

# Clinical Implications of Household Food Security: Definitions, Monitoring, and Policy

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## ■ ABSTRACT

Poverty-related food insecurity is a reality that many clinicians in nutrition and health care encounter either directly or indirectly. It is associated with both overnutrition and undernutrition, but it is not congruent with malnutrition. Food insecurity affects human development and health throughout the lifecycle, but can be particularly harmful during critical or vulnerable stages early and late in life. Understanding the causes and consequences of food insecurity and knowing how to identify them can improve the quality and effectiveness of clinical care, and facilitate prevention and treatment of many kinds of health problems. Numerous public policies and programs exist to ameliorate and prevent poverty-related food insecurity. However, the resources to support them ebb and flow with the politics of annual state and federal budgetary cycles. Support and need for these social-safety-net programs also vary with business cycles. Unfortunately, need often expands as support shrinks along with employment and government revenues during recessions, and shrinks as support expands along with employment and government revenues during expansions. *Nutr Clin Care*. 2002; 5:152-167 ■

**KEY WORDS:** Hunger, Poverty, Diet, Socioeconomic Factors, United States

## INTRODUCTION

The last half of the 20th century was characterized by rapid expansion of knowledge and major breakthroughs in nutrition and health sciences.<sup>1</sup> Accom-

panying the explosion of nutrition and health knowledge have been comparable growth and maturation in related disciplines such as epidemiology, biostatistics, demography, and research methods. These advances have led to design and implementation of increasingly effective systems for determining and monitoring the prevalence of diseases and for risk-factor surveillance and monitoring. An important component of these latter developments was the National Nutrition Monitoring and Related Research Program created by Congress in 1990.<sup>2</sup>

In pursuit of objectives of the National Nutrition Monitoring and Related Research Act, the USDA's Food and Consumer Service (FCS) and the CDC's National Center for Health Statistics (NCHS) were given responsibility for establishing a research program to develop standardized measures of food security, food insecurity, and hunger for the U.S. population.<sup>3</sup> The research program was initiated in 1992 as the Food Security Measurement Project (FSMP). In the first phase of this ongoing research program, a household-level survey instrument was developed for annual administration by the Census Bureau as a supplement to its nationally representative Current Population Survey (CPS).<sup>4</sup> In the second phase, data from the CPS Food Security Supplement were used to create and validate a food-security scale for the U.S. population.

## BACKGROUND ON FOOD SECURITY

The concept of food security emerged during the 1980s from international development work. The term food security appears extensively in the work of the United Nations' Food and Agriculture Orga-

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nization (UN/FAO), the Consultative Group on International Agricultural Research (CGIAR), the International Food Policy Research Institute (IFPRI), the World Bank, and other international development organizations during the 1980s and 1990s. In 1994, the UN/FAO launched the Special Programme for Food Security, "a multidisciplinary programme that combines expertise and experience from a wide range of fields to promote an integrated and participative approach to food security." In November 1996, representatives from 185 countries and the European Community met in Rome for the World Food Summit. Out of that week-long conference emerged the Rome Declaration on World Food Security, and an accompanying Plan of Action to reduce food insecurity and hunger by half in all countries by 2015.

The concept of food security was adopted in the early 1990s as a useful framework for describing, researching, and designing policies to address poverty-related food access problems at the household level in the United States.<sup>3-5</sup> Consensus conceptual definitions of food security, food insecurity, and hunger for the U.S. context were derived and published by the Life Sciences Research Office (LSRO) of the Federation of American Societies of Experimental Biology (FASEB) in collaboration with the American Institute of Nutrition (AIN) in 1990.<sup>6</sup> These conceptual definitions were operationalized, and empirical measures of food security developed under sponsorship of the USDA Food and Consumer Services (FCS) and CDC National Center for Health Statistics (NCHS) in the Food Security Measurement Study (FSMS) of 1995-1997.<sup>3-5,9</sup>

### Definition and Measurement of Food Security

The conceptual definitions of food security, food insecurity, and hunger synthesized by the LSRO's expert panel have been stated as follows:<sup>5-7</sup>

*Food Security:* Access by all people at all times to enough food for an active, healthy life.

*Food Insecurity:* Limited or uncertain availability of nutritionally adequate and safe foods, or limited or uncertain access to food.

*Hunger:* The uneasy or painful sensation caused by a lack of food. The recurrent and involuntary lack of access to food . . . Hunger, in its meaning of the uneasy or painful sensation caused by a lack of food, is . . . a potential, although not necessary, consequence of food insecurity.

Malnutrition is also a potential, although not necessary, consequence of food insecurity.

The three conceptual categories listed above were shown to represent adjacent levels of severity of a single well-ordered phenomenon. Food security emerged as a continuum, with households at the least-severe level termed food secure, and those at the most severe level termed food insecure with severe hunger, as follows:<sup>5,7,9</sup>

*Food secure:* Household shows no or minimal evidence of food insecurity.

*Food insecure without hunger:* Food insecurity is evident in household's concerns and adjustments to household food management, including reductions in diet quality, but with no or limited reductions in quantity of food intake.

