ABSTRACT

Title of Thesis: INFLUENCE OF FOOD-RELATED LIFE SKILLS ON FOOD SECURITY OF RURAL, LOW-INCOME FAMILIES

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This study examined the effects of food-related life skills on food security in a sample of rural, low-income mothers. While research suggests that income and food assistance benefits do not protect low-income families from food insecurity, the potential of food resource management to optimize limited income and food assistance is unknown. Linear regression was employed to determine the extent to which food-related life skills affect food security status within the sample. Findings indicate that mothers in food secure households are significantly more likely to possess food-related life skills than mothers in food insecure households. The ability to make a family budget was a significant predictor of food security, while income relative to household size and poverty level, food stamps, and participation in WIC and the School Lunch Program were not significant predictors. Findings emphasize the importance of helping low-income families obtain skills and resources that protect them from food insecurity.

INFLUENCE OF FOOD-RELATED LIFE SKILLS ON FOOD SECURITY OF RURAL, LOW-INCOME FAMILIES

by

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CHAPTER I: Introduction

Poverty is associated with negative outcomes that span all dimensions of well-being, including health and mental health, development, education, income adequacy, food security, and life satisfaction. Despite numerous policy and programmatic attempts to alleviate its negative effects, poverty and its associated ills continue to affect a sizeable portion of the U.S. population.

Although policy research institutions are investigating the impact of welfare policy reforms on women and families in urban areas, little work has been done to investigate how these changes affect those in rural areas (Braun & Vandergriff-Avery, 2001; Whitener, Weber, & Duncan, 2002). What little comparative and/or rural poverty research is available suggests that low-income people in rural areas are fairing as poorly as or more poorly than their urban counterparts. Low-income populations in rural areas often have greater challenges accessing basic goods, social support and community networks, transportation, job opportunities, child care, health services, and social services. Given these special challenges, research that investigates a variety of dimensions of well-being of rural, low-income families is needed. The ability to describe the extent to which unique circumstances or characteristics affect outcomes of well-being among the rural poor provides important input for program planning and policy revision. Policymakers, educators, and program staff can incorporate these findings into policies and programs to address more adequately the strengths and needs of low-income rural families.

Even with the dramatic decline in welfare caseloads and increases in employment among the poor, welfare reform may be affecting rural and urban families differently and

may not be working as well for the rural poor (Cook & Dagata, 1997; Rural Policy Research Institute, 2001; Whitener, Weber, & Duncan, 2002; Zimmerman & Garkovich, 1998). Because the responsibility of welfare program administration is now at the state level, noncompliance sanctions, eligibility and benefits, work requirements, and child care assistance vary from state to state (Gallagher, 1998; Liebschutz, 2000). Additionally, welfare reform raised eligibility criteria for welfare receipt, restricted food stamp distribution, excluded most legal immigrants from benefit receipt, and imposed noncompliance sanctions. The dramatic decline in food stamp receipt among eligible individuals has been attributed in part to confusion about eligibility and lack of access (Nord, 2000).

One indicator of well-being, and a basic need for the ability to function and work, is food security status. Food security status describes the extent to which families are able to consistently access the quality and quantity of food needed for healthy living (Nord, Andrews, & Carlson, 2003). Food security is hindered by a lack of money and other resources, causing 11.1% of U.S. households to experience food insecurity in 2002 (Nord, Andrews, & Carlson, 2003). In about one-third of food insecure households, equal to 3.5 % of the U.S. population, one or more family members have experienced hunger in the past year (Nord, Andrews, & Carlson, 2003). Food insecure households that avoid hunger do so by supplementing food shortages with emergency food assistance, federal food assistance programs, such as Supplemental Nutrition Program for Women, Infants, and Children (WIC), the Food Stamp Program, and the School Lunch and Breakfast Programs, and/or limiting the purchase of more costly foods. These forms

of food assistance are an important resource to low-income families, although their effectiveness and impact is difficult to measure.

Yet, while federal programs provide food assistance to many low-income individuals and families, the programs are not eliminating food insecurity (Cohen, et. al, 1999; Olson, Seiling, & Lawrence, 2001; Ribar & Hamrick, 2003). Though it seems intuitive that adequate income available for food spending would alleviate food insecurity, not all of those who lack adequate income experience food insecurity and not all of those who experience food insecurity lack adequate income (Nord, Andrews, & Carlson, 2003). Research suggests that additional factors are affecting and/or contributing to food insecurity. Examining other characteristics, factors, and skills that may help the poor optimize food resources may help explain the failure of food assistance to relieve food insecurity.

One factor that may relieve food insecurity is food resource management. Food resource management skills may be an asset to low-income families who struggle with food security. Given the relative shortage of income available for food spending in low-income families, the ability to manage resources is an important skill to protect families from food insecurity. Some studies indicate a strong relationship between food insecurity and a lack of food-related life skills, such as preparing a family budget, managing bills, and stretching groceries to the end of a month (Anderson & Swanson, 2002; Bauer & Dolan, in press).

Relevant food resource management skills may protect low-income families from negative poverty outcomes including food insecurity. Diminished human capacity, however, puts the rural poor at a relative disadvantage of obtaining these skills because of

problems with access, isolation, and lack of opportunity characteristics of many rural communities. This disadvantage again highlights the need to examine factors related to negative outcomes in rural, limited resource populations. With lower levels of education and less capital than non-poor families, low-income families may benefit from nutrition and family resource management education programs that teach skills relevant to achieving household food security.

Given the seriousness of food insecurity, especially among rural, low-income families, more knowledge about the characteristics or circumstances that affect food security outcomes is needed. This information may help policies, programs, and families to optimize food assistance and food resources and reduce the negative impact of insufficient income. If food resource management skills influence food security status, skills intervention may help protect the poor from food insecurity and improve their overall well-being.

CHAPTER II: Literature Review

Rural Poverty and Rural, Low-Income Family Well-Being

Rural residency, with accompanying low incomes, is associated with various negative outcomes in well-being. With inadequate income to meet their needs, despite earned income and public assistance, the rural poor fall short of self-sufficiency (Braun, Lawrence, Dyk, & Vandergriff-Avery, 2002). Some problems in rural, low-income families are related to outcomes in physical and mental health, education, food security, and other factors. Chronic stress, isolation, limited access to resources and services, underemployment, unemployment, and income inadequacy affect these outcomes, creating family frailty and economic crisis (Bauer, Braun, & Olson, 2000). Comparative poverty literature suggests that rural families often face a greater variety of chronic stressors than their urban counterparts (Bokemeier & Garkovich, 1991; Flora & Christenson, 1991), contributing to the possibility for more, or more serious, negative outcomes. Trends attributed to increased vulnerability in rural populations include inadequate education, single parenting, early parenting, discrimination, and erosion of family support networks (Braun et al., 2002). These trends are thought to foster the intergenerational transfer of poverty and compromise the potential to become self-sufficient (Fitchen, 1995).

The rural poor face greater barriers to self-sufficiency because they have fewer job options (Cook & Gibbs, 2000; Gibbs, 2001) and lower educational attainment (U.S. Census Bureau, 2001) than the urban poor. Fifty-nine percent of allrural adults attained no more than a college degree, compared with forty-eight percent of allcentral city adults (U.S. Census Bureau, 2001). Furthermore, the job growth in rural areas does not parallel

rural residents' education and skills (Weber et al., 2003) and minimum wage and part-time work are the most prevalent jobs available to rural workers (McKernan, Lerman, Pindus, & Valente, 2000), making underemployment more prevalent in nonmetropolitan areas (Cook & Gibbs, 2000; Findeis & Jensen, 1998). Despite representing 19% of the U.S. population and growing at a rate less than one fifth of the metropolitan population, nonmetropolitan areas account for only 3% of labor force growth (Economic Research Service, 2003b). Thus, residents in nonmetropolitan areas are more likely to reach welfare time limits sooner than their metropolitan counterparts due to lack of available jobs (Rural Dimensions of Welfare Reform, 2000). Welfare-to-work programs are primarily located in metro areas (Kraybill & Lobao, 2001), adding an additional barrier to economic self-sufficiency through work as current welfare policy espouses. Finally, rural areas often lack health and mental health facilities, emergency services, special needs services, public transportation, specialized educational or job training, and formal and/or accredited child care (Weber et al., 2003) vital to a quality of life and to employment. When these services and resources are available, low population density, long distances, expenses, and scheduling inflexibility in rural areas makes access difficult or impossible.

In addition to the current barriers to work affecting the rural poor, the problem of persistent poverty disproportionately affects rural regions. Defined by county poverty rates of twenty percent or more every decade since 1960, persistent poverty plagues rural areas at eight times the rate of urban areas (Deavers & Hoppe, 1992; Economic Research Service, 2003; Imig, Bokemeier, Keefe, Struthers, & Imig, 1997; Miller, Candrall, & Weber, 2003). Persistently poor rural areas have higher unemployment rates, numbers of children, and percentage of minorities and lower educational levels (Miller et al., 2003).

The persistence of poverty in rural areas may be attributed, in part, to the lack of sufficient work opportunities, supportive resources, and developed infrastructure.

The new work requirements and time limits legislated in the Personal Responsibility and Work Opportunities Reconciliation Act of 1996 present unique challenges for the rural poor, who tend to live in areas with fewer job opportunities and choices, lower-wage jobs, no public (and unreliable or no private) transportation, and little access to affordable, quality child care (Gibbs, 2001; Weber et al., 2003). Work mandates especially burden the rural poor (Mechstroth, Ponza, & Der, 2003) because of the lack of resources in rural communities that foster initiatives to help people find and keep living-wage employment. Rural welfare recipients may be unable to make appointments, find steady employment, take advantage of work supports (e.g., child care), and receive food stamps because of lack of access, time and transportation constraints, ineligibility, and expired time limits.

Income disparities related to gender are amplified in rural areas, which are related to limited employment opportunities for women in rural areas and more stringent notions of traditional gender roles in rural areas (Flora & Flora, 2003; Flora, Spears, Flora, & Swanson, 1992; McLaughlin & Sachs, 1988). Rural areas are more likely to have occupational segregation, and part-time and/or temporary work is considered most appropriate work for rural women (Gringeri, 1995; Semyonov, 1983). As a result, poverty disproportionately affects women and children (Lichter & McLaughlin, 1995), especially rural single mothers (Lichter & Jenson, 2001). Income disparities are also reflected in food insecurity status, with single mother households disproportionately experiencing food insecurity and hunger.

Food Insecurity, Food Resource Management, and Nutrition Adequacy

Despite a national food insecurity rate of 11.1%, 32% of single mother households, 38.8% of households below the poverty line, 16.5% of households with children under 18, and 17.6% of households with children under 6 experienced food insecurity in 2002 (Nord, Andrews, & Carlson, 2003). The prevalence of hunger in single mother households was 8.7%, compared with a national prevalence of 3.5% (Nord, Andrews, & Carlson, 2003). Even though children are likely to be protected from hunger even in food insecure households, children in 265,000 U.S. households experienced hunger at some time throughout the year in 2002 (Nord, Andrews, & Carlson, 2003). Children raised in food insecure conditions experience academic problems (Reid, 2001). Lack of adequate nutrition affects the ability to learn and eventually, the ability to earn (Braun, l997). Thus, the well-being and future of children raised in food insecure households are potentially compromised.

In one study comparing single mother families with married couple families, single mothers shop for food less frequently and had more negative views of food adequacy in their households. Both family types had similar food expenditures and diets high in fat and cholesterol and lacking in food variety and nutrient intake (Lino & Guthrie, 1994). As compared with higher-income parents, low-income parents were less likely to read nutrition labels when food shopping, less aware of diet-related conditions, and much less likely to have diets low in fat and cholesterol. Low-income parents were also more attentive to food costs, convenience, and shelf life than higher income parents (Morton & Guthrie, 1997). These findings suggest that there are special considerations regarding food resource management and diet affecting low-income and/or single mother

families. Time and resources may hinder low-income families from providing the quantity of food necessary. Because of these concerns, dietary quality is likely to be a secondary matter. In addition to using emergency and governmental food assistance, individuals having difficulty meeting food needs may resort to risky food acquisition practices to acquire food or money for food (see Kempson, Keenan, Sadani, Ridlen, & Rosato, 2002).

