

Oxford Bibliographies

Your Best Research Starts Here



The Nutrition Transition

Daniel C. Ervin, David López-Carr, Anna Carla López-Carr

Introduction

The nutrition transition theory concerns the broad changes in the pattern of human diet that have occurred across time and space. The idea was created by Dr. Barry Popkin and arose from the demographic transition theory, which describes the changes in human birth and death patterns, and the epidemiological transition theory, which describes the changes in causes of death. The nutrition transition is described by five stages: food gathering, famine, receding famine, degenerative diseases, and behavioral change toward a healthy, balanced diet. Currently, the vast majority of the world's people remain in pattern 3 (receding famine) or pattern 4 (degenerative diseases). They are either emerging from undernutrition because of a lack of calories or certain nutrients or they are engaged in a modern form of malnutrition consisting of too-many calories from unhealthy sources. The modern diet of pattern 4 is high in oils, sugars, animal products, fat, cholesterol, sweeteners, and processed and prepared foods. The results of this transition are the diminishment of famine and the diseases that accompany it, which have plagued humankind for most of our existence. Unfortunately, this is complemented by the rapid growth of nutrition-related noncommunicable diseases (NR-NCDs). The most obvious of these is obesity, but it also includes diabetes, cardiovascular disease, cancer, and the metabolic syndrome. The transition to this new diet has already occurred throughout the developed world and is occurring in the developing nations at an alarming speed. However, the shift between eating patterns remains incomplete, and many places face both the diseases of undernutrition and malnutrition, the so-called double burden. The negative outcomes of these two patterns are exacerbated among the world's poor; both the poor portions of the developed world and the poor nations of the developing world. This topic is one that overlaps with many academic fields, including medicine, nutrition, public health, epidemiology, and demography. As geographers we will attempt to provide a broad introduction to the theory, but we believe that geography is a particularly relevant perspective. The nutrition transition is spatially heterogeneous; a slum household in a city may be in stage 2 of the transition, while a nearby luxury home may be in stage 5. Geography and geographical methods sensitive to spatial scale are therefore critical. Since much of the research on this topic is in public health, there is a great opportunity for geographers to become more active in solving existing nutrition paradoxes. This article will provide literature on the current status of nutrition transition throughout the world, with the greater focus on the newer pattern of malnutrition. This will include its causes, its effects, related concepts, responses, and future directions.

General Overviews

This section contains general overviews of the concept of the nutrition transition. Popkin 2002a is an article-length introduction to the theory, while Caballero and Popkin 2002 is a book-length treatment of the same topic. World Health Organization 2003 provides a more comprehensive and less academic perspective. Popkin 2002b represents an introduction to the particular issues developing countries face. In contrast to the rest of the sources in this section, Semba and Bloem 2008 and United Nations System Standing Committee on Nutrition 2010 concern mostly undernutrition.

Caballero, Benjamin, and Barry M. Popkin, eds. *The Nutrition Transition: Diet and Disease in the Developing World*. New York: Academic Press, 2002.

A book-long treatment of the nutrition transition, edited by two of the leading scholars in the field. Provides a global overview and more detail on selected topics of importance. An excellent book to begin your search, and perhaps all that is needed for the casual reader.

Popkin, Barry M. "An Overview on the Nutrition Transition and Its Health Implications: The Bellagio Meeting." *Public Health Nutrition* 5.1A (2002a): 93–103.

A short review of the theory of the nutrition transition, easily understood and replete with informative figures. Written by the preeminent scholar on the topic. Quickly sketches the outline of the nutrition transition as it has occurred in major regions of the world, discussing what is known and areas where data are lacking.

Popkin, Barry M. "The Shift in Stages of the Nutrition Transition in the Developing World Differs from Past Experiences!" *Public Health Nutrition* 5.1A (2002b): 205–214.

Spells out how and why the current nutrition transition process in the developing world is different than what occurred in the developed world. Good introduction to the issues affecting the developing world.

Semba, Richard D., and Martin W. Bloem, eds. *Nutrition and Health in Developing Countries*. Totowa, NJ: Humana Press, 2008.

An academic book providing information about undernutrition, although it does devote some time at the end to the nutrition-related noncommunicable diseases. A start to the topic of the global nutrition situation.

United Nations System Standing Committee on Nutrition. *Progress in Nutrition: 6th Report on the World Nutrition Situation*. Geneva, Switzerland: United Nations System, 2010.

An overview of the nutrition situation throughout much of the world, focused mostly on the problems of undernutrition.

World Health Organization. *Diet, Nutrition, and the Prevention of Chronic Diseases: Report of a Joint WHO/FAO Expert Consultation. Technical Report 916*. Geneva, Switzerland: World Health Organization, 2003.

A detailed report outlining how changes in diet have affected the morbidity of chronic diseases worldwide. A good reference work for this topic, and written in an accessible manner.

Background Reading

This literature provides an introduction to two concepts intertwined with the nutrition transition: the demographic transition theory and the epidemiologic transition theory. Kirk 1996 is an article-length overview of the demographic transition theory, while Caldwell and Caldwell 2006 is a broader and deeper book-length treatment of the same topic. Omran 1971 was the original publication detailing the epidemiologic transition theory. Salomon and Murray 2002 has a good review of the theory's evolution over time, as well as empirically testing the theory itself.

Caldwell, John C., and Bruce K. Caldwell. *Demographic Transition Theory*. Dordrecht, The Netherlands: Springer, 2006.

This book follows the demographic transition throughout human history, including projections into the future and speculations on the effects of low fertility. A thorough discussion of this broad topic.

Kirk, Dudley. “Demographic Transition Theory.” *Population Studies: A Journal of Demography* 50.3 (1996): 361–387.