*Food insecure with moderate hunger:* Food intake for adults in the household is reduced to an extent that implies that adults experience hunger due to a lack of resources. If children are present, the quality of food available to them may be reduced, but usually not its quantity.

*Food insecure with severe hunger:* Households with children reduce the children's food intake to an extent that implies that the children experience hunger as a result of inadequate household resources. Adults in households with or without children experience extensive reductions in food intake.

The hunger categories are based on survey responses indicating that food intake has been reduced below normal levels (eg, by reducing the size of meals, skipping meals, or going a whole day without eating) for either adults or children in the household, or both, and that these reductions occurred specifically because the household did not have enough food or money to buy food. Even though hunger is a normal state experienced by all people, the Food Security Scale was designed to capture recurrent resource-constrained hunger, experienced because a household does not have sufficient food or financial resources to buy food.<sup>5,9</sup>

### PREVALENCE OF FOOD INSECURITY AND HUNGER IN THE UNITED STATES

The Food Security Scale produces food-security scores for all households in which an adult respondent completes the survey. The continuous scores are then used to categorize households into one of the four categories just described on the basis of cut-off values determined in the initial Food Secu-

rity Measurement Study, and validated with data from the four successive implementations of the scale (in 1996–1999).<sup>5,6,8–10</sup>

In recent years, with high rates of growth in the U.S. economy and very low unemployment, increasingly smaller proportions of most demographic subgroups experienced food insecurity with severe hunger. As a result, USDA analysts combined the two severity levels involving hunger and now report prevalence estimates for three levels of severity only (food secure, food insecure *without* hunger, and food insecure *with* hunger). Table 1 shows the prevalence of these three food security categories for U.S. households and residents by selected characteristics in 1999, the latest

year for which estimates are available. (As of this writing, the USDA report containing prevalence estimates for 2000 is in press and the data for 2001 have been collected but not analyzed. USDA and the Census Bureau are preparing for implementation of the 2002 CPS survey.)

Overall, 10.5 million U.S. households (10.1%) were food insecure at some level of severity in 1999.<sup>6</sup> In 3.1 million households (3.0%), at least one adult or child experienced hunger. (Since questions in the Food Security Supplement do not ask specifically about conditions of each member of the household, it is not possible to ascribe hunger status to all members of households with more than one adult and one child. One can, however,

**Table 1.** Prevalence of Food Security, Food Insecurity, and Hunger by Selected Characteristics Households: 1999

Category	Total (1000s)	Food Secure		Food Insecure (All)		Food Insecure With No Hunger		Food Insecure With Hunger	
		(1000)	(%)	(1000)	(%)	(1000)	(%)	(1000)	(%)
All Households	104,684	94,154	89.9	10,529	10.1	7,420	7.1	3,109	3.0
All Persons	270,318	239,304	88.5	31,015	11.5	23,237	8.6	7,779	2.9
Adults	198,900	179,960	90.5	18,941	9.5	13,869	7.0	5,072	2.5
Children < 18	71,418	59,344	83.1	12,074	16.9	9,368	13.1	2,707	3.8
Household Composition									
With children < 6 yrs	17,231	14,439	83.9	2,792	16.2	2,265	13.1	527	3.1
With children < 18 yrs	37,884	32,290	85.2	5,594	14.8	4,340	11.5	1,254	3.3
Married-couple families	26,303	23,771	90.4	2,532	9.6	2,105	8.0	428	1.6
Female head, no spouse	8,744	6,146	70.3	2,598	29.7	1,890	21.6	709	8.1
Male head, no spouse	2,187	1,817	83.1	370	16.9	280	12.8	89	4.1
With no children < 18 yrs	66,800	61,865	92.6	4,935	7.4	3,080	4.6	1,855	2.8
More than one adult	39,568	37,380	94.5	2,188	5.5	1,470	3.7	718	1.8
Women living alone	16,046	14,473	90.2	1,573	9.8	908	5.7	665	4.1
Men living alone	11,187	10,013	89.5	1,174	10.5	701	6.3	473	4.2
Households with elderly	24,704	23,265	94.2	1,439	5.8	1,055	4.3	385	1.6
Elderly living alone	10,049	9,413	93.7	636	6.3	423	4.2	214	2.1
Race/Ethnicity of Households									
White non-Hispanic	78,998	73,451	93.0	5,546	7.0	3,873	4.9	1,673	2.1
Black non-Hispanic	12,616	9,936	78.8	2,680	21.2	1,866	14.8	814	6.4
Hispanic (of any race)	9,192	7,285	79.2	1,907	20.8	1,406	15.3	502	5.5
Other non-Hispanic	3,878	3,482	89.8	396	10.2	275	7.1	121	3.1
Household Income-to-Poverty Ratio									
Under 0.50	4,563	2,774	60.8	1,789	39.2	1,164	25.5	625	13.7
Under 1.00	11,319	7,169	63.3	4,150	36.7	2,767	24.5	1,383	12.2
Under 1.30	17,432	11,799	67.7	5,633	32.3	3,767	21.6	1,866	10.7
Under 1.85	27,261	20,145	73.9	7,116	26.1	4,907	18.0	2,210	8.1
1.85 and over	63,909	61,299	95.9	2,610	4.1	1,969	3.1	641	1.0
Area of Residence									
Inside metropolitan area	84,304	75,844	90.0	8,460	10.0	5,903	7.0	2,558	3.0
In central cities	26,718	23,027	86.2	3,691	13.8	2,578	9.6	1,113	4.2
Not in central cities	43,103	39,793	92.3	3,310	7.7	2,290	5.3	1,020	2.4
Outside metropolitan areas	20,379	18,311	89.9	2,069	10.1	1,517	7.4	552	2.7