The inability to meet basic needs, created by a lack of earning ability and other factors, manifests itself in a number of negative outcomes. Rural, low-income women tend to have poor nutrition and experience food insecurity. Non-metro families are more likely to experience food insecurity than non-central city metro families, with 11.6% and 8.8% of each population food insecure, respectively (Nord, Andrews, & Carlson 2003). Food insecurity also disproportionately affects black and Hispanic rural families at the rates of 22% and 21.7% respectively (Nord, Andrews, & Carlson 2003). Rural families have higher risk of nutrition-related chronic conditions (e.g., cancer, cardiovascular disease, diabetes, and hypertension), obesity, and other debilitating health conditions (Monroe, O'Neil, Tiller, & Smith, 2002); and food insecure families are more likely to experience serious illnesses (Anderson & Swanson, 2002). In light of the absence of health care coverage and access to health facilities, these risks further complicate the potential for well-being.

Food Assistance in Rural, Low-Income Families

The effects of food stamp receipt on food security are difficult to measure. While it might be assumed that families who are less able to meet basic food needs may be more likely to receive and make use of food stamp benefits, it may also be assumed that

families who use food stamp benefits are more able to meet food needs. Therefore, food stamp receipt may be attributed to problems providing adequate food or positive changes in food security status. The direction of causality may work either way, complicating researchers' ability to evaluate the impact of food stamp receipt on food security (Nord, 2000). For this reason, interpreting fluctuations in food insecurity over time among food stamp recipients is an indefinite task (Nord, 2000).

Participation in the Food Stamp Program varies widely,with a large number of eligible individuals and families not receiving benefits. Factors of non-receipt include fluctuations in eligibility, attitudes towards public assistance, misinformation about eligibility, and access (disability or health status, transportation, etc.). A study conducted by the Economic Research Service suggests that the monthly income of eligible individuals who do not receive food stamps fluctuates more than the income of eligible individuals who do receive food stamps, with non-participants experiencing temporary drops in income. Other non-participants may experience a greater depth of poverty, low literacy, or disability, factors that act as barriers to Food Stamp Program participation. While these groups may be in greater need of food assistance, they are unable to access the benefit due to circumstances similar to those that limit their incomes (Farrell, Fishman, Langley, Stapleton, & Gibbs, 2003).

Evidence does not suggest that food stamps alleviate food problems in low-income families (Ribar & Hamrick, 2003). Furthermore, in one study of rural families, the amounts of food stamp benefits or participation in other food assistance programs were not significantly associated with food security status (Olson, Seiling, & Lawrence, 2001). Finally, a study suggested that food outcomes were more negative among food

stamp recipients, as compared with eligible individuals not receiving food stamps. Half of all food stamp recipients were found to have some level of food insecurity (Cohen, et. al, 1999). Regardless of whether these findings are related to the depth of poverty experienced by food stamp recipients or the inadequacy of food stamps in assisting low-income families, food insecurity is clearly dependent on more than just poverty status (Ribar & Hamrick, 2003). Because a large proportion of food stamp recipients experience food insecurity despite receiving food assistance, human capital factors that could optimize the use of food resources, including food stamps, offers an area of investigation for researchers.

Life Skills and Life Skills Intervention

Given the economic disadvantages presented by limited skills, increases in particular skills are thought to affect the capacity to earn, and thus, the capacity to become healthy and economically self-sufficient. It is not clear, however, what types of skills and knowledge are critical in influencing positive outcomes and what models of intervention increase skills and knowledge with a significant, lasting impact. In one study of rural families, life skills and community resource knowledge were significantly protective against food insecurity, with those with high skill levels one eighth as likely to experience food insecurity as those with low skill levels (Olson, Seiling, & Lawrence, 2001).

Some findings suggest that the relatedness of the skill or knowledge to an anticipated outcome affects the strength of the influence. Research has shown life skills education for economically or educationally disadvantaged adults to have positive, lasting outcomes when the intervention is directed toward specific skill development,

rather than abstract learning (Giroux & Pietrofesa, 1973). Furthermore, deficits in particular skill and knowledge areas are thought to be related to negative outcomes in those areas. For example, food security, often used as a measure of well-being, is associated with lower levels of certain basic budgetary skills. In one study of rural families, researchers found that a strong significant relationship exists between food security and ability to manage bills, prepare a family budget, and stretch groceries to the end of the month (Anderson & Swanson, 2002; Olson, Seiling, & Lawrence, 2001). Another study showed that food insufficiency fell with rising income and education levels (Rose, Gunderson, & Oliveira, 1998), suggesting that human capital may be an important factor in the relationship between variations in income and food security.

In addition to relatedness between skill and outcome in nutrition education, results by educational intervention type may vary. In a nutrition education program for low-income Hispanic adults, results suggest that the stages of change model and the peer education component led to significant gains in, and retention of, nutrition-related knowledge, skills, and behavior (Taylor, Serrano, Anderson, & Kendall, 2000). The stages of change model (Prochaska & DiClemente, 1992) suggests that individuals must go through a series of stages, including pre-contemplation, contemplation, preparation, action, and maintenance, to experience behavioral change. This model assumes that behavior change requires different thinking about behaviors, and that interventions are more effective when they are tailored to the stage that subjects are in at the time of intervention (Campbell, 1997). The stages of change model is often used in nutrition education. These and related findings also suggest that income, literacy level, culture,

and community are important considerations influencing the potential for success in educational interventions.

Through the USDA's Food and Nutrition Service (FNS), the federal government invests significant resources in nutrition education as a skill-building intervention. The FNS mission is "to increase food security and reduce hunger in partnership with cooperating organizations by providing low income persons with access to food, a healthful diet, and nutrition education." The goal of food stamp nutrition education, funded through the FNS, is "to provide educational programs that increase, within a limited budget, the likelihood of food stamp recipients making healthy food choices and choosing active lifestyles consistent with the most recent advice reflected in the Dietary Guidelines for Americans and the Food Guide Pyramid" (Food and Nutrition Service, 2003).

The Food Stamp Program suggests nutrition education interventions that improve dietary quality, food safety, food security, and food resource management in low-income households. While an emphasized goal of many nutrition education programs for limited resource populations is to increase dietary quality knowledge and food preparation skills, the positive influence of these skills on food security status is dubious. Much of the research on these programs shows that, while food resource management and budgeting skills are related to positive outcomes in food security, healthy meal preparation skills may not be protective of food insecurity (Anderson & Swanson, 2002; McLaughlin, Tarasuk, & Kreiger, 2003; Olson, Seiling, & Lawrence, 2001). There is also a weak link between nutrition knowledge and actual behavior (Nayga, 2000). Food resource management skills education, however, may elicit behavioral changes that positively

affect food security status. A study of food insecure parents in Washington found that stretching food dollars was the most requested nutrition education topic (Hoisington, Shultz, & Butkus, 2002).

In order for programs to target limited resource populations effectively, researchers must provide evidence that such populations are in need of particular information or skills and that having such knowledge can influence outcomes positively. Given the connection between some food-related life skills and food security, food stamp nutrition education programs may be able to influence more positive outcomes in food security status by teaching low-income adults particular food resource management skills. Results from studies of the relationship between life skills and food security can help program planners provide appropriate intervention that uses the connection between life skills and food security as a basis for such curricula.

The effectiveness of educational interventions in increasing skill and knowledge levels in low-income populations is often mixed. One study of single, low-income mothers indicated that, while a life skills course improved self-esteem, assertiveness, and parenting, financial stress continued to cause worry within the sample. Skill changes were also reported in the areas of stress management and problem solving, though improvement in these areas was slightly less strong (Whittington, 1986). Given the persistence of financial stress, arguably a factor at the foundation of negative outcomes associated with poverty, human capital increases may not be able to elicit the amount of change necessary to affect well-being. Regarding food security, however, particular skills in budgeting and planning and the ability to access community food resources may reduce the negative impact of insufficient income on food security status. This study will

explore the relationships between these resource management skills (budgeting, managing bills, and stretching food resources) and food security.

Theoretical Framework

This research was guided by elements of human capital theory and the Welfare to Well-Being Framework (Bauer, Braun, & Olson, 2000). The theory surrounding human capital indicates that possessing particular resources and attributes, such as health, knowledge, and skills, may contribute to an individual's employability (Becker, 1993), and thus, to an individual's ability to earn. Human capital theory also suggests that income inequality is, in part, attributable to differences in skills, education, and other assets (Becker & Tomes, 1986). Because this capacity to be economically self-sufficient is dependent upon the ability to earn, discussion of human capital is an essential element of poverty and welfare policy research. Achieving economic security on a limited income depends largely on acquiring non-financial assets, like human capital (Venner & Brown, 999), which helps people obtain adequate employment and manage daily living. Previous research has examined the extent to which human capital is an essential factor in the self-sufficiency of rural workers, particularly rural working women (e.g., Jensen, Findeis, Hsu, & Schachter, 1999; Porterfield, 2001). It may also be an important factor in relieving food insecurity. In this study, income and food-related life skills were examined in relation to food security status in a sample of rural, low-income mothers.

This theoretical explanation suggests that, if human capital can be increased through educational interventions, it may help increase well-being among the rural poor. An increase in food resource management skills may influence level of food security and thus, increase well-being and capacity for self-sufficiency. Based upon the literature, the

ways in which limited human capital negatively affects outcomes of well-being established the potential for a programmatic impact on this process. This study examined the assertion that a relationship between certain indicators of income and food security can be affected by change in the level of human capital.

The Welfare to Well-Being Framework (Bauer, Braun, & Olson, 2000) is a classification system that describes four levels of economic well-being: in crisis, at risk, safe, and thriving. *In crisis* describes families who are unable to meet basic needs and unable to contribute to the community. A*t risk* describes those who cannot fully meet needs with current income and require additional assistance. *Safe* describes those who can meet their basic needs with current income and have the potential to contribute to the community, and *thriving* describes those who can meet needs and wants. These classifications correspond with the federal poverty levels, with in crisis describing those below the federal poverty line, at risk describing those between 100 and 150% of the poverty line, safe describing those between 150 and 200% of the poverty line, and thriving describing those over 200% of the poverty line. This theoretical framework helps illuminate the levels of economic well-being experienced by the sample in relation to levels of food security status.

Purpose of the Study

Numerous findings link poverty with negative outcomes in well-being, education, health, food security, and earnings. Given the potential of educational intervention to assuage the negative effects of poverty, researchers must determine what factors may help protect families from food insecurity. This study explores the relationship between indicators of human capital and well-being, through examination of the effects of food-

related life skill levels and income as predictors of food security status over two waves of data. Focusing on a sample of rural families, a subset of the poverty population vastly ignored in the scholarly and political arenas, this study contributes to knowledge needed to confront critical problems surrounding rural poverty. The intent of this study is to: examine demographic differences between food secure and food insecure households; analyze the relationships among income, household composition, food-related life skills, food assistance, education, employment, and food security; examine the extent to which food-related life skills predict food security status and the extent to which the relationship between income and food security varies given food-related life skill levels; and analyze relationships among income, food-related life skills, and food security over two waves of data. Based upon research that suggests low skill levels are related to negative outcomes for rural, low-income mothers, this study aims to fill a gap in the literature by addressing the potential of food-related skills to predict a specific outcome, food security status.

This investigation contributes to knowledge about the well-being of rural, low-income families, providing an analysis useful in helping low-income individuals maximize food resources. Investigating the effects of food-related life skills on food security provides valuable input for public assistance programming and educational interventions. Findings offer implications for policy revisions and programmatic approaches in public assistance regarding the role of educational intervention in supplementing food assistance programs. Shortcomings and directions of future research are discussed.

Research Questions

Based upon previous research and the proposed directional model of this study, the following research questions were examined:

1. On what demographic variables are there significant differences between mothers in food secure and food insecure households in each wave of data?
2. On what demographic variables are there significant differences between Wave One and Wave Two?
3. On what demographic variables are there significant differences between families in crisis or at risk and families who are safe or thriving?
4. What is the strength of the relationship between earned income plus food assistance benefits and food security in each wave of data?
5. What is the strength of the relationship between income relative to household size and poverty threshold (income-to-needs ratio) and food security in each wave of data?
6. What is the strength of the relationship between level of education and food security in each wave of data?
7. To what extent do difficulty paying for food, food-related life skills, and income-to-needs predict food security status in each wave of data?
8. To what extent do problems affording food, food-related life skills, and income-to-needs in both waves predict the change in food security status over both waves of data?

Figure 1 depicts the relationships explored among food security status, the major dependent variable, and the multiple independent variables in this study.

