



An Examination of the Sex-Specific Nature of Nutrition Assessment within the Nutrition Care Process: Considerations for Nutrition and Dietetics Practitioners Working with Transgender and Gender Diverse Clients

THE NUTRITION CARE PROCESS (NCP) is the standardized process for nutrition and dietetics practitioners to deliver care.^{1,2} Nutrition assessment is the first step of the NCP and is utilized to gather and synthesize client data that will ultimately inform a nutrition diagnosis. This step is considered an ongoing process of initial data collection,

reassessment, and analysis against reference standards. The eight domains of nutrition assessment are: food/nutrition-related history; anthropometric measure; biochemical data, medical tests, and procedures; nutrition-focused physical findings; client history; assessment, monitoring, and evaluation tools; etiology category; and progress evaluation.³

nature of nutrition assessment within the NCP. Our objectives are to identify the aspects of nutrition assessment that rely on biological sex, suggest approaches for nutrition and dietetics practitioners when working with TGGD clients, and illustrate the possible approaches with three sample cases.

This article was written by **Whitney Linsenmeyer, PhD, RD, LD**, assistant professor, Department of Nutrition and Dietetics, Saint Louis University, St Louis, MO; **Sarah Garwood, MD**, associate professor and co-director, Washington University School of Medicine, Transgender Center at St Louis Children's Hospital, St. Louis MO; and **Jennifer Waters, MS, RDN, LDN**, instructor, Benedictine University, Lisle, IL.

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Certain aspects of nutrition assessment are sex-specific, meaning they require nutrition and dietetics practitioners to select a male or female sex. This presents a unique question for nutrition and dietetics practitioners working with transgender and gender diverse (TGGD) clients. For the purposes of this article, we are using the term *transgender* to describe a person whose gender identity differs from the sex that was assigned at birth, and term *gender diverse* to describe a broader range of gender identities that may be more complex or fluid. As detailed in the client history domain of the electronic Nutrition Care Process Terminology, the term *sex* refers to a person's sex assigned at birth based on the assessment of external genitalia, reproductive organs, chromosomes, and gonads, whereas the terms *gender* or *gender identity* refer to a person's internal sense of self and how they fit into the world with respect to gender.^{3,4} It is noteworthy that these terms may evolve over time and be interpreted differently based on cultural context and local realities.⁵

Given that nutrition assessment is the seminal step in the delivery of nutrition care, the purpose of this article is to evaluate the sex-specific

TRANSGENDER HEALTH AND NUTRITION

In the United States, an estimated 0.6% of adults and 0.7% of youth aged 13 to 17 years identify as TGGD.^{6,7} Although societal understanding and acceptance is growing, marked health disparities persist among the TGGD population second to gender-based stigma and discrimination. TGGD adults in the United States are more than twice as likely to live in poverty and three times more likely to experience unemployment than the general population. Within the health care system, one-third of TGGD adults had at least one recent negative experience related to their gender identity such as verbal harassment or being refused treatment. Nearly one-quarter of TGGD adults avoided seeking needed health care due to fear of mistreatment. Due to the compounding effects of other forms of discrimination, transgender adults of color reported even higher rates of poverty, unemployment, and resulting health disparities.⁸

Nutrition-related health disparities include elevated rates of disordered eating and body dysmorphia, food insecurity, and overweight and obesity compared with cisgender populations.⁹⁻¹⁴ Disordered eating may be

exacerbated among TGGD youth due to the use of food as a coping mechanism for gender-related stigma or distress.^{11,13} Beyond the intersection with poverty and homelessness, food insecurity may be elevated among TGGD youth and adults due to fear of discrimination at faith-based food pantries, the need to provide identification that may include a photograph or gender marker inconsistent with gender identity, the competing financial burden of food and medical care, and familial rejection.^{9,12-14}

TGGD individuals may transition in different ways to align with their gender identity, such as socially, legally, or medically, although the types of therapeutic options, timing, and duration are variable and individualized.⁵ Medical interventions are medically necessary for many transgender individuals to alleviate the psychological distress caused by gender dysphoria.^{5,8} Among adolescents, medical interventions may include pubertal hormone suppression to allow more time for gender identity exploration and to prevent development of secondary sexual characteristics that do not align with gender identity, followed by masculinizing or feminizing hormone therapy (HT).^{4,5} Among adults, medical interventions may include HT and/or gender-affirming surgeries.^{4,5} Clinical practice guidelines and standards of care published by national and international health organizations are used to guide the medical care of TGGD clients (see [Table 1](#)).