An article-length overview of the demographic transition theory. Provides an excellent short introduction to the topic.

Omran, Abdel R. “The Epidemiologic Transition: A Theory of the Epidemiology of Population Change.” *Milbank Memorial Fund Quarterly* 49.4 (1971): 509–538.

The original article describing the theory of the epidemiologic transition. Provides a good start for the concept of how causes of death change over time and place as societies change.

Salomon, Joshua A., and Christopher J. L. Murray. “The Epidemiologic Transition Revisited: Compositional Models for Causes of Death by Age and Sex.” *Population and Development Review* 28.2 (2002): 205–228.

A good update on how this theory has evolved over time. The article also attempts to test this theory empirically. May be equation-heavy for introductory readers.

Causes

The nutrition transition is a complex phenomenon occurring in different ways around the globe. As such, a number of causes contribute to it: economic, political, social, biological, etc. This section of the article will cover a number of these causes that are active topics in the academic literature: Globalization, Sweeteners, Animal Products, Smaller Topics in Diet Composition, Poverty and Socioeconomic Status, and the Physical Environment.

GLOBALIZATION

Globalization relates to the idea of changing diet and human health in a number of complex ways, only some of which concern diet and nutrition directly. Huynen, et al. 2005 is an in-depth theoretical framework of the general idea of globalization and health. Kawachi and Wamala 2007 is a book-length treatment of globalization and health. Popkin 2006 and Hawkes 2006 specifically address the connections between globalization and the nutrition transition. Food and Agriculture Organization of the United Nations 2004 is a more thorough, book-length treatment of the connection between globalization and diet.

Food and Agriculture Organization of the United Nations, ed. *Globalization of Food Systems in Developing Countries: Impact on Food Security and Nutrition*. Papers presented at the workshop “Globalization of Food Systems: Impacts on Food Security and Nutrition” held at FAO headquarters in Rome from 8–10 October 2003. FAO Food and Nutrition Paper 83. Rome: Food and Agriculture Organization of the United Nations, 2004.

A comprehensive treatise on how globalization affects food systems, not all of which relate directly to the nutrition transition, but that are important for context. Text available online.

Hawkes, Corinna. “Uneven Dietary Development: Linking the Policies and Processes of Globalization with the Nutrition Transition, Obesity and Diet-Related Chronic Diseases.” *Globalization and Health* 2.1 (March 2006): 4.

Discusses how globalization influences the nutrition transition. This article and Popkin 2006 provide a start to the idea of globalization and nutrition change.

Huynen, Maud M. T. E., Pim Martens, and Henk B. M. Hilderink. "The Health Impacts of Globalisation: A Conceptual Framework." *Globalization and Health* 1.14 (August 2005).

A theoretical framework for grasping the complex concept of globalization and health, a good start to this topic.

Kawachi, Ichiro, and Sarah P. Wamala, eds. *Globalization and Health*. Oxford: Oxford University Press, 2007.

A thorough review of the connections between globalization and health, not all of which relate directly to the nutrition transition.

Popkin, Barry M. "Technology, Transport, Globalization and the Nutrition Transition Food Policy." *Food Policy* 31.6 (December 2006): 554–569.

Discusses some of globalization's many connections to the nutrition transition. This article and Hawkes 2006 provide a useful initiation to the coupled notion of globalization and nutrition change.

SWEETENERS

Increased sweetener consumption has emerged as an important component of the nutrition transition, and one that accounts for a large portion of the increased calories of malnutrition. Popkin and Nielsen 2003 is a brief overview of the contribution of sweeteners to the nutrition transition and an estimate of their role in the global diet. Guthrie and Morton 2000 calculates the source of added sweeteners in the US diet. One of the primary sources for increasing sweeteners in our diets is packaged drinks. Nielsen and Popkin 2004 discusses the amount of increase in beverage intake in the United States. Vartanian, et al. 2007 offers a review and meta-analysis of eighty-eight studies on the connection between soft-drink consumption and health effects, while Malik, et al. 2006 does the same for the connection between sweetened drinks and weight gain. Bray, et al. 2004 discusses the contribution of high-fructose corn syrup (HFCS) to obesity, a topic that has received much popular attention. This article includes some discussion of potential biological mechanisms linking HFCS to obesity. Forshee, et al. 2007 provides a counterpoint to Bray, et al. 2004, arguing that HFCS is no different than any other calorie source.

Bray, George A., Samara Joy Nielsen, and Barry M. Popkin. "Consumption of High-Fructose Corn Syrup in Beverages May Play a Role in the Epidemic of Obesity." *American Journal of Clinical Nutrition* 79.4 (April 2004): 537–543.

Discussion of the connection between HFCS and obesity, including possible biologic mechanisms.

Forshee, Richard A., Maureen L. Storey, David B. Allison, et al. "A Critical Examination of the Evidence Relating High Fructose Corn Syrup and Weight Gain." *Critical Reviews in Food Science and Nutrition* 47.6 (2007): 561–582.

A counterpoint to the negative views of HFCS. Argues that HFCS is no different than any other calorie source.

Guthrie, Joanne F., and Joan F. Morton. "Food Sources of Added Sweeteners in the Diets of Americans." *Journal of the American Dietetic Association* 100.1 (January 2000): 43–51.

A detailed study of exactly where sweeteners are located in the US diet, and a source for hard numbers about exactly where

sweeteners are added to the diet in the developed world.

Malik, Vasanti S., Matthias B. Schulze, and Frank B. Hu. "Intake of Sugar-Sweetened Beverages and Weight Gain: A Systematic Review." *American Journal of Clinical Nutrition* 84.2 (August 2006): 274–288.

A review article about sweetened beverages and their effects on weight gain. Concludes that sugar-sweetened beverages are consistently associated with weight gain, both for adults and children. The reviewed articles are also a good source for further references about this topic.