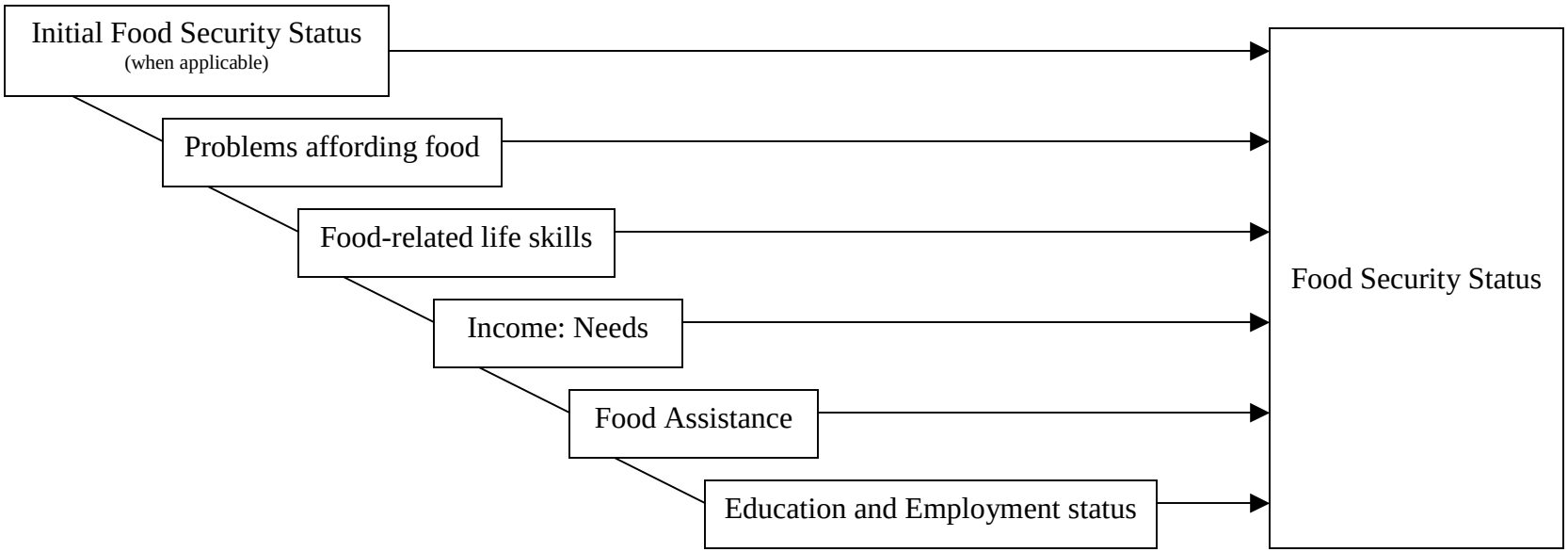

Figure 1. Model for predicting food security outcomes from income and food-related life skills

CHAPTER III: Methods

Sample

The sample for this study was drawn from the multi-state, longitudinal study, NC-223: "Rural Low-Income Families: Tracking their Well-Being and Functioning in the Context of Welfare Reform." The NC-223 study involves researchers from land-grant universities in fourteen states, cooperatively assessing changes in the well-being of low-income families living in rural areas in the context of welfare policy modifications. NC-223, funded in part by the Unites States Department of Agriculture (USDA) Agricultural Experiment Station System, began in October 1998 and is authorized as NC-1101 to continue through September 2007. The Personal Responsibility and Work Opportunities Reconciliation Act of 1996 (PRWORA) (PL104-193) and the Agricultural, Rural Development, Food and Drug Administration, and Related Agencies Appropriations Act of 1997 (PL104-180) are the impetus of the NC-223 policy analyses. The fourteen states included in the Wave One and Wave Two data collections (California, Indiana, Kentucky, Louisiana, Nebraska, New Hampshire, New York, Maryland, Massachusetts, Michigan, Minnesota, Ohio, Oregon, and Wyoming) represent diverse regions throughout the United States (3 Western, 5 Central, 2 Southern, and 4 Eastern).

The NC-223 sample for this study was comprised of 315 mothers who participated in both waves of data collection. The mothers lived in 24 counties designated as "rural" based on Butler and Beale's (1994) rural-urban continuum codes. Using the rural-urban continuum, counties are classified by population and proximity to a major metropolitan area, with a classification of zero being the most urban and a classification of nine being the most rural. All of the counties sampled in this study were

classified as a six or higher on the continuum (6=nonmetro county with urban population of 2,500-19,999, adjacent to a metro area, 7=nonmetro county with urban population of 2,500-19,999, not adjacent to a metro area, 8=nonmetro county completely rural or less than 2,500 urban population, adjacent to a metro area, 9=nonmetro county completely rural or less than 2,500 urban population, not adjacent to a metro area). Inclusion criteria for participants in this study were mothers at least 18 years of age, with a child or children 12 years of age or younger who are eligible for or receiving food stamps or WIC.

In 1999-2000, participants were recruited using various methods designed to represent diversity across the study locations. Participants were recruited by individuals who were working in programs that potentially serve eligible families (Food stamp programs, WIC, Head Start, work centers, Social Service offices, vocational schools, welfare to work classes, food pantries, Cooperative Extension, emergency food and housing services, child care centers for farm labors, Housing Authority offices, Latino Migrant and Settled Workers Program, and Spanish Speaking Community Action Program). Using a qualitative-quantitative protocol for data collection, face-to-face interviews were conducted in 2000, 2001, and 2002. For the purposes of this study, Wave One and Wave Two were used, as the third wave of data was unavailable for this investigation. For the current study, the NC-223 sample was screened to ensure that participants' total household incomes were under 200 percent of the poverty level.

Procedures

Researchers collected data through interviews, each using similar (not identical) sampling and interviewing procedures. Each participating state was required to collect

data from at least 20 participants in order to be included in the multi-state study. While recruitment procedures varied among states, convenience sampling techniques were used by all states.

Data collection teams from each participating state were made up of university faculty members, graduate and undergraduate students, county Extension educators, county social services employees, and, in some states, translators. Using a semi-structured protocol, team members conducted one-on-one, face-to-face interviews with participants lasting up to three hours. Interviews included the completion of standardized survey measures and answering open-ended questions, yielding quantitative and qualitative data about participants and their families. Data include information on current household composition, family well-being, family schedules and personal time, parenting, physical and mental health, community life, housing, household expenses, ability and efforts to make ends meet, sources of income, current employment, work history, life skills, knowledge of community resources, family of origin, social support, education, child care, transportation, food security, and attitudes about and experiences with social services and welfare reform. Interviews were audiotaped and transcribed by research team members from each state. All quantitative data were entered into an SPSS data file by a data entry team at Oregon State University. While the data set contains extensive qualitative data, only quantitative data were used for this study.

Measures

Predictor Variables. The income-to-needs ratio, as measured by a computation of total monthly earnings divided by the poverty threshold for a given household size, was used as an independent variable in this study. The income-to-needs ratio is a continuous

variable that best captures the amount of income available for spending on basic needs, as household size affects household food needs and the cost of supplying adequate food for the household. Using the Bauer, Braun, and Olson framework, the income-to-needs ratio was categorized as the following: .01 to .99 = in crisis, 1.0 to 1.3 = at risk, 1.31 to 1.50 = safe, 1.51 to 2.0 = thriving, and 2.01+ = sustaining. Total monthly earnings were measured by adding the following variables: wages and salaries (for self and partner, if applicable), tips, and commissions. Poverty threshold was calculated using the federal thresholds for given family/household sizes. The framework describes four levels of economic well-being based on the income-to-needs ratio.

Food-related life skills were also used as independent variables. Four food-related items included in the 25-item assessment of life skills were found to be correlated with food security status in previous studies (Anderson & Swanson, 2002; Olson, Seiling, & Lawrence, 2001) were used. The food-related life skills included the ability to: 1) make a family budget, 2) manage bills, 3) stretch groceries to the end of the month, and 4) prepare a well-balanced meal. All responses were coded as binary variables (1=Yes, 0=No).

Problems affording food, as indicated by self-report, was used as an independent variable to determine whether or not participants perceived paying for food as a challenge. Responses to this question were coded as binary variables (1=Yes, 0=No).

Outcome Variables. The main dependent variable for this study was level of food security. The level of food security was obtained using the USDA 18-item Core Food Security Module (Bickel et al., 2000; Hamilton et al., 1997; Price, Hamilton, & Cook, 1997). The questionnaire contains items that ask whether participants experienced not

having enough money for food, not having enough time for food preparation or shopping, not being able to access a store, not having access to cooking appliances, and not having access to the kinds of foods wanted. Responses to these questions were coded as binary variables (1=Yes, 0=No). Responses to these questions determined whether or not household food problems are attributable to financial circumstances. Participants who had food problems attributed to financial circumstances were then asked whether family members skip meals, cut meal sizes, go without eating for a whole day, and experience hunger. A food security scale score was obtained by adding scores from questionnaire items 2-16. Scores could range from 0 to 18, with a maximum possible total score of 18. These scores were then assigned to the following categories: 1=food secure (score of 0), 2=marginally food secure (score of 1-2), 3=food insecure without hunger (score 3-7), 4=food insecure with hunger (score≥8).

Control Variables. Level of education, employment status, and food assistance were included as control variables. Level of education was included as a control variable to account for differences among participants that may affect life skills and earnings potential. Participants reported the highest level of education completed by using the following ordinal scale: 1= 8^{th} grade or less, 2=some high school, 3=high school diploma or GED, 4= specialized technical, business, or vocational training after high school, 5= some college, including an Associate's degree, 6= college or university graduate, 7= one or more years beyond college, and 8= graduate degree. Employment status was included as a control variable to account for the variability in income between employed and unemployed participants. Employment status was obtained by asking participants if they

were currently working. Responses to this item were coded as binary variables (1=Yes, 0=No).

Controlling for the receipt of food assistance accounted for differences within the sample as to the amount of money exclusively available for food spending (food stamps) and the receipt of supplemental food (free or reduced school lunch and WIC). Food stamp benefits represented the dollar amount of food stamps received by participants each month. Participants reported whether or not they were receiving free or reduced school lunch and whether or not they were receiving WIC at the time of each interview. Responses to these questions were coded as binary variables (1=Yes, 0=No).

Data Analysis

Descriptive statistics were generated for all variables. Bivariate analyses were used to determine the correlative relationships among each of the variables of interest. Independent samples t-tests were used to determine the differences between food secure and food insecure households during each wave of data. Independent samples t-tests were also used to determine any differences based on depth of poverty, as indicated by the Bauer, Braun, and Olson framework (2000). Paired samples t-tests were used to determine the demographic differences between the sample at Wave One and the sample at Wave Two.

A series of linear regression analyses were used to determine the extent to which problems affording food, food-related life skills, and the income to-needs ratio predicted outcomes in food security status. The first regression analysis examined these relationships in Wave One. The second regression analysis examined the extent to which food security status in Wave Two is predictable by status in Wave One, problems

affording food in Wave Two, food-related skill levels in Wave Two, and the income-to-needs ratio in Wave Two. This analysis helped determine the importance of initial food security status in predicting future food security status. The third regression analysis examined problems affording food in both waves, food-related life skills in both waves, and the income-to-needs ratio in both waves as predictors of the change in food security status from wave one to wave two. The fourth regression analysis examined the extent to which food security status in Wave One, changes in problems affording food, changes in food-related skill levels, and changes in income-to-needs ratios are predictive of the change in food security status between waves one and two.

Chapter IV: Results

Demographic Characteristics

Demographic characteristics of the sample and demographic comparisons between food secure and food insecure households are presented in Table 1. The total sample consisted of 315 rural mothers ranging from age 17 to age 58, with the mean age of 29.2 years (SD=7.36). In Wave One, 47% of mothers were married; 23.8% were single, 15.2% were divorced or separated, and 14.0% were living with their partners. In Wave Two, 48.4% of mothers were married, 20.4% were single, 14.7% were divorced or separated, and 16.6% were living with their partners. The average number of children per mother was 2.40 (SD=1.35) in Wave One and 2.43 (SD=1.32) in Wave Two. Sixty-five percent of mothers were non-Hispanic white, 22.2% were Hispanic/Latina, 8.0% were African American, 1.3% were Native American, and 3.5% were multiracial/other. Among the sample, 10.2% completed schooling up to ninth grade, 20.4% had some high school education, 28.3% earned a high school diploma or GED, 14.3% received some type of specialized technical, business, or vocational training after high school, 23.6% had some college education (including those who earned Associate's degrees), 2.9% received a college degree, and .3% received a graduate degree.

The mothers who participated in the study during both waves of data collection were compared with those who dropped out after the first wave using an independent samples t-test. The only significant difference between those who participated in both waves and those who participated in the first wave only was the number of children. Those who dropped out of the study had fewer children (M=2.06, SD=1.16) than those who stayed in (M=2.40, SD=1.35) ($p > .05$).