Understanding aspects of a client's medical transition is particularly relevant to nutrition and dietetics practitioners given the nutrition-related

implications that may result.¹⁵ Masculinizing and feminizing HT may result in changes to anthropometric measures (ie, body weight and waist circumference), laboratory values (ie, lipid panel and complete blood count), and diagnostic tests (ie, bone mineral density).¹⁵⁻¹⁸ Not only are these measures expected to change with HT, but many of the reference standards rely on sex-specific values. For example, body fat is expected to decrease or increase with masculinizing and feminizing HT, respectively, which is further complicated by the sex-specific reference values for body fat percentage.^{5,19}

This presents a unique question for nutrition and dietetics practitioners regarding how to best interpret a client's data. Currently no clinical practice standards exist to guide the nutrition care of TGGD clients, although we can apply clinical reasoning and draw from advancements in the broader medical community.²⁰

SEX-SPECIFIC ASPECTS OF NUTRITION ASSESSMENT

Various aspects of nutrition assessment require nutrition and dietetics professionals to choose between male or female biological sex. [Table 2](#) details the sex-specific data collected within each nutrition assessment domain. These attributes may influence interpretation of the client's data and the remaining steps of the NCP, including the nutrition diagnosis, intervention, and monitoring and evaluation. For example, the decision to interpret a TGGD adolescent's body mass index (BMI)-for-age percentile on the growth chart for a boy or girl may influence the nutrition diagnosis for weight

status as underweight, healthy weight, overweight, or obese.

As depicted in [Table 2](#), the sex-specific attributes of nutrition assessment are clustered in the first three domains. Within food/nutrition-related history, estimation of energy needs may require use of predictive energy equations where sex is a variable, such as the Harris-Benedict or Mifflin-St Jeor equations.^{21,22} When evaluating adequacy of water, energy, the energy-yielding nutrients, and vitamins and minerals, certain Dietary Reference Intakes (DRI) provide sex-specific references such as the Estimated Energy Requirement, Recommended Dietary Allowances (RDA), and Adequate Intakes.²³ The DRI values for some nutrients do not vary between the male and female values, whereas others reflect a dramatic difference. For example, the RDA for vitamin D is 600 IU/day for both women and men aged 19 to 70 years, whereas the RDA for iron assumes the presence of menstruation and more than doubles for women compared with men aged 19 to 50 years (18 mg/day and 8 mg/day, respectively).²³

Within the anthropometric measures domain, body fat percentage, waist circumference, and waist-to-hip ratio rely on sex-specific reference ranges.²⁴⁻²⁶ For children aged 2 to 20 years, interpretation of BMI-for-age percentiles rely on a separate growth chart for girls vs boys.²⁷

Lastly, within the domain of biochemical data, medical tests, and procedures, interpretation of multiple laboratory values relies on sex-specific ranges, including those within a lipid panel (high-density lipoprotein cholesterol level and cholesterol to high-density lipoprotein cholesterol ratio), complete blood count (hemoglobin, hematocrit, red blood cell count, and ferritin levels), kidney function (creatinine excretion), and liver function (alkaline phosphatase level). Interpretation of bone mineral density testing relies on z and T scores relative to the average values for a person of the same age and sex.²⁸⁻³¹

SUGGESTED APPROACHES FOR NUTRITION ASSESSMENT

The following approaches are based on clinical reasoning and drawn from the broader medical community. Given the

Table 1. Clinical practice guidelines and standards of care for transgender populations

Standards of Care for the Health of Transsexual, Transgender and Gender Nonconforming People by the World Professional Association for Transgender Health: https://www.wpath.org/
Guidelines for the Primary and Gender-Affirming Care of Transgender and Gender Nonbinary People by the University of California, San Francisco: https://transcare.ucsf.edu/guidelines
Clinical Practice Guidelines for the Treatment of Gender Dysphoric/Gender-Incongruent Persons by the Endocrine Society: https://academic.oup.com/jcem/article/102/11/3869/4157558

Table 2. Sex-specific data points of nutrition assessment within the Nutrition Care Process.