Nielsen, Samara Joy, and Barry M. Popkin. "Changes in Beverage Intake between 1977 and 2001." *American Journal of Preventive Medicine* 27.3 (October 2004): 205–210.

Information on the increase in beverage intake in the United States, a prime source of sweeteners. An introduction to the importance and perhaps unique effects of sweetened beverages on health.

Popkin, Barry M., and Samara Joy Nielsen. "The Sweetening of the World's Diet." *Obesity Research* 11.11 (2003): 1325–1332.

A good entry point to the topic of sweeteners and the nutrition transition. Provides an overview and global estimates.

Vartanian, Lenny R., Marlene B. Schwartz, and Kelly D. Brownell. "Effects of Soft Drink Consumption on Nutrition and Health: A Systematic Review and Meta-analysis." *American Journal of Public Health* 97.4 (April 2007): 667–675.

A meta-analysis of published articles about the connection between soft drinks and nutrition and health. Provides an overview of the academic literature.

ANIMAL PRODUCTS

An increase in animal products is another of the important factors in the nutrition transition. Meat consumption and production is a topic of some controversy because it touches on personal, social, and religious beliefs and has important ecological impacts. Also, meat production is a multibillion-dollar industry and therefore has wide-ranging economic and political ramifications. This article concerns itself solely with its effects on public health. Popkin 2009 and Walker, et al. 2005 provide an overview of the global health consequences of increased meat consumption. Delgado, et al. 1999 is a discussion of the many ways in which animal product consumption and production is changing, and the effects of this change. Speedy 2003 presents global statistics on animal product production and consumption, and Sinha, et al. 2009 describes a large study on the connection between cancer and meat consumption. Walker, et al. 2005 offers a critical evaluation of the effects of meat production and consumption. McAfee, et al. 2010 discusses the benefits as well as the risks, providing a counter to the previous articles.

Delgado, Christopher L., Mark Rosegrant, Henning Steinfeld, Simeon Ehui, and Claude Courbois. *Livestock to 2020: The Next Food Revolution. Food, Agriculture, and the Environment Discussion Paper 28*. Washington, DC: International Food Policy Research Institute, 1999.

A broad introduction to the topic of animal products. Contains some information not relevant to the topic of the nutrition transition and is a little dated, but it remains a valuable introduction.

McAfee, Alison J., Emeir M. McSorley, Geraldine J. Cuskelly, et al. "Red Meat Consumption: An Overview of the Risks and Benefits." *Meat Science* 84.1 (January 2010): 1–13.

A counterpoint to Sinha, et al. 2009, reviews some positives about the consumption of red meat, as well as evaluating some of the posited negative associations.

Popkin, Barry M. "Reducing Meat Consumption Has Multiple Benefits for the World's Health." *Archives of Internal Medicine* 169.6 (2009): 543–545.

A short overview on the topic of global health and meat consumption, a good place to begin.

Sinha, Rashmi, Amanda J. Cross, Barry I. Graubard, Michael F. Leitzmann, and Arthur Schatzkin. "Meat Intake and Mortality: A Prospective Study of over Half a Million People." *Archives of Internal Medicine* 169.6 (2009): 562–571.

A large study on the connection between meat consumption and mortality. An empirically sound study showing the negative consequences of meat consumption.

Speedy, Andrew W. "Global Production and Consumption of Animal Source Foods." *Journal of Nutrition* 133.11 (1 November 2003): 4048S–4053S.

An excellent source of statistics on the current global production and consumption of animal products.

Walker, Polly, Pamela Rhubart-Berg, Shawn McKenzie, Kristin Kelling, and Robert S. Lawrence. "Public Health Implications of Meat Production and Consumption." *Public Health Nutrition* 8.4 (2005): 348–356.

Another overview of the potential effects of meat on public health. Evaluates the effects of the production processes as well as the consumption of meat, which is rare in the literature.

SMALLER TOPICS IN DIET COMPOSITION

A defining concept of the nutrition transition is a change in the basic foodstuffs consumed. However, changes in amount, and where food is prepared and purchased, are also important. Briefel and Johnson 2004 offers a general discussion on how food consumption has changed in the United States. Young and Nestle 2002 covers the issue of increased portion size. Guthrie, et al. 2002 discusses the increase in consumption of food prepared outside the home. A growing subset of food prepared outside the home is fast food, and Pereira, et al. 2005 presents the results from a fifteen-year study evaluating the connection between fast food and nutrition-related noncommunicable diseases (NR-NCDs).

Briefel, Ronette R., and Clifford L. Johnson. "Secular Trends in Dietary Intake in the United States." *Annual Review of Nutrition* 24 (2004): 401–431.

General overview of diet changes in the United States. A good starting point for this topic because it provides some history.

Guthrie, Joanne F., Biing-Hwan Lin, and Elizabeth Frazao. "Role of Food Prepared away from Home in the American Diet, 1977–78 versus 1994–96: Changes and Consequences." *Journal of Nutrition Education and Behavior* 34.3 (2002): 140–150.

An overview of the changes in the consumption of food prepared away from the home in the United States.

Pereira, Mark A., Alex I. Kartashov, Cara B. Ebbeling, et al. "Fast-Food Habits, Weight Gain, and Insulin Resistance (the CARDIA Study): 15-Year Prospective Analysis." *Lancet* 365.9453 (January 2005): 36–42.

A large-scale, longitudinal study of how fast food is connected to nutrition-related noncommunicable diseases.

Young, Lisa R., and Marion Nestle. "The Contribution of Expanding Portion Sizes to the US Obesity Epidemic." *American Journal of Public Health* 92.2 (2002): 246–249.