At the time of the Wave One interview, 51% of mothers were employed, compared with 56.5% at the time of the Wave Two interview. In Wave One, the mean total annual household income was $15,713.43 (SD=10,440.18). The mean amount of food stamp benefits was $111.39 per month (SD=143.23). In Wave Two, the mean total annual household income was $23,3330.78 (SD=15421.49). The mean amount of food stamp benefits was $104.00 per month (SD=153.17). Sixty-seven percent of mothers in Wave One were receiving WIC, and 58.77% had children participating in the School Lunch Program. While only 54.29% of mothers in Wave Two were receiving WIC, 63.26% had children participating in the School Lunch Program.

In Wave One, 32% of the sample were classified as food secure, 17.7% were marginally food secure, 33.7% were food insecure without hunger, and 16.7% were food insecure with hunger. In Wave Two, 37.7% of the sample was classified as food secure, 21% were marginally food secure, 30% were food insecure without hunger, and 11.3% were food insecure with hunger. Using the Welfare to Well-Being Framework (Bauer, Braun, & Olson, 2000), 2.5% of the sample in Wave One were economically sustaining, 6.3% were economically thriving, 7% were safe, 14.6% were at risk, and 69.5% were in crisis. In Wave Two, 12.7% were sustaining, 15.2% were thriving, 8.3%were safe, 13.7% were at risk, and 50.2% were in crisis. Over the two waves of data, 19.8% of households experienced a decline in food security status, 50.5% experienced no change, and 29.7% experienced an improvement.

The Food Security Scale, which has been shown to have good reliability (α=.81 for households with children, α=.74 for all households), is stable over time, and is robust across diverse populations (Keenan, Olson, Hersey, & Parmer, 2003), had a reliability

coefficient of α=.8224 in this sample. In Wave One, 43.8% of participants reported that their households had enough of the foods they wanted to eat. Among the participants, 39.4% reported that their households had enough food, but not always the kinds of foods they wanted to eat, 15.5% of participants reported that their households sometimes did not have enough to eat, and less than 2% of participants reported that their households often did not have enough to eat. Of those who reported sometimes or often not having enough to eat, 97.7% cited not having enough money for food as the reason. Sixty-one percent of the sample worried that food would run out before they had money to buy more. As reported by 43.5% of the participants, in the last twelve months, food did run out before they had money to buy more. Not being able to afford well-balanced meals was reported by 35.5%, and 46.7% reported relying on a few low-cost items to feed their households because they were running out of money to buy food. Nearly a third (30%) reported that their children did not have balanced meals and 21.5% reported that their children were not eating enough because of a lack of money. Of those experiencing food problems, 42% reported that an adult in their households had skipped a meal in the last twelve months because there was not enough money for food. In the last twelve months, 44.9% of respondents ate less, 25.7% experienced hunger, and 19.4% lost weight because they did not have enough money for food. Of the respondents skipping meals, experiencing weight loss, or experiencing hunger, 16% reported that their children experienced hunger.

In Wave Two, the food security status of the sample improved. Forty-six percent of respondents reported that they had enough of the foods they wanted to eat, 42.5% reported having enough food, but not always the kind of foods they wanted, 10.2%

reported sometimes not having enough food, and 1% reported often not having enough food. Of those who sometimes or often did not have enough food, 93.9% cited not having enough money, 9.7 % cited not having enough time to cook, and 25% cited difficulty getting to a store. Fifty-three percent of the sample worried that food would run out before they had money to buy more, and 37.7% reported that, in the last twelve months, they did run out of food before having money to buy more. Not being able to afford balanced meals was reported by 32%, while 40.2% reported relying on a few low-cost food items, and 24.8% reported not being able to provide children with well-balanced meals. Of those experiencing food problems, 18.9% reported that their children were not eating enough, 42.3% reported cutting meal sizes, 36.1% reported eating less, 24.4% experienced hunger, and 13.2% lost weight due to a lack of money for food. Of the respondents skipping meals, experiencing weight loss, or experiencing hunger, 8.8% reported that their children experienced hunger.

When the demographic characteristics of mothers in food secure households were compared with those of mothers from food insecure households in Wave One, mothers differed significantly on several characteristics (see Table 1). Mothers in food insecure households were more likely to have lower educational attainment and to be unemployed. Mothers in food insecure households were also more likely to report difficulty paying for food. Although the sample as a whole reported high levels of food-related skills, several significant differences between skill levels in food secure and food insecure households were present. Mothers in food secure households were more likely to know how to stretch groceries until the end of the month. They were also significantly more likely to know how to manage family bills and make a family budget. Their overall level of life

skills was significantly higher than the skill levels of mothers in food insecure households.

In Wave Two, mothers in food secure households differed from mothers in food insecure households on employment status, income, and amount of food stamps. As in Wave One, mothers in food secure households were also more likely to have higher levels of overall life skills and be less likely to report difficulty paying for food in Wave Two. Income relative to household size and poverty level (income-to-needs ratio) indicated that food insecure households were significantlymore likely to be experiencing crisis or risk than food secure households. Income and food assistance levels distinguished food secure households from food insecure households in Wave Two, though not in Wave One.

The income-to-needs ratio, amount of food stamps, receipt of supplementary food assistance (WIC and free or reduced school lunch), and the ability to prepare a well-balanced meal were not significantly different between food secure and food insecure households in Wave One. In Wave Two, none of the food-related life skill levels differed significantly between these groups.

Table 1

Characteristics of the Sample - Demographic Differences between Food Secure and Food Insecure Households

	Total Sample W_1 (*N*=315)		Food Secure Households W_1 (*N*=147)		Food Insecure Households W_1 (*N*=148)			Total Sample W_2 (*N*=315)		Food Secure Households W_2 (*N*=176)		Food Insecure Households W2 (*N*=124)		
Characteristic	M	(SD)	M	(SD)	M	(SD)	T[1]	M	(SD)	M	(SD)	M	(SD)	t[1]
Age in years	29.2	7.36	28.39	7.46	29.63	7.03	-1.46	--	--	--	--	--	--	--
Number of children	2.40	1.35	2.28	1.42	2.43	1.24	-.976	2.43	1.32	2.38	1.30	2.51	1.37	-.852
Employed	.508	.501	.582	.495	.426	.496	2.71**	.565	.500	.653	.477	.436	.498	3.826***
Educational attainment level	3.31	1.39	3.51	1.39	3.07	1.29	2.75**	--	--	--	--	--	--	--
Household composition	4.01	1.56	3.84	1.63	4.08	1.44	-1.33	4.09	1.54	4.03	1.57	4.16	1.54	-.729
Total annual household income in dollars	15,713.43	10440.18	15,527.75	10,653.34	15,684.33	10,181.61	-.129	23,330.78	15,421.49	25,335.24	16,086.14	20,983.65	14,292.08	2.415*
Food stamp benefit in dollars	111.39	143.23	107.08	144.88	118.91	139.83	-.697	104.00	153.17	83..32	136.09	132.74	172.58	-2.760**
Income-to-needs ratio	.716	.591	.732	..574	.689	.605	.629	1.12	.911	1.274	.961	.9204	.794	3.367**
Receiving WIC	.673	.470	.678	.469	.662	.475	.289	.543	.499	.523	.501	.589	.494	-1.130
Receiving school lunch	.588	.493	.569	.497	.635	.483	-1.15	.633	.483	.636	.482	.631	.485	.092
Difficulty paying for food	.386	.488	.145	.353	.636	.483	-9.71***	.281	.450	.126	.333	.504	.502	-7.825***
Know how to make a family budget	.823	.382	.917	.277	.738	.441	4.15***	.856	.352	.860	.349	.863	.346	-.068
Know how to manage bills	.871	.336	.945	.229	.799	.402	3.80***	.880	.325	.893	.310	.863	.346	.635
Know how to stretch groceries until the end of the month	.852	.356	.903	.297	.807	.396	2.33*	.919	.273	.943	.234	.892	.313	1.29
Know how to prepare a well-balanced meal	.968	.176	.986	.117	.973	.163	.806	.976	.153	.976	.156	.987	.116	-.529
Life skills composite (out of 25)	19.00	4.41	19.83	3.99	18.15	4.67	2.82**	19.85	4.13	20.60	3.85	18.47	4.14	3.62***

[1]Independent-samples t-tests compared means of food secure households and food insecure households at Wave 1 and Wave 2

*p<.05 **p<.01 ***p<.001 (2-tailed)

Table 2 summarizes the differences in the sample between Wave One and Wave Two. When comparing household circumstances over time, the amount of income and the proportion of households receiving WIC increased from Wave One to Wave Two. Fewer mothers reported difficulty paying for food, while more reported knowing how to stretch groceries to the end of the month in Wave Two. Mothers reported higher levels of overall life skills in Wave Two. More households were experiencing food security and higher ratios of income-to-need. Thus, fewer families were experiencing crisis or risk in Wave Two than were in crisis or at risk in Wave One.

Table 2

Characteristics of the Sample - Demographic Differences between Wave One and Wave Two

	Sample at Wave 1 (N = 315)		Sample at Wave 2 (N = 315)		Paired Differences			
Characteristic	(M)	(SD)	(M)	(SD)	(M)	(SD)	(SE)	t[1]
Number of children	2.400	1.35	2.43	1.32	-.035	1.89	.106	-.328
Employed	.508	.501	.565	.497	-.057	.712	.040	-1.43
Household composition	4.01	1.56	4.09	1.54	-.076	2.11	.119	-.642
Total monthly household income in dollars	1311.62	865.84	1911.38	1279.11	-599.76	1504.67	83.85	-7.15***
Food stamp benefits in dollars	110.33	142.40	103.53	153.23	6.80	205.56	11.77	.577
Income-to-needs ratio	.716	.591	1.12	.911	-.404	1.08	.061	-6.65***
Receiving WIC	.673	.470	.543	.499	.130	.667	.038	3.46**
Receiving school lunch	.588	.493	.634	.483	-.046	.661	.038	-1.21
Difficulty paying for food	.385	.488	.291	.455	.095	.672	.039	2.42*
Food secure	.497	.501	.587	.493	-.09	.698	.041	2.39*
Know how to make a family budget	.839	.368	.853	.355	-.015	.520	.036	-.404
Know how to manage bills	.854	.354	.878	.328	-.024	.479	.035	-.728
Know how to stretch groceries until the end of the month	.850	.358	.917	.276	-.068	.449	.031	-2.18*
Know how to prepare a well-balanced meal	.981	.137	.976	.154	.005	.209	.014	.333
Life skills composite (out of 25)	18.64	4.51	20.10	3.69	-1.46	5.44	.479	-3.04**

[1]Paired-samples t-tests compared means of the sample at Wave 1 and Wave 2.

*p<.05 **p<.01 ***p<.001 (2-tailed)

Table 3 summarizes the demographic differences in depth of poverty between households that were in crisis or at risk and households that were safe or thriving. In Wave One, households in crisis or at risk were more likely to be receiving free or reduced school lunch, earning less income, and receiving more food stamps than households that were safe or thriving. They were also less likely to report being able to prepare a well-balanced meal, stretch groceries to the end of the month, and make a family budget. These differences, however, became insignificant in Wave Two, when the skill levels of households in crisis or at risk were comparable to safe or thriving households. Households that were in crisis or at risk during Wave Two were more likely to be receiving WIC and free or reduced school lunch, experiencing food insecurity, and having difficulty paying for food. They were also more likely to be unemployed, having more children, earn lower incomes, and receive more food stamps than safe or thriving households.

In Wave One, households in crisis or at risk were no more likely than safe or thriving households to experience unemployment, lower levels of education, and problems affording food. They were not significantly more likely to be food insecure, less able to manage bills, or have lower overall life skill levels. In Wave Two, households in crisis or at risk were no more likely than safe or thriving households to lack the ability to make a budget, manage bills, stretch groceries, and prepare a well-balanced meal or to have lower overall life skill levels.

