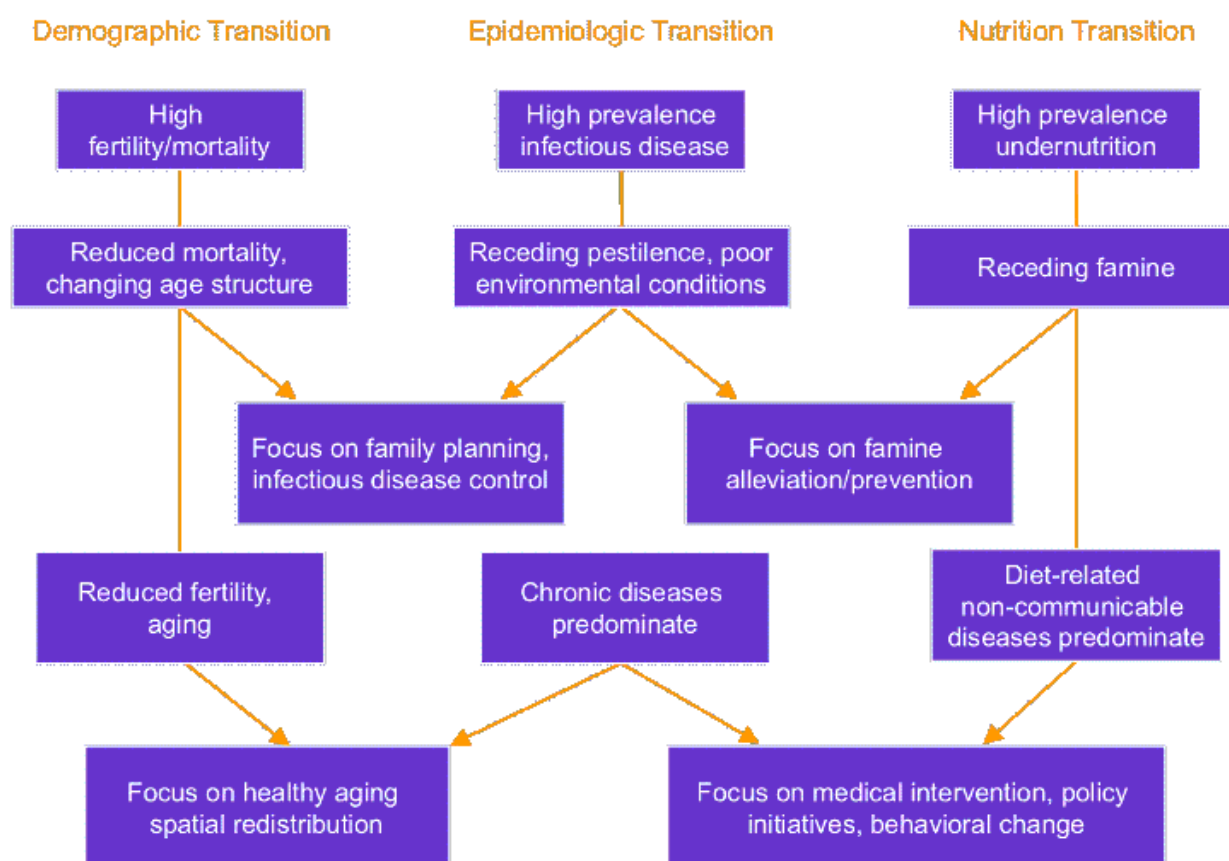


## What is the Nutrition Transition?

Two historic processes of change occur simultaneous to or precede the nutrition transition. One is the demographic transition: the shift from a pattern of high fertility and high mortality to one of low fertility and low mortality (typical of modern industrialized countries). Even more directly relevant is the epidemiologic transition, first described by Omran<sup>1</sup>: the shift from a pattern of high prevalence of infectious diseases associated with malnutrition, and periodic famine and poor environmental sanitation, to a pattern of high prevalence of chronic and degenerative diseases associated with urban-industrial life styles. A third pattern of delayed degenerative diseases has been more recently formulated (e.g., Olshansky and Ault<sup>2</sup>). Accompanying this progression is a major shift in age-specific mortality patterns and a consequent increase in life expectancy. Interpretations of the demographic and epidemiologic transition share a focus with the nutrition transition on the ways in which populations move from one pattern to the next. Similarly, large shifts have occurred in dietary and physical activity and inactivity patterns. These changes are reflected in nutritional outcomes, such as changes in average stature and body composition. Modern societies seem to be converging on a pattern of diet high in saturated fat, sugar, and refined foods and low in fiber - often termed the "Western diet." Many see this dietary pattern to be associated with high levels of chronic and degenerative diseases and with reduced disability-free time. These three relationships are presented in Figure 1.

**Figure 1: Stages of Health, Nutritional, and Demographic Change**



Human diet and activity patterns and nutritional status have undergone a sequence of major shifts, defined as broad patterns of food use and their corresponding nutrition-related diseases. Over the last three centuries, the pace of dietary and activity change appears to have accelerated, to varying degrees in different regions of the world. Further, dietary and activity changes are paralleled by major changes in health status, as well as by major demographic and socioeconomic changes. Obesity emerges early in these shifting conditions as does the level and age composition of morbidity and mortality. We can think of five broad nutrition patterns. They are not restricted to particular periods of human history. For convenience, the patterns are outlined as historical developments; however, "earlier" patterns are not restricted to the periods in which they first arose, but continue to characterize certain geographic and socioeconomic subpopulations.

#### Pattern 1: Collecting Food

This diet, which characterizes hunter-gatherer populations, is high in carbohydrates and fiber and low in fat, especially saturated fat<sup>3,4</sup>. The proportion of polyunsaturated fat in meat from wild animals is significantly higher than in meat from modern domesticated animals<sup>5</sup>. Activity patterns are very high and little obesity is found among hunter-gatherer societies. It is important to note that much of the research on hunter-gatherers is based on modern hunter-gatherers as there is much less evidence on pre-historic people.

