Role of Nutrition in Adolescent Health

Adolescence is a nutritionally vulnerable stage of life as a result of physical, physiological, lifestyle and social factors. Nutrition is a leading adolescent health challenge globally; the main problems are undernutrition, obesity, and iron deficiency anemia. Obesity is a greater challenge in high-income countries, while undernutrition constitutes a greater challenge in low- and middle-income countries (LMICs), although the level of obesity is also rapidly increasing in many LMICs. Early pregnancy exerts additional nutritional burden on adolescent girls. The prevalence of underweight among adolescent females (15–19 years) is as high as 34% in Niger and Senegal, 35% in Bangladesh, and 47% in India. This chapter reviews the current evidence about the social determinants of health (SDH) – the conditions in which people are born, grow, live, work and age – as regards adolescents and young women’s health and nutrition. Important structural determinants include macroeconomic and policy contexts (e.g. level of national wealth and inequity, youth unemployment level) and socioeconomic positions (e.g. income, gender, education). Intermediary determinants include material conditions, behavior and biological system, psychosocial factors, and the health system. Adolescent health policy and programmatic interventions need to take SDH into account in order to reduce inequities, and improve health and well-being.

Introduction

Adolescence is associated with rapid and profound changes in every realm of human development – physical, psychosocial, and mental. These changes have significant implications for nutritional behavior and outcomes. Physically, the growth rate in adolescence is only second to that in the first year of human life [1], and
nutrient needs are greatest in adolescence [2]. Adolescents’ eating habits, which are heavily influenced by the media and their perception of ideal body image, and lifestyles such as alcohol use also increase their nutritional vulnerability [3]. Early pregnancy adds to the burden of nutritional challenge for adolescent girls [3].

The leading nutritional challenges of adolescents globally are undernutrition, obesity, and iron deficiency anemia. The prevalence of underweight among adolescent girls (15–19 years) is as high as 34% in Niger and Senegal, 35% in Bangladesh, and 47% in India, while that of overweight is as high as 36% in Egypt and 37% in Turkey [4]. A recent analysis indicated that more than a quarter of adolescent girls aged 15–19 years in 11 of the 64 countries assessed are underweight, while more than a fifth of adolescent girls in 11 out of 58 countries are overweight. Furthermore, in 21 out of 41 countries for which data were analyzed, more than a third were anemic. A review of South East Asian countries noted that between 16 and 67% of adolescents are thin, while stunting rate ranged from 10 to 48% [5]. In a study of 13 European countries, Israel and the United States, the rate of obesity in adolescence was reported to be 5% [6].

Whereas many public health efforts focus on individual behaviors, social determinants of health (SDH) relate to factors that are beyond the control of the individual – social, economic, political, cultural and environmental determinants of health, which constitute the ‘causes of the causes’. In this chapter, we review the current evidence about SDH as regards adolescents and young women’s health and nutrition.

**The Concept of Social Determinants of Health**

The Commission on Social Determinants of Health (CSDH) defines SDH as ‘the conditions in which people are born, grow, live, work and age’ [7]. SDH has also been referred to as ‘the complex, integrated, and overlapping social structures and economic systems that include social and physical environments and health services’, which are shaped by the level of income, power, and resources at global, national, and local levels. These social structures and economic systems dictate to a large extent the degree to which an individual has access to opportunities and resources to protect, improve, and maintain their health. There is a moral imperative to address SDH to reduce inequities as well as improve health and well-being. Adolescence is particularly crucial in terms of SDH as it presents a second chance to address inequities [8, 9].

The CSDH framework, adopted for this paper (fig. 1) [10], departs from many previous models by conceptualizing the health system itself as an element of SDH. Briefly, the CSDH framework shows how the larger socioeconomic and
political context, which incorporates governance, macroeconomic, social and public policies as well as cultural and societal values, gives rise to and interacts with a set of socioeconomic positions, which are structural stratifiers. The most important structural stratifiers include social class, gender, ethnicity, education, occupation and income. Together, context, structural mechanisms and the resultant socioeconomic position of individuals constitute the ‘social determinants of health inequities’. These underlying SDH inequities operate through a set of intermediary determinants of health such as material circumstances, behavioral and biological factors and the health system to impact on equity in health and well-being. The terminologies of ‘structural determinants’ and ‘intermediary determinants’ underscore the causal priority of the structural factors [10].