Table 3

Characteristics of the Sample – Differences between groups by depth of poverty

	Households in Crisis or at Risk W_1 (*N*=263)		Households Safe or Thriving W_1 (*N*=52)			Households in Crisis or at Risk W_2 (*N*=198)		Households Safe or Thriving W2 (*N*=117)		
Characteristic	M	(SD)	M	(SD)	T[1]	M	(SD)	M	(SD)	t[1]
Age in years	28.93	7.23	30.54	7.93	1.44	--	--	--	--	--
Number of children	2.41	1.38	2.33	1.20	-.427	2.60	1.38	2.15	1.16	-3.081**
Employed	.487	.501	.615	.491	1.72	.515	.501	.650	.479	2.37*
Educational attainment level	3.25	1.36	3.60	1.54	1.63	--	--	--	--	--
Household composition	3.97	1.60	4.21	1.30	1.02	4.13	1.67	4.02	1.29	-.649
Total monthly household income in dollars	1067.82	684.26	2531.56	656.51	14.19***	1245.19	930.83	3092.12	1173.42	15.356**
Food stamp benefits in dollars	126.58	146.17	31.67	93.21	-5.82***	141.87	166.71	40.87	99.96	-6.69***
Receiving WIC	.688	.464	.596	.496	-1.24	.591	.493	.462	.501	-2.24*
Receiving school lunch	.613	.488	.462	.503	-2.03*	.690	.464	.535	.501	-2.73**
Difficulty paying for food	.379	.486	.420	.499	.541	.310	.464	.233	.424	-1.50
Food secure	1.50	.501	1.53	.504	.425	1.48	.501	1.31	.464	-2.92**
Know how to make a family budget	.804	.398	.922	.272	2.60*	.842	.366	.880	.327	.768
Know how to manage bills	.866	.341	.898	.306	.613	.871	.336	.896	.307	.546
Know how to stretch groceries until the end of the month	.835	.372	.940	.240	2.57*	.902	.298	.948	.223	1.17
Know how to prepare a well-balanced meal	.962	.192	1.00	.000	3.22**	.970	.171	.987	.114	.780
Life skills composite (out of 25)	18.85	4.50	19.91	3.75	1.25	19.47	4.26	20.5	3.84	1.74

[1]Independent-samples t-tests compared means of households below poverty line and households above poverty line

*p<.05 **p<.01 ***p<.001 (2-tailed)

Bivariate Relationships between Continuous Variables

Tables 4 and 5 present correlation matricesof the variables of interest in this study for Wave One and Wave Two. Although none of the relationships yielded particularly strong correlation values, there were many statistically significant relationships among the variables of interest: in Wave One, employment status, which may reveal the presence or absence of income at the time of the interview, was weakly associated with education, food security, overall life skills, and knowing how to make a family budget. Education was significantly moderately associated with food-related life skills, overall life skills, and food security status. Each of the food related skills, as well as the overall life skills, were significantly associated with one another as expected. Food security was significantly negatively correlated with each of the food-related skills, suggesting that as skill levels increase, the level of food insecurity decreases. The income-to-needs ratio was significantly associated with employment status, level of education, knowing how to make a family budget, and overall life skills.

In Wave Two, employment status was significantly, but weakly associated with knowing how to manage bills, food security status, monthly income, and the income-to-needs ratio. Education was significantly associated with food-related life skills and overall life skills, as well as the income-to-needs ratio. Again, each of the food related skills, as well as the overall life skills, were significantlyassociated with one another. The income-to-needs ratio was significantlyassociated with food security status.

Table 4

Bivariate Relationships among Continuous Variables, Wave1

Variable	1	2	3	4	5	6	7	8	9	10	11
1. Employment	--										
2. Educational attainment	.147**	--									
3. Difficulty paying for food	.048	-.025	--								
4. Know how to make a family budget	.077	.183**	.013	--							
5. Know how to manage bills	.002	.314**	-.128*	.431**	--						
6. Know how to stretch groceries to the end of the month	-.014	.221**	-.067	.295**	.454**	--					
7. Life skills composite	-.035	.574**	.012	.515**	.549**	.415**	--				
8. Food security score	.133*	-.111	.534**	-.221**	-.214**	-.181**	-.187**	--			
9. Monthly household income	.208**	.102	.089	.098	.034	.046	.223**	-.032	--		
10. Monthly household income and food stamp benefits	.166**	.098	.060	.092	.074	.099	.228**	-.037	.986**	--	
11. Income-to-needs	.326**	.121*	.067	.125*	.040	.024	.164*	-.105	.831**	.789**	--

*p<.05 **p<.01 (2-tailed)

Table 5

Bivariate Relationships among Continuous Variables, Wave 2

Variable	1	2	3	4	5	6	7	8	9	10	11
1. Employment	--										
2. Educational attainment	.038	--									
3. Difficulty paying for food	-.007	.106	--								
4. Know how to make a family budget	.119	-.009	-.036	--							
5. Know how to manage bills	.186**	.058	-.046	.684**	--						
6. Know how to stretch groceries to the end of the month	.131	.036	-.100	.527**	.430**	--					
7. Life skills composite	.040	-.111*	-.084	.231**	.262**	.194**	--				
8. Food security status	-.195**	-.029	.511**	.013	-.082	-.113	-.036	--			
9. Monthly household income	.164**	-.022	-.072	-.081	-.078	-.036	-.022	-.113	--		
10. Monthly household income and food stamp benefits	.151**	-.024	-.074	-.081	-.076	-.032	-.030	-.101	.993**	--	
11. Income-to-needs	.275**	-.001	-.085	-.053	-.035	.045	-.034	-.168**	.884**	.868**	--

*p<.05 **p<.01 (2-tailed)

While the correlation between income-to-needs and food security is weak (r= -.105 in Wave One and r= -.168, p<.01 in Wave Two), scatterplots were created to further clarify these relationships. Figures 2 and 3 illustrate that, in both waves of data, there is no concentration of respondents in each food security category in a particular income-to-needs range. Moreover, many respondents who were classified as food insecure without hunger in Wave One had high income-to-needs ratios, and many respondents who were classified as food secure in Wave One had low income-to-needs ratios. In Wave Two, the majority of respondents has income-to-needs ratios between .5 and 1.5, regardless of food security category.

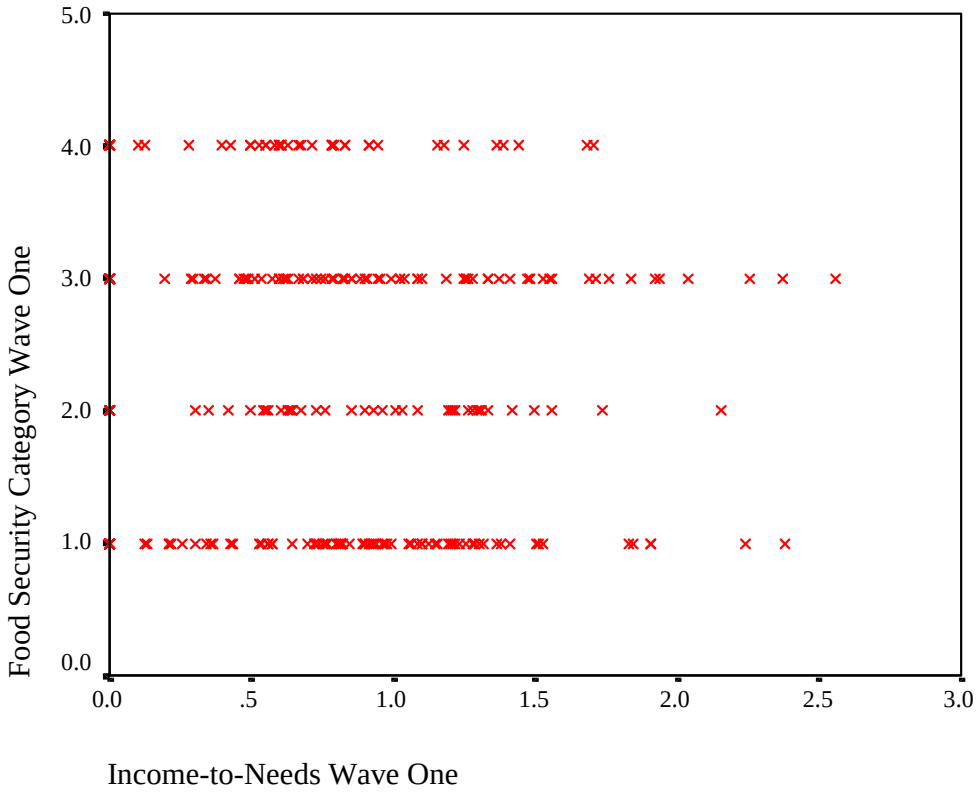

Figure 2. Relationship between income-to-needs and food security, Wave One

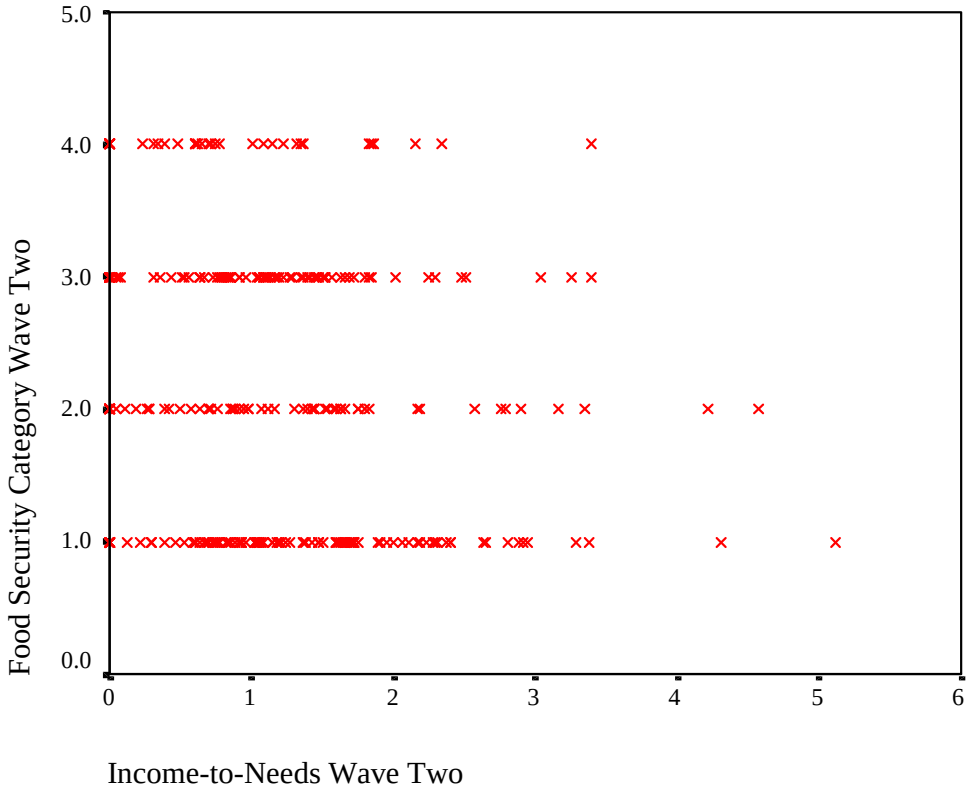

Figure 3. Relationship between income-to-needs and food security, Wave Two

Stepwise Linear Regression Analyses

Regression Analysis Series I: Wave One

A series of regression models were run to examine the relationships between food-related life skills, the income-to-needs ratio, and food security status among this sample of rural, low-income families. Using hierarchical linear regression and stepwise variable selection (entered at $p<.05$, removed at $p>.10$), the first series of regression models examined the extent to which problems affording food, specific food-related life skills, and income-to-needs predict food security status in Wave One. Variables of interest were entered in order according to the model depicted in Figure 1. As presented in Table 6, the results of this analysis indicated that when food security was regressed on

problems affording food, the model was significant (R^2 of .366, $F_{1, 192}$ =110.686, p<.001). Reported difficulty paying for food was a significant predictor of food security status, and this model accounted for 36.6% of the variance in food security status.

When the ability to make a family budget was added, the model was significant (R^2 of .398, $F_{2, 191}$=63.158, p<.001). Difficulty paying for food remained a significant predictor of food insecurity (p<.001). The ability to make a family budget was also a significant predictor (p<.01), accounting for an additional 3.2% of the variance in food security status. Those who reported having this skill were less likely to experience food insecurity. When education level (Model 3, R^2 of .411, $F_{3, 190}$ =45.975, p<.001) and employment status (Model 4, R of .420, $F_{4, 189}$ =35.996, p<.001) were added, each model accounted for an additional 2.3% and .012% respectively. Lower levels of education (p<.05) and unemployment (p<.05) were significant predictors of food insecurity. The final model, including difficulty paying for food, the ability to make a family budget, education level, and employment status, accounted for 42% of the variance in food security status in the sample.