Nutrition assessment domain	Common data points with sex-specific reference ranges	Comments
Food/nutrition-related history	Energy needs	Some predictive energy equations use sex/gender as a variable; that is, Harris-Benedict, Mifflin-St Jeor
	Dietary Reference Intake values	The Estimated Energy Requirements, Recommended Dietary Allowances, and Adequate Intakes for water, energy, and the energy nutrients, plus the Recommended Dietary Allowances and Adequate Intakes for vitamins and minerals
Anthropometric measures	Body fat percentage Waist circumference Waist-to-hip ratio Body mass index-for-age percentiles	
Biochemical data, medical tests, and procedures	High-density lipoprotein cholesterol Cholesterol to high-density lipoprotein ratio	When used as the clinical cutoff for clinical identification of metabolic syndrome
	Hemoglobin Hematocrit	For patients receiving masculinizing hormone therapy: the University of California San Francisco guidelines recommend using the male reference value for the upper limit of normal and the male value for the lower limit of normal if amenorrheic. ⁴ For patients on feminizing hormone therapy: The University of California San Francisco guidelines recommend using the female reference value for the lower limit of normal and the male reference value for the upper limit of normal ⁴
	Red blood cell count Ferritin Creatinine Alkaline phosphatase	For clients on both feminizing and masculinizing hormone therapy: The University of California San Francisco guidelines recommend using the male reference value for the upper limit of normal ⁴
	Bone mineral density	
Nutrition-focused physical findings	None	Although there are no sex-specific reference values related to the nutrition-focused physical exam, changes in muscle and fat mass are expected with a medical transition
Client history	None	The 2-step method of sex and gender identity data is ideal to separately query sex assigned at birth and gender identity ^a <i>(continued on next page)</i>

Table 2. Sex-specific data points of nutrition assessment within the Nutrition Care Process. (continued)

Nutrition assessment domain	Common data points with sex-specific reference ranges	Comments
Assessment, monitoring and evaluation tools	None	This domain refers to an array of tools that may be used to assess for and/or monitor health and disease status, some of which may be sex-specific (ie, minimum dietary diversity for women indicator score)
Etiology category	None	
Progress evaluation	None	

^aTate CC, Ledbetter JN, Youssef CP. A two-question method for assessing gender categories in the social and medical sciences. *J Sex Res.* 2013;50(8):767-776.

emerging nature of transgender health research, these approaches are not finite and are likely to evolve with the growing body of science.

Use Reference Values Consistent with Sex Assigned at Birth for Clients Who Have Not Medically Transitioned

For adolescents on pubertal suppression therapy and adolescents/adults who have not medically transitioned with HT or surgical interventions, nutrition and dietetics practitioners can utilize the reference values consistent with the client's sex assigned at birth. Given that the predictive energy questions,^{21,22} DRI values,²³ anthropometric measures,²⁵⁻²⁷ and reference ranges for certain biochemical data points²⁸⁻³¹ are based on clinically reported sex-specific differences, utilizing a client's sex assigned at birth will provide the most accurate assessment for those who have not medically transitioned. This approach has been utilized in clinical practice by health care teams caring for TGGD clients.^{13,32}

An estimated 62% of TGGD adults in the United States have medically transitioned with HT and an additional 23% plan to do so in the future. A smaller proportion have had gender-affirming surgeries (4% to 43% depending on surgery type), with orchiectomy as the most common transfeminine surgery and chest surgery as the most common transmasculine surgery.³³ Therefore, nutrition and dietetics practitioners should not assume that a TGGD client has medically transitioned based on their gender identity or expression, and should gather this information as part of their past medical history through

chart review and/or the client interview.

Individualize Nutrition Assessment to Align with the Client's Medical Transition

Physical changes typically begin and peak within a certain window of time after initiating HT, although the timing and scale of changes will vary among individuals. The World Professional Association for Transgender Health guidelines specify the expected time of onset and maximum effect with masculinizing HT (ie, increased muscle mass/strength, body fat redistribution, and cessation of menses) and feminizing HT (ie, body fat redistribution, decreased muscle mass/strength, and softening of skin/decreased oiliness).⁵ For example, clients on masculinizing HT may experience increased muscle mass/strength starting at 6 to 12 months with an expected maximum effect at 2 to 5 years, whereas those on feminizing HT may experience decreased muscle mass/strength starting at 3 to 6 months with an expected maximum effect at 1 to 2 years.⁵

Nutrition and dietetics professionals can use these guidelines to inform their decision to use the male or female reference values, especially for those that are directly related to anticipated physical changes with HT such as body fat percentage, waist circumference, waist-to-hip ratio, and the interpretation of laboratory values related to iron status. Lastly, the need to individualize nutrition assessment is especially relevant given that some clients may seek moderate changes with HT or a combination of masculine and feminine secondary sex characteristics.⁴

Express Data as a Range between the Female and Male Reference Values

For certain parameters of nutrition assessment, it may be reasonable to express data as a range using both the female and male reference values, especially where ranges are routinely used in clinical practice such as estimating energy or protein needs.^{23,34} This may also be appropriate for patients on HT for a relatively short period (ie, <6 months) or who are on low-to-moderate HT regimens and therefore intentionally within the midrange between the male and female norms.⁴ Nutrition and dietetics practitioners have reported this approach using case studies and clinical case series of TGGD adults, and in their interpretation of BMI percentile charts for TGGD youth.^{32,33,35,36}

SAMPLE CASES

The following cases were developed by the authors and based on real TGGD patients seen through our clinical practices. The authors are cisgender registered dietitian nutritionists and physicians who specialize in clinical practice and research with the TGGD community. The case studies were reviewed by a trans man who is active in the lesbian, gay, bisexual, and transgender community to ensure the language presented is culturally appropriate (see the Acknowledgements).

