access to health care providers could correlate with participants in this study, reporting *Food and nutrition knowledge deficit* as their most used nutrition diagnosis.

*Limited access to food* was the second most common nutrition diagnosis within the sample. Lack of access to food in this study could be related to the income reported by the participants and their ethnic group. Food insecurity disproportionately affects certain groups of people, including those living in poverty, those who are underemployed or unemployed, and the homeless.\textsuperscript{81(p.1)}
Food insecurity is prevalent among Latinos. The prevalence of food insecurity has been reported to be highest among Puerto Ricans (25.4%) relative to other Hispanic groups such as Cubans (12.1%) or Mexican Americans (20.8%). Puerto Rican individuals are particularly susceptible to adverse health and health-related outcomes resulting from food insecurity; research suggested that food insecurity is associated with poor health access, type 2 diabetes, and poor glycemic control over time. Research also indicated that food insecurity is associated with subsequent cognitive decline among Puerto Ricans.
CHAPTER SIX: APPLICATION TO PROFESSIONAL PRACTICE AND IMPLICATIONS FOR SOCIAL CHANGE

Future research and practice

Clear gaps emerged from the results of this study on a transgender population. While further research is likely needed in all areas discussed, a relative lack of research related to dietary intake, nutrition assessment and nutrition interventions results in inherent inaccuracies and inconsistencies when delivering the nutrition care process to a transgender community. Future clinical practice guidelines for the nutrition care of transgender patients should also provide guidance for clinicians to increase confidence and competency in using inclusive terminology, counseling skills, and more broadly conceived gender-affirmative care.

Food insecurity and policy

Several multi-level, public health solutions are required to alleviate issues of food insecurity and food access in the transgender population. First, federally, national-population-based surveys assessing food security in the general population should be required to capture gender identity so public health professionals can use the most rigorous epidemiological methods to accurately assess food insecurity within the transgender population. Currently, none of the health surveillance programs include inclusive measures of gender.13

Federal or state level legislation must be established to protect transgender patients from social stigma and discrimination in employment, housing, and healthcare. Lack of legal protection jeopardizes transgender people’s employment opportunities, housing options, food security and access to community food resources. Future research should consider exploring food insecurity and food assistance used by transgender people on a national level, allowing for comparisons of transgender patients living in Puerto Rico and residing in other states. Filling this
research gap is a critical step for developing and innovating community-based interventions that are culturally sensitive to address food insecurity and health disparities for the transgender community.

**Nutrition interventions for transgender patients**

Observational studies will continue to be helpful in describing correlations and parameters of prevalence of nutrition disparities, while experimental studies are needed to examine how nutrition therapy may mitigate the known nutrition-related problems. Studies are also needed to evaluate the appropriateness and effectiveness of different nutrition interventions, such as nutrition counselling, education, and coordination of nutrition care, as well as studies that examine access to nutrition care, such as counselling and referrals to registered dietitian nutritionists.

According to this study’s findings, nutrition interventions centered on patient care were an efficient and inclusive form of nutrition intervention and were well received by participants. Additional research is needed to determine many other specific details regarding the NCPM components. The information provided in this study for identification for a nutrition diagnosis may help dietitians in many ways. Understanding the frequency of certain diagnoses, in addition to the impact of the economic background and demographic characteristics, can allow RDNs to properly identify the nutrition related problems with the transgender population. Creating a tailored or people centered care for transgender patients helps adapt the NCPM components to provide quality, consistent practice and to achieve expected outcomes at all levels of career development.

Future research could also assess participants’ readiness for change prior to nutrition intervention in order to determine the effectiveness of nutrition interventions. Additional subjects
using more objective measures of behavior change would be helpful to determine the effectiveness of specific nutrition interventions.

**Nutrition Care Process Components and transgender patients**

Findings in this study revealed that using the NCPM components in the transgender population resulted in beneficial effects on the health outcomes of the participants. Inclusive terminology that describes and includes the transgender population’s specific nutrition-related problems is necessary to properly deliver nutrition care for this population.