A discussion of how increasing portion size factors into obesity and nutrition-related noncommunicable diseases. Nestle is one of the more well-known authors in the field of food studies.

POVERTY AND SOCIOECONOMIC STATUS

There is a close relationship between poverty and the negative effects of the nutrition transition both in developed and developing countries. The connection between poverty and undernutrition are fairly obvious, but the connection between poverty and malnutrition remains less so. This connection is so counterintuitive it is sometimes labeled the "food insecurity obesity paradox." Wang and Beydoun 2007 is a review article about obesity and socioeconomic status (SES) in the United States, providing an introduction to the topic in developed countries, while Monteiro, et al. 2004 does the same for the developing world. McLaren 2007 is a thorough review of the published literature in all countries. Peña and Bacallao 2000 is a book-length examination that provides an overview as well as a number of chapters about Latin America and the Caribbean. Wang 2001 provides information about global childhood obesity and its connection to SES. Drewnowski and Spector 2004 is an attempt to explain this phenomenon through economics, an active line of reasoning in the literature. Dinour, et al. 2007 reviews some of the proposed explanations for this phenomenon in the developed world.

Dinour, Lauren M., Dara Bergen, and Ming-Chin Yeh. "The Food Insecurity–Obesity Paradox: A Review of the Literature and the Role Food Stamps May Play." *Journal of the American Dietetic Association* 107.11 (2007): 1952–1961.

Reviews some of the proposed explanations for the "food insecurity–obesity paradox" in the developed world.

Drewnowski, Adam, and S. E. Spector. "Poverty and Obesity: The Role of Energy Density and Energy Costs." *American Journal of Clinical Nutrition* 79.1 (2004): 6–16.

An attempt at explaining the "food insecurity–obesity paradox" through economics. Drewnowski is one of the more active scholars in the study of the nutrition transition.

McLaren, Lindsay. "Socioeconomic Status and Obesity." *Epidemiologic Reviews* 29.1 (2007): 29–48.

A thorough review of the published literature both in the developing and developed world on the connection between SES and obesity.

Monteiro, Carlos A., Eryl C. Moura, Wolney L. Conde, and Barry M. Popkin. "Socioeconomic Status and Obesity in Adult Populations of Developing Countries: A Review." *Bulletin of the World Health Organization* 82.12 (2004): 940–946.

A review article about the relationship between socioeconomic status and obesity in the developing world.

Peña, Manuel, and Jorge Bacallao, eds. *Obesity and Poverty: A New Public Health Challenge*. Publicaciones Cientificas 576. Washington, DC: Pan American Health Organization, 2000.

A book-length examination of the connections between obesity and poverty. Provides a global overview as well as a number of chapters specifically about Latin America and the Caribbean.

Wang, Youfa. "Cross-National Comparison of Childhood Obesity: The Epidemic and the Relationship between Obesity and Socioeconomic Status." *International Journal of Epidemiology* 30.5 (2001): 1129–1136.

This article provides an introduction to the subtopic of global childhood obesity and its connection to SES.

Wang, Youfa, and May A. Beydoun. "The Obesity Epidemic in the United States—Gender, Age, Socioeconomic, Racial/Ethnic, and Geographic Characteristics: A Systematic Review and Meta-regression Analysis." *Epidemiologic Reviews* 29.1 (2007): 6–28.

A review of the published literature on the connection between obesity and demographic characteristics, including poverty and SES. A good beginning for those attempting to understand how the nutrition transition affects different populations within the developing world.

PHYSICAL ENVIRONMENT

The physical environment itself has an effect on people's diet and dietary outcomes. Increasing urbanization is strongly associated with the nutrition transition; Popkin 1999 and Mendez and Popkin 2004 are overviews of the connections between these two phenomena. One of the proposed connections between urbanization and nutrition-related noncommunicable diseases (NR-NCDs) is the lack of local access to healthful food, sometimes called the "food desert phenomenon." Much recent work has been published on the concept of food deserts, and the idea has even gained some political traction in the United States. Beaulac, et al. 2009 is a review of the published research on the topic and describes some of the issues that this topic faces, including inconsistent methods and shifting definitions. It concludes that there is evidence of the existence of food deserts in the United States, but not so in other developed countries. Whitacre, et al. 2009 provides a more in-depth review of food deserts, including methods and recommendations to combat this problem. Developing countries are shifting the way they purchase food to resemble that of the developing world, a change sometimes termed the supermarket revolution. Humphrey 2007 critically evaluates this concept. Another related idea is the reduction in physical activity that accompanies urbanization, a concept discussed in Monda 2007. Research has also been conducted in a more holistic manner on the effects of local environment on NR-NCDs. Lake and Townshend 2006 is a brief introduction to the idea of obesogenic environments, which is a holistic view of how the physical and sociocultural environment can affect one's obesity risk. Booth, et al. 2005 reviews other published work connecting obesity and the built environment.

Beaulac, Julie, Elizabeth Kristjansson, and Steven Cummins. "A Systematic Review of Food Deserts, 1966–2007." *Preventing Chronic Disease* 6.3 (June 2009).

A review of the research on the topic of food deserts, describing some of the issues that this topic faces, including inconsistent methods and shifting definitions. It concludes that there is evidence of the existence of food deserts in the United States, but not so in other developed countries.

Booth, Katie M., Megan M. Pinkston, and Walker S. Carlos Poston. "Obesity and the Built Environment." In *Supplement: Obesity: Etiology, Treatment, Prevention, and Applications in Practice. Journal of the American Dietetic Association* 105.5 (May 2005): 110–117.

A review of recent literature connecting obesity and the built environment.

Humphrey, John. "The Supermarket Revolution in Developing Countries: Tidal Wave or Tough Competitive Struggle?" *Journal of Economic Geography* 7.4 (July 2007): 433–450.