#### Pattern 2: Famine

The diet becomes much less varied and subject to larger variations and periods of acute scarcity of food. These dietary changes are hypothesized to be associated with nutritional stress and a reduction in stature (estimated by some at about 4 inches<sup>6,7</sup>). During the later phases of this pattern, social stratification intensifies, and dietary variation increases according to gender and social status<sup>8</sup>. The pattern of famine (as with each of the patterns) has varied over time and space. Some civilizations are more successful than others in alleviating famine and chronic hunger, at least for their more privileged citizens<sup>9</sup>. The types of physical activities changed but there was little change in activity levels during this period.

#### Pattern 3: Receding Famine

The consumption of fruits, vegetables, and animal protein increases, and starchy staples become less important in the diet. Many earlier civilizations made great progress in reducing chronic hunger and famines, but only in the last third of the last millennium have these changes become widespread, leading to marked shifts in diet. However, famines continued well into the eighteenth century in portions of Europe and remain common in some regions of the world. Activity patterns start to shift and inactivity and leisure becomes a part of the lives of more people.

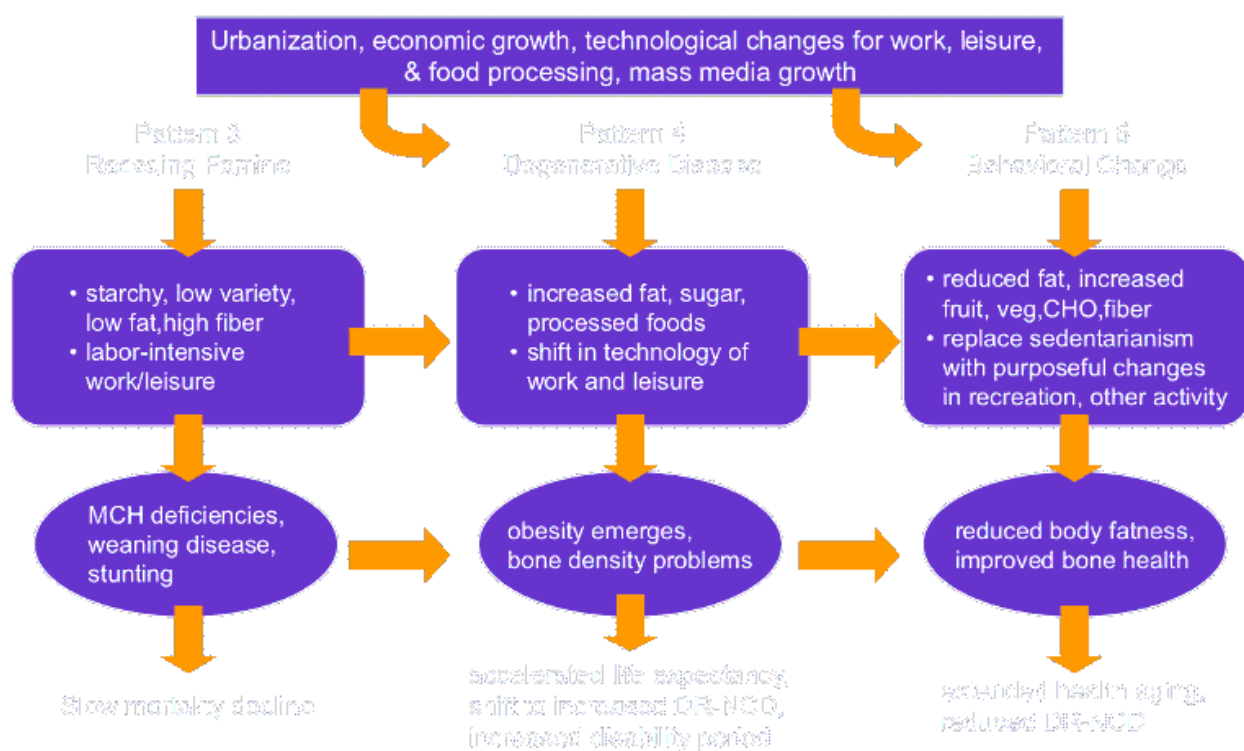
#### Pattern 4: Nutrition-related Noncommunicable Disease(NR-NCD)

A diet high in total fat, cholesterol, sugar, and other refined carbohydrates and low in polyunsaturated fatty acids and fiber, and often accompanied by an increasingly sedentary life, is characteristic of most high-income societies (and increasing portions of the population in low-income societies), resulting in increased prevalence of obesity and contributing to the degenerative diseases that characterize Omran's final epidemiologic stage.

### Pattern 5: Behavioral Change

A new dietary pattern appears to be emerging as a result of changes in diet, evidently associated with the desire to prevent or delay degenerative diseases and prolong health. Whether these changes, instituted in some countries by consumers and in others also prodded by government policy, will constitute a large-scale transition in dietary structure and body composition remains to be seen<sup>10-12</sup>. If such a new dietary pattern takes hold, it may be very important in enhancing "successful aging", that is, postponing infirmity and increasing the disability free life expectancy<sup>13,14</sup>. Our focus is increasingly on patterns 3 to 5, in particular on the rapid shift in much of the world's low and moderate income countries from the stage of receding famine to NR-NCD. Figure 2 presents this focus. The concern about this period is so great that the term the Nutrition Transition is synonymous for many, with this shift from Pattern 3 to 4.

**Figure 2. Stages of the Nutrition Transition**



Source: Barry Popkin (2002) "Introduction..." Public Health Nutrition 5

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## Overview

Rapid socioeconomic, demographic, and technological change, often linked with increasing globalization, is explained by a vast array of shifts in our way of living and doing commerce. These shifts have led to an ever increasing rate of change of dietary, activity, and body composition patterns around the world. The pace of dietary and physical activity change has accelerated to varying degrees in different regions of the world. Examining the patterns of change in dietary and physical activity patterns and nutritional status, and exploring their relationships with economic, social, demographic, and health factors, will improve our understanding of the causes of change and their consequences for health and economic well-being.