Table 6

Effects of Problems Affording Food, Food-Related Life Skills, and Income-to-Needs on Food Security Status – Wave One (N=194)

	Model 1		Model 2		Model 3		Model 4	
	b	*SE*	*b*	*SE*	*b*	*SE*	*b*	*SE*
Intercept	1.748	.084	2.159	.152	2.524	.201	2.590	.202
BLOCK ONE								
Difficulty paying for food	1.379***	.131	1.373***	.128	1.368***	.126	1.372***	.125
Make a family budget	-1.80		-.508**	.158	-.425**	.159	-.414**	.158
Manage bills	-.084		-.007		.035		.024	
Stretch groceries	.006		.061		.084		.079	
Overall life skills	-.144		-.071		.035		.051	
Income-to-needs	-.087		-.054		-.040		-.009	
BLOCK TWO								
Food Stamps	.098		.090		.065		.065	
WIC	-.068		-.074		-.096		-.096	
Free/reduced school lunch	.081		.066		.084		.084	
Education	-.182		-.153		-.126**	.047	-.114*	.047
Employment status	-.139		-.128		-.110		-.246*	.124
R^2	.366***		.398***		.411***		.420***	
R^2 change	.366***		.032**		.023**		.012*	

*$p<.05$ **$p<.01$ ***$p<.001$

Regression Analysis Series II: Wave Two

Using hierarchical linear regression and stepwise variable selection (entered at $p<.05$, removed at $p>.10$), the first regression series was repeated, examining the effects of problems affording food, food-related life skills, and income-to-needs on food security in Wave Two (see Table 7). In the first step, food security was regressed on problems affording food. The resulting model was significant (R^2 of .289, $F_{1, 172} = 71.072$, $p<.001$), and accounted for 29.2% of the variance in food security outcomes. Reported difficulty paying for food was a significant predictor of food security status in Wave Two. In the second step, overall life skills were added. This model was also significant (R^2 of .315, $F_{2, 171} = 39.193$, $p<.001$), accounting for an additional 2.2% of the variance in food security, with motherswho possessed higher skill levels experiencing less food insecurity. The ability to make a family budget was added in the third step, resulting in a final model that accounted for 33.2% of the variance in food security outcomes in Wave Two (R^2 of .332, $F_{3, 170} = 23.390$, $p<.001$). Contrary to its role in the first regression series where it predicted food security, the ability to make a family budget predicted food insecurity in this model ($p<.05$).

Table 7

Effects of Problems Affording Food, Food-Related Life Skills, and Income-to-Needs on Food Security Status – Wave Two (N=174)

	Model 1		Model 2		Model 3	
	b	*SE*	*b*	*SE*	*b*	*SE*
Intercept	1.705	.082	2.535	.364	2.617	.362
BLOCK ONE						
Food security status W_1	.031	.	.041		.040	
Difficulty paying for food	1.361***	.161	1.315***	.161	1.309***	.159
Make a family budget	.023		.163*		.511*	.242
Manage bills	-.007		.129		.026	
Stretch groceries	-.036		.041		-.028	
Overall life skills	-.149*		-.0411*	.018	-.067**	.021
Income-to-needs	-.075		-.057		-.053	
BLOCK TWO						
Food Stamps	.086		.073		.062	
WIC	.038		.039		.024	
Free/reduced school lunch	.012		-.006		.003	
Education	-.014		-.018		-.025	
Employment status	-.149*		-.116		-.115	
R^2	.292***		.314***		.332***	
R^2 change	.292***		.022*		.018*	

*$p<.05$ **$p<.01$ ***$p<.001$

Regression Analysis Series III: Change in Food Security Status

Using hierarchical linear regression, the third regression series examined the effects of problems affording food in both waves, food-related life skills in both waves, and income-to-needs in both waves on changes in food security status between Wave One and Wave Two. The first model regressed change in food security on initial food security status. As shown in Table 8, the resulting model was significant (R^2 of .360, $F_{1, 97}$ =54.606, p<.001), and accounted for 36% of the variance in food security outcomes. Food security status in Wave One was a significant predictor of changes in food security status between waves one and two. Difficulty paying for food in waves one and two was added to model two, indicating that difficulty paying for food in Wave Two was a significant predictor of change in food security status (R^2 of .489, $F_{3, 95}$ =30.266, p<.001). This model accounted for an additional 12.9% of variance in food security status change, with those who experienced difficulty paying for food in Wave Two more likely to have declining food security status between waves one and two.

Food-related life skills in waves one and two were added in model three, which was significant (R^2 of .507, $F_{11, 87}$=8.137, p<.001). This model accounted for an additional 1.8% of variance in food security change, which was not significant. None of the food-related life skills in either wave was a significant predictor of change in food security status. In the next model, income-to-needs ratios in waves one and two were added. Neither variable was a significant predictor of change in food security status, accounting for only an additional .2% of variance in outcomes. Because income-to-needs ratios in waves one and two accounted for less than 1% of variance in outcomes, block four was removed from the regression series.

Food assistance (food stamps, WIC, and School Lunch Program) in waves one and two was added in the fourth model to control for possible effects of food assistance on food security change. This model was significant (R^2 of .541, $F_{17, 81}$=5.620, p<.001), but it only accounted for an additional 3.4% of variance in food securitychange . None of the food assistance variables added to this model was a significant predictor of change in food security status. Level of education and employment status in waves one and two were added to the next model as control variables. Education level and employment status were not significant predictors of change in food security status. Because education level and employment status in waves one and two contributed less than 1% of the variance in food security change, block six was removed from the regression series. Though difficulty paying for food in Wave Two remained a significant predictor, both model three and model four decreased the impact that it had on change in food security status.

Initial food security status and difficulty paying for food in Wave Two were significant predictors in the change in food security status between Wave One and Wave Two. Difficulty paying for food in Wave Two predicted a decline in food security status. Other factors, including food-related life skills and food assistance contributed to the overall variance of the model, though none contributed a significant amount.

Table 8

Effects of Wave One Food Security Status, Problems Affording Food, Food-Related Life Skills, and Income-to-Needs on Change in Food Security Status (N=99)

	Model 1		Model 2		Model 3		Model 4	
	b	*SE*	*b*	*SE*	*b*	*SE*	*B*	*SE*
Intercept	-.751	.131	-.612	.126	-.507	.392	-.497	.436
BLOCK ONE								
Food security status W_1	.366***	.049	.352***	.059	.347***	.063	.335***	.064
BLOCK TWO								
Difficulty paying for food, W_1			.088	.134	.125	.143	.151	.146
Difficulty paying for food W_2			-.527***	.113	-.515***	.121	-.499***	.125
BLOCK THREE								
Make a family budget W_1					.190	.157	.137	.164
Make a family budget W_2					.053	.297	.012	.313
Manage bills W_1					.011	.188	-.007	.194
Manage bills W_2					-.162	.273	-.175	.300
Stretch groceries W_1					-.147	.159	-.128	.166
Stretch groceries W_2					.103	.245	.188	.252
Overall life skills W_1					-.011	.015	-.009	.016
Overall life skills W_2					.003	.018	.002	.018
BLOCK FOUR								
Income-to-needs W_1								
Income-to-needs W_2								
BLOCK FIVE								
Food Stamps W_1							.0006	.000
Food Stamps W_2							-.0003	.000
WIC W_1							-.094	.113
WIC W_2							.082	.110
School Lunch Program W_1							-.161	.118
School Lunch Program W_2							.114	.126
BLOCK SIX								
Education								
Employment status W_1								
Employment status W_2								
R^2	.360***		.489***		.507***		.541***	
R^2 change	.360***		.129***		.018		.034	

*$p<.05$ **$p<.01$ ***$p<.001$

Regression Analysis Series IV: Changes in Predictors on Change in Food Security Status

Finally, using hierarchical linear regression and a stepwise variable selection method (entered at $p<.05$, removed at $p>.10$), the fourth regression series examined the effects of initial food security status, change in difficulty paying for food, changes in food-related life skills, and changes in income-to-needs on the change in food security status between Wave One and Wave Two (see Table 9). In the first model ($R^2=.371$, $F_{1, 96}=56.735$, $p>.001$), initial food security status predicted changes in food security status, accounting for 37.1% of the variance in outcomes. In model two, change in difficulty paying for food was added as a predictor of decline in food security status. The model was significant ($R^2=.461$, $F_{2, 95}=40.610$, $p>.001$), accounting for an additional 8.9% of variance in food security status change. Changes in food-related life skills and income-to-needs were not significant predictors of food security status change.

Table 9

Effects of Changes in Problems Affording Food, Food-Related Life Skills and Income-to-Needs between Waves One and Two on Change in Food Security Status (N=92)

	Model 1		Model 2	
	b	*SE*	*b*	*SE*
Intercept	-.737	.131	-.592	.130
BLOCK ONE				
Food security status W_1	.375***	.050	.281***	.052
Difficulty paying for food Δ	-.336		-.331***	.083
Make a family budget Δ	.019		-.012	
Manage bills Δ	.025		.002	
Stretch groceries Δ	.140		.120	
Overall life skills Δ	.129		.098	
Income-to-needs Δ	.049		.066	
BLOCK TWO				
Food stamps Δ	-.102		-.091	
WIC Δ	.108		.103	
School Lunch Program Δ	.095		.125	
Education	.021		-.014	
Employment status Δ	.064		.071	
R^2	.371***		.461***	
R^2 change	.371***		.089***	

*$p<.05$ **$p<.01$ ***$p<.001$

Chapter V: Discussion

This study explored the relationship among difficulty paying for food, food-related life skills, income based on household size and poverty threshold, and the food security status of a sample of rural, low-income mothers. This research builds upon previous findings that suggest increasing human capital capacity through educational intervention can help promote improvements in food security and self-sufficiency. While research suggests that human capital, ability to earn, and outcomes of well-being are all related, this study aimed to address relationships among specific types of skills, income, and food security.

Hierarchical linear regression was used to determine the extent to which difficulty paying for food, food-related life skills, and income-to-needs predict outcomes in food security status. The stepwise variable selection method allowed for the most significant predictors to be added to regression models, providing a basis upon which future research can examine the influence of food resource management on food security. Findings yield knowledge about the influence of particular food resource management skills on food security and about the factors that predict changes in food security status. Findings also offer implications for programmatic and policy changes to better alleviate food insecurity.

General Trends

The demographic characteristics of the sample describe trends that exemplify some of the challenges of rural, low-income households. Roughly half of these mothers were employed in Wave One, with a slightly higher percent employed in Wave Two. These low rates of employment may be explained by residence in a persistently poor rural

area, a lack of job opportunities in rural areas, or a lack of job opportunities for rural women as described in previous research (Cook & Gibbs, 2000; Flora & Flora, 2003; Flora, Flora, Spears, & Swanson, 1992; Gibbs, 2001; McLaughlin & Sachs, 1988; Miller et al., 2003). The average mother in the sample obtained a high school diploma or equivalent, though about a fifth of the sample only had some high school education and about a fourth had some college education. Unsurprisingly, the educational attainment levels of this low-income sample are drastically lower than the educational attainment of all rural adults (Census Bureau, 2001; Miller et al., 2003). The median household income of the sample was $14,400 in Wave One and $22,090 in Wave Two, which represent 78% and 110% of the federal poverty line respectively. The average dollar amount of food stamp benefits declined about $7 between Wave One and Wave Two, which could be explained by the increase in earned income. Participation in WIC declined between wave one and wave two, while participation in the School Lunch Program increased. Perhaps this change was an indicator of children becoming older, and thus no longer eligible for WIC, entering school, and becoming eligible for the School Lunch Program.

Rates of food insecurity experienced by the sample (54.4% in Wave One, 41.3% in Wave Two) were far higher than 10.1% of all U.S. households that experienced food insecurity in 1999 (the year in which these data were collected) (Andrews, Nord, Bickel, & Carlson, 2000). Less than 1% of all U.S. households experienced food insecurity with hunger, while 16.7% of the sample in Wave One and 11.3% in Wave Two experienced food insecurity with hunger. When compared with rates of food insecurity in U.S. households with children (14.8%), households below the federal poverty line (36.7%), female-headed households (29.7%), and non-metropolitan households (10.1%), the

sample still experienced food insecurity at higher rates than each of these groups at both waves of data collection.

Between Wave One and Wave Two, food security improved in the overall sample, with 29.7% experiencing improvement. At the same time, however, 19.8% of the sample experienced a decline in food security, while 50.5% experienced no change. Households in this sample were earning almost $600 more per month in Wave Two than in Wave One, and thus the sample also had a higher income-to-needs ratio in Wave Two. The sample experienced a 13% decline in WIC receipt, a 9% decline in difficulty paying for food, a 6% improvement in knowing how to stretch groceries until the end of the month, and an increase in overall life skills levels in Wave Two. The sample also experienced a 19.3% decline in householdsin crisis and an 8.9% increase in sustaining households in Wave Two. These changes represent an overall improvement in economic well-being from Wave One to Wave Two. These changes may be attributable to the positive impact of the late 1990's economic boom reaching rural areas, and to additional income and income-earners joining the household.