Source: Andrews M, Nord M, Bickel G, Carlson S. *Measuring Food Security in the United States: Household Food Security in the United States, 1999*. USDA/ERS Food Assistance and Nutrition Research Report No. 8. Washington, DC; Fall 2000. Totals exclude households whose food-security status is unknown.

ascribe overall food-insecurity status to all members of any household that is not food secure. In addition, if a household is categorized as "food insecure with hunger" it is appropriate to say that all members live in a household where hunger is experienced. This minor unintended limitation results from the specific form of the survey and the questions it contains.) Just over 31.0 million people lived in food-insecure households in 1999, and 7.8 million lived in households where hunger was experienced. Examination of Table 1 shows that households with children (age < 18 yrs) are twice as likely to be food insecure as households without children (relative risk:  $0.148/0.074 = 2.0$ ). Female-headed households with children and no spouse are more than three times as likely to be food insecure as married-couple households with children (relative risk = 3.1).

Other notable comparisons of the prevalence of food insecurity and hunger relevant to clinical contexts include those by race/ethnicity of household, ratio of household income to poverty, and area of residence. Non-Hispanic black and Hispanic households are three times as likely to be food insecure as non-Hispanic white households (relative risk = 3.0 for both), and households in central cities are nearly twice as likely as metropolitan households not in central cities to be food insecure (relative risk = 1.8). Households with incomes below 185% of the poverty threshold are more than four times as likely to be food insecure as those with incomes greater than or equal to 185% of poverty (relative risk = 4.4). The prevalence of food insecurity and hunger rises steadily as the ratio of household income to poverty decreases (similar to a dose-response effect), with the highest prevalence among households whose incomes are below 50% of the poverty threshold.

### **FOOD INSECURITY, HUNGER, AND MALNUTRITION**

It is unlikely, in the absence of morbidity, congenital anomaly, or pathology, that clinicians will encounter protein-calorie undernutrition in the U.S. population unless it is accompanied by relatively severe food insecurity or hunger. However, it is not at all uncommon for micro-nutrient undernutrition or deficiencies to occur under conditions of food insecurity without hunger, or under food-secure

conditions. Indeed, prominent clinical concerns often arise due to micro-nutrient deficiencies associated with food insecurity short of measurable hunger, or with only moderate hunger.

In the past two decades, consequences of over-nutrition have emerged as important factors in some of the most serious threats to human health (eg, diabetes, hypertension, cardio-vascular disease, orthopedic conditions, sleep apnea, asthma, and cancer).<sup>11-13</sup> Overweight and obesity are epidemic in the United States across nearly all age levels, with growing concerns regarding emergence of obesity at earlier childhood ages,<sup>14-16</sup> and implications for later body composition and health.<sup>17-19</sup> Trends in the U.S. economy and society, including effects of technological change on prices and availability of food, patterns of food consumption and eating behavior, work and physical activity, have led to conditions that support widespread overconsumption of calories relative to daily needs.<sup>20-25</sup>

### **FOOD INSECURITY AND OBESITY**

Since the 1970s, research has accumulated suggesting that food insecurity may play a role in onset of overweight and obesity among some low-income subpopulations.<sup>26-32</sup> Although the evidence is not yet conclusive, there are several lines of research currently underway whose results are consistent with causal associations between food insecurity and obesity.<sup>33-41</sup> To the extent that there are associations between food insecurity and obesity, clinicians serving affected subpopulations will be doubly challenged in their efforts to provide effective preventive care.

### **POVERTY, FOOD INSECURITY, AND SOCIAL WELFARE PROGRAMS**

#### **U.S. Poverty Measures**

When created in 1963, the U.S. poverty levels were based on the cost of a diet. Although the thresholds have been updated annually for inflation since 1963, they have never been revised to reflect the change in proportion of total household expenditures spent for food. In the 1960s, the average household spent roughly one-third of its total monthly expenditures for food (averaged over all households at all income levels). In principle, this

implied that multiplying the average cost to households of a minimally nutritious diet by a factor of three would provide an indication of the poverty threshold, or the minimum amount of income needed to meet basic needs.<sup>42,43</sup>

Using the cost of the USDA's Thrifty Food Plan for different size families as estimates of the costs of minimally adequate diets, the poverty thresholds were obtained by multiplying these dollar values by three. This remains the basis of poverty measurement in the United States today.<sup>44,45</sup> Elegant as it is in logic and simplicity, this measure only succeeds when the relative proportion of the average household budget spent on food is accurate. Setting aside the question of whether this is the most accurate approach to estimating the cost of households' basic needs, a more fundamental concern is whether the proportion of household income spent on food has remained constant over time.