This study proposes further analysis using the diagnosis of *Intended weight gain* and *Intended weight loss* as two possible nutrition problem diagnoses with these patients. These diagnoses are currently only used to propose an eating disorder problem, but in this case, this population is reporting this nutrition-related problem in order to achieve a desired outcome of gender affirmation. Analysis of this adaptation or consideration of the NCPT could be considered for future study.

This study provided a look at the application of the Nutrition Care Process components to include diverse areas of practice and culturally sensitive synonyms. In an evolving health care environment, the vision for the NCPM and NCPT is to facilitate communication within and among health care systems for outcomes, research, and quality improvement. Thus, the results in this study could provide an important link to advance the field of nutrition and dietetics. This study responded to several of the aspirations and goals for the NCPT, and the research provided needed data that analyzed the process and outcomes of nutrition care in a specific population. This study helped improve the nutritional health status of most of the participants. The results of the study hint at the necessity of creating and providing professional development and training for diversity inclusion, such as to transgender patients.
This study should be considered as a research tool to further explore NCPT implementation, its success, and the effectiveness in communicating quality care that improves health outcomes.

**Proposed NCPM for Transgender patients.**

<table>
<thead>
<tr>
<th>Component/Step</th>
<th>Principles/Definition</th>
<th>Application/Practices</th>
</tr>
</thead>
<tbody>
<tr>
<td>Step 1: Nutrition Assessment</td>
<td>Organized approaches to collect, classify, and synthesize important and relevant data needed to identify nutrition-related problems and their causes.</td>
<td>Nutrition assessment and reassessment should include tailor-made questions for transgender patients. The following topics should be addressed: <em>Client history</em> (1) Pronoun or preferred name to be used during the intervention (2) Ask about gender assigned at birth (3) Assess gender identity <em>Biochemical data, medical tests, and procedures</em> (1) Consider gender-specific treatments and medications (2) Gender affirming surgeries (3) Consider transition stage of the patient (if applies, not all patients use hormone therapy) <em>Anthropometric measurements</em> (1) Consider patient’s desire for gender affirmation</td>
</tr>
</tbody>
</table>
| Step 2: Nutrition Diagnosis | Nutrition and dietetics practitioner’s identification and labeling of an existing nutrition problem(s) that the practitioner is responsible for treating. | Nutrition focused physical findings.
(1) Ask about non-medical body modifications (tucking, binding, or other practices) that may alter body measurements.

With the information obtained from the patient, nutrition-related problems were identified with their possible etiology or cause. The following diagnosis should be considered for this population:

*Intake*

(a) Intended weight loss to obtain desired gender affirmation
(b) Intended weight gain to obtain desired gender affirmation

*Clinical*

(c) Altered nutrition related lab values related to gender affirming therapy

*Behavioral/Environmental*

(d) Lack of role models
(e) Obsessive desire to be thin or overweight to achieve desired gender affirmation |
(f) Eating disorder to achieve desired gender affirmation
(g) Depression related to gender dysphoria

| Step 3: Nutrition Intervention | Purposely planned action(s) designed with the patient to promote a nutrition-related change in behavior, a reduction of risk factors, improvement of environmental conditions, or aspect of health status to resolve or improve the identified nutrition diagnosis(es) or nutrition problem(s). | Personalized nutrition education for this population
Population strategies
Population based nutrition actions |
| Monitor/Evaluate | Determine and measure the amount of progress made for the nutrition intervention and whether the nutrition related goals/expected outcomes are being met. | Through the plan’s follow up interventions, patient’s goals and problems identified will be monitored to determine status and outcomes. |
Advocacy

Regional networks and international groups already exist. Leaders of the nutrition and dietetic profession should advocate for the inclusion of transgender individuals as key populations in national strategic plans and programs. Dietitians involved in nutrition care for transgender patients should help develop leadership and provide a clear framework that communities can use for strategic planning process.
CHAPTER SEVEN: CONCLUSION