A critical evaluation of the concept of the supermarket revolution.

Lake, Amelia, and Tim Townshend. "Obesogenic Environments: Exploring the Built and Food Environments." *Perspectives in Public* 126.6 (November 2006): 262–267.

An introduction to the concept of obesogenic environments, which is a holistic view of how the physical and sociocultural environment can affect one's obesity risk.

Mendez, Michelle A., and Barry M. Popkin. "Globalization, Urbanization and Nutritional Change in the Developing World." Paper presented at the workshop "Globalization of Food Systems: Impacts on Food Security and Nutrition," held at FAO headquarters in Rome, 8–10 October 2003. In *Globalization of Food Systems in Developing Countries: Impact on Food Security and Nutrition*. Edited by Food and Agricultural Organization of the United Nations, 55–80. FAO Food and Nutrition Paper 83. Rome: Food and Agriculture Organization of the United Nations, 2004.

An overview of the connection between urbanization and the nutrition transition.

Monda, Keri L., Penny Gordon-Larsen, June Stevens, and Barry M. Popkin. "China's Transition: The Effect of Rapid Urbanization on Adult Occupational Physical Activity." *Social Science & Medicine* 64.4 (February 2007): 858–870.

An example of how urbanization and the changed physical environment affect physical activity.

Popkin, Barry M. "Urbanization, Lifestyle Changes and the Nutrition Transition." *World Development* 27.11 (November 1999): 1905–1916.

An overview of the connections between urbanization and the nutrition transition.

Whitacre, Paula, Peggy Tsai, and Janet Mulligan. *The Public Health Effects of Food Deserts: Workshop Summary*. Papers presented at a workshop convened by the Institute of Medicine and the National Research Council on 26–27 January 2009 in Washington, DC. Washington, DC: National Academies Press, 2009.

A workshop summary that provides a thorough introduction to the concept of food deserts. Includes definitions, methods of analysis, and recommendations to combat this problem. Text available online.

Effects

As populations move from pattern 3 of ending undernutrition and into pattern 4 of malnutrition, they trade in one set of health conditions for another. The condition most commonly associated with pattern 4 is Obesity. As the most obvious and physically visible outcome of malnutrition, this condition has garnered the most attention. The discussion of obesity is often used as a stand-in for the entire suite of nutrition-related noncommunicable diseases (NR-NCDs). In fact, obesity is positively correlated with almost all other NR-NCDs, making it both conceptually and biologically the primary outcome of malnutrition. However, there are a number of other outcomes, and this section of the article also covers the most prominent of these Other Health Effects as well as effects on Children and the concept of the Double or Dual Burden.

OBESITY

Obesity is the most commonly associated negative outcome of the nutrition transition. Popkin and Gordon-Larsen 2004 is an article-length treatment of the global obesity situation, while World Health Organization 2000 is a more thorough, book-length overview. Wang and Beydoun 2007 is a review of the current status of obesity in the United States and includes future predictions and an examination of related issues. Most of the cases of obesity are now in the developing world, and Prentice 2006 discusses obesity in developing countries. Yoon, et al. 2006 is a good resource for the topic of obesity and diabetes in Asia, while Uauy, et al. 2001 covers obesity in Latin America.

Popkin, Barry M., and Penny Gordon-Larsen. "The Nutrition Transition: Worldwide Obesity Dynamics and Their Determinants." *International Journal of Obesity* 28.S3 (2004): S2–S9.

An overview of the global obesity situation and the nutrition transition. A good introduction to this topic.

Prentice, Andrew M. "The Emerging Epidemic of Obesity in Developing Countries." *International Journal of Epidemiology* 35.1 (February 2006): 93–99.

An overview of obesity in developing countries, provides current statistics as well as discussing the underweight/overweight household and the double or dual burden, both issues particularly important for developing countries.

Uauy, Ricardo, Cecilia Albala, and Juliana Kain. "Obesity Trends in Latin America: Transiting from Under- to Overweight." *Journal of Nutrition* 131.3 (1 March 2001): 893S–899S.

A brief overview of the obesity situation in Latin America, with special attention to indigenous people.

Wang, Youfa, and May A. Beydoun. "The Obesity Epidemic in the United States—Gender, Age, Socioeconomic, Racial/Ethnic, and Geographic Characteristics: A Systematic Review and Meta-regression Analysis." *Epidemiologic Reviews* 29.1 (January 2007): 6–28.

A discussion of obesity in the United States. An article review and meta-analysis of other published work on the topic. Includes the different effects on different populations.

World Health Organization. *Obesity: Preventing and Managing the Global Epidemic*. WHO Technical Report 894. Geneva, Switzerland: World Health Organization, 2000.

A book-length overview of the global obesity situation at the turn of the 21st century, from a public health and policy perspective. A reputable source for those who would like an in-depth review of this idea.

Yoon, Kun-Ho, Jin-Hee Lee, Ji-Won Kim, et al. "Epidemic Obesity and Type 2 Diabetes in Asia." *Lancet* 368.9548 (2006): 1681–1688.

An overview of the situation in Asia. Provides current statistics, issues, and recommendations.

