

UNDERSTANDING RESERVATION HUNGER: FOOD ACQUISITION AND
FOOD SECURITY AMONG THE NORTHERN CHEYENNE

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**UNDERSTANDING RESERVATION HUNGER: FOOD ACQUISITION AND
FOOD SECURITY AMONG THE NORTHERN CHEYENNE**

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LIST OF ABBREVIATIONS

International Covenant on Economic, Social, and Cultural Rights.....	ICESCR
Chief Dull Knife College.....	CDKC
General Educational Development Test.....	GED
United States Department of Agriculture.....	USDA
Economic Research Service.....	ERS
Special Supplemental Nutrition Program for Women, Infants and Children.....	WIC
Food Stamp Program.....	FSP
Food Distribution Program on Indian Reservations.....	FDPIR
Temporary Assistance to Needy Families.....	TANF
Family Assistance in Montana.....	FAIM
Community Food Security.....	CFS
Analysis of Variance.....	ANOVA
Odds.....	EXP (B)
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UNDERSTANDING RESERVATION HUNGER: FOOD ACQUISITION AND FOOD SECURITY AMONG THE NORTHERN CHEYENNE

ABSTRACT

The problem of hunger and poverty in the United States is unmistakably one of an inability to participate in the economic systems that surround food provisioning due to a lack of resources. Native Americans are widely recognized as one of the most economically disadvantaged populations in the United States. The Northern Cheyenne represent a group that experiences poverty and hunger at an exceptionally high level. As an extreme case study, this project examines patterns and implications of food provisioning choices that may be relevant to other groups that experience food insecurity as well.

While the range of food provisioning strategies used by participants is significant and really stunning, the majority of existing research stops at the documentation of these sources. This project adds conceptually and methodologically to this literature by examining not only the sources of food reportedly used by households, but also the combinations of sources used as

strategies in food provisioning. This is done through the application of a cluster analysis to show the patterns in which households actually use food sources together on the reservation. In addition, the relationships between household use of food sources and strategies and food security levels are examined. Thus, this project attempts to start a conversation not only about the types of choices that households must make, but how this is happening and what it looks like for limited resource households.

The purpose of this study is to document food security levels on the reservation and to assess the relationships to household and respondent characteristics, food sources, programs and strategies that Northern Cheyenne households use to acquire food. A variety of analytical tools are used to accomplish this, including frequencies, cross-tabulation, binomial and multinomial logistical regressions and cluster analysis. Levels of household food security are measured through the 18 question USDA Food Security Core Module. Questions on food source use were developed from previous research in this population and categories were collapsed into dichotomous categories of use and non-use for most of the analysis for this project.

Using the livelihoods perspective to understand food source use, we see that households use the food sources and strategies that reflect their capitals and capabilities. It also appears that households will use the most “productive” or reliable food sources first. As expected, clustering the food sources shows greater clarity for these food provisioning patterns on the reservation, and show that sources are grouped into understandable combinations. Overall, households that have access to more reliable and valuable resources (such as wages or fixed income transfers) are more likely to reach food security. Conversely, households that use more risky food sources (such as pawning or churches) are more likely to have food insecurity.

An understanding of the implications of choices that people must make to acquire enough food for their households each month can inform future policies and programs. This has implications for the Northern Cheyenne who could clearly benefit from a greater understanding of their situation to act to re-empower their community. But as a theoretical guide, this instrumental case study also has applications to other food insecure groups-- especially rural communities-- throughout the world. Furthermore, this can hopefully prompt new ways of thinking and organizing food and food programs and systems.

This research points to the reality of food insecurity and hunger in the United States and will hopefully provoke discussion about the resources and systems underlying food provisioning activities in this country.

Chapter 1: Poverty, Hunger and Food Provisioning

Poverty is most often defined in economic terms and, practically speaking, translates into an inability to fully participate in society. Poverty is also often accompanied by social and physical hardship such as food insecurity and hunger. Research literature aimed at understanding poverty looks at both individual characteristics and larger structural factors as a cause of poverty. Individual explanations of poverty, which are most common in American public discourse, policy and social science, focus on personal traits and/or individual deficiencies to account for poverty. In other words, poverty research in the United States is often research on “poor people.” These studies may be looking at any variety of characteristics and often conclude that poverty in the lives of individuals is related to their level of human capital (education and skills) and other personal attributes such as behavioral or cultural deficiencies (i.e. single parenting, substance abuse, tardiness). This perspective leads to programs and resources that are focused on changing the behavior, attitudes or other characteristics of poor individuals, without changing the overarching economic model, and calls for increased individual education programs and individual

skill enhancement to promote human capital formation among the poor (Olsen et al 2002; Kramer-Leblanc et al 1997).

In contrast, macro, structural, approaches argue that poverty is a result of systems that reward the powerful actors at the expense of those without access to important institutions and power. In the United States, capitalist systems centered on competition and reliant on manipulation of capital and labor reward the “winners” (with more capital) and necessitate “losers.” For example, Rank (2004) argues that a majority of Americans will experience poverty at some time in adulthood, which he argues points to structural inadequacies, including low paying jobs and an ineffective safety-net.

In this view, personal characteristics are thus relevant as outcomes to the hegemonic relationships that the poor find themselves in, or as supplements to the already overpowering barriers to economic success. In other words, by focusing unduly on the characteristics of the participants as character flaws, we fail to see the origins of individual characteristics (“good” or “bad”) within the broader context of opportunities and structures (Rank 2004; see also Wilson 1996, 1997; Albrecht et al 2000). From this perspective, simply adding programs or resources to the system is not enough. Whole systems must be changed in order to make room for the real alleviation of poverty.

Rank (2004) argues that we can look at the people who lose, or the rules that shape the process, but that ultimately both are important. In his theory, the intersection of social class and human capital represents the level of vulnerability to poverty (Rank 2004). Cynthia Duncan (1999) also takes this perspective in her look at poverty in three rural communities and concludes that building human capital is essential, especially in promoting real educational opportunities, but that this happens in the context of political and economic constraints (see also Cotter 2002).

Similarly, Fitchen (1995) argues that poverty is a result of both system level and individual factors. "Poverty has increased in certain rural places as a result of system-level factors, such as economic change, but socio-behavioral characteristics of individuals and households determine why, given these system-level changes, certain people have become poor or are poorer than other people" (266). It is important, therefore, in any examination of poverty--or any of its many relatives-- to look at both the context in which people are living as well as how personal choices and characteristics intersect with these social and economic factors.