Since 1963, the average annual proportion of household expenditures spent for food has declined consistently to about 11% in 2000. Over the same period, the average annual proportion of expenditures spent on other basic needs (most notably housing and transportation) increased consistently.<sup>46-48</sup> As a result, using the same multiplier, logic underlying the initial definition of the poverty thresholds with current proportions of expenditures for food implies a multiplier of approximately 9 instead of 3. Obviously, this would lead to much higher income levels being identified as poverty thresholds, and much larger numbers and proportions of people identified as being in poverty.<sup>46</sup>

Support for the view that the current poverty thresholds understate the costs of basic needs, and therefore lead to underestimation of the level and proportion of the U.S. population at risk for health issues associated with poverty, comes from several sources. The National Research Council of the National Academy of Science conducted a review of the U.S. poverty measures in the mid-1990s, finding them deficient in several respects and recommending a number of changes. The overall effect of implementation of the NRC recommendations would be to increase the number and proportion of people identified as living in poverty.<sup>49</sup>

Another relevant set of studies attempts to determine the minimum income levels actually needed by different size and type of families in different geographic locations within the United States for

basic economic self-sufficiency.<sup>50-52</sup> These studies use actual current data on costs of basic goods and services in different states and regions together with existing taxes and tax credits to estimate actual minimum economic self-sufficiency income levels. Generally, the resulting self-sufficiency income estimates fall above 200% of the federal poverty thresholds.<sup>50-52</sup>

The food-insecurity prevalence estimates summarized in Table 1 for 1999 also provide useful information regarding the relevance of the current poverty thresholds. Data in Table 1 show that, at income levels at or above 185% of poverty, the prevalence of food insecurity and hunger is quite low, with overall food insecurity at 4.1%, food insecurity without hunger at 3.1%, and only 1.0% of households experiencing hunger. Households with incomes equal to or greater than 130% but less than 185% of poverty have higher rates of food insecurity, with 15.1% food insecure overall, 11.6% without hunger and 3.5% with hunger.

### Social-Safety-Net Programs

Increasingly, clinicians require familiarity with public policies and programs providing support for low-income individuals and families, especially in urban areas. Such services attain even greater importance as health-care financing becomes more complex and if prevention achieves a more prominent role in the health-care system. One of 15 food assistance programs funded and overseen by the federal government, the Food Stamp Program (FSP) is the nation's largest nutrition safety-net program for low-income people. Gross income eligibility for receipt of food stamps is 130% of poverty, making most households with incomes below this level that fulfill other eligibility requirements able to receive food assistance, if they apply.

However, the Personal Responsibility and Work Opportunity Reconciliation Act (PRWORA) of 1996, the most recent welfare reform law, changed several aspects of the FSP, making many legal permanent residents and single adults without children ineligible.<sup>53,54</sup> In addition, provisions of PRWORA aimed at diverting or deterring applications for cash assistance, and sundry new rules aimed at enforcing compliance with behavioral expectations, appear to have led many households eligible for food stamps not to apply.<sup>53-56</sup> There is evidence

that the magnitude and extensiveness of changes made by PRWORA may have created so much uncertainty about the new welfare system that many current and potential recipients are frequently uninformed or misinformed regarding their eligibility and other critical aspects of program operation.<sup>53-60</sup>

PRWORA eliminated entitlement status from cash assistance to families with dependent children (AFDC) and replaced it with Temporary Assistance to Needy Families (TANF), while transforming federal funding for AFDC/TANF into a system of block grants to states. New rules and regulations under PRWORA enabled states to place additional restrictions on eligibility and impose a wide range of new behavioral requirements for continued receipt of aid, along with punitive sanctions for failure to comply with these requirements. The new law placed an overall five-year limit on receipt of benefits for most recipients, and transferred primary responsibilities for design, implementation, and oversight of welfare programs to state and local governments. These changes allowed states wide latitude in imposing even stricter time limits and other eligibility requirements.<sup>57-59</sup>

A primary goal of welfare reform was to move recipients off the caseloads and into jobs. In many states, innovative approaches to delivery of services in support of this transition from welfare to work emerged. As a result of the welfare reform changes and growth in the economy during the 1990s, between 1994 and 1999, the national AFDC/TANF caseload declined by 8.0 million recipients (56.0%).<sup>60</sup> Over the same period, the average national monthly FSP caseload declined by 9.3 million recipients (33.8%).<sup>61</sup>

Historically, AFDC/TANF families have been predominantly female-headed single-parent families. In 1994, 74.4% of all AFDC families were single-parent families, and 87.3% of all adult recipients were female.<sup>62</sup> Over the period 1994-1999, the total number of people living in female-headed single-parent households with incomes below the poverty level declined by 2.77 million, somewhat less than the 8.0 million decline in AFDC/TANF recipients over the same period.<sup>63-64</sup> From 1995 (the earliest year for which data are available) to 1999, the overall number of food-insecure female-headed households with children declined by only 0.48 million, from 2.84 to 2.36 million, while the total number of children living in all food-insecure households

(regardless of type) declined by 1.6 million, from 12.2 to 10.6 million.<sup>5,6</sup> These data suggest that the large declines in TANF and FSP caseloads cannot be wholly attributed to reductions in the number of people living in poverty or with food insecurity.