OTHER HEALTH EFFECTS

Malnutrition has health consequences beyond obesity; this portion of the article will provide sources for the most prominent of them. After obesity, diabetes is the NR-NCD most commonly associated with the nutrition transition. Bonow and Gheorghiadu 2004 and Zimmet, et al. 2001 are article-length introductions to the global topic of diabetes. Yusuf, et al. 2001 concerns the global incidence of cardiovascular disease, and its connection to the nutrition transition. Feigin, et al. 2003 provides statistics about the global incidence of stroke. There are some links between the nutrition transition and cancer, although this is usually viewed through the mechanism of obesity and high body mass index (BMI) readings. Renehan, et al. 2008 provides a meta-review of the connection between BMI and cancer and is a good source for statistics about correlation between the two conditions. World Cancer Research Fund and American Institute for Cancer Research 2007 presents a book-length examination of the connection between cancer and the nutrition transition. The metabolic syndrome (also known as syndrome X) is an attempt to collect and classify a cluster of health disorders, all of which are associated with the nutrition transition. Eckel, et al. 2005 is a well-written though technical introduction to this topic. Kahn, et al. 2005 is a starting point for the critical discussion of the varying definitions of this syndrome and its usefulness; it is helpful in understanding the arguments that surround this concept.

Bonow, Robert O., and Mihai Gheorghiadu. "The Diabetes Epidemic: A National and Global Crisis." *American Journal of Medicine* 116.S5A (March 2004): 2S–10S.

An accessible, article-length overview of the global diabetes epidemic. Contains some information on the current morbidity of the disease, and its relationship to other NR-NCDs.

Eckel, Robert H., Scott M. Grundy, and Paul Z. Zimmet. "The Metabolic Syndrome." *Lancet* 365.9468 (2005): 1415–1428.

An introduction to the metabolic syndrome, from the medical standpoint. Includes a discussion of different definitions. A good, though technical, introduction to the topic.

Feigin, Valery L., Carlene M. M. Lawes, Derrick A. Bennett, and Craig S. Anderson. "Stroke Epidemiology: A Review of Population-Based Studies of Incidence, Prevalence, and Case-Fatality in the Late 20th Century." *Lancet Neurology* 2.1 (January 2003): 43–53.

An article about the global incidence of stroke. Provides a good source for statistics on this condition, which experts argue remains understudied.

Kahn, Richard, John Buse, Ele Ferrannini, and Michael Stern. "The Metabolic Syndrome: Time for a Critical Appraisal; Joint Statement from the American Diabetes Association and the European Association for the Study of Diabetes." *Diabetes Care* 28.9 (2005): 2289–2304.

A critical discussion of the varying definitions of this syndrome and its usefulness. Helpful in understanding the argument that surrounds this concept.

Rehman, Andrew G., Margaret Tyson, Matthias Egger, Richard F. Heller, and Marcel Zwahlen. "Body-Mass Index and Incidence of Cancer: A Systematic Review and Meta-analysis of Prospective Observational Studies." *Lancet* 371.9612 (2008): 569–578.

A meta-review of the connection between BMI and cancer. A good source for statistics about correlations between the two conditions.

World Cancer Research Fund and American Institute for Cancer Research. *Food, Nutrition, Physical Activity, and the Prevention of Cancer: A Global Perspective*. Washington, DC: WCRF/AICR, 2007.

A book-length examination of the connection between cancer and the nutrition transition. Provides thorough, in-depth coverage of this topic.

Yusuf, Salim, Srinath Reddy, Stephanie Ôunpuu, and Sonia Anand. "Global Burden of Cardiovascular Diseases, Part I: General Considerations, the Epidemiologic Transition, Risk Factors, and Impact of Urbanization." *Circulation* 104.22 (November 2001): 2746–2753.

Provides an introduction to the global progress of cardiovascular diseases.

Zimmet, Paul, K. G. M. M. Alberti, and Jonathan Shaw. "Global and Societal Implications of the Diabetes Epidemic." *Nature* 414.6865 (2001): 782–787.

A short but technical overview of the global diabetes epidemic. A good introduction to the topic.

CHILDREN

The effect both of undernutrition and malnutrition on children is a subtopic that has garnered much attention, both from the rapid spread of obesity within children themselves, and from its eventual effects on adult health. Black, et al. 2008 and Victora, et al. 2008 are two articles in series that provide a good introduction to the short-term and long-term effects of undernutrition in children. Lobstein, et al. 2004 is an introduction to the particular effects of malnutrition in children. Ogden, et al. 2012 presents morbidity statistics for obesity in children in the United States, while Onis and Blössner 2000 does the same for developing countries. Parsons, et al. 1999 details how childhood conditions affect adult outcomes of NR-NCDs. Ebbeling, et al. 2002 provides some policy recommendations for the future. Weiss, et al 2004 concerns an empirical study about obesity and the metabolic syndrome in children and adolescents. This article supports the connection between obesity in children and long-term negative health outcomes.

Black, Robert E., Lindsay H. Allen, Zulfiqar A. Bhutta, et al. "Maternal and Child Undernutrition: Global and Regional Exposures and Health Consequences." *Lancet* 371.9608 (2008): 243–260.

A review of the global effects of undernutrition on maternal and child health. A companion piece to Victora, et al.2008.

Ebbeling, Cara B., Dorota B. Pawlak, and David S. Ludwig. "Childhood Obesity: Public-Health Crisis, Common Sense Cure." *Lancet* 360.9331 (August 2002): 473–482.

A short overview on childhood obesity. Nontechnical and includes recommendations for the future.

Lobstein, Tim, Louise Baur, and Ricardo Uauy. "Obesity in Children and Young People: A Crisis in Public Health." *Obesity Reviews* 5.S1 (2004): 4–85.

A good introduction to the concept of obesity and children.

Ogden, Cynthia L., Margaret D. Carroll, Brian K. Kit, and Katherine M. Flegal. "Prevalence of Obesity and Trends in Body Mass Index among US Children and Adolescents, 1999–2010." *JAMA* 307.5 (February 2012): 483–490.

Reviews the trends for obesity among children within the United States.

Onis, Mercedes de, and Monika Blössner. "Prevalence and Trends of Overweight among Preschool Children in Developing Countries." *American Journal of Clinical Nutrition* 72.4 (October 2000): 1032–1039.