Transgender individuals have unique nutrition needs, which may vary according to their stage of social and medical transition. While the potential nutrition-related health outcomes of hormone therapy and the prevalence of nutrition-related health outcomes compared to the cisgender population have been reported throughout the literature, only a small amount of research examines effective methods of implementing nutrition therapy for nutrition professionals working with transgender individuals. A greater base of primary research examining relevant nutrition-related topics in transgender individuals is needed before sufficient literature exists to inform high-quality evidenced-based clinical nutrition practice guidelines for transgender individuals.

Nutrition-related problems and etiologies of the sample were identified, and the problems identified were consistent with the limited available data. The results of this study suggest that patient centered nutrition care for transgender patients had a positive impact on the patients’ nutrition-related health outcomes. Overall, the results obtained represent just a glance at the impact nutrition interventions could have on transgender patients. This study by itself will not be able to provide practical and successful advice to the increasing transgender population. The current study proved that the Nutrition Care Process Model applied to the transgender population promote improvement in overall health status of the patients.

This study shows the importance of RDNs’ professional development and continuing education to provide competence in the nutrition care of this population as well as to promote diversity and inclusion in practice for practical and successful nutrition interventions. Objective and longitudinal studies that capture the transgender population environmental information and risk factors are required. The results of these analyses will provide the scientific evidence and
knowledge to offer actionable, more specific health recommendations to improve the quality of life of transgender patients and transform the promise of inclusive and inclusive nutrition into a reality.
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https://inddex.nutrition.tufts.edu/node/83


YRBSS | Youth Risk Behavior Surveillance System | Data | Adolescent and School Health | CDC


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Appendix A

Conceptual definitions and terminology

A conceptual definition defines a term or variable and is used to express the real definition thus explaining the different variables to be used in an investigation. The following definitions will be used in this project:

a. Anthropometric measurements (anthropometry) - study of the human body through anthropometric measurements and evaluations in order to understand the processes involved in growth, exercise, and nutrition. Example: body weight, body mass index and waist circumference.

b. Biochemical values - tests of blood, excreta, and other fluid samples to investigate the health and nutritional status of patients.

c. Diet - consists of obtaining, preparing, and eating food.

d. Medical-nutritional therapy (MNT) - use of a specific nutritional service to treat a disease, injury or condition that involves two phases:
   - Assessment of the nutritional status of the client
   - Treatment which includes nutritional therapy, counseling, education, and the use of specialized nutritional supplements if needed.

e. Medical-nutritional treatment (MNT) for transgender patients - is a systematic approach to providing high quality nutrition care following the four distinct, interrelated steps:
   a. Nutrition Assessment: The RDN collects and documents information such as food or nutrition-related history; biochemical data, medical tests and procedures; anthropometric measurements, nutrition-focused physical findings and client history.
b. Nutrition Diagnosis: Data collected during the nutrition assessment guides the RDN in selection of the appropriate nutrition diagnosis (i.e., naming the specific problem).

c. Nutrition Intervention: The RDN then selects the nutrition intervention that will be directed to the root cause (or etiology) of the nutrition problem and aimed at alleviating the signs and symptoms of the diagnosis.

d. Nutrition Monitoring/Evaluation: The final step of the process is monitoring and evaluation, which the RDN uses to determine if the client has achieved, or is making progress toward, the planned goals.

f. Malnutrition – any disorder that describes the results from improper or unbalanced food intake.

g. Food security- measure of the availability of food and individuals' ability to access it.

h. Minority stress – psychosocial stress derived from minority status.

i. Gender identity – a person’s internal sense of self and how they fit into the world, from the perspective of gender.

j. Gender dysphoria - the condition of feeling one's emotional and psychological identity as male or female to be contrary to one's biological sex.

k. Gender expression – the outward manner in which an individual expresses or displays their gender. This may include choices in clothing, hairstyle, or speech and mannerisms.