LB is a 17-year old, non-Hispanic White individual who was referred to a registered dietitian nutritionist for disordered eating. LB was assigned male at birth, identifies as nonbinary, and uses they/their pronouns. They wear both masculine and feminine clothing and are not interested in pursuing medical

interventions such as HT or surgery. LB is 5-ft, 6-in tall and weighs 120 lb. Which growth chart would be most accurate to assess LB's weight status?

Given that LB has not medically transitioned, using the growth chart consistent with their sex assigned at birth (male) would provide the most accurate interpretation of their weight status. LB's BMI is 20 based on their height and weight. Using the BMI-for-age growth chart for boys ages 2 to 20 years, LB is in the 30th percentile for BMI-for-age.

Although using sex assigned at birth to assess weight status, nutrition and dietetics practitioners can honor LB's nonbinary gender identity in a several of ways, such as using their correct name and pronouns, ensuring their medical records accurately represent their gender identity, and using gender-neutral language to describe the body if that is LB's preference.^{18,32}

The CDC growth charts are inherently limited for TGGD patients who are medically transitioning due to the binary options of boy or girl charts.²⁷ Current standards of care do not address which growth chart to utilize.^{4,5} Existing research has reported the strategy of assessing growth using both the boy and girl charts for TGGD patients who are medically transitioning and has underpinned the need for further research in this area.^{13,32,36}

JY is a 50-year old, African American trans man who was referred to nutrition services for nutrition assessment and suspected iron deficiency. JY was assigned female at birth, identifies as a trans man, and uses he/his or they/their pronouns. JY's past medical history indicates he medically transitioned in his mid-20s, has been on masculinizing HT consistently for the past 25 years, and is amenorrheic. JY is training for a marathon and runs at a moderate pace approximately 10 to 15 hours per week. Their labs are provided below. Given JY's past medical history and the University of California San Francisco guidelines (see [Table 2](#)), which reference values would be most appropriate to assess hemoglobin and hematocrit?

Hemoglobin = 12 g/dL

Hematocrit = 37%

Red blood cells = 5.0 mL

Platelet count = 250,000

White blood cells = 6,000 cells/mL

Given that JY medically transitioned more than 2 decades ago and is amenorrheic, it would be appropriate to use the male reference ranges for hemoglobin (13.5 to 16.5 g/dL) and hematocrit (41% to 50%). This is consistent with the University of California San Francisco guidelines for interpretation of hemoglobin and hematocrit values based on HT and amenorrheic status.⁴

MR is a 30-year old, Hispanic trans woman seeking nutrition counseling for metabolic syndrome and weight management. MR was assigned male at birth, identifies as a trans woman, and uses she/her pronouns. She started feminizing HT 1 month ago. MR is 5-ft, 8-in tall and weighs 180 lb; she would prefer a smaller physique and expressed that she would like to lose about 30 lb. She does Pilates or yoga once a week and walks her dog for 30 minutes daily. Using the Estimated Energy Requirement equation, what are MR's energy needs to maintain her current weight? What energy requirement would support MR's weight loss goal?

Given that MR has just started HT and energy needs are often described in a range, it would be appropriate to express her energy needs in a range using the female and male values. To maintain her current weight, she would need 2,570 to 2,850 kcal/day. To support her weight loss goal with a 500-kcal/day deficit, she would need 2,070 to 2,350 kcal/day.

CONCLUSIONS

Multiple attributes of nutrition assessment rely on sex-specific reference values. This poses a unique question for nutrition and dietetics practitioners working with TGGD clients regarding when to use the male or female reference values. Although existing clinical care guidelines provide some guidance on the interpretation of lab values with sex-specific ranges, nutrition and dietetics practitioners must apply clinical reasoning to determine the most appropriate strategies based on the client's stage of medical transition and the nature of the reference value. Ongoing research is needed to inform the optimal approach to deliver gender-affirming nutrition care for TGGD clients.

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AUTHOR INFORMATION

Address correspondence to: Whitney Linsenmeyer, PhD, RD, LD, Department of Nutrition and Dietetics, Saint Louis University, 3437 Caroline St, St Louis, MO 63104. E-mail: Whitney.linsenmeyer@health.slu.edu

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