Because food is necessary for all people everyday, hunger, and food insecurity are compelling aspects of economic hardship. Food strategies are

one way that individuals can circumvent the rigid institutional structures that constrain food choices and options. This project is interested in the ways that people adapt and cope with hunger, poverty and uncertainty. Although this analysis does recognize the importance of looking at and acknowledging the contextual and systemic factors as an important part of the story, this project looks primarily at the ways that individuals and households manage and act within sometimes difficult circumstances. This project seeks to understand food provisioning choices within a rural reservation context. Specifically, I am interested in how using food sources, and in particular the use of food acquisition strategies, relate to a particularly troubling aspect of poverty- food insecurity.

Hunger and Food Security in the United States

Food insecurity is present in developed and developing countries although the household experiences vary due to political, economic, and social circumstances. Although food security includes many aspects of the food system and is associated with poverty, the concept of food security used here is categorically interested in the ability of households to acquire and access appropriate and healthy food. I rely on work by the United States Department of Agriculture (USDA) and the food security measure developed by them.

Specifically, it is defined as “access by all people at all times to enough food for an active, healthy life” (Jensen 2000; Andrews 1998; Hamilton 1997; Bickel 2000). In effect, food insecurity is the inability to obtain the necessary, nutritionally and socially appropriate food for oneself and one’s family (see also, Van Esterik 1999; Riches 1999). Food security is often measured at the household level as it is in this setting that food provisioning usually occurs.

The first sub-panel study on hunger in the United States reported about 11 million people that live in food insecure households with either severe or moderate hunger, while another 23 million people live with less severe food insecurity (Poppendiek, 2000). Hunger in this country is “a matter of some people regularly having inadequate access to sufficient food” rather than insufficient supplies for the population, as may be the case elsewhere (Fitchen 1988:310). In other words, food insecurity in the United States is the inability to purchase or acquire satisfactory food rather than a shortfall of food generally.

It is estimated that about 10.7 million American households were food insecure in 1998 and 2001 studies representing nearly 36 million people (Bickel et al 1999; Nord et al 2002). Of those who experienced food insecurity, more than 35 percent experienced the more severe level that included hunger—the physical response of not having enough food to eat (Bickel et al 1999; Jensen 2000). As

a group, Native Americans experience lower levels of food security and higher levels of hunger, perhaps the highest of all ethnic groups in the United States (First Nations Development Institute 2004).

Food plays a vital role in cultural life as well as physical well-being. Fitchen (1988) contends that hunger must be understood culturally as well as physically. Food insecurity affects the economic, social, physical, and psychological health of individuals and households. It is an essential component to household and individual well-being. For example, recent studies show that food insecurity is related to negative health outcomes for adults and children, such as obesity, diabetes, stress, and anxiety (Cook et al 2004; Lee and Frongillo 2001; Adams et al 2003; Quandt and Rao 1999; Bickel 2000; Vozoris and Tarasuk 2003). Related psychological consequences are also well documented (Quandt and Rao 1999; Bickel 2000; Siefert et al 2001; Weinreb et al 2002). Social and economic costs associated with food insecurity are associated with increased health care expenditures, including increased hospitalization, and other social disruptions (Cook et al 2004; Kempson et al 2002).

Adaptations to Economic and Food Constraints

David Harvey explains the difference between living in poverty and being poor. "Unpredictability, not just a lack of resources generates a culture of

poverty. *To be poor* is to lack resources; *to live in poverty*, however, means learning to live with *variable social and economic environments*" (Harvey 1993:24 italics in original). Adaptations become requisite when individuals and/or communities of individuals endure prolonged poverty and unpredictability, and these adaptations create the social structure of poverty (Harvey 1993). Unfortunately these structures often act to exacerbate the poverty from which these individuals are trying to escape through the depletion of resources (Zimmerman et al 2003; Harvey 1993). The Northern Cheyenne reservation is a good example of a community with the variable economic conditions spoken of by Harvey (1993) and we can expect to see interesting individual and household adaptations as we look more carefully at their patterns of behavior.

Food acquisition strategies are important for individuals who have to circumvent the rigid institutional structures that constrain access to food. Because people do not have definite food bills each month, manipulating food costs is an important part of coping with an insecure economic situation. It is also an interesting way to look at how individuals and households make choices within income and institutional constraints because there is more room for individual adaptation. Within a context of economic and food vulnerability, individual and household adaptations are an important way to overcome insecurity.

Both policies and programs influence the options available to individuals. Yet even within the same political and economic context, strategies may differ considerably. Looking at the individual adaptations to these constraints can help us understand the choices that lead to food security.

Northern Cheyenne Case Study

Native Americans suffer from a distinctive kind of poverty on the reservation because of their particular history. With an overall poverty rate of 24.5% during 1999-2001, Native Americans are widely recognized as one of the most economically disadvantaged populations in the United States (U.S. Department of Commerce 2002; see also Snipp and Sandefur 1988; Snipp 1996; Antell et al 1999). There is no question that social, economic and political policies have shaped the context of reservation life. The creation and maintenance of the reservation system has encouraged dependence on the Federal government (Weist 1977; Cahn and Hearn 1969; Churchill 1992; Stands in Timber 1967). Many reservations continue to lack sufficient levels of economic development oriented toward the community. Federal policies and programs in the past and present clearly impact the economic structure and the available resources on reservations in a dramatic fashion.

Because the Cheyenne are relatively representative of plains and other tribal populations in circumstances, and especially in relationship to the federal government, they offer a good opportunity for analysis of the distinctive situation of reservation populations (Ward 1996). Problems surrounding food and the food system on the reservation are particularly poignant. In a recent study of The Northern Cheyenne, Hiwalker and associates (2002) found that nearly 70% of households were food insecure, with 35% regularly experiencing hunger. These rates are astoundingly high in comparison to national averages (about 11% food insecure with 3% food insecure with hunger according to Nord et al 2002), reflecting the joblessness and poverty that characterizes many Indian reservations. The Northern Cheyenne represent a group that experiences poverty and hunger at an exceptionally high level. As an extreme case study, we are able to examine the patterns and implications of individual choices that may be relevant to other groups that experience food insecurity as well.

Project Contributions

This project seeks to understand the relationship between food acquisition strategies and food security for residents of the Northern Cheyenne reservation. This case study represents an extreme example of poverty and hunger, yet informs the question of how people cope and make choices in

difficult circumstances. Food choices available to the Northern Cheyenne are influenced in part by policies and programs. Yet individuals and households differ in how they secure food for their families. This study examines and reveals how households use food sources and food strategies and their impact on food security for a vulnerable population. Drawing from a variety of research literatures, this project contributes several key conceptual, methodological and theoretical insights.