The Nutrition Transition Program of [UNC-CH](#), housed at [The Carolina Population Center](#), is developing a series of longitudinal surveys and studies coupled with ecological and other cross-

sectional research. The goal is to further our understanding of the patterns, determinants, consequences, and program and policy options for dealing with the transition. Emphasis is placed on the shift of countries and large populations into the stage of the nutrition transition associated with high levels of nutrition-related noncommunicable diseases (NR-NCD). We use "nutrition" rather than diet, so the term NR-NCD incorporates the effects of physical activity and body composition rather than solely focusing on dietary patterns and their effects. The NR-NCD's were once referred to as diseases of affluence. For decades, however, NR-NCD's have affected all income levels among more affluent countries. As we now show in our research, NR-NCD's are increasing at all income levels in the lower- and middle-income countries as well

<http://www.nutrans.org/whatis.html>

## The Nutrition Transition and its Implications for Health in the Developing World

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The nutrition transition, marked by rapid shifts toward the Nutrition Transition Pattern characterized by increased inactivity and obesity, has occurred along with other rapid social and economic changes in the developing world. The complex interplay among the demographic, nutrition, and epidemiological transitions has led to increases in morbidity and mortality due to several noncommunicable diseases.

[Private website](#) (password protected) for Bellagio conference participants.

Bellagio Conference

August 20-24, 2001, Bellagio, Italy

Followed by a symposium at the International Congress of Nutrition in Vienna, Italy

- **Bellagio Conference Declaration** in Acrobat PDF format:  
[Chinese English](#)
- **[Table of Contents](#)** of conference papers in Acrobat PDF format (full text will be available after their publication in February 2002)
- **[Picture of Participants](#)**

The Bellagio Conference was organized by the [International Union of Nutritional Sciences Committee on the Nutrition Transition](#) and was held to further understand the nutrition transition and discuss ways to push forward both research and program/policy work.

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N Bisward et al. American´s changing appetite: Food consumption and spending to 2020. Food review Nr./Spring 2002;p.2-9  
 USDA – Economic Research Service

## **Reich, dick, traurig**

**Lebensqualität – Lebenszufriedenheit (bezug zum Lebensstandard; Einkommen)**

Quality of Life - Index

**Der weltweite Trend zu immer mehr Besitz belastet nicht nur die Umwelt. Er macht vor allem krank und einsam**

□ BERLIN epd "Konsum ist für ein Viertel der Weltbevölkerung zu einer Selbstverständlichkeit geworden", sagte der Forschungsdirektor des Washingtoner Worldwatch-Instituts Gary Gardner gestern, als er den Bericht "Zur Lage der Welt 2004 - Die Welt des Konsums" vorstellte. Nicht nur in den reichen Industriestaaten, sondern auch in Schwellenländern wie China und Indien wachse die "Konsumentenklasse" rapide. Nur in Afrika südlich der Sahara sei der Konsum in den vergangenen zwei Jahrzehnten um 20 Prozent zurückgegangen. Nach wie vor müssen knapp drei Milliarden Menschen um ihre Existenz bangen.

Der Lebensstil der Reichen und relativ gut Verdienenden hat noch andere Konsequenzen. Neben der systematischen Zerstörung der ökologischen Lebensgrundlagen wirkt sich der Konsum auch sozial und gesundheitlich aus: "65 Prozent aller US-Amerikaner sind stark übergewichtig, und der Anteil in anderen Ländern wächst", sagte Gardner. Immer mehr Menschen verschuldeten sich - ihre Freundschaften sowie Familienstrukturen zerbrächen.

"Ein neues Konsummodell ist möglich und machbar", so Gardner. Dazu sei es nötig, dass die Regierungen aller Länder eine ökologische Steuerreform verabschieden. Außerdem seien Verpackungsgesetze sowie ein stärkerer Einsatz für qualitativ hochwertige, langlebige Produkte nötig. Auch müsse es zu einer neuen Verbraucherethik kommen. Es müsse künftig mehr um das persönliche Wohlbefinden statt um Wohlstand gehen. Gardner: "Wir müssen uns alle fragen, wann habe ich genug, und was sind meine Bedürfnisse?"

Der stellvertretende Fraktionsvorsitzende der Grünen, Reinhard Loske, lobte die Empfehlungen der Studie. "Der Worldwatch-Bericht zeigt, dass unser Lebensstil auf Kosten anderer geht", sagte er. In Deutschland setze sich die Regierung seit geraumer Zeit für ein anderes Konsumverhalten ein.

taz Nr. 7344 vom 27.4.2004, Seite 9, 65 Zeilen (Agentur)

<http://www.taz.de/pt/2004/04/27/a0162.nf/text>

<http://www.germanwatch.org/presse/2004-04-26.htm>

## *Reicher, fetter und nicht viel glücklicher*

### **Deutsche Herausgeber von "Zur Lage der Welt 2004" zeigen Grenzen des globalen Konsums auf**

**Gemeinsame Pressemitteilung von Heinrich-Böll-Stiftung und Germanwatch**

**Berlin, 26.4.2004.** Am heutigen Montag wurde in Berlin die deutschsprachige Fassung des "Berichts zur Lage der Welt 2004" des Worldwatch-Institutes in Washington vorgestellt. Der Bericht analysiert weltweite Konsumgewohnheiten und -motivationen und ihre zunehmend negativen Auswirkungen auf Umwelt und Gesellschaften. Konkret formuliert der Bericht eine Reihe von Forderungen sowohl an Verbraucher wie auch an die Politik. Mitherausgeber der deutschen Ausgabe sind die Heinrich-Böll-Stiftung und Germanwatch.