Several studies have documented extensive declines in participation in the FSP during the 1990s and show that a large part of the decline was due to growth in the economy and falling unemployment raising the incomes of previously eligible households above the income eligibility level.<sup>54-56</sup> However, these and other studies also show that a majority (56%) of the decline in FSP caseloads resulted from decline in the participation rates, that is, the proportion of eligible households participating.<sup>53-56</sup>

Food-security prevalence data from USDA show that from 1995 to 1999, even though food insecurity declined overall, among households with incomes at or below 130% of the poverty level (the gross income eligibility cutoff for the FSP), food insecurity actually increased from 23% to 28%. This indicates that many low-income households stopped getting food stamps, or did not apply for them even though they were food insecure and felt they needed more food.<sup>53</sup> In addition, studies of the private emergency food assistance system over the same period indicate that many households leaving the TANF and FSP caseloads are relying more heavily on food from private emergency sources such as food pantries, soup kitchens, and shelters.<sup>65-67</sup>

The implications of these social and economic realities for clinicians and clinical practice are numerous. They suggest that clinicians practicing in areas serving low-income populations will benefit from knowledge of and sensitivity to issues associated with poverty-related food insecurity and hunger. Clinicians and clients/patients will also benefit from familiarity with social-safety-net programs available to support low-income families, especially public and private food assistance programs.

## THE STATE OF THE U.S. ECONOMY

To a certain extent, poverty and food insecurity are correlated with the state of the economy. When the economy is in an expansionary phase and unemployment is low or declining, poverty and food insecurity also tend to decline. When the economy

is in a recession and unemployment is increasing, both poverty and food insecurity tend to increase. From March 1991 to March 2001, the U.S. economy experienced the longest period of growth in recorded history.<sup>69,70</sup> Beginning in March 2001, after reaching the peak of this record 10-year economic expansion, the economy entered a recession, or contractionary period, characterized by increasing unemployment and decreasing economic output. The average length of recessions in the U.S. economy during the post-WW II period is 11 months, with the employment level declining by 1.1% on average during each recession. Based on the March 2001 employment level, on average this would amount to a decline in employment of about 1.5 million workers.

According to the latest data available from the Bureau of Labor Statistics (BLS), the national unemployment rate for January 2002 was 5.6% (1.3 percentage points higher than in March 2001), with 7.9 million workers unemployed (1.9 million more than in March 2001). As of January, the total number of workers employed had declined by 2.3 million, or by 1.7% from the number employed in the peak month of March 2001 (135.8 million). The 2.3 million decline in employment from March 2001 to January 2002 was made up of a seasonal decline of about 0.5 million in the civilian labor force, plus an additional 1.9 million unemployed workers.

The record expansionary period from March 1991 to March 2001 began with the unemployment rate at 6.8%, and 8.6 million workers unemployed. During this 10-year expansion, the unemployment rate remained above 6% until September 1994, continued above 5% until April 1997, only dipped below 4% for the two months of September and October 2000, and remained at or above 4% through the peak month of March 2001 when it stood at 4.3% with 6.1 million workers unemployed.

This strongly suggests that the "full employment" unemployment rate (ie, the lowest unemployment rate that the U.S. economy can reach and sustain for any appreciable length of time) is probably not lower than 4%, and may even be higher (eg, 5%). The importance of this is that under known conditions, unemployment is not likely to fall below 4% for very long (if at all), and poverty, food insecurity, and hunger are not likely to disappear altogether, even during economic booms. And, of

course, even in full employment, the young, elderly, disabled, etc cannot work anyway.

Of particular concern as the current recession proceeds are implications for the several million former and current welfare recipients who have been moved into the workforce and are competing with newly unemployed workers for low-wage jobs. As unemployment increases it may become more difficult for recipients currently working to hold onto their jobs, and for those attempting to find jobs to succeed. Moreover, time limits have already begun to take effect in most states, adding to the uncertainty faced by many low-income current and former recipients. Even so, from the beginning of the current recession in March 2001 to September 2001, welfare caseloads increased in 33 states. In 22 states, caseloads increased every month in the year from September 2000 to September 2001. (See Center for Law and Social Policy, <http://www.clasp.org>. Welfare caseloads are up in most states.)

### **CLINICAL IMPLICATIONS OF FOOD INSECURITY AND MALNUTRITION: A LIFE-CYCLE PERSPECTIVE**

Considering the clinical implications of poverty-related food insecurity from a life-cycle perspective, each stage is characterized by particular nutrition and health requirements, and poverty and food insecurity can influence food and nutrient availability in each stage. The most vulnerable stages may be the earliest and latest: those involving pregnancy, prenatal development, birth, infancy, and early childhood, and those involving elder years, assisted living, long-term care, death, and dying. Yet every stage is important for healthy life, and each can be compromised by food insecurity, hunger, and malnutrition.