Characteristics of Food Insecure Households

Mothers in food secure households differed from mothers in food insecure households on several key characteristics. In both waves of data, mothers in food secure households were more likely to be employed, have higher overall levels of life skills, and report no difficulty paying for food. Mothers in food secure households also had higher levels of education and were able to manage bills, make a family budget, and stretch groceries to the end of the month, although these differences were only evident in Wave One. In Wave Two, income, income-to-needs, and food stamp benefits were

significantly different between food secure and food insecure households. Consistent with previous findings (Rose, Gunderson, & Oliveira, 1998), higher education levels in Wave One and higher income in Wave Two are associated with food security.

While Wave One results suggest that food resource management skills are related to positive outcomes in food security, the ability to prepare a well-balanced meal was not related. This finding reinforces previous literature that cites the lack of influence of dietary quality knowledge on food security outcomes (Anderson & Swanson, 2002; McLaughlin, Tarasuk, & Kreiger, 2003; Olson, Seiling, & Lawrence, 2001).

The associations between income plus food stamps and food security, income-to-needs and food security, and education and food security in each wave of data were all weak negative correlations. Each correlation, with the exception of that between income-to-needs and food security in Wave Two, was also statistically insignificant. More education, higher income-to-needs, and fewer food stamp dollars were correlated with food security, thus these characteristics are weakly associated with food secure households in the sample. Scatterplots representing the correlation between income-to-needs and food security did not indicate that participants differed in food security status based upon their income-to-needs ratios. This finding provides additional support for the contention that raising income available for food spending will improve food security status.

The Influence of Problems Affording Food, Food-Related Life Skills, and Income-to-Needs on Food Security

In order to examine the extent to which problems being able to afford food are predictive of food insecurity in Wave One and in Wave Two, two series of regression

models were tested. The first series, including four significant models, tested this relationship in Wave One, while the second series, including three significant models, tested this relationship in Wave Two. In both series, all models found difficulty paying for food to be a significant predictor of food insecurity. Difficulty paying for food accounted for the largest proportion of variance in food security outcomes of any other variable examined in this study. The importance of this variable in predicting outcomes in food security is likely attributable to the close relationship that difficulty paying for food has with the experience of food insecurity. Thus, asking householders whether they have difficulty paying for food may eventually serve as a brief screening question for the administration of the more extensive Food Security Scale.

In order to examine the extent to which food-related life skills are predictive of food security, food-related life skills were entered into the first two regression series. In the series examining Wave One, the ability to make a family budget was a significant predictor of food security. This finding suggests that the ability to budget may protect low-income families from food insecurity (Anderson & Swanson, 2002; Olson, Seiling, & Lawrence, 2001). In the regression series examining Wave Two, the ability to make a family budget was a significant predictor, but in the opposite direction, predicting food insecurity rather than food security. Budgeting skills in Wave Two were predictive of food insecurity. Overall life skills were a significant predictor of food security in Wave Two. While these outcomes may suggest that the ability to make a budget and overall life skills predict positive outcomes in food security, more research is needed to determine their potential to protect families from food insecurity.

The ability to manage bills and the ability to stretch groceries to the end of the month were not predictive of food security in either regression series. This lack of significance, however, may be due to the use of a stepwise variable entry method and the intercorrelations among the food-related life skills. The stepwise method removes variables that are highly correlated with other predictors that may diminish the influence of those predictors on the dependent variable. Thus, skills such as stretching groceries until the end of the month and managing bills may be significant predictors of food security in other regression models, but they were removed from the stepwise regressions because of multicollinearity with other, more significant predictors. The results of Wave Two analyses of life skills should be interpreted with caution, as a large number of missing data for food-related and overall life skills in Wave Two may have skewed analyses using these variables. Wave Two analyses may also be affected by the dramatic increases in income from Wave One to Wave Two.

To examine the impact of the income-to-needs ratio on food security outcomes, income-to-needs values were run in the first two regression series. They were not, however, selected into any models in either wave due to a lack of significance. Consistent with literature that suggests weak relationships or no relationship between money available for food spending and food security, income-to-needs was not predictive of food security in either wave of data. This finding reinforces suggestions that raising the level of cash benefits available may not protect low-income families from food insecurity.

Control variables were selected into the final model of the first regression series, slightly affecting the significance of other predictors in the model. The impact of the

ability to make a family budget became slightly less significant as a predictor of food security when education level and employment status were controlled. The impact of difficulty paying for food slightly decreased when education level was controlled and slightly increased when employment status were controlled. Other variables controlling for food assistance were run in the first two regression series, but none of these was entered into any model in either series due to lack of significance. This lack of influence highlights some of the ambiguity about the impact of food assistance on food security outcomes (Cohen et al., 1999; Nord, 2000; Nord, Andrews, & Carlson, 2003; Olson, Seiling, & Lawrence, 2001; Ribar & Hamrick, 2003).

The Influence of Problems Affording Food, Food-Related Life Skills, and Income-to-Needs on Changes in Food Security Status

In order to examine the impact of problems affording food, food-related life skills, and income-to-needs on changes in food security status from Wave One to Wave Two, two additional regression series were run. The first series assigned pairs of variables (representing Wave One and Wave Two for each variable) to different blocks to assess the effects of the variables in both waves on food security status change. Regression models in this series showed that only initial (Wave One) food security status and difficulty paying for food in Wave Two were predictive of changes in food security status. Food-related life skills, overall life skills, income-to-needs, food assistance controls, and education and employment controls were not significantly predictive of change in food security status. The impact of multicollinearity may detract from the accuracy of this analysis, as food-related life skills may have been selected as predictors if they were entered into the regression independently.

The second regression series examining change in food security used change values for problems affording food, food-related and overall life skills, income-to-needs, food assistance, and employment, as well as initial food security status and education level to predict food security status change. Only initial food security status and a change in difficulty paying for food were selected into models as significant predictors of changes in food security status. Changes in skill levels, income-to-needs, food assistance, and employment were not predictive of food security, which suggests again that raising the level of cash or food benefits available to low-income families will not protect them from experiencing changes in food security status.

The human capital theory used to guide this investigation is reinforced by the findings of this investigation. This theory helps explain the gap between the quality and quantity of food families are able to provide and what they need to sustain a healthy lifestyle. Given their low incomes and limited resources, families need something more to close this gap. Food resource management skills may help maximize a family's resources, but they may not ultimately be able to help families make up for a significant lack of income and ensure food security.

The Welfare to Well-Being Framework may help explain why assistance is not enough for families to close the gap between what they have and what they need. The findings of this investigation, however, do not support the framework's suggestion that these gaps are based on income relative to family size and poverty threshold. Many families in the sample experienced food insecurity despite higher income-to-needs ratios than other families who were food secure. Thus, in this sample, there did not seem to be a breaking point at which sufficient income protected families from food insecurity. The

absence of income in some families in the sample did not ensure that they would experience food insecurity.

Summary of Findings

Mothers in food secure households are more likely to possess overall life skills and food resource management skills, such as making a family budget and managing bills, than mothers in food insecure households. Difficulty affording food and lacking the ability to make a family budget are significant predictors of food insecurity. Income and food assistance were not significant predictors of food security. Although the predictive analyses in this study were exploratory, they offer important bases for future research that addresses the consistency of these findings over time.

Limitations

Although this study contributes to the relatively small body of literature addressing food security and human capital in low-income families, it has a number of methodological limitations. Because the study's analysis is based on secondary data, a limited number of food and food-security related variables were available. The original study only included measurements of a small number of food-related life skills and did not seek information about use of emergency food assistance, nutrition knowledge, participation in nutrition education, food preparation skills, food shopping skills, or food resource management skills. These variables may have yielded a clearer understanding of the factors that influence food security in low-income families.

This study used the ability to stretch groceries until the end of the month as a life skill related to food security status. Because the need to stretch groceries (and the associated ability to do so) may only be connected with families who have trouble

meeting food needs and more limited income, it is possible that the presence of this skill is reported for different reasons. Mothers in food secure households may report possessing this skill because they have never experienced trouble providing sufficient food, while mothers in food insecure households may report not having this skill because they have experienced trouble making groceries last. Therefore, differences in skill level between these two groups in their ability to make groceries last (rather than a difference in resources available for food) should be interpreted with caution.

The variables used in this study were obtained from self-report measures of skills and knowledge, introducing the possibility that participants provided socially desirable responses. Additionally, participants who report having a particular skill or knowledge may not actually employ this human capital into their daily living. This factor has the effect of minimizing the significance of food-related human capital as a predictor variable. It is also difficult to infer that food spending is a high priority of all low-income families. For example, a mother with relatively sufficient income may feel that using her income to pay for housing, utilities, medical care, and other expenses is a higher priority than providing sufficient amounts and/or quality of food for herself. In this case, the ability to interpret the relationship between income and food security is limited. Furthermore, a high level of food-related skills may not influence the relationship between income and food security unless food security is a familial priority.

Food-related life skills measures, especially those in Wave Two, may not be representative of the whole sample, as a large number of data are missing. Other Wave Two data and results may have been skewed due to the dramatic increases in income experienced by a large portion of the sample. This increase has the potential to impact all

of the variables examined in this study. This limitation may, in part, explain the lack of significance of variables in Wave Two that had a large impact on food security outcomes in Wave One.

Because the predictive analyses in this study used a stepwise variable selection method, the variables selected into the regression models may not be the only significant predictors of food security status of all of the variables run in the regressions. Food-related life skills that may be significant predictors of food security status in other models were not significant predictors in these analyses, in part, due to the regression methods used. In particular, the high intercorrelation between the ability to manage bills and the ability to make a family budget (R^2=.431 in Wave One, R^2=.684 in Wave Two) may have resulted in the removal of the ability to manage bills as a significant predictor. The third regression series, especially, should be interpreted with caution, given the large number of independent variables that were entered.

While the current study makes statistical inferences about the influence of food-related life skills and income on food security status, it cannot suggest any causal links between food security and food assistance. Moreover, the limited availability of information regarding processes related to food security does not allow an analysis of the efforts taken to reduce food insecurity, the effectiveness of these efforts, and change in food security outcomes related to a change in human capital and/or behavioral change. The study only allows a view of food security, life skills, and income over a two year period, which does not allow for confident interpretation of the impact of skills and income over time. Analyses using more than the first two waves of data may allow for a more thorough investigation of food security and food-related life skills over time,

accounting also for normative fluctuations in circumstances. This analysis provides limited or no knowledge about income history, food security history, or nutrition education, and food assistance use over time, all of which may influence the relationships examined in this study.

Despite the use of some control variables, the study does not account for many personal, familial, economic, community, or societal circumstances that may influence income, life skills, and food security status. Other influences may include misinformation about eligibility for food assistance, attitudes about food assistance, availability of emergency food assistance, cost and availability of food (seasonally and/or by location), and access to food stores. In some cases, mothers who possess food-related life skills may be unable to use this human capital to combat food security within their households. Physical and mental health problems, a lack of functional or available kitchen appliances, time constraints, or special dietary needs may act as barriers to employ human capital.

Regarding the direction of causality, limited income is commonly thought of as a cause of or contributing factor to food insecurity. It is possible, however, that the impact of food insecurity on health status and employability further compromises the ability to earn. Because of the lack of reliable longitudinal data available, it is difficult to isolate the circular effects of income and food security to explain these possibilities. Furthermore, the depth of poverty may be associated with a greater need to use emergency food assistance and food stamps. The extent to which families utilize emergency food aid, however, should alleviate the severity of food insecurity within the

household. Again, these relationships may be causal in either or both directions and should be interpreted with caution.

This study examines a non-randomly selected sample of rural, low-income mothers, thus, findings may not be generalizable to all rural, low-income mothers. Furthermore, mothers who participated in the study were likely to have some type of contact with a local program or agency before being asked and agreeing to participate. These relationships may indicate some differences between the sample and the population, in that the sample is comprised of mothers who were receiving some type of service, assistance, or intervention. The sample is drawn from fourteen states that may differ socially, geographically, and economically from each other and may not be representative of all states in the U.S. With minorities overrepresented and non-Hispanic whites underrepresented, the sample is also not representative of the racial/ethnic make-up of rural America. Analyzing this sample as a whole may diminish the within-group differences that vary by location and other characteristics.

Although mothers in the sample during both waves of data had slightly more children than mothers who dropped out of the study, this difference was not thought to influence outcomes. Number of children was not significantly associated with any other variables of interest, and the difference between the sample and the Wave One drop-outs was about .34 children. The number of children in a household was also indirectly controlled for in the income-to-needs ratio.