"Wir müssen uns fragen: Was ist genug? Was ist angesichts der Zunahme des weltweiten Konsums von diesem Planeten noch ertragbar? Der Norden, also auch wir Verbraucherinnen und Verbraucher in Deutschland sind gefragt, mit anderen und besseren Beispielen voranzugehen, damit die sehr viel größere Zahl von Menschen im Süden, insbesondere in den Schwellenländern, nicht dieselben Fehlentwicklungen vollziehen wie wir!" - so Klaus Milke, stellvertretender Vorsitzender von Germanwatch bei der Vorstellung des neuen Worldwatch-Berichts. "Die Menschen im Süden haben natürlich das Recht, letztlich genauso zu konsumieren wie wir. Doch die Ressourcen sind endlich und die Belastbarkeit mit Treibhausgasen und Schmutz ist schon jetzt über das erträgliche Maß hinausgewachsen." Auch deshalb werde in diesem Jahr in "Zur Lage der Welt" als gesonderter deutscher Beitrag von Germanwatch das brisante Beispiel Flugverkehr dargestellt. "Wir regen an, dass in Zukunft weniger und wenn doch, dann klimabewusst geflogen wird", so Milke weiter.

Für die Heinrich-Böll-Stiftung sagte deren Vorstand Ralf Fücks: "Der moderne Massenkonsum hat die ökologischen Grenzen auf breiter Front überschritten, und das Gesetz des 'immer mehr und immer billiger' ist der mächtigste Antrieb für den ökologischen Ruin des Planeten geworden. 'Geiz ist geil' als Werbeslogan einer Kaufhaus-Kette - nichts bringt diese perverse Dumping-Logik besser auf den Begriff". Doch es gebe auch gute Nachrichten, so Fücks weiter. "Mit der Verantwortung der Konsumenten wurde auch ihre Macht als Nachfrager entdeckt. Nichts fürchten moderne Unternehmen mehr als öffentliche Attacken, mit denen sie wegen ökologischer oder sozialer Sünden an den Pranger gestellt werden", betonte Fücks.

Auch die deutsche Politik muss sich diesen Herausforderungen stellen. Im September 2004 verabschiedet die Bundesregierung ihren Fortschrittsbericht zur nationalen Nachhaltigkeitsstrategie. Die Förderung nachhaltiger Produktions- und Konsummuster muss dabei als prioritäres Ziel formuliert werden.

Allerdings kann die Politik einen Kurswechsel nicht alleine organisieren. Nachhaltige Entwicklung und globale Gerechtigkeit liegen auch in der Hand der vielen Millionen Konsumentinnen und Konsumenten - entscheidend wird sein, ob diese auf dem Markt der Möglichkeiten ihre Gestaltungsmacht wahrnehmen.

Konsum ist mittlerweile für 1,7 Milliarden Personen auf diesem Globus zur Selbstverständlichkeit geworden, während 2,8 Milliarden Menschen mit weniger als zwei Dollar pro Tag um ihre nackte Existenz kämpfen. Der verschwenderische Lebensstil in den Industrieländern und den Ober- und Mittelschichten der sogenannten Entwicklungsländer und Schwellenländer trägt zur Zerstörung der ökologischen Lebensgrundlagen für die ärmeren Bevölkerungsschichten bei.

Mit diesen Konsequenzen befasst sich der neue Worldwatch-Report. Gleichzeitig skizziert er die Umriss einer künftigen Ökonomie, die dem entfesselten Konsum eine andere Vision vom "Guten Leben" entgegensetzt.

Die deutsche Ausgabe von "State of the World 2004. The Consumer Society" vom Worldwatch Institute unter Mitherausgeberschaft von Germanwatch und der Heinrich-Böll-Stiftung erscheint unter dem Titel "Zur Lage der Welt 2004. Die Welt des Konsums" im Verlag Westfälisches Dampfboot, Münster, 320 S., 19,90 Euro, ISBN 3-89691-570-3

*Für Interviewwünsche (auch mit Gary Gardner, Director for Research des Worldwatch-Institutes, der bis 29.4. in Berlin ist) wenden Sie sich bitte an:*

- Michael Alvarez, Heinrich-Böll-Stiftung, Pressesprecher, Tel. 030-28534-202 oder 0175-5221811
- Ralf Willinger, Germanwatch-Pressereferent, Tel: 030-2888 356-5

<http://www.worldwatch.org/pubs/sow/2004/>

Zukunft 2050 – großes Internationales Projekt – keine deutschen dabei

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**Global Consultative Process Launched on Agricultural Science**

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**JOHANNESBURG, August 29, 2002** – A new international consultative process was launched today on the risks and opportunities of using agricultural science to reduce hunger and improve rural livelihoods in the developing world.

The initiative, which is expected to last through mid-2003, aims to exchange ideas between consumers, farmers, scientists, NGOs, governments, and the private sector in an effort to produce an international assessment on agricultural science that would give decision-makers the tools and information they need to answer the tough questions surrounding the issue.



The new process will be co-chaired by **World Bank Chief Scientist Robert T. Watson**, who is also the former head of the UN's Intergovernmental Panel on Climate Change (IPCC); **Claudia Martinez Zuleta**, former Colombian deputy minister of environment; **Rita Sharma**, the joint secretary and land resources commissioner of India's agriculture ministry; **Louise Fresco**, the FAO's assistant director general for agriculture; and **Seyfu Ketema**, executive secretary of the Association for Strengthening Agricultural Research in Eastern and Central Africa.

*"Nearly 800 million people go to bed hungry every night and over the next 50 years, food production will have to double to meet growing demands,"* said **Ian Johnson**, the **World Bank's vice-president for sustainable development**.

*"This will involve both productivity and environmental management challenges. As we move forward, the application of science to agriculture needs to be fully assessed in terms of its contribution to enabling farmers to be more productive. But equally, the environmental and social risks, as well as ethical issues, need to be discussed in an open and transparent manner. By discussing and examining the issues with everyone from farmers and consumers, to NGOs and governments, we can contribute to the informed dialogue among them,"* said Johnson, who also chairs the **Consultative Group on International Agricultural Research (CGIAR)**.

The consultative process on agricultural science will look at the risks and opportunities of a broad range of issues, such as organic agriculture, traditional plant breeding techniques, new farming technologies, and biotechnology. The assessment will be modeled on similar assessments on climate change and ozone that have proven invaluable for guiding policy makers on pressing issues.