Poverty, and especially food security research looking at Native American reservation populations is limited. This is in part due to the sometimes difficulty of accessing and administering research projects on rural reservations due to physical and cultural barriers. Because this project uses the United States Department of Agriculture (USDA) survey questions to assess food security levels, this project is able to provide information that is comparable to other populations. Therefore, this project contributes valuable information to literature on Native American poverty and hunger. Because this project focuses on a rural Native American Indian reservation, within a specific context of poverty and hunger, it also provides theoretical insight into the interplay between context and household food provisioning choices.

Emergency food provisioning systems, as part of the current food system in the United States, are also examined for their relationship to food security levels. Within the logic of the marketplace, this system works through the 'charity' frame and thus creates a context in which households work to provide food to their families. Informal programs and services typically are unquestioned as they fit into the overall cultural and economic context. Formal food assistance programs available to households vulnerable to food insecurity require various stipulations; however they all have rules that must be met in order to access the assistance. Literature examining food programs and the food provisioning system in the United States is disparate.

Although some programs are studied for specific concerns in more detail--like the Food Stamp program and the Women, Infants and Children Nutrition Program (WIC)—others, typically informal programs, are not specifically investigated for their use and/or relationships to food outcomes at all. This project adds to this literature by looking specifically at who is most likely to use various formal and informal programs and the relationships to levels of food security.

The sustainable livelihoods literature asserts that households construct livelihoods—or strategies for maintaining or achieving a standard of living

–through daily choices and negotiations (Valdivia and Gilles 2001). Households must use what assets and capital resources are available to them in order to act to create or maintain these livelihoods. In other words, households act according to available capitals and capabilities. This project contributes to this theoretical assertion through an examination of how households work and make choices about food provisioning. When applied to food provisioning, this literature points to the importance of taking into account the different types and the number of food sources that households may use. This project adds to this literature by examining these concepts for food provisioning specifically and investigating the coping and adaptations of households that are in stress (as with unemployment, etc) in terms of their food provisioning choices.

Additionally, literature looking at household coping mechanisms and nutritional outcomes among economically challenged households typically looks at the effect that food insecurity (or food insufficiency) has for food provisioning choices. This food provisioning literature is still emerging and is cursory and preliminary. For example, although significant research documents the range of choices that limited-resource households may turn to in order to acquire food, there is no research that looks at the ways that households actually manage the various sources of food for their households.

This project adds conceptually and methodologically to this literature by examining not only the sources of food reportedly used by households, but also the combinations of sources used as strategies in food provisioning. It is important to begin to think about how households are constructing strategies—or the whole gamut of food provisioning work—instead of just looking at it piecemeal. This project is a holistic look at how households attempt to meet food needs. This is done through the application of novel methodological techniques. Cluster analysis is used to show the patterns in which households actually use food sources together on the reservation. Thus, this project attempts to start a conversation not only about the types of choices that households must make, but how this is happening and what it looks like for limited resource households.

This project also seeks to answer several questions about how households use food sources and food strategies and how these relate to food security on the reservation. The next four chapters provide the conceptual and methodological background for the research that is presented in this project. Starting with chapter 2, which details the specific Native American and Northern Cheyenne context within which this project is located. Chapter 3 describes the food system in the United States and how food security and food provisioning fits into that system. Chapter 4 gives further details about the ideas of the livelihood

perspective and relevant literatures to food provisioning. Chapter 5 explains the methodological issues and details the data analysis undertaken in this project. Chapters 6, 7, and 8 present the findings for each set of questions: looking at food sources, food strategies and food security for this population. Finally, this research is summarized with some final concluding thoughts and ideas in chapter 9.

Chapter 2: The Northern Cheyenne in the Native American Context in the United States

Native Americans are recognized as one of the most impoverished groups in the nation, consistently ranking at the very bottom on measures of well-being and earnings (Snipp 1996, 1988). The Northern Cheyenne Indians, like many Native Americans today, rely extensively on the Federal government for food and resources. The Bureau of Indian Affairs acknowledged that the Northern Cheyenne Reservation was the poorest of the seven Indian reservations in Montana in 1997 (Montana 1997). Additionally, this reservation was identified as requiring the most help with economic, social and educational programs (Montana 1997). The Northwest Area Foundation (NAF 2004) reports the poverty rate for Northern Cheyenne at 50% as compared to 39% for Native Americans on reservations generally in 1999. Of the 72 reservations in the Northwest eight-state regional focus, the Northern Cheyenne reservation ranked 67th for poverty (NAF 2004). Unfortunately, according to the Northern Cheyenne Social Preservation Project, the unemployment rate for the Northern Cheyenne Nation was 75% in 2001 (NAF 2004). Moreover, like many Indian reservations, the majority of jobs

available for the Northern Cheyenne are in the public sector including schools, hospitals, social services and government agencies.

Poverty on the reservation is also related to other hardships including hunger. Specifically, recent estimates demonstrate a 70% food insecurity rate on the Northern Cheyenne reservation (Hiwalker 2001; Ward 1999). Hunger and poverty on the Northern Cheyenne reservation are embedded in relationships constructed over time and experienced historically. This chapter will provide background of the important social, political, and economic forces for Native Americans and for the Northern Cheyenne. In addition, the specific context of the Northern Cheyenne reservation is examined in order that we more fully understand the context in which individuals and households make choices. Why is this group so vulnerable to poverty and hunger?

Economic Organization and the Reservation

The United States was established on the ideas and principles of capitalism. As an economic system, capitalism requires the commodification of things and reliance upon money. In every economic form, there are rules as to how one can participate and typically, not all people participate in the economy equally. This means that groups and individuals may be excluded based on their relationship to market mechanisms, creating large imbalances of power

in the broader society. Groups without access to money and capital cannot participate and therefore become dependent on others for their very survival. This is exemplified in the economic circumstances observed on many Indian reservations today.

“There is no question that American Indians are one of the poorest groups in American society” (Snipp 1996:30). Reservations have been linked to poverty and a dependency relationship with the Federal government. In recognition of their role in the economic problems on reservations, the Federal government has made several attempts to remedy poverty among Native American populations. Troster (1996) shows that there is a strong positive correlation between federal expenditures and the state of economic well-being for Indians. This suggests that reservations can be mechanisms of disempowerment for tribes through an over dependence on Federal government policies and projects. Although as a Tribe the Northern Cheyenne have responded to these factors in their own distinct manner, the relational and structural underpinnings continue to be relevant for understanding the current situation on the reservation.