#### **Prenatal Period, Birth and Infancy**

Adequate nutrition before conception and during pregnancy is essential for a healthy pregnancy, optimum prenatal growth, development, and a successful birth outcome. Although there is more to learn about optimum nutrition for conception, pregnancy, and birth, basic requirements are well documented.<sup>71-76</sup> Food insecurity can compromise the nutritional status of both the mother and the

fetus, and negatively influence the birth outcome as well as present and future development of the infant. Both undernutrition and overnutrition can be exacerbated by food insecurity during and after pregnancy and pose risks to both mother and child.

A particular issue in the U.S. related to pregnancy, prenatal health, and birth is the high prevalence of adolescent and teen births. The overall birth rate for U.S. women ages 15-19 years of age in 2000 was 48.5 live births per 1,000 women, down from 62.1 live births per 1,000 women in 1991.<sup>77,78</sup> The estimated pregnancy rate for all U.S. women ages 15-19 in 1997 was 94.3 pregnancies per 1,000 women, down from 116.5 in 1991.<sup>79,80</sup> Rates of pregnancies and births are more than twice as high for women ages 18-19 years as for those 15-17, and vary by race/ethnic origin. In 1997 (the latest year for which comparable pregnancy and birth rate data are available), pregnancy and birth rates for non-Hispanic white women ages 15-19 years were 65.1 and 36.0 per 1,000 women, respectively. For non-Hispanic black women ages 15-19 years, pregnancy and birth rates were 170.4 and 90.8 per 1,000 women, respectively. Rates for Hispanic women ages 15-19 years were 148.7 and 97.4 per 1,000 women, respectively.<sup>80</sup>

Although the U.S. teen pregnancy and birth rates declined steadily throughout the 1990s,<sup>77,78</sup> they remain higher than in other developed countries.<sup>79-81</sup> Even though age of initiation and levels of sexual activity among U.S. teens do not differ appreciably from those in other developed countries, compared to teens in England and Wales, Canada, France, and Sweden, U.S. teenagers are more likely to become pregnant and have a birth.<sup>81,82</sup>

These differences are attributed to U.S. teens receiving less information about reproductive health at home and at school, receiving less clear and consistent information about appropriate sexual behavior and family planning, having poorer access to women's health services (including reproductive health services), having poorer access to contraceptive services, being less effective contraceptive users, and having poorer access to abortions.<sup>81,82</sup> Once a pregnancy occurs, U.S. teens are less likely to have an abortion than teens in the other countries mentioned. This difference is attributed to the marked contrast between the way abortion is viewed and provided in the United States relative to the other developed countries in the study.<sup>81-83</sup>

The authors of these teen pregnancy and birth studies point out that social and economic well-being and equality are closely linked to lower teenage pregnancy and birth rates, noting that "government commitments to social welfare and equality for all members of society provide greater support for individual well-being in other countries than in the United States."<sup>82</sup> Similar observations can be made regarding poverty and food insecurity and the social-welfare policies adopted to address them.

Effective national commitments to reducing economic disparities and ensuring access by all members of society to goods and services needed to meet basic needs are credited with helping to maintain lower rates of teen pregnancies and births.<sup>81,82</sup> They undoubtedly also help to prevent food insecurity, hunger, and associated health problems. Data in Tables 1 and 2 indicate that poverty, food insecurity, and hunger rates for female-headed households with no spouse present are among the highest of all subgroups examined. Moreover, children in these households are especially vulnerable and often fair especially poorly.

### Food Insecurity and Cognitive Development

Pediatric clinicians may encounter the effects of food insecurity in a variety of forms, ranging from inorganic failure to thrive (FTT), to iron deficiency, anemia, and other micro-nutrient deficiencies. Poverty-related food insecurity and malnutrition during the first three years of life can have serious negative impacts on subsequent physiological, behavioral, and cognitive development in humans.<sup>84-89</sup> In the United States, as elsewhere, poverty is a major cause of conditions that result in impairments in growth and development among young children of poor families through limitations on food security and nutrition, constrained environmental stimulation, impaired immunity, increased morbidity, reduced access to healthcare, and other ways.<sup>90-93</sup>

Over the past decade a growing body of evidence suggests that cognitive deficits accumulated due to chronic mild-to-moderate undernutrition during the first three to five years of life can lead to long-lasting impairment and underachievement.<sup>88-93</sup> Recent studies have also found food insecurity associated with psychosocial dysfunction, behavior problems, academic underachievement, and school failure.<sup>94-98</sup> In these studies, food insecurity and