*"My experience in chairing international assessments on climate change, biodiversity and ozone leads me to believe that it is possible to ensure that a professional assessment in which all voices are heard will be achieved,"* said Watson. *"Such agreements only work when they are inclusive and transparent. We must not shy away from the difficult challenge of discussing with a wide range of partners what exactly are the tradeoffs in using agricultural science to meet growing food needs."*

The consultative process will try to maximize input through a number of ways, including meetings in various parts of the world, videoconferences, and an interactive website at [www.agassessment.org](http://www.agassessment.org)

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Nutrition for the new millennium: Using nutrition transition research to guide the creation of a  
 more unified vision of nutrition as linked to the obesity pandemic

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Key Words: nutrition transition, macroeconomic, environmental factors

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**ABSTRACT**

*Objective:* This paper focuses on factors that play a major role in our rapid, global nutritional changes.

*Design:* A range of studies showing how an understanding of social, economic, and technological change at the global, national, and community levels affect diet, activity and body composition patterns and trends. These studies are used to demonstrate the value of the key global, national, community, household, and individual factors that should define the field of nutrition.

*Setting:* The focus is global.

*Results:* Large shifts have occurred in diet and in physical activity patterns—particularly in the last one or two decades of the twentieth century. These changes are reflected in nutritional outcomes such as changes in average stature, body composition, and morbidity. Understanding the rapidity of these changes and the underlying factors at the global, national, and community levels is critical for creating a science of nutrition that can prevent disease and sustain the health and integrity of humans.

*Conclusions:* This paper presents a vision of the nutrition field that is one where scholars who work on many levels will intersect; equal weight in the nutrition profession will be provided to all dimensions as they are welcomed into the field of nutrition—particularly those that will directly or indirectly affect dietary patterns, physical activity patterns, and energetics. This vision of the field is one where scholars from a range of disciplines and perspectives meet to work together with the goal being a focus on improving nutritional status and the human condition.

Running Head: Nutrition transition research can guide our vision

## **Introduction**

Large shifts have occurred in diet and in physical activity patterns—particularly in the last one or two decades of the twentieth century. These changes are reflected in nutritional outcomes, such as changes in average stature, body composition, and morbidity. Understanding the rapidity of these changes and the underlying factors at the global, national, and community levels is critical for creating a science of nutrition that can prevent disease and sustain the health and integrity of humans. At the same time, as scholars are learning from work in the environmental and ecological arenas, the promotion of a sustainable food system needs to be fully cognizant and conscious of the interplay between creation of the food supply and the environment. The same certainly holds for the arena of physical activity, an area that must become part of the purview and focus of the nutritional field—if we are to create healthy societies. This paper focuses mainly on the nutrition field and the factors we understand as playing a major role in our rapid, global nutritional changes.

### **The major issues to be addressed**

In a series of papers, this author has shown some major shifts in diet, activity, and body composition that have occurred across the globe. These include the following shifts:

1. The structure and composition of the diets of all nations are changing rapidly. Among the key changes are:
  - \* The world's food supply and diets have been sweetened tremendously.<sup>1</sup>
  - \* Edible oil intake has grown very rapidly, particularly in Asia, the Middle East, and Africa.<sup>2</sup>
  - \* The energy density of diets—particularly of the developing world—seems to be growing rapidly.<sup>3</sup>

- \* The intake of animal source foods is rapidly increasing in the developing world.<sup>4</sup>
2. Physical activity patterns across the globe are changing very rapidly. The key dimensions of this change are often ignored in the West as the focus is on leisure, and not the full set of changes taking place. Among the key changes are:
- \* Vast shifts in the overall allocation of market work (away from agriculture and other energy intensive occupations) towards service sector occupations.<sup>5,6</sup>
  - \* Concurrent marked reductions in the level of activity within each occupation.<sup>5,7</sup>
  - \* Changes in (a) the types of transportation used and (b) leisure activity patterns that reflect a rapid shift toward reduced energy expenditures.<sup>8</sup>
  - \* Mechanization of all home production related activities.<sup>9</sup>
  - \* Reduction of food preparation time by over half—from 2-3 hours per day to less than an hour per day—as food consumed away from home increases in the higher-income world.<sup>10,11</sup>
3. Body composition shifts have led to rapid changes in global obesity and a related decline in undernutrition among adults—but less among children. The shifts in body composition include:
- \* Obesity is growing rapidly on a global basis and the rate of change is faster in the developing world.<sup>4,12</sup>
  - \* Child obesity is increasing globally; however, the levels and rates of change seem to be lagging behind those of adults.<sup>13,14</sup>
  - \* The shift of the body composition distribution (based on BMI) is rightward; therefore, undernutrition is declining as obesity increases.<sup>6,15</sup>
  - \* The burden of obesity is shifting to the poor throughout the globe.<sup>16,17</sup>

- \* The shift toward obesity dominating underweight among women of child-bearing age is occurring globally in both urban and rural areas.<sup>18</sup>

These changes have allowed us to understand some of the major underlying global factors. These include:

- \* Urbanization has certainly accelerated the process of social and economic change linked to creating a more obesogenic environment.<sup>5,19</sup> While some new research shows that obesity is emerging in rural areas worldwide, clearly there is a confluence of factors that has made the more urbanized environments of the world to be more obesogenic. These include: (a) mass transportation systems—which replace walking and biking, (b) mass media—which encourages a shift in diet and activity and other aspects of ones lifestyle, (c) more access to westernized and more energy-dense foods, and (d) increased use of modern technologies in all phases of work, leisure, and movement.
- \* Rapid income changes are very important.<sup>20,21</sup> There have been very rapid increases in per capita income in countries on all continents including China, Chile, Brazil, Mexico, India, and some other very large countries. The income increases have been linked with shifts toward higher energy-dense diets and reduced activity.
- \* Price changes are equally powerful and have been fueled by a rapid decline in the past half century in food prices, particularly real animal source food prices.<sup>4,22–24</sup> The past several decades have seen major reductions in prices of beef and many other animal source foods. For example, the real world price for 100 kg of beef dropped from over US \$500 to about US \$200.
- \* Technology changes and the diffusion of new technology related to activity and diet are very important<sup>2</sup>. For instance, it has been shown how the improved technology for



removing edible vegetable oil from oilseeds led to improved varieties of oil seed, which then led to a revolution in the cost and availability of vegetable oils in the 1960–89 period.