**Social Determinants of Health in Adolescent Nutrition**

**Structural Determinants**

Within the context of the CSDH framework, structural mechanisms are those that generate stratification and social class divisions in the society and that de-
Socioeconomic and Political Context

A review of experiences in Eastern European countries that changed from communism to market-based economy showed that the macroeconomic and policy frameworks influence food availability and consumption pattern [11]. Policies of reducing or eliminating agricultural subsidies, agricultural trade liberalization, and elimination of food price subsidies affected the types of foods available, their absolute prices, and, more importantly their relative prices. Such changes are likely to particularly impact the low-income groups, including adolescents in low-paying jobs. A review of European studies noted that the level of childhood overweight and obesity appears higher in southern countries but lower in central and eastern countries that experienced political and economic transition [12]. Within developing countries, higher prevalence of obesity in adolescence was found in the oil-rich Middle East [13]. In Europe, countries with higher levels of social inequality tend to have the highest prevalence of adolescent obesity [14].

While their work did not specifically include nutritional outcomes, Viner et al. [8], based on ecological analyses, had reported that both greater national wealth and lower level of inequity are significantly associated with better health outcomes for adolescents across several domains, including reduced all-cause mortality and fewer teenage births. Low- and middle-income countries (LMICs) contribute disproportionately high level of adolescent mortality: adolescent mortality rate in LMICs (162/100,000) is more than three times the rate for high-income countries (45/100,000) [15]. Roskam et al. [16], based on the study of 19 European countries, have reported that with a EUR 10,000 increase in GDP per person, there was a 3% increase in overweight and obesity for men with a low level of education but a 4% decrease for those with a high level. Youth unemployment is an increasing challenge globally, and is associated with poor health outcomes among adolescents [17]. In Europe, for example, the rate of youth unemployment ranged from 7.9% in Germany to 52.7% in Greece in mid-2012 [18].

Socioeconomic Positions

Gender

In many LMICs, the nutritional needs of adolescent females have lower priority than those of males. In some parts of India, for example, girls are expected to eat with their mothers after all other family members have been served [19]; this practice may compromise both the quality and quantity of food available to the adolescent girl, particularly in low-income families. Adolescent girls have been reported to have greater nutritional deficit compared to males [5]. A study car-
ried out in Bangladesh has also reported that the intake of fish, meat, eggs, milk, legumes and fruits and vegetables was higher in boys compared to girls [19]. Ecological analyses suggest that countries with greater sex inequalities had poorer health outcomes for both male and female adolescents after the adjustment of data for national wealth [8].

Female gainful employment, autonomy, and decision-making power are an important gender issue, particularly for married adolescent girls who are often married off to much older men. Female earning has been reported to affect income elasticity of demand for food and other family consumables more directly than men’s earning [20]. However, there is a strong interaction between female income, autonomy and decision-making opportunities. Results of studies in Africa have shown that households in which women have a greater control over their income are more likely to be food secure compared to other households at similar levels of income [21].

Ethnicity
Available evidence strongly suggests that ethnicity impacts on adolescent health, and studies in many parts of the world have shown that ethnic minorities (particularly adolescents) are more vulnerable nutritionally and are at greater disadvantage in terms of socioeconomic and health well-being [22–24]. The argument has, however, been made that the association between ethnic origin and health outcomes may not be totally explained by the structural factors that lead to deprivation in the group, but also ‘relate to the differing cultural and religious norms and effects of discrimination’ [8].

Social Class and Income
Several studies have shown that socioeconomic class and income impact on nutritional status. Economic status and incomes are proxies of access to food of appropriate quantity and quality. Also, the economic status of the household signifies the degree to which individuals may have access to other factors that impact on nutritional outcomes, improved health services, water sources and sanitation facilities.