**Table 2.** Number and Percent of Persons in Poverty by Selected Characteristics, 1999

Characteristics	Total in Population/Group (1000s)	Number in Poverty (1000s)	Percent in Poverty (%)
All Persons	273,493	32,258	11.8
Children under 18	71,731	12,109	16.9
Ages 18-64	169,820	16,982	10.0
Ages 65 and older	32,649	3,167	9.7
Type of Household			
Married-couple families	179,169	10,422	5.8
Related children under 18	51,341	4,297	8.4
Related children under 6	17,300	1,565	9.0
Female head, no spouse	38,223	11,607	30.4
Related children under 18	15,762	6,602	41.9
Related children under 6	4,678	2,353	50.3
Women living alone	15,558	2,791	17.9
Men living alone	11,210	1,467	13.1
Race/Ethnicity			
White	224,373	21,922	9.8
Black	35,373	8,360	23.6
Hispanic	32,669	7,439	22.8
Ratio of Income to Poverty			
Under 0.50	273,493	12,681	4.6
Under 1.00	273,493	32,258	11.8
Under 1.30	273,493	46,896	17.1
Under 1.85	273,493	74,968	27.4
Under 2.00	273,493	82,316	30.1
Area of Residence			
In metropolitan areas	221,348	24,816	11.2
In central cities	80,052	13,123	16.4
Not in central cities	141,296	11,693	8.3
Outside metropolitan areas	52,145	7,442	14.3

Source: Dalaker JD, Proctor BD. *Poverty in the United States: 1999*. U.S. Census Bureau, Current Population Reports, Series P60-207. Washington, DC: U.S. GPO; September 1999.

hunger appear to be associated with undesirable outcomes independent of related malnutrition, suggesting that the experience of poverty-related food insecurity and hunger involves or is associated with stresses that impinge on the child in ways above and beyond any accompanying measurable nutritional insults.<sup>96-98</sup>

### Maternal Depression

A major pathway for expression of poverty-related stresses in families, including food insecurity, is maternal depression. A large literature exists on the nature and implications of maternal depression, with extensive reviews available.<sup>99</sup> Poverty and associated health problems can be important factors in the onset and duration of episodes of maternal depression.<sup>100</sup> In turn, maternal depression affects mothers' ability to function effectively in a variety of ways and can interfere with responses to food insufficiency.<sup>101</sup>

The current understanding of household food insecurity as a managed process emphasizes the role of household food managers (usually mothers) in undertaking a complex set of coping behaviors to avoid hunger among household members.<sup>3-5</sup> In households with children, responses to food insecurity often involve rationing behaviors aimed at sparing children from reduction of food intake and consequent hunger.<sup>5</sup> These circumstances involve stresses expressed in the Food Security Scale in terms such as "We worried whether our food would run out before we got money to buy more," and "The food we bought just didn't last and we didn't have money to get more."<sup>5</sup>

Clinicians serving either adult or pediatric populations in which food insecurity is an issue may encounter depression and related co-occurring mental and physiological illnesses. Depression often co-occurs with other illnesses and health-related behaviors such as chronic medical conditions that

impede functional effectiveness, eating disorders, and substance-related disorders.<sup>99</sup> These and other illnesses can be complicated by food insecurity in a variety of ways ranging from symptomatic to behavioral.

### **Implications for Patients with Chronic Disease**

Chronic illnesses have become widespread in the U.S. population and many can be complicated by food insecurity. Estimates for 1995 indicate approximately 100 million people have chronic conditions.<sup>102</sup> Diabetes, heart disease, HIV, hypertension, chronic obstructive pulmonary disease, asthma, and sickle-cell anemia are just a few of the large number of chronic illnesses that a growing number of Americans are learning to manage.

Patient noncompliance with medication, diet, and other requirements is often a major issue in successful management of chronic illness. For low-income families with chronically ill members, especially those without health insurance or with public insurance, compliance with dietary requirements can be seriously compromised by episodes of food insecurity.<sup>103</sup>

### **Implications for the Elderly**

Clinicians serving elderly populations in the United States will face extraordinary challenges over the coming decades. Although a smaller proportion of elderly Americans is poor than is the case for younger age groups, growth in the elderly population as the "baby boom" generation ages raises serious concerns related to food security, chronic illness, and long-term care for the elderly.

In 2000, according to data from the Census 2000 Supplementary Survey, there were 33.1 million people in the United States aged 65 years and over, with 3.3 million aged 85 years and over.<sup>104</sup> According to Census Bureau population projections, by the end of this decade the number of people aged 65 and over will have increased to 39.7 million with 5.8 million aged 85 and over. By the year 2020, these projections are 53.7 million aged 65 and over and 6.8 million aged 85 and over. Over the next two decades, the number of Americans 100 years old and older will increase by nearly 300% from 65,000 to 235,000.<sup>105</sup> As a result of higher mortality rates among males at all ages,

about 56% of people aged 65 and over, 65% of those 85 and over, and 77% of those 100 years old and older in 2020 will be women.<sup>104</sup>

These demographic dynamics imply major challenges for the U.S. Social Security, insurance, and health-care systems, and for clinicians and other care providers who will undertake the unprecedented task of caring for these increasingly large numbers of elderly people in the future. For many elderly, food security takes on additional dimensions related to restricted mobility and limits on activities. Issues related to chronic illnesses and conditions are especially relevant in the elderly population, as are special dietary and pharmacologic requirements, all of which can be seriously complicated by food insecurity.