Information and statistics about obesity in young children in developing countries.

Parsons, Tessa J., Christine Power, S. Logan, and Carolyn D. Summerbell. "Childhood Predictors of Adult Obesity: A Systematic Review." *International Journal of Obesity and Related Metabolic Disorders* 23.S8 (1999): S1–S107.

A meta-review of how behavior in childhood affects adult obesity and other related disorders.

Victora, Cesar G., Linda Adair, Caroline Fall, et al. "Maternal and Child Undernutrition: Consequences for Adult Health and Human Capital." *Lancet* 371.9609 (2008): 340–357.

Discusses the long-term effects and societal impact of maternal and child undernutrition. A companion piece to Black 2008.

Weiss, Ram, James Dziura, Tania S. Burgert, et al. "Obesity and the Metabolic Syndrome in Children and Adolescents." *New England Journal of Medicine* 350.23 (2004): 2362–2374.

An empirical study about obesity and the metabolic syndrome in children and adolescents. Provides hard evidence that obesity in children leads to long-term negative health outcomes.

DOUBLE OR DUAL BURDEN

The transition from undernutrition to malnutrition is occurring rapidly in developing countries, causing some locations to suffer a high incidence of infectious disease and chronic disease at the same time; the so-called double burden or dual burden. This concept is also sometimes referred to as the nutrition transition paradox. In developing countries people are malnourished in terms of quality and quantity of food. Urban food insecurity can be understood through an impoverished household's need to buy more calories per monetary unit. In cities this is most likely accomplished by purchasing foods that are cheap, mass produced, and high in saturated fats and oils. The source of these foods is the mobile, informal food vending economy, although processed and packaged foods are growing in importance. Developing countries face a double edged sword. Unable to afford the healthiest foods, the urban population is dependent on cheap fats and sugars, leading to increasing morbidity due to nutrition-related disease. At the same time, the majority of urban people still lack adequate health care and the wherewithal to seek preventative measures or treatment. Therefore, while diet-related disease is increasing, it is going untreated by health systems which are too underfunded to cope and by populations that are not well-informed about the health risks of their daily food intake. Caballero 2005 serves as introduction to the concept. The Food and Agriculture Organization of the United Nations 2006 is a more thorough source, providing evidence from different countries. Doak, et al. 2005 discusses the phenomenon of

underweight and overweight members of the same household. Galal 2002 discusses this issue in Egypt, where the dual burden is an important issue.

Caballero, Benjamin. “A Nutrition Paradox—Underweight and Obesity in Developing Countries.” *New England Journal of Medicine* 352.15 (2005): 1514–1516.

An introduction to the concept of the nutrition paradox, by one of the more active researchers in the topic.

Doak, Colleen M., Linda S. Adair, Margaret Bentley, Carlos Monteiro, and Barry M. Popkin. “The Dual Burden Household and the Nutrition Transition Paradox.” *International Journal of Obesity* 29.1 (2005): 129–136.

A discussion of how undernutrition and malnutrition can exist in the same household.

Food and Agriculture Organization of the United Nations. *The Double Burden of Malnutrition: Case Studies from Six Developing Countries.* *FAO Food and Nutrition Paper 84.* Rome: Food and Agriculture Organization of the United Nations, 2006.

A thorough review of the idea of the double burden. Also includes case studies from six countries.

Galal, Osman M. “The nutrition transition in Egypt: obesity, undernutrition and the food consumption context.” *Public Health Nutrition* 5.1A (2002): 141-148.

An example of the negative impact of the nutrition transition on an urbanizing developing country.

Responses

The proposed responses to dealing with the negative consequences of nutrition transition are numerous and varied. This section provides some examples of proposed responses to the current situation. Huang, et al. 2009 argues that to respond effectively to this complex issue we must adopt a systems view. Drewnowski and Darmon 2005 views the situation from an economic angle and proposes policy responses. James, et al. 2004 calls for a comprehensive policy approach. Swinburn and Egger 2002 argues for a population-based approach instead of individual approaches. Wadden, et al. 2002 discusses the “toxic environment” of the modern world and tackles the issue from a psychological and environment viewpoint. Mello, et al. 2006 discusses the role of the law in prevention of obesity. Nestle and Jacobson 2000 argues for a policy response to the obesity epidemic. Gortmaker, et al. 2011 presents a further set of recommendations and responses from a group of concerned researchers.

Drewnowski, Adam, and Nicole Darmon. “Food Choices and Diet Costs: An Economic Analysis.” *Journal of Nutrition* 135.4 (2005): 900–904.

One of a number of works that Drewnowski has authored on the nutrition transition from an economic vantage point.

Gortmaker, Steven L., Boyd A. Swinburn, David Levy, et al. “Changing the Future of Obesity: Science, Policy, and Action.” *Lancet* 378.9793 (2011): 838–847.

A multipart proposal for the future, by a collection of well-known researchers in the field. Advocates a systems view, policy responses, and funding for prevention, as well as more monitoring.

Huang, Terry T., Adam Drewnoski, Shiriki K. Kumanyika, and Thomas A. Glass. "A Systems-Oriented Multilevel Framework for Addressing Obesity in the 21st Century." *Preventing Chronic Disease* 6.3 (2009): A82.

The nutrition transition and obesity are complex topics. This article asserts that we must view them from a system standpoint in order to respond effectively.

James, Philip T., Neville Rigby, and Rachel Leach. "The Obesity Epidemic, Metabolic Syndrome and Future Prevention Strategies." *European Journal of Cardiovascular Prevention & Rehabilitation* 11.1 (2004): 3–8.

Some prevention ideas from a policy perspective.