- \* Globalization of food marketing and distribution are important in ways not yet understood.<sup>25</sup> In all regions of the world the fresh open markets of the past are being replaced by large or mega supermarkets with Carrefour, Wal-Mart, and a few other global chains leading the way.
- \* Expansion of mass media penetration is equally powerful, but to date has not been rigorously studied, as it relates to global shifts in diet and activity and obesity. While the reach and scope of television, advertising on TV, and all other forms of media have expanded rapidly in scope and reach, little is understood about the impact of these shifts on eating and activity patterns.
- \* Access to the types of services and infrastructure that improve dietary and physical activity patterns has skewed toward the rich, at least in the higher-income world and most likely in the lower-income world.<sup>26</sup>

### **So What?**

The rapidity of change and the power of the macroeconomic forces and some community level factors, as documented in (a) the studies noted above, (b) many other studies by this author, and (c) studies by other scholars, provide us with some sense of the larger forces that truly affect our food supply. It is certainly true that individual choice, as measured and reflected in factors such as education level, play a key role.<sup>27</sup> Nevertheless, the role of education and knowledge occur within a broader set of social, economic, and technological factors that truly affect choices of food and activity patterns.

Box 1 and the figure included provide some sense of the factors that interact to affect energy imbalance and obesity.

--Box 1 about here--

Furthermore, it is felt that we have ignored the broader environmental changes at the national and community levels and far too much of our research and thinking has been focused on individual behaviors and biology—to the neglect of these broader factors. As shown in Figure 1, there are a vast array of policies related to topics as diverse as food subsidies, credits and taxes, walkable communities, crime, traffic safety, building design, and mass transportation that can impact diet and physical activity. Only a few examples are provided here.

Limited research has focused on analyses of the ways pricing can affect obesity and nutrition. A research model developed by Huang showed how economic factors, including own and cross-price effects, influence food and nutrient demand.<sup>28</sup> Currently, no national food consumption surveys in the United States allow us to link food prices with these data. Similar tools in tobacco consumption have permitted important modeling to demonstrate the price elasticity of tobacco.

Within this limited research, other elements of the food system have been examined. A few studies have used food markets as venues for interventions with positive outcomes.<sup>29</sup> Location and concentration of various food services appear to be associated with socioeconomic status (SES) and racial segregation.<sup>30-31</sup> Similarly, Morland found that the local food environment was associated with adherence to recommended dietary guidelines within racially distinct groups.<sup>32</sup> The effect on youth of environmental access to food, including vending machines, has been studied.<sup>10,11,33,34</sup> More research is needed to explain how longitudinal shifts in the food environment affect changes in eating patterns.

Researchers have examined environmental determinants such as community sports, access to home fitness equipment,<sup>35,36</sup> outdoor play space, time spent outdoors,<sup>37,38</sup> family environments,<sup>39</sup> and exercise opportunities.<sup>40</sup> Neighborhood environment is related to obesity, physical activity, and other health-related behaviors.<sup>41-45</sup> Urban planners find extremely low rates of walking for transportation and few pedestrian-favorable land-use policies.<sup>46</sup> Walking/biking increases with proximity, density, connectivity,<sup>44,45,47</sup> higher population density,<sup>48,49</sup> land-use mix, pedestrian advances (e.g., sidewalk connectivity),<sup>50-52</sup> and reduced pollution.<sup>53</sup> This topic warrants additional research, replication, and refinement.

Our definition of the national and local factors should be further broadened to select the entire range of factors affecting diet, activity, and energy imbalance. Before consideration of these individual behavioral and biological factors, there are many more factors at the global, national, and community levels that truly play key roles in affecting food choices and activity patterns. It is often more difficult to understand initially the macro factors and to create evidenced-based program and policy knowledge on these factors. Minimal or no research has focused on linking in a systematic way the factors that create the food supply, food prices, and options for activity that we face daily on a global basis to the obesity changes we see.

--Box 2 about here--

### **Conclusion: So How Does the World Proceed to Improve Nutrition?**

There are many national examples of limited changes that are most important for understanding some choices that we may face. Details on these are not provided here due to limited time and space but it is felt that much more research is needed to understand the unique characteristics that might work at the global, national, and local levels.

Our field of nutrition is envisioned as one where scholars who work on many levels will intersect and equal weight will be given by our profession to all dimensions and these many elements will be welcomed into the field. Moreover, it is felt that the social, economic, and behavioral dimensions are as important as the biomedical ones—but these are the neglected components of the equation. The nutrition field is envisioned as one where scholars from a range of disciplines and perspectives meet to work together with the goal being a focus on these interconnected spheres as noted in Figure 3 below.

--Figure 3 about here--

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**BOX 1 Causal Web of Influence on the Prevalence of Obesity**

As illustrated in Figure 1, many factors at the national, state, community, family, clinical, and individual levels affect energy imbalance and obesity. While obesity is ultimately a physiological process, many factors at each level (individual, family, clinical, community, and macro) are important, and must be linked to achieve our goals. Furthermore, any change at any level aside from one at the metabolic level that affects energy utilization or related functions must deal with the factors causing energy imbalance. Few countries have been successful in arresting or reversing the obesity epidemic in large populations and we must search for ways to address this imbalance over the life cycle.

--INCLUDE FIGURE 1 HERE--

## BOX 2 The Societal Factors that Affect Obesity

The International Obesity Task Force created a model to delineate the major macroeconomic factors that affect obesity. It is important to emphasize that many of the major decisions set in place over the decades related to agricultural research, food trade and related factors affect the relative prices of the foodstuffs available today. Countries have designed their nation's infrastructure partially around certain models, which include an emphasis on cheap and available sugar, corn and soybeans and other grains and oilseeds used to feed animal source foods, and inexpensive access to beef, pork, fish, and poultry and eggs. The same can be said to exist for development of technologies to allow us to be more sedentary. Mankind has seen a distinct focus on improving the variety and tastiness of our food and on reducing our physical effort at travel, work, and leisure. Figure 2 highlights some of the sectors that distinctly affect diet, activity and obesity.