In 1999, an estimated 35.6% of all noninstitutionalized persons aged 65 and over in the United States experienced some limitation on activities caused by chronic illnesses or conditions. Moreover, 6.3% of people in this age group experienced activities of daily living limitations (ADL), and 12.4% experienced limitations of instrumental activities of daily living (IADL).<sup>106</sup> Such limitations can impede access to nutritious food in a variety of ways, leading to or exacerbating food insecurity. In addition, these limitations can affect one's ability to prepare and consume food without assistance, sometimes necessitating nutrition support. Poverty and food insecurity can, in turn, compound the negative health effects of limitations on activity.

Many elderly people suffer from multiple chronic illnesses or conditions, often involving multiple medications or polypharmacy.<sup>107,108</sup> Age-related pharmacokinetic and pharmacodynamic changes affect absorption, distribution, metabolism, and excretion of drugs. These factors are both affected by and affect nutrition in the elderly. Inadequate or inappropriate food intake associated with food insecurity can contribute to malabsorption and ineffective distribution, metabolism, and excretion of drugs, exacerbating problematic drug-nutrient interactions.

Commensurately, polypharmacy can decrease nutrient bioavailability, chelate nutrients, inhibit nutrient absorption, and alter the environment and physiology of the GI tract.<sup>107-110</sup> In addition, multiple chronic illnesses and polypharmacy often inhibit appetite, affect sensory-specific satiety, and impede the motivation and ability to obtain, prepare, and eat

food. All these situations can be complicated by poverty-related food insecurity, adding to the difficulties faced by clinicians in caring for chronically ill elderly patients. All of these issues will be amplified and multiplied by the rapid increase in the elderly population, especially the component aged 85 and over, in the next two decades.

### Health Insurance and Access to Care

Many low-income people and families in the United States have no health insurance or are covered by public insurance (eg, Medicaid, Indian Health Service, or state child health insurance programs (SCHIPs)). Table 3 shows the proportions of people who lacked health insurance for the entire year in 1996 and 2000 by selected characteristics. In 1996, 15.5% of all people in the United States had no health insurance, including 14.8% of all children. The proportion of all people in poverty with no health insurance that year was nearly twice as great (30.8%), while 23.3% of children living in poverty lacked health insurance during the entire year.<sup>111,112</sup>

**Table 3.** Percent of People with No Health Insurance Coverage During the Entire Year by Selected Characteristics: 1996 and 2000

Characteristic	All People		People in Poverty	
	1996	2000	1996	2000
Total	15.5	14.0	30.8	29.5
Under 18 years	14.8	11.6	23.3	21.5
18 to 24 years	28.9	27.3	42.4	46.6
25 to 34 years	22.3	21.2	45.3	46.3
35 to 44 years	16.3	15.5	42.7	42.1
45 to 64 years	13.7	12.6	36.0	31.0
65 years & over	1.1	0.7	3.6	2.4
White	14.4	12.9	32.1	31.0
Black	21.7	18.5	26.9	24.5
Hispanic	33.6	32.0	39.5	43.0
Asian or Pacific Islander	21.1	18.0	37.4	36.5
Worked during year	17.4	16.2	48.4	45.5
Full time	16.3	15.4	52.2	47.5
Part time	22.4	20.7	42.7	42.1
Did not work	25.3	23.6	35.2	36.6
Native	13.7	11.9	26.8	25.3
Foreign born	33.6	31.6	54.0	53.7
Naturalized citizen	17.2	15.9	39.3	30.4
Not a citizen	42.4	41.3	57.0	60.9

Source: Bennefield RL. *Health Insurance Coverage: 1996*. Current Population Reports, P60-199. U.S. Census Bureau; September 1997. Mills RJ. *Health Insurance Coverage: 2000*. Current Population Reports, P60-215. U.S. Census Bureau; September 2001.

In 2000, near the end of the recent record 10-year economic expansion, and four years after enactment of the new welfare reform law in 1996, 14% of all Americans had no health insurance, including 11.6% of all children. The proportion of people with incomes below poverty who had no health insurance all year in 2000 had declined by 1.3 percentage points from the rate in 1996 to 29.5%, including 21.5% of poor children. Of those poor people with any kind of health insurance coverage throughout the year in 1996, 78.8% were covered by some kind of government or public insurance. In 2000, the proportion of poor people with any health insurance covered by government insurance was 71.2%.<sup>111,112</sup>

These data have far-reaching implications for clinicians and health-care providers serving communities that include low-income populations. Recent literature describes persistent and worsening disparities in access to and utilization of health care among low-income children and youth in the United States, especially in urban areas,<sup>113-121</sup> with increased reliance on hospital emergency departments (EDs) for primary and acute care, particularly by those with public health insurance or no insurance.<sup>122-124</sup> Other studies have highlighted increased difficulties experienced by low-income parents in caring for sick children due to lack of paid or unpaid work leave, irregular and inflexible work schedules, and absence of health insurance associated with low-wage jobs.<sup>125,126</sup>

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