l. Gender non-conforming – a person whose gender identity differs from that which was assigned at birth, but may be more complex, fluid, multifaceted, or otherwise less clearly defined than a transgender person.
m. Sex – historically, referred to the sex assigned at birth, based on assessment of external genitalia, as well as chromosomes and gonads.

n. Sexual orientation – describes sexual attraction only and is not directly related to gender identity. The sexual orientation of transgender people is defined by the individual.

o. Cisgender/Cis – the state of alignment of one’s gender identity with the gender assigned at birth. Cisgender means having a non-transgender identity.

p. CIS normativity – the assumption all people are cis, that those assigned male at birth always grow up to be men and those assigned female at birth always grow up to be woman.

q. Gender queer – a person whose identity does not align with a binary gender category such as “man/woman”, “boy/girl”. Gender queer persons often identify themselves as an intermediary gender.

r. Nonbinary – umbrella term for anyone who does not identify with static, binary gender identities. Includes persons who may identify as having an intermediary gender (e.g., gender queer), as being multiple genders, as having constantly shifting gender, or as not having a gender altogether.

s. Transgender man – an umbrella term to describe all persons assigned female at birth that transition to live as men/boys or somewhere on the masculine spectrum.

t. Transgender woman – an umbrella term to describe all persons assigned male at birth that transition to live as girl/women or somewhere on the feminine spectrum.

u. Transition – period when individuals change from gender role associated with their sex assigned at birth to a different role. Transition may or may not include feminization or
masculinization of the body through hormones or other medical procedures. The nature and duration of transition is variable and individualized.

v. Male-to-female (MtF) – born male, living as female. Defined as transgender woman.
w. Female-to-male (FtM) – born female, living as a male. Defined as transgender man.
x. Non-medical body modification (NMBM) techniques - body modifications that can be accomplished without medical or surgical intervention. One of the most used common NMBM techniques are nutrition and exercise, followed by genital tucking and chest binding.
y. Chest binding - binding refers to flattening breast tissue to create a male-appearing chest using a variety of materials and methods. It is a fairly common step in FTM transition.
z. Genital tucking - ways one can hide the penis and testes, such as moving the penis and scrotum between the buttocks or moving the testes up into the inguinal canals. The inguinal canals make up the body cavity where the testes sit before birth. Tucking may be used by people who identify as transgender women, gender nonconforming and nonbinary.

aa. Transsexual – a person who undergoes medical transition and social transition to align the gender they live and present as with their internal gender identity.
bb. They/Them/Their: neutral pronouns used by some who have a nonbinary or nonconforming gender identity.
cc. Cross dresser / drag queen / drag king - refers to those who may wear the clothing of a gender that differs from the sex which they were assigned at birth for entertainment, self-expression, or sexual pleasure. Some cross dressers and people who dress in drag may
exhibit an overlap with components of a transgender identity. The term transvestite is no longer used in the English language and is considered pejorative.
Appendix B: Assessment questions used in the study.

Nutrition Assessment

Introduction: How would you like to be addressed? What name and pronoun(s) would you like me to use? How would you describe your gender identity?

Demographic data:

1. Did you have any prior nutrition education or intervention? _________

Health history:

2. Are you taking any medications specific for your gender affirmation treatment? ________________

Nutrition history:

3. What change in your health or nutritional habits would you like to make? Do you have any nutrition concerns?

___________________________________________________________

4. Have you ever chosen to follow a special diet, eating pattern, meal plan?

___________________________________________________________

5. Do you tend to eat at regular or set times each day? Yes/No

6. What beverages do you typically drink within a week and how much?

___________________________________________________________

7. Where do you eat on a regular basis? __________________________

Weight history
8. Would you like to be weighed and/or measured today for a body composition assessment? ____________________________

9. Have you had any recent changes in your weight? Yes/No

________________________________________________________

10. If more nutrition interventions are available, would you be interested in receiving more nutrition consultations? Yes/No

________________________________________________________