In general, the prevalence of undernutrition among adolescent girls from upper socioeconomic class is lower than among girls from poorer families, especially in LMICs. On the other hand, the relationship between socioeconomic condition and overnutrition is variable. Whereas higher rate of obesity is noted among adolescents from upper socioeconomic groups in LMICs, overweight and obesity may be associated with low-income families in high-income countries [25]. Robertson et al. [14] reported a strong negative association between obesity and socioeconomic class in western European countries: in particular, higher
prevalence of obesity was recorded among women and children in lower socioeconomic groups compared to richer populations. The authors suggested that about 20–25% of the risk of obesity among men and 40–50% among women in Europe can be attributed to differences in socioeconomic factors. While the observation in LMICs may likely be associated with availability and access to food, the picture in Europe and other high-income environments can be explained by exposure and vulnerability to obesogenic environment such as the availability and composition of fast food and ready meals. In general, adolescents from low-income families are more likely to skip meals and make less healthy food choices.

Education
Education is strongly correlated and positively associated with good nutritional outcomes in most studies. Education was found to be negatively associated with obesity in most European countries and adolescent undernutrition in LMICs. More educated women have a higher level of health literacy and are more knowledgeable on utilizing available resources for the improvement of their nutritional status and that of their family members [26].

Occupation
Occupation appears to influence nutritional outcome mainly though the income earned. Studies in Nigeria, for example, show that malnutrition is higher among families where the head of the household is primarily involved in agriculture, which is mostly subsistence farming and yields low income. Additionally, there may be also the contribution of poor level of education and working conditions as well as living environment. Adolescents who are engaged in physical jobs may have higher nutritional demand, and in the face of low pay, may tend to be undernourished.

Intermediary Determinants
The main categories of intermediary determinants of health are: material circumstances; psychosocial circumstances; behavioral and/or biological factors, and the health system itself as a social determinant.

Material Circumstances
In general, rural areas have poorer resources than urban areas, and studies have shown that rural dwellers have worse nutritional status compared to urban dwellers, especially in LMICs. Studies in Ethiopia, for example, have consistently shown that women in rural areas are more likely to suffer from chronic en-
ergy deficiency than women in urban areas [25]. Maternal nutritional status is worse in sub-Saharan Africa among rural-based women compared to urban women [25]. In a review of adolescent nutrition in South East Asia, the prevalence of thinness and stunting was found to be higher in rural areas compared to urban areas [5].

Behavioral and Biological Factors
Behavioral factors include nutritional habits, physical activity and other lifestyle practices that can impact on dietary intakes and subsequent physiological processing of food. Biological factors include genetic issues, rate of maturation and physiological processes such as pregnancy and disease states such as chronic health conditions.

Studies have shown that a variety of factors are associated with adolescent dietary patterns. In Greece, for example, the proportion of adolescent girls (age 15–16 years) who skip breakfast was double that of boys (24 vs. 12%) [27]. A study of adolescents in Iran showed that girls are more selective in their dietary behavior compared to boys, showing more discretion with regard to the taste and health aspect of foods as well as more concern for their body image [28]. In general, there is an increasing preference for fast foods, snacks and other processed foods by adolescents in many parts of the world, whereas more natural and traditional foods are often regarded as 'less fashionable and less classy'. This pattern is partially a reflection of the impact of media and globalization.

Psychosocial circumstances including stressful living circumstances as well as relationship dynamics may influence adolescent dietary pattern and nutritional outcomes. Family and peers also influence the choice of food and dietary patterns of adolescents. Adolescent dietary pattern may also be influenced by physiologic processes, the state of health and lifestyle factors such as alcohol.

Health System
The health system plays an important role in nutritional issues through efforts such as nutrition education, health promotion, and disease prevention, as well as the ability to mediate the different consequences of sickness and diseases in people’s lives.

Conclusion
Our findings show that several structural and intermediary determinants influence adolescent nutritional status and health outcomes. Of particular importance are the macroeconomic context, including the level of wealth and ineq-
uity, level of youth unemployment, gender, media influence, mother’s education, peer influence and health system actions. Policy and programmatic interventions regarding adolescent health need to integrate responses to these structural and intermediary factors to achieve optimal results. These must include evidence-driven efforts directed at improving knowledge and awareness about SDH, and strategic actions that blend health system response with relevant ones from other sectors to reduce inequities and improve the conditions in which people are born, grow, live, work and age. Finally, it is important to recognize that several gaps still exist regarding our knowledge of SDH and their impact on adolescent health. Thus, researchers must invest more efforts into assessing SDH and measuring the impact of related interventions to improve the health of adolescents locally and globally.

Disclosure Statement

The authors hereby declare that they have no conflicts of interest in relation to this chapter.

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