--INCLUDE FIGURE 2 HERE--

## The Nutrition Transition: Diet and Disease in the Developing World

**Edited by: Benjamin Caballero** , Johns Hopkins University, Maryland, U.S.A.

**Edited by: Barry Popkin** , University of North Carolina, Chapel Hill, U.S.A.

**ISBN 0121536548 · Hardback · 200 Pages**  
**Academic Press · Published August 2002**

**Price: £ 55.00** **The Nutrition Transition** is a timely work as it comes at a time when multiple transitions are approaching rapidly, and globalization has become a dominant theme. It is a valuable documentation of the food and nutrition components of the most accelerated set of major transitions in human history. Leading authorities in the fields of nutrition, food science, economics, demography, international health, and public health present and discuss available data on the process and impact of the nutrition transition in developing countries. This book provides up-to-date information on population trends, changes in food production, epidemiology of diet-related chronic diseases in the developing world, and outlines key issues that need to be addressed.

### Reviews

"I love the concept that the evolution of the prestigious AP Food Science and Technology International Series has emerged to a very integrated consideration of the human consequences of its technological accomplishments over 37 years.

The term "Nutrition Transition" has had an important effect of legitimizing a concern in developing countries other than that of deprivation and food insecurity. It is good to get the connotation out there among the various academic disciplines. The inner cover "urbanization" maps are attractive, vibrant in color, and relevant!

The prestige of a World Food Prize winner (Scrimshaw) and a Nobel Laureate (Fogel) as contributors cannot go unnoticed. The rest of the contributors cast is pretty impressive, too! For me, the two best crafted chapters are chapter 2 (Fogel/Hemchen) and chapter 7 (Adair). They stand out among the other very good contributions.

It is intellectually honest to the core. The complexity of the issues is real, and no pabulum simplicity is offered (nor could be offered). It is fodder for deep thinking.... it is VALUABLE to the hilt! And should be read by human biologists, by epidemiologists, and policy and program community."

--Noel Soloman, Center for Studies of Sensory Impairment (CESSIAM), Guatemala

"I consider this volume an extremely well presented view of this critical topic, a truly pressing global issue. The interaction of both the social and biological dimensions is well presented. This unique approach to the complex problems derived from the **Nutrition Transition** is novel and deserves special acknowledgements. ...A multidisciplinary/interdisciplinary book written by true leaders in their respective fields. ...The implications for global, regional and national nutrition and health policies are well presented and deserve the attention not only of leaders but also of policy makers. ...I only hope that the message from Caballero and Popkin is translated into policy actions by public nutrition and public health specialists. This should ultimately lead to improved health and nutrition, and to the well being of populations globally."

--Ricardo Uauy, Institute of Nutrition and Food Technology, University of Chile

## Features

Contains numerous illustrative figures and tables

Two case studies included-on China and Brazil

Foreword written by Nevin Scrimshaw, recipient of the World Food Prize

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### **PART II: BIOLOGICAL FACTORS AFFECTING THE NUTRITION TRANSITION**

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Early nutritional conditions and later risk of disease.

Obesity.

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Cardiovascular diseases.

Case Study 1: China.

Case Study 2: Brazil.

Policy implications.

FROM: Barry M. Popkin, Chair  
Carlos Monteiro, Vice Chair

DATE: October 28, 2005

We feel the Task Force should continue. The plans are noted below.

#### International Congress of Obesity

The Task Force met twice over the course of the meeting. The decision was made by all involved to create a Bellagio + 7 meeting. That would attempt to accomplish several things:

First it would systematically document dynamics and changes in a set of countries, including countries represented by those on the committee, but also 7-10 other developing countries. A template is being developed for this initiative and then we will begin to work on which countries to invite, which individuals to involve, etc.

Second, it would critically lay out what is being done in each country to address the shifts of the pattern of the Nutrition Transition toward the stage linked with chronic degenerative diseases, including obesity.

Third, it would look at new emerging cross-cutting issues the committee will define over the next two years.

Fourth, all members wished to remain on the committee and we added two members—one, a young faculty from the Netherlands and the second, an older one from the US. We are continuously searching for young professionals who fit our goals and criteria of excellence. We have identified 5 potential young persons and will be watching them and considering them over the next year.

Fifth, the only two persons who could truly take over leadership are Carlos Monteiro and Gail Harrison and my sense is that for now, I remain the best option to keep this moving.

#### Committee activities June 2004-June 2005

The committee has been very active in a number of countries in pushing forward research and programmatic work in this area but has not undertaken any coordinated cross-national effort during this period. We try to highlight a few of the key initiatives underway linked with our key focal countries and committee members.

**Brazil:** Carlos Monteiro lead the Brazilian task force that analyzed the most recent national food and nutrition survey conducted in Brazil in 2002/2003 on a random sample of 48 thousand families. This task force was integrated by researchers and representatives of the MoH and IBGE (the federal office for official statistics in Brazil). The publication of the main survey findings (available from the IBGE site under the title: Pesquisa de Orcamento Familiar 2002/2003) updated the nutrition transition showing increasing obesity rates in the country, particularly in the poorest regions and families, and a shifting of the diet towards increasing fat content, increasing saturated fat content and increasing sugary, salty, processed foods with no changes in the low consumption of fruits and vegetables. This publication had enormous repercussions in the nutrition community and also in the national media,

particularly in light of the strong emphasis placed by the federal government on “anti-hunger” measures (Fome Zero program). Carlos also acted as a consultant for the WHO/FAO fruits and vegetables initiative participating in technical meetings in Geneva and Kobe that discussed and proposed ways to implement the initiative in developing countries. In Brazil, Carlos is assisting the federal government and selected municipalities in the implementation of the fruits and vegetable initiative. A recent community trial conducted by Carlos and his group at the University of São Paulo in a poor, underserved area of São Paulo city provided evidence that feasible actions combining education and improvements in the supply of fruits and vegetables can increase significantly the consumption of these foods by low income families. A large-scale replication of the intervention is being planned for the near future.