Mello, Michelle M., David M. Studdert, and Troyen A. Brennan. "Obesity—The New Frontier of Public Health Law." *New England Journal of Medicine* 354.24 (2006): 2601–2610.

This article is an introduction to legal responses to an increase in obesity, a growing source of conflict as groups call for soda taxes and areas look to ban or label particular foods.

Nestle, Marion, and Michael F. Jacobson. "Halting the Obesity Epidemic: A Public Health Policy Approach." *Public Health Reports* 115.1 (2000): 12–24.

Nestle is one of the best-known academics in the food studies field and has written extensively about food policy. This article is one of her many responses to the growing obesity epidemic.

Swinburn, Boyd, and Garry Egger. "Preventive Strategies against Weight Gain and Obesity." *Obesity Reviews* 3.4 (2002): 289–301.

An argument for fighting obesity, by using population-based approaches.

Wadden, Thomas A., Kelly D. Brownell, and Gary D. Foster. "Obesity: Responding to the Global Epidemic." *Journal of Consulting and Clinical Psychology* 70.3 (2002): 510–525.

A viewpoint from psychology. Calls for a fight against the "toxic environment" and for more research to be done.

New Directions

This final section of the article attempts to identify what the future holds for the nutrition transition, as well as some emerging directions in this field of research. Olshansky, et al. 2005 and Wang, et al. 2008 offer some predictions about how the nutrition transition will affect the United States in the future. Despite some of the calls for policy- or population-based responses to malnutrition presented in the Responses section, medical and individual treatments for the effects of malnutrition are rapidly increasing. Surgery is one increasingly popular response to nutrition-related noncommunicable diseases (NR-NCDs), and Buchwald, et al. 2004 is a meta-analysis about the literature on this topic. Rucker, et al. 2007 is a meta-analysis of another

emerging direction in treatment for obesity: pharmacotherapy. Sofi, et al. 2008 is a meta-review of another hot topic in nutrition: the Mediterranean diet. Badman and Flier 2005 proposes that more research into the intestine and organs may lead to novel treatments for obesity. Gibbs 2005 provides an entry into some recent literature that suggests that obesity may be less of a serious issue than was previously thought. Godfray, et al. 2010 is a theme issue of the *Philosophical Transactions of the Royal Society B*. A special open-access version of the journal, it contains twenty articles on various topics by experts in the field. The intent is to predict how food production will change by 2050, or how it should change to meet the rising demand. It covers a diverse array of topics already discussed in the current article, such as urbanization, consumption, livestock, globalization, and the connection between food production and public health. It also contains a number of new topics such as aquaculture, food pricing, food waste, and water. An excellent read to learn about the current state of food production and how it might change in the future.

Badman, Michael K., and Jeffrey S. Flier. "The Gut and Energy Balance: Visceral Allies in the Obesity Wars." *Science* 307.5717 (25 March 2005): 1909–1914.

An introduction into the connection between the intestine and associated visceral organs and obesity. Provides an overview of the current knowledge on the subject, as well as discussing some possible future obesity therapies.

Buchwald, Henry, Yoav Avidor, Eugene Braunwald, et al. "Bariatric Surgery: A Systematic Review and Meta-analysis." *JAMA* 292.14 (2004): 1724–1737.

Surgery to counter the effects of malnutrition is increasingly common in the developing world. This article is a review and meta-analysis about bariatric surgery as a treatment for obesity.

Gibbs, W. Wayt. "Obesity: An Overblown Epidemic?" *Scientific American* 292.6 (2005): 70–77.

A counterpoint to much of the published literature on obesity. This article collects some non-mainstream viewpoints that argue the obesity epidemic is overstated.

Godfray, H. Charles J., John R. Beddington, Ian R. Crute, et al. eds. Theme Issue: Food Security: Feeding the World in 2050. *Philosophical Transactions of the Royal Society B: Biological Sciences* 365.1554 (27 September 2010).

A special theme issue of the *Philosophical Transactions of the Royal Society B*. It contains twenty articles on various topics by experts in the field. The intent is to predict how food production will change by 2050, or how it should change to meet the rising demand. Covers a diverse array of topics.

Olshansky, S. Jay, Douglas J. Passaro, Ronald C. Hershow, et al. "A Potential Decline in Life Expectancy in the United States in the 21st Century." *New England Journal of Medicine* 352.11 (2005): 1138–1145.

A discussion of what the nutrition transition may mean for life expectancy. Provides some predictions about the future.

Rucker, Diana, Raj Padwal, Stephanie K. Li, Cintia Curioni, and David C. W. Lau. "Long Term Pharmacotherapy for Obesity and Overweight: Updated Meta-analysis." *BMJ* 335.7631 (2007): 1194–1199.

A meta-analysis of research that looked at various drug treatments for obesity. Concludes that there has been some modest success.

Sofi, Francesco, Francesca Cesari, Rosanna Abbate, Gian Franco Gensini, and Alessandro Casini. "Adherence to Mediterranean Diet and Health Status: Meta-analysis." *BMJ* 337.7671 (2008): 673–675.

A meta-analysis of research examining the connection between the Mediterranean diet and health effects, including morbidity. It concludes that this diet is associated with significant improvements in a number of indicators of health, including morbidity.

Wang, Youfa, May A. Beydoun, Benjamin Caballero, Lan Liang, and Shiriki K. Kumanyika. "Will All Americans Become Overweight or Obese? Estimating the Progression and Cost of the US Obesity Epidemic." *Obesity* 16.10 (2008): 2323–2330.

A discussion of the future trends of obesity, as well as some economic ramifications of this prediction.

LAST MODIFIED: 06/25/2013

DOI: 10.1093/OBO/9780199874002-0078

BACK TO TOP

Copyright © 2014. All rights reserved.