This hardship and dependency is arguably related to the political history surrounding the displacement of Indians from traditional access to land and resources and the creation of the reservation system. These were

and are essential to the creation and maintenance of dependency rooted in the organization of land and governance for Native Americans and for the Northern Cheyenne specifically. “Indian policy” has always been paternalistic, using the language of guardianship and expecting childlike dependence. Reservations were established under the assumptions that tribes would be dependent on the Federal government, at least for a while, and external control over food and food annuities were typical (Tabachnick 2001; Cosgrove 1998).

Although this varies widely, tribes were relatively self-reliant in food provisioning through access to hunting and the cultivation of land before the conquest and placement of Indians on reservations (Hurst 1987). The economic circumstances of unsuccessful agricultural development, as well as the political policies of the War Department and subsequently the Department of the Interior –responsible for the governance of reservations and Indians –worked to the disadvantage of tribal self-reliance. Reservations changed the way that Native Americans related to land, work on land, and access to food.

Importance of Land

Food and hunger have often resulted from policies to acquire land and resources in the name of progress. Barriers to accessing land are inherently

disempowering in terms of food security. Historically, the production and acquisition of food and access to land cannot be separated.

For example, the land enclosures which took place in Britain during the 13th and 14th centuries led to poverty for English peasants. But it was the revocation of the poor laws that drove people into the cities and the urban squalor associated with the Industrial Revolution. Some economists of the time were aware of and even argued for the use of hunger, or the elimination of food assistance, as a mechanism of social control. In the words of one, it is a natural control of the poor:

It is only hunger which can spur and goad [the poor] on to labor . . . Hunger is not only a peaceable, silent, unremitted pressure, but, as the most powerful motive to industry and labour, it calls forth the most powerful exertions. . . .Hunger will tame the fiercest animals, it will teach decency and civility, obedience and subjection to the most brutish, the most obstinate, and the most perverse.
(Townsend 1786, sec 3 and 4).

In this case, hunger proved to be a powerful motivator for peasants reluctant to go to the growing cities for work in factories controlled by powerful interests of their time.

For Native Americans, this was often accomplished through treaties that promised material support as compensation for the loss of hunting and gathering grounds. However, these treaties were often disregarded by corrupt BIA agents

that were in charge of distributing food. In what is sometimes called the “sell and starve” policy, Indians were often forced to give up even more land in order to access the rations that were promised to them (Cankù Lúta 2001).

Clearly, land plays an important role in the development of capitalism. This form of economic organization requires expansion and accumulation of land—western expansion in the case of the United States. According to Storper and Walker “the economic and social relations that are dominant in world capitalism at any particular time are, in fact, outcomes of its historical geography: the history of capitalism is simultaneously its geography” (1989:10). In other words, to understand the history of capitalism and the power relations associated with it, one must take account of geography. These authors argue that geography is important, not only in outcomes, but in the foundations of political, social and economic organization. For capitalism, geographical industrialism through territorial expansion is the central method of economic development and growth (Storper and Walker 1989). Capitalist development in the United States from the early colonial period entailed encroaching on Native lands at great cost to tribes, including their economic and social independence.

Native American Land

The relationship of European American immigrants and Native Americans

in what is now the United States has centered on land tenure and land acquisition (Danzinger 1974; Kickingbird and Ducheneaux 1973; Deloria 1994; O'Brien 1989; Carlson 1981; Vecsey et al 1980). Much of this conflict is seen not only in the physical battles and struggles, but also in the language and ideology used to describe and justify symbols and events.

For European settlers, "land was the central fact of American life and ideology, its control and division was to be the preoccupation of US politics until the Civil War" (Cosgrove 1998:175). For these immigrants, individual land ownership symbolized wealth and a freedom that was often previously unavailable to them.

Land ownership remained the basis of status definition and while it was indeed made available to a larger portion of the population than was the case in European country, nevertheless inequalities were inherent . . . most obviously Amerindians and Blacks were institutionally excluded from participation (Cosgrove 1998:173).

Land was important in definitions of status, wealth and freedom for the European immigrants and was a major consideration in governance of the new republic (Cosgrove 1984; Slyuter 2001). Cosgrove (1984) argues that the perspectives of European thinkers and moralists were important in shaping the way that we think about land and the resultant policies. Competing definitions,

for example from Jefferson versus Hamilton, proposed very different roles for the land in nation building. Yet they shared common goals of private land ownership and a perspective of agriculture that was informed by the feudal system of Europe (Cosgrove 1984).

In 1871, the U.S. Congress unilaterally terminated treaty-making with Native tribes. This has had important implications for policies regarding Native rights and resources and is still very much disputed today. While the U.S. government claims ultimate title over Indian land, they allow a “use-right” or the right to occupancy (Tabachnick 2001). This means that the only recourse for tribes is to sue the federal government to stop the development or sale of Indian land, which has not always been practical or possible. United States law, and policies related to American Indians, represents the struggle over delineating use-value and occupancy rights for Indians in order to excuse the appropriation of land (Tabachnick 2001; O’Brien 1980; Kickingbird et al 1973).

The U.S. Government and Land Tenure

Land tenure systems were created in the new republic in contradiction to the system of Indian land tenure and titles. Tabachnick (2001) explains that the portrayal of Indians as people who objected to selling their land because

it was sacred was often interpreted as a simple dichotomy that they did not “own” land. While it might be true that they did not generally own land in the same way as the Europeans, there were complex rules over how land was to be used and by whom. In other words, ‘no individual property system’ is not equal to ‘no property system at all.’ Their common property system included rights of individuals but not the “free and clear” rights of the European settlers. For Native systems, common rights typically overlapped individual rights in complex social, political and economic systems (Tabachnick 2001; see also Maxwell et al 1999).

Conflict over land centered on questions of rights over land. Violence was often perpetuated and justified in the quest for individual ownership of land, or private property. This reveals a basic conflict between the two systems of logic in regards to land. The underlying assumptions of sovereignty within the doctrines of discovery carried over from Europe were upheld in the discourse and government of the new emerging nation. In the words of Marshall:

the United States, then, have unequivocally acceded to that great and broad rule which its civilized inhabitants now hold this country. . .They maintain, as all others have maintained, that discovery gave an exclusive right to extinguish the Indian title of occupancy, either by purchase or by conquest (as quoted in Tabachnick 2001:265).

This movement toward individual ownership was seen as necessary for the emerging capitalist nation that required property, or commodified land, as opposed to land held in common. Tabachnick (2001) argues that the United States relied on the incorrect “myth” that a market society requires the destruction of “pre-modern” common property systems with the resulting loss of Indian land and sovereignty.

Cultural and Political Representation of Land

Historically, Indians have fought any displacement from their lands. There are many examples of early tribal leaders refusing money for land, citing religious relationships to it (Vecsey et al 1981; Deloria 1994). Land is described as the ultimate provider of life and as such is sacred. Removal policies undermined individual and tribal connections to place and identity.

Removal also meant taking Indians from places charged with meaning and emotion. Indians were dislocated from sacred space . . . where revelations occurred, where their ancestors were buried. . . Removal was more than a political loss; it was a crisis of life itself, a religious crisis of the deepest order (Vecsey et al 1980:26; see also Basso 1996).

The fight for land has led to a struggle to preserve Indian culture. Cahn and Hearne (1989) sum up this relationship by stating that “land is the basis of all things Indian” (1969:68) and Leslie Silko (1996) asserts that “the people and

the land are inseparable” (1996:85). Native Americans have both physical and social/spiritual connections to the land. This is in part due to the shared history placed in the geographical features of the land, and also from the struggles to hold onto the land and keep it from the United States government and opportunists (Basso 1992; Cahn and Hearne 1969; Churchill 1992). Land “has many meanings for the Indian. The relationship of a tribe to its land defines that tribe: its identity, its culture, its way of life, *its fundamental rights, its methods of adaptation, its pattern of survival*” (emphasis added, Cahn and Hearne 1969:68). In addition to providing the means of living, land became the representation of the Indian right to be Indian and it has important implications for not only the identity and community of Indian people, but for mechanisms of adaptation.

The struggle over land in the Black Hills in South Dakota is one example of how conflict over Native land reflects U.S. power over Native Americans with profound cultural and social implications. When silver was discovered there, the Sioux Tribes were forced to cede about an additional one third of the land agreed upon by treaty in 1868. In the years shortly following, the U. S. government continued to “persuade” the Tribes to relinquish another half of the remaining lands (Vecsey et al 1980). As part of an effort to reduce the threat of retaliation from the unhappy Sioux Indians, the United States government began

a campaign against them, specifically targeting cultural and religious practices. The Assimilation Policy, begun in 1882, forbade key spiritual practices including the Sun Dance, which functions as an important unifying ritual. Children were systematically removed to “remote boarding schools at which their language and cultural practices were not only prohibited, but replaced with those of their conquerors” (Churchill 1992:164; Vecsey et al, 1981). Because of the deep rooted cultural ties to land, cultural subjugation was necessary to acquire land holdings once reserved for Indians. This is still manifested in the struggles with tribes over protected areas on reservations.

Emergence of Reservation Systems

Policies towards Indians have historically been perceived to be, and indeed verifiably have been aggressive. Native American reservations were first established through congressional acts, treaties and executive orders during the 1870's. The broader system of governance into which reservations are embedded has important implications for the development of social systems and infrastructure. United States policies toward Native Americans historically represent the exchange of food aid, or temporary assistance, for the procurement of land, undermining long term security.

Land acquisition was central to popular assimilationist policies reflected in Native American policy as the reservation system took shape. As the U.S. Congress passed an act dishonoring further treaty making with tribes, Senator Eugene Casserly, recognizing this connection, stated in somewhat prophetic fashion:

I know what the misfortune of the tribe is. Their misfortune is not that they are red men; not that they are semi-civilized, not that they are a dwindling race, not that they are a weak race. Their misfortune is that they hold great bodies of rich lands, which have aroused the cupidity of powerful corporations and of powerful individuals . . . I greatly fear that the adoption of this provision to discontinue treaty-making is the beginning to the end in respect to Indian Lands. It is the first step in a great scheme of spoliation, in which the Indians will be plundered, corporations and individuals enriched, and the American name dishonored in history (Quoted in O'Brien, 1980).

Many land reform policies of the United States reflect the attitudes and voices of select stakeholders. The accompanying implications for Native American Indians were largely negative regardless of the rhetoric (Kickingbird et al 1973; O'Brien 1989; Carlson 1981; Vecsey et al 1980).

Tabachnick (2001) argues that battles over land, and especially common property systems, were really an attack on tribal sovereignty and self-government (see also Deloria 1974). For example, President Theodore Roosevelt

praised the Dawes Act as way to break up “the tribal mass” (Tabachnick 2001).

The Dawes Act of 1887 (also known as the General Allotment Act) had important implications to Indian control over their reserved lands. In the name of progress, and in an effort to help Indians *use their land productively*, this act forced tribes to divide and allocate specified tracts of land of their reservations for individual ownership. “The idea that individual ownership of property was the key to individual virtue and hard work was so widespread that it achieved virtually unquestioned acceptance” (Carlson 1981:8; O’Brien 1989; Tabichnick 2001). In effect, this lead to the opening up of unallocated land for sale or lease to non-Indians, and a “massive transfer of land holdings to whites”(Carlson 1981:19). Indeed, the timing of the reservation allotments show that non-Indian economic interests were paramount, and overall the Dawes Act yielded most benefits to non-Indians (Carlson 1981; Welch 1994).

This had large ramifications for furthering increased Indian dependence on the federal government as it worked to retard farming and industry on the reservations and strip Native Americans further of land assets. In other words, unfortunately:

Whenever an Indian reservation has on it good land, or timber, or minerals, the cupidity of the white man is excited, and a constant struggle is inaugurated to dispossess the Indian, in which the avarice and determination of the white man usually prevails (Commissioner of Indian Affairs, 1876, quoted in Vecsey et al 1980:73).

Although it varies widely, today many reservations continue to reflect a small amount of Indian ownership and are “patchworked” with non-Indian titles. Arguably, the agreements and compromises from Indians over land rights have not brought the freedom and independence sought by tribes.

The reservation land system is still a key element of the Native American experience in regards to land and governance. It has arguably created a structure that brings about dependence on the Federal government (Weist 1977; Cahn and Hearn 1969; Churchill 1992; Stands in Timber 1967). Ironically however, reservations are often important symbols of identity and power for tribes. Although reservations are tiny portions of land originally possessed by or guaranteed to tribes, what lands they do have act as sanctuaries. “To some degree Indians can protect themselves by maintaining their refuges-reservations” (Vecsey et al 1980:xiv). The land of the reservation is cultural space, which has

implications for identity and belonging, as well as a political symbol representing both empowerment and disempowerment (Feinauer 1999).

Indian Agriculture

One of the most important implications of these land policies was to further disempower tribes from the ability to provide adequate food for tribal members. Although constantly present in the rhetoric, “modern” agriculture was never successful on reservations because the resources necessary were never fully acknowledged and the process reflected too many conflicting interests (Hurt 1987). Many reservation lands, especially those located in the west, were notoriously dry and inadequate for profitable cultivation. Hurt (1987) explains that grazing cattle was considered a better option for agricultural production in the west, but it required access to more land, as well as capital. These conditions worked against the interests of Indians, making Indian lands attractive to neighboring ranchers and unworkable for most Indians without capital resources (Hurt 1987).

The reservation system eliminated access to previously available resources. Together with continuing land policy seeking to “modernize” Indians, which made no provision for the capital and credit necessary, reservations provided a context where tribes struggled to be self-reliant and thus became

continually dependent on the Federal government for basic needs such as food.

A capitalist agricultural political agenda first ignored the real economies of Natives and then sought to impose a system in the interests of capitalism that ignored the needs and realities of tribes.

The Northern Cheyenne

The Northern Cheyenne reservation was established in southeastern Montana in 1884 by Executive Order. The reservation includes 447,000 acres with 36 miles from east to west and 23 miles from north to south. Physical isolation on the reservation has contributed to the maintenance of a distinct cultural identity. Social status is linked to various traits including kinship group membership, blood quantum (e.g., full-blood, mixed Indian and non-Indian, mixed tribes), employment status, and participation in traditional and other social activities (e.g., drum groups, sweats, pow-wows, etc.) (Ward 1996). Kinship structures are central to the social relationships of Tribal members (Ward 1996). To some extent, the location of family groups still follows the patterns of settlement at the time the reservation was established (Moore 1987). Members of extended families still choose to live close to each other, although more families are now typical of the nuclear family living in a single-family residence. However, individuals often

still maintain close ties with family living in separate households (Ward 1996; Champagne ND1).

With many traditional Cheyennes in opposition, the Northern Cheyenne voted to accept a new constitutional government under the Indian Reorganization Act of 1937 (IRA, 1934). This government has an electoral system with a tribal chairperson and council representing the five districts on the reservation today. This new government is subject to the Bureau of Indian Affairs (BIA), which monitor's tribal actions in order to assess compliance with its own laws (Champagne ND3). "The BIA and the Secretary of the Interior have the right to review all decisions of the tribal council and to veto or modify them if they do not conform to regulation or policy" (Champagne ND3). Formally, the IRA government is differentiated from all other aspects of the community. However, informally, many of the traditional forms of Northern Cheyenne polity still exist today (Champagne ND3). Family and social ties continue to be a very important part of the community, both politically and otherwise. The influence of traditional leaders has steadily declined and gradually became associated only with the religious and ceremonial functions of the Tribe.

Farming and ranching were a major part of the economy beginning with the formation of the reservation in 1884. But by 1990, these occupations

comprised only 4 percent of total jobs on the reservation. Of those presently employed, 36 percent work in the public sector, while 60 percent work for private wages (Ward 1998). Poverty is very real to residents of the Northern Cheyenne Reservation. In 1997, the Northern Cheyenne Reservation was deemed the poorest of the seven Indian reservations in Montana with the greatest need for economic, social and educational programs. Poverty levels on the reservation were approximately 53% compared to 16% for the State of Montana (Montana 1997). "The Northern Cheyenne economy is hindered by the lack of access to private capital, the outflow of local capital, high unemployment and an underdeveloped economic base" (Champagne ND3).

Unemployment is a big concern on the reservation, but even when Indians are employed, it is often in low paying occupations (Ward 1998). "Like many reservations, the majority of jobs at Northern Cheyenne are in the public sector: schools, hospitals, social services, and government agencies" (Ward 1998:469). With the decline of funding for public sector programs in the 1980's, reservation programs lost many administrative positions. This has led to an increase of Indian workers in service occupations and/or retail, and a decrease in pay. These jobs are also less likely to offer benefits, as they are more concentrated in small businesses and entry-level positions (Ward 1998).

In this context, it is not unusual for unemployed adults to contribute to their households via subsistence and informal economic activities and/or eligibility for social programs (such as general assistance, Family Assistance in Montana --FAIM, church charities, beading, etc.) (Ward 1996). The norm is for individuals and families to have low levels of income that is supplemented when needed through extended family support and other social resources (Ward 1998). "Family survival is paramount, and individuals may contribute in different ways to the well-being of the family; some may provide wages earned by working while others offer skills used in hunting, seasonal work, or other activities" (Ward 1998:471).

Traditional Food Provisioning

Moore (1996) describes a series of Cheyenne migrations beginning in the 17th century through the 18th century. Historical documents and archeological evidence suggest that the Cheyenne moved from being primarily sedentary horticulturalists to a nomadic hunting tribe. They moved from Minnesota, where they grew and harvested wild rice on the banks of the Mille Lacs, to encampments and villages along rivers through North and South Dakota where they grew corn and vegetables, and finally to Wyoming and Montana where they relied primarily upon the buffalo for food on the Great Plains (Moore

1996; Grinnell 1923). This transition occurred rather slowly and not always in a linear direction. Rather, Cheyenne Indians used their knowledge of farming and hunting to adapt and to provide food for Tribal members. "It should not be assumed that the Cheyennes, in their earlier periods, knew nothing about farming, making tipis, or building earthen lodges. Like all humans, they utilized at one time only part of their mental inventory of cultural knowledge" (Moore 1996:20).

According to Grinnell (1974), although The Cheyenne Indians had always been hunters, they also cultivated a variety of vegetables (especially corn and squash), beans and collected wild roots and berries. Unlike many plains Indians, the Cheyenne incorporated a wide variety of "flesh" into their diets including birds and even reptiles. According to tradition they incorporated foods according to their availability due to region and season. At different periods, their diets were quite different— for example, one time period is marked by a diet primarily of rabbits and another almost entirely fish (see Grinnell 1974 for a detailed discussion of the variety of foods grown, and cultivated by the Cheyenne as well as hunting practices and traditions). What is clear is that the Cheyenne have a tradition of being resourceful in food provisioning, using what resources are available without substantial cultural barriers.

Food provisioning was a community activity and food was meted out according to need and social rules. “The food secured [in hunts] was common property, and its legitimate share was assigned to each family” (Grinnell 1974:248). Food needs were paramount to the Cheyenne Tribal organization and social system and food norms indicated that tribal members share. “Among the Indians there was practical community in the matter of food. A man who was hungry need never suffer. If he entered the lodge of some neighbor or acquaintance—unless it was a time of actual starvation--food was at once set before him” (Grinnell 1974:170).

These traditional food practices reflect a rich and diverse history that places food provisioning as a central community act. The Northern Cheyenne continue to reflect strong values for sharing food and traditional food continues to be used, especially in ceremonies. Today the Northern Cheyenne are fully integrated into the commodified food system although there seems to be renewed interest in turning back toward some traditional foods and meals. This is related to a resurgence in Native identity and an interest in cultural sovereignty (Nagel 1996), as well as increasing attention to troubling nutritional deficiencies in the modern industrial diet.

The Northern Cheyenne Reservation

Because of the intense contention over the appropriate location of reserved land for the Northern Cheyenne, there is still a great deal of pride in their ability to finally choose the location of their reservation, established in 1884 (Moore 1996; Hoebel 1960; Weist 1977). The dramatic escape from their forced relocation to Indian Country in current day Oklahoma, lead by Dull Knife and Little Wolf, is seen as a symbol of their struggle for cultural preservation and ancestral history (Champagne 1996). After marching back from Oklahoma in defiance of army regulations back to ancestral lands on the northern plains, they chose an important summer camp with meaningful Tribal history (Hoebel 1960; Stands in Timber 1967; Dusenberry 1955).

The land of the reservation has become a symbol of the ability of the Northern Cheyenne to survive and face antagonistic conditions. The land is a part of their shared experiences (Feinauer 1999). Indeed the quest to return to their lands despite considerable resistance by the United States government is an indication of their appreciation of the land. While some tribes have not been able to hold onto their land, the Northern Cheyenne have been successful in regaining control over their reserved land and now own about 98% of the land on their reservation as well as water rights and air pollution control (Ward 1998).

Besides the strong emotional, cultural and spiritual aspects of their land, it also has value in more pragmatic ways. This is evident in many of the actions taken by the Tribe to control and protect it. For example, the Cheyenne fought to preserve water rights from the Tongue River. They also joined the neighboring ranchers gaining a class-one level of air quality from the Environmental Protection Agency, requiring local coal operations to develop and implement new technology for protecting air quality. They also resisted tempting economic incentives to tear open their land to extract coal, effectively maintaining control over their air and land (Ward 1998).

The recognition of power embedded in the land is clearly evident in the stated effort to maintain the land of the reservation. This is not only true in the controversy over coal development, but also in the rhetorical retelling of historical events. In statements about the experience of living in their reservation community, Cheyenne respondents spoke candidly of their awareness of power relations historically and connected to the land system and the need to fight for their land (Feinauer 1999). For example one informant states “If it wasn’t for us and relatives fighting for this land and setting down our roots here, [we wouldn’t have a community]” and another stated that the older people “still remember

how hard it was to get this reservation and call it home. And we are very thankful” (as quoted in Feinauer 1999).

The issue of power within the system of reservation lands becomes even more clear as individuals talk of the pressures of living on the reservation within the context of the larger Federal government. The reservation system was created through treaties promising food and supplies, if the Indians stayed on the land reserved for them (Feinauer 1999). This system immediately created hardship and dependency, depriving the Indians of control over their own communities. Policies and situations that lead to conflict and tensions are relevant to the way that this system was established.

There is recognition on the reservation that land has been used as a weapon of disempowerment. Food is especially important as a tool and symbol in this process. The thoughts of one Cheyenne informant are particularly insightful in understanding the role of food in the disempowerment for this Tribe.

Long time ago, way back when there was no reservations, when they was roaming the country, they had great leaders they fought each other. The tribes had great warriors and they had people what were just like the US, their Ulysses Grant and all them. Well the Cheyennes had their own heroes and their own outstanding people too. Then the White people put them on the reservation and when

they did that they took away their rifles and everything so they couldn't hunt for their own food anymore. They killed their buffalo off and said they would take care of them. When they wanted something, the Indian people would refuse their leadership and then they would take away their food and the leaders would see their people die; the elderly, the children, women suffering. So the leaders had to bow to the White people, get on their knees and say yes, we will do whatever you want. That was a long time ago so they could feed their people. And the government is still doing that today but in a different way. That is where they took the spirit of our leaders. We have no leaders on the reservation that can stand up to the White people (as quoted in Feinauer 1999).

This shows the interconnection of land, food and power for The Northern Cheyenne through the reservation system. There is a sense of pride in being able to overcome, at least in part, some of the injustice that was wielded against them. Yet, this did not extend to regaining control of their Tribal food system.

Conclusions

Native Americans, and the Northern Cheyenne specifically, are more likely to be dependent on the government for help and to be at risk for food insecurity and poverty. This is arguably related to large scale land appropriation and a reservation system that further disempowered tribes. Systematic disregard for Indian rights, coupled with reservations devoid of capital resources, have left this group vulnerable to hunger and poverty.

Land represents something different today than it did during the early agricultural period of reservation making. Although displacement from lands and traditional agricultural systems was important for the disempowerment of many tribes, Hurst (1987) argues that agriculture no longer represents the same economic possibilities for empowerment for tribes. Tribes generally cannot compete within the agricultural market that is increasingly industrial and concentrated. However, the problems for the reservations, evident in early efforts at agriculture, remain the same today, including the lack of capital and credit and the environmental constraints of arid soil (Hurt 1987).

The Northern Cheyenne represent a group excluded from the great prosperity of this country. This Tribe, though injured and disempowered through the political agenda for the advancement of capitalism and industrialization (Stroper and Walker 1989), have not been simply passive actors in this process. Duane Champagne argues that the Northern Cheyenne, although economically marginalized and subject to bureaucratic domination as other tribes, have been able to survive because of cultural values and norms reflecting the emphasis on community survival (Champagne 1996, ND1, ND2). He argues that we must be careful not to fall into deterministic explanations that ignore the power of

repressed groups to make choices and adapt, in whatever ways big or small, to the hegemonic powers of colonialism (Champagne ND2).

The Northern Cheyenne have recently been effective in resisting the exploitation of their land in several ways. For example, through deliberate effort, this Tribe has been effective in regaining ownership over most of the land of the reservation. Additionally, the Northern Cheyenne Tribe effectively fought to maintain their rights to develop and exploit the coal that covers their reservation by suing the Federal government to stop the sale of leases to outside companies (Champagne ND1; Ward 1998). The Northern Cheyenne Tribe, through a combined effort with neighboring ranchers, were important agents in protecting air and water, for the reservation and nearby land, to force regional coal plants to adopt cleaner technologies for air emissions and to restore landscapes disturbed by strip mining. The struggle to control their resources continues as methane development presents a new challenge to Northern Cheyenne land. But despite these efforts, significant access to land and resources were severed under the reservation system, and the Northern Cheyenne have struggled to overcome the dependency that has ensued (Champagne 1996, ND1).

Chapter 3: Food Security and Assistance Programs in the United States and on the Reservation

Although the problem of hunger has been decried from political, social, and ecclesiastical leaders, families in the United States that experience hunger face difficult and uncertain choices. There are numerous programs and services directed to alleviating problems associated with food insecurity, as well as individual adaptations to particular needs and situations. Research specific to food acquisition among poor and vulnerable groups points to opportunities and strategies that may be important for households to achieve food security, and suggests that vulnerable households can be rather creative as they seek food security.

It is important to acknowledge both the structural context and individual agency in an examination of food provisioning, because the poor make choices within the context of an assortment of opportunity structures. This project is specifically interested in the food provisioning choices of the Northern Cheyenne for acquiring food security. The concept of food security, as used in this project, is related to the ability of each household to secure food to eat. This is affected

by several factors, including individual household characteristics and the wider economic, institutional, and political variables.

Food programs and resources in the U.S. are embedded in the historical and political food system. In this chapter food security is examined in the context of the larger food system in the United States. Adaptations and coping mechanisms for hungry households in the form of food programs and strategies are considered as they are represented in the literature.

Food Security

Definitions of food security have proliferated since the concept came into vogue. An early working definition by the World Bank in 1986 suggests that it is “access to enough food at all times for an active, healthy, lifestyle” (Davies 1996:15). By 1992, some thirty-two different definitions were identified differing by level of analysis (nation to household or individual) and emphasizing different problems associated with acquiring food (Davies 1996; Riches 1997).

According to the guidelines for use of the USDA Food Security Survey (Hamilton et al 1997a, 1997b; Price et al 1997), food security is defined as access to enough healthy food for all people at all times. Inversely, food insecurity represents the inability to reach this goal for whatever reason. Hunger is a potential, although

not necessary, consequence of food insecurity. Food insecurity reflects lack of access to quality and amount of foods and not just with the physical sensations associated with inadequate amounts of food. In sum, food security focuses on the uncertain availability of food due to food shortages and/or restricted access to food generally as well as lacking sufficient nutritional and appropriate food.

Food insufficiency is another concept that is used in the literature to look at these kinds of questions. However, it differs somewhat in terms of how it is measured and is a more narrow concept than food security. Food insufficiency focuses on the reduced intake of food and is comparable to the more severe forms of food insecurity, or food insecurity with hunger (Wu et al 2005).

Studies of food security around the world look to sources other than food availability as potential solutions to this problem. Increasing the world food supply would have little or no impact on alleviating hunger in developing countries according to the International Institute for Applied Systems Analysis (IIASA). "The basic problem is how to increase the food entitlement, especially purchasing power of those groups with insufficient food" (Barraclough 1991:2). The problem is increasingly defined as one of distribution and organization (McMichael 2000). For example, in the United States an estimated 10 percent

of the population suffers under-nutrition associated with poverty, despite food availability more than 40 percent above food needs (Barraclough 1991). In this context, food entitlement and public food programs, are critical to achieving food security (Allen 1999; Riches 1999; Van Esterik 1999). Arguably, the United States does not have a strong history of supporting adequate food entitlements and questions remain regarding their efficacy to provide adequately for the needs of hungry Americans (Poppendiek 1997,1998, 2000).

Eighty-nine percent of American households were food secure throughout the entire year 2002 (Nord et al 2003). The remaining households were food insecure at least some time during that year. The prevalence of food insecurity rose from 10.7 percent in 2001 to 11.1 percent in 2002, and the prevalence of food insecurity with hunger rose from 3.3 percent to 3.5 percent. Just over one-half of all food insecure households participated in one or more of the three largest federal food assistance programs during the month prior to the survey. About 19 percent of food insecure households, (or 3.0 percent of all U.S. households) obtained emergency food from a food pantry at some time during that year (Nord et al 2003).

Bickel and associates (1999) find that households that are headed by single women with children, those with incomes below the official poverty rate, and especially Hispanic and Black households experience higher rates of food insecurity. In addition, households with children suffer food insecurity at a rate more than double that of households without children (Bickel et al 1999). Wu and Schimmele (2005) report similar findings that food insufficiency (or severe food insecurity) is related to being a woman and especially a single mother. They also find that household that depend on social assistance have higher likelihoods of food insufficiency. Interestingly, these authors also find that middle aged respondents were more likely to experience food insufficiency than older or younger respondents.

Similarly, another study found that single parenting, and larger household size were significant contributors to food insecurity, as well as lack of savings, unexpected expenses, not receiving free milk, eggs and cheese (probably through WIC) and adding more than \$50 to food stamps to purchase sufficient food (Olsen et al 1997). Olsen and associates (2004) focus their research on levels of human capital among poor rural families to explain food security levels. As a result they conclude that financial skills of the mother, maternal depression, low

levels of education and difficulty paying for medical care are most associated with food insecurity. By simply examining the individual coping behavior, much of this research glosses over the question of capital assets and barriers and access to assistance in coping behavior.

The Food Aid Economy

Although a fundamental and important basic need, food affairs in the United States are surprisingly ad hoc (Fisher 1997; Pinstrup-Andersen 1993). For example, there is no municipal department that organizes and provides for food issues, no “department of food” so to speak (Fisher 1997). Instead, food concerns are assigned to government departments that often have conflicting roles in their responsibilities. For example, the USDA is primarily responsible for farm and agricultural production concerns. However, the USDA is also responsible for running commodity food assistance programs supplying tangible food resources for the income poor. Moreover, the Food Stamp Act of 1964 stated the dual purposes of strengthening the agricultural economy and providing improved levels of nutrition among low-income households (UDSA). As a result, government responses to food insecurity are sometimes strained.

Certainly, food is related to issues of power in US and throughout the world (McMichael 2000; Mintz 1995). The political economy of food is especially interesting because food is necessary for every single human being every day, and access is highly related to political and economic conditions. Food carries greater significance for human life than other artifacts including money.

Unfortunately, food has historically been important in the subjugation of Native Americans and others through colonization and other forms of political domination. "The political use of this commodity [of food] undoubtedly has potentially the most direct and inhumane effects, and thus is a weapon strongly parallel to military instruments" (Wallenstein 1976:279).

The Right to Food

International law (ICESCR) affirms the right to housing, primary health care, basic education and food (Van Esterik 1999). "Hunger might well be the most flagrantly violated human right, in spite of the almost unanimous endorsements of governments concerning the right to food" (Van Esterik 1999:226). Implementing the right to food and food security is arguably a complicated and difficult political process. Solutions to hunger are embedded in a cultural frame (Fitchen 1988). Historically, hunger