Directions of Future Research

The gaps in available literature and the limitations of this study suggest a number of possible directions for future research. First, this study draws attention to the need for

more research addressing the well-being of low-income, rural families in the context of changing welfare regulations. Specifically, research in the area of food security and the factors related to food secure outcomes is needed to improve the effectiveness of food assistance programs and nutrition education programs targeting limited resource populations. Pilot tests and program evaluations that investigate the effects of food resource management skill building can also contribute greatly to food security knowledge. Studies examining food security and human capital across various populations would also help policymakers and service providers improve the efficacy of programs for low-income families with diverse needs.

Improvement in research design, including larger randomized and representative samples, may help researchers yield results that are more generalizable. Including measures of food assistance use, more food-related skills and knowledge, and more detailed experiences with food security/insecurity would help researchers investigate the relationships among income, food resource management, and food security more thoroughly. The inclusion and analysis of qualitative data may also help explicate the factors and processes that contribute to or relieve food insecurity in poor rural families. Because changes in food security status are little studied and most research uses means that mask the changes in individual families, researchers should also examine individual changes experienced over time (Hofferth, 2004).

Building upon exploratory data analyses, future research should employ statistical procedures that allow food -related life skills, food security, and changes in these characteristics to be examined independent of predictors that do not significantly contribute to regression models. These results would provide more conclusive evidence,

helping programs to make improvements with a higher level of confidence. Using the NC-223 dataset, future investigations of food security and food-related life skills should include an analysis of Wave Three data. Other research should attempt to investigate similar changes in food security status over time.

Program and Policy Implications

This study has many important implications for policymakers and service providers concerned with improving the well-being of rural, low-income families. Findings suggest changes at the individual, family, community, and government levels. For rural, low-income households experiencing food insecurity, findings suggest that possessing particular food-related skills can help close the gap between resources available for food and resources needed for adequate food consumption. On the other hand, knowing how to prepare a well-balanced meal (knowledge of food preparation and dietary quality) was not related to food security in this and other studies. Program planners can make use of these findings by implementing food resource management (i.e., making a budget, managing bills, comparison shopping, stretching groceries, etc.) into nutrition education programs for limited resource populations. Families, in turn, can use these skills to maximize their own food resources to improve food their food security. Pilot programs should test the effectiveness of this type of intervention. Given that food security is a priority of food stamp nutrition education programs, planners may also use these findings to increase the number of resources allocated to teach food resource management skills and decrease the number of resources allocated to teach food preparation skills and dietary quality. This type of human capital investment may provide a long-term benefit to this population while limiting the need for providing

continual in-kind assistance. Resources can be redirected to newly food insecure families and reallocated to address other needs in low-income families.

Although the food stamp program is intended only as a supplement to recipients' food spending, policymakers should be aware that food stamp benefits are often not enough to meet families' food needs. Family composition, local cost of living, local food availability, and unforeseen family expenses all affect the adequacy of food stamps in helping families meet their basic food needs. These factors should be taken into consideration in determining food stamp benefits, rather than distributing food stamps based on family size and income alone. By increasing purchasing power, food stamps do help some families close the gap between their own resources and what they need to provide adequate food. Given the large number of families who are eligible for, but not receiving food stamps, policymakers should be sure to direct additional food assistance funds to outreach campaigns (General Accounting Office, 2004). In addition, policymakers must be aware of the potential of human capital interventions to increase food security among the poor and fund nutrition education programming for low-income families accordingly. Revising food stamp distribution and increasing educational funding in food resource management are two key ways of enhancing food security among the rural poor. By strengthening the resources available to low-income families, policymakers provide the rural poor with the opportunity to become more self-sufficient.

The consistent significance of reported difficulty paying for food in predicting food security may help researchers obtain basic food security data more easily. Although the self-report of difficulty paying for food is a question measuring perception of food

problems, it may be used as an inexpensive and quick food insecurity pre-screening alternative to the more extensive USDA Food Security Scale.

Conclusion

The overall purpose of this study was to examine the impact of food-related life skills and income-to-needs on food security outcomes. Findings indicate that there are significant differences in food-related life skills between mothers in food secure households and mothers in food insecure households. Findings also indicate that the ability to prepare a family budget is an important predictor of positive outcomes in food security, while difficulty paying for food is an important predictor of food insecurity. Income-to-needs and food assistance were not significant predictors, therefore research, policies, and programs must find a way to optimize limited income and food assistance with other tools that influence food security.

These findings suggest that teaching limited resource populations food resource management skills may promote food security. Because of the limited amount of research connecting food resource management with food security, more research is needed to clarify this relationship and determine other factors that influence food security outcomes. These initial findings, however, provide a basis for future research and nutrition education program content revision for low-income populations. Future research should focus on determining meaningful ways to influence food security status by helping low-income individuals obtain knowledge and skills that help them establish positive outcomes in well-being. Nutrition education programs should pilot food resource management interventions to help low-income families make the most of available resources and avoid food insecurity.

Appendix A

FOOD-SECURITY/HUNGER CORE MODULE
USDA, Food and Nutrition Service and Economic Research Service – 6/23/99

These next questions are about the food eaten in your household in the last 12 months, since (current month) of last year and whether you were able to afford the food you need.

1. Which of these statements best describes the food eaten in your household in the last 12 months:

[1] Enough of the kinds of food we want to eat (SKIP 1a and 1b)
[2] Enough but not always the kinds of food we want (SKIP 1a)
[3] Sometimes not enough to eat [SKIP 1b]
[4] Often not enough [SKIP 1b]
[ ] DK or Refused (SKIP 1a and 1b)

1a. [IF OPTION 3 OR 4 SELECTED, ASK] Here are some reasons why people don't always have enough to eat. For each one, please tell me if that is a reason why YOU don't always have enough to eat. [READ LIST. MARK ALL THAT APPLY.]

YES	NO	DK	
[ ]	[ ]	[ ]	Not enough money for food
[ ]	[ ]	[ ]	Not enough time for shopping or cooking
[ ]	[ ]	[ ]	Too hard to get to the store
[ ]	[ ]	[ ]	On a diet
[ ]	[ ]	[ ]	No working stove available
[ ]	[ ]	[ ]	Not able to cook or eat because of health problems

1b. [IF OPTION 2 SELECTED, ASK] Here are some reasons why people don't always have the quality or variety of food they want. For each one, please tell me if that is a reason why YOU don't always have the kinds of food you want to eat. [READ LIST. MARK ALL THAT APPLY.]

YES	NO	DK	
[ ]	[ ]	[ ]	Not enough money for food
[ ]	[ ]	[ ]	Kinds of food (I/we) want not available
[ ]	[ ]	[ ]	Not enough time for shopping or cooking
[ ]	[ ]	[ ]	Too hard to get to the store
[ ]	[ ]	[ ]	On a special diet

Stage 1: Questions 2-6 (asked of all households; begin scale items).

2. Now I'm going to read you several statements that people have made about their food situation. For these statements, please tell me whether the statement was often true, sometimes true, or never true for (you/your household) in the last 12 months, that is, since last (name of current month).

   The first statement is "(I/We) worried whether (my/our) food would run out before (I/we) got money to buy more." Was that often true, sometimes true, or never true for (you/your household) in the last 12 months?

   [ ] Often true
   [ ] Sometimes true
   [ ] Never true
   [ ] DK or Refused

3. "The food that (I/we) bought just didn't last, and (I/we) didn't have money to get more." Was that often, sometimes, or never true for (you/your household) in the last 12 months?

   [ ] Often true
   [ ] Sometimes true
   [ ] Never true
   [ ] DK or Refused

4. "(I/we) couldn't afford to eat balanced meals." Was that often, sometimes, or never true for (you/your household) in the last 12 months?

   [ ] Often true
   [ ] Sometimes true
   [ ] Never true
   [ ] DK or Refused

[IF CHILDREN UNDER 18 IN HOUSEHOLD, ASK Q5 - 6; OTHERWISE SKIP TO 1st-Level Screen.]

5. "(I/we) relied on only a few kinds of low-cost food to feed (my/our) child/the children) because (I was/we were) running out of money to buy food." Was that often, sometimes, or never true for (you/your household) in the last 12 months?

   [ ] Often true
   [ ] Sometimes true
   [ ] Never true
   [ ] DK or Refused

6. "(I/We) couldn't feed (my/our) child/the children) a balanced meal, because (I/we) couldn't afford that." Was that often, sometimes, or never true for (you/your household) in the last 12 months?

[ ] Often true
[ ] Sometimes true
[ ] Never true
[ ] DK or Refused

1st-level Screen (screener for Stage 2): If affirmative response to any one of Questions 2-6 (i.e., "often true" or "sometimes true"), OR, response [3] or [4] to Question 1 (if administered), then continue to Stage 2; otherwise, skip to end.

Stage 2: Questions 7-11

[IF CHILDREN UNDER 18 IN HOUSEHOLD, ASK Q7; OTHERWISE SKIP TO Q8]

7. "(My/Our child was/The children were) not eating enough because (I/we) just couldn't afford enough food." Was that often, sometimes, or never true for (you/your household) in the last 12 months?

[ ] Often true
[ ] Sometimes true
[ ] Never true
[ ] DK or Refused

8. In the last 12 months, since last (name of current month), did (you/you or other adults in your household) ever cut the size of your meals or skip meals because there wasn't enough money for food?

[ ] Yes
[ ] No (Skip 8a)
[ ] DK (Skip 8a)

8a. [IF YES ABOVE, ASK] How often did this happen---almost every month, some months but not every month, or in only 1 or 2 months?

[ ] Almost every month
[ ] Some months but not every month
[ ] Only 1 or 2 months
[ ] DK

9. In the last 12 months, did you ever eat less than you felt you should because there wasn't enough money to buy food?

[ ] Yes
[ ] No
[ ] DK

10. In the last 12 months, were you every hungry but didn't eat because you couldn't afford enough food?

[ ] Yes
[ ] No
[ ] DK

11. In the last 12 months, did you lose weight because you didn't have enough money for food?

[ ] Yes
[ ] No
[ ] DK

2nd-level Screen (screener for Stage 3): If affirmative response to any one of Questions 7 through 11, then continue to Stage 3; otherwise, skip to end.

Stage 3: Questions 12-16

12. In the last 12 months, did (you/you or other adults in your household) ever not eat for a whole day because there wasn't enough money for food?

[ ] Yes
[ ] No (Skip 12a)
[ ] DK (Skip 12a)

12a. [IF YES ABOVE, ASK] How often did this happen---almost every month, some months but not every month, or in only 1 or 2 months?

[ ] Almost every month
[ ] Some months but not every month
[ ] Only 1 or 2 months
[ ] DK

[IF CHILDREN UNDER 18 IN HOUSEHOLD, ASK 13-16; OTHERWISE SKIP TO END.]

13. The next questions are about children living in the household who are under 18 years old. In the last 12 months, since (current month) of last year, did you ever cut the size of (your child's/any of the children's) meals because there wasn't enough money for food?

[ ] Yes
[ ] No
[ ] DK

14. In the last 12 months, did (CHILD'S NAME/any of the children) ever skip meals because there wasn't enough money for food?

[ ] Yes
[ ] No (Skip 14a)
[ ] DK (Skip 14a)

14a. [IF YES ABOVE ASK] How often did this happen---almost every month, some months but not every month, or in only 1 or 2 months?

[ ] Almost every month
[ ] Some months but not every month
[ ] Only 1 or 2 months
[ ] DK

15. In the last 12 months, (was your child/ were the children) ever hungry but you just couldn't afford more food?

[ ] Yes
[ ] No
[ ] DK

16. In the last 12 months, did (your child/any of the children) ever not eat for a whole day because there wasn't enough money for food?

[ ] Yes
[ ] No
[ ] DK

Appendix B

LIFE SKILLS ASSESSMENT

Do you have:	Yes	No
1. A driver's license		
2. Car insurance		
3. Car registration		
4. Health insurance		
5. A checking account		
6. A good credit record		
7. A local library card		
Do you know how to:		
8. Manage your bills		
9. Write a personal check		
10. Make a family budget		
11. Stretch your groceries to the end of the month		
12. Register to vote		
13. Apply for a credit card		
14. Prepare a well-balanced meal for your family		
15. Get telephone service		
16. Work with your landlord to improve housing		
17. Register a consumer complaint		
18. Talk to your child's teacher		
19. Fill out forms to apply for services		
20. Apply for a job		
21. Write a resume		
22. Dress for a job		
23. Fill out your own income tax forms		
24. Join a local club or organization		
25. Create a personal support system		

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