**Mexico:** Juan Rivera has led a major initiative to focus a great deal more work on noncommunicable diseases and related risk factors in Mexico.

1. They conducted an analysis of the 1999 Mexican Nutrition Survey which used cluster analysis to identify different dietary patterns. They further studied the association of the dietary patterns with NCD risk factors.
2. They are studying the prevalence of NCD risk factors such as blood lipids, glucose, and insulin in a probabilistic sample of adolescent and adult Mexicans studied in 2000. They are analyzing the nature of the association of the risk factors with BMI and other anthropometric indices.
3. They are participating in a project organized by the FAO Food and Nutrition Division entitled "Assessment of Dietary Changes and their Health Implications in Countries facing the ‘double burden’ of malnutrition". They are in charge of preparing a document describing the situation and the trends in Mexico using data from several cross sectional surveys on food purchases, diet, anthropometry, chronic diseases and mortality.
4. They are conducting the evaluation of a poverty alleviation program which provides cash transfers as well as nutrition and health services to 5 million low income families in Mexico. Cash transfers are used as incentives for investment in nutrition, health, and education. They are studying the effects of the program on food intakes, body weight and composition, and chronic diseases.
5. They developed a proposal that was pre-selected for funding by ILSI/PAHO/CDC. The project will study the elements in the environment of public schools that promote overweight. With the use of formative research, interventions aimed at changing the environment to promote physical activity and a healthful diet for the prevention of obesity in children will be developed and their effects will be tested.
6. They have acquired funds to conduct this year the third national nutrition survey that will include a random sample of 40,000 households. They will use



comparable methodology to the first (1988) and the second (1999) national nutrition surveys, which will allow the study of trends in diet and in under and overnutrition and chronic diseases in the Mexican population.

7. They have created, in collaboration with INTA (Chile) a network of research centers in nutrition in LA with support from UNU/IUNS. The two main Institutions are INTA Chile and INSP Mexico. Fernando Vio (INTA Director) and Juan Rivera are the regional coordinators of the UNU Nutrition Program in LA. The first activity involved a diagnosis of the main nutrition problems and an inventory of research institutions in nutrition, their capacity and their publications conducted in 8 LA countries. As a result of the diagnosis, research priorities were identified and working groups created. Each working group is developing multicenter proposals that will be sent to donors. One major group addresses obesity and chronic diseases. One of the projects is work with Industry in LA to reduce or eliminate trans fatty acids. We have another group dealing with childhood obesity. Each group involves investigators from INTA, INSP and other research institutions in the region.

**Geoffrey Cannon:** He has led a worldwide group focused on creating a newer broader vision of nutrition. In addition, he is playing a major role with the World Cancer Research Federation in reviewing diet and cancer relationships within the context of the dynamic worldwide shift in stages of the Nutrition Transition. This Panel has Juan Rivera, a task force member, on it.

**United States:** Barry Popkin is leading a group of scholars to develop a beverage guidance system for the US. Given the very high percentage of calories from beverages in the US (over 21%), this is viewed as a key way to continue to fight the obesity increases in that country. Barry Popkin has also presented aspects of the Nutrition Transition at a plenary talk as part of the Sixth International Conference on Preventive Cardiology Iguazu, Brazil. He also created and received funding for an NIH Roadmap Center on Obesity that features a large component on the nutrition transition and involves 71 faculty members from over 35 departments and six schools on the UNC campus as well as other institutions in the region.

**China-United States:** A national conference in China this summer will highlight the nutrition transition and Barry Popkin will be a key plenary speaker. The group is also working with the Chinese Ministry of Health to consider ways to prevent further increases in obesity in China.

**South Africa:** With two very active committee members and nutrition viewed as a major concern by the government, Committee members have been most active there. South Africa is a country in transition, experiencing a quadruple burden of disease and the coexistence of both under-and overnutrition often within the same communities, and even within households.

The nutrition transition has been an integral focus of the Food-Based Dietary Guideline process in SA (initiated by Este Vorster in 1997). Since both the coexistence of under-and over-nutrition as well as changes/shifts in dietary intake with development and urbanization from local evidence has been incorporated. Primordial prevention of diseases of lifestyle (e.g., specific attention to intakes of types of fats,

legumes and fruit and vegetables and physical activity are incorporated in the health messages). The South African Department of Health officially approved the FBDGs (comprising 11 Guidelines) in 2003, and the professional and national launches took place in 2004. Lesley Bourne was part of the core working group throughout this period and was tasked with/convened the Pediatric FBDGs (PFBDGs ages 0 - 7years). As with the core process all steps outlined in FAO/WHO have been followed and the database is extensive. Este and Lesley have convened over 25 meetings.

Another major issue is the South African leg of the PURE study, in which the health transition of Africans (urban and rural) is monitored over 12 years. Part of this study also monitors the nutrition transition. Este Vorster's group is handling this.

The South African group has had a great deal to do with the ICN. Dr. Vorster has played a lead role as has Dr. Bourne. The latter has organized the Focus Asia symposium.

A third major issue relates to the linkage of HIV/AIDS and nutrition. It has become a major issue in South Africa.

**Thailand:** One major effort was the organization and implementation of the Thai National Food Consumption Survey. A second has been the development in Thailand of a coordinated research agenda on the nutrition transition and cardiovascular disease. There are several agencies involved including national research council, Thailand research fund as well as the National Health

Foundation. Dr. Vongsvat was central to the organization of this as it relates nutrition to CVD and diabetes.

One initiative coming out of this is a large research effort she will lead on the Thai Muslim population related to the identification of the environmental contributing factors of noncommunicable diseases.

**Morocco:** They have also worked to develop a food based dietary guide. Further, they are working to understand how the Mediterranean diet, viewed as an excellent way to fight obesity in Morocco, is being followed there. There is also a joint Moroccan-Dutch study on Moroccan women immigrants in the Netherlands.

Attachment A: Members of the International Union for Nutritional Sciences

**Task Force on the Nutrition Transition as of September 24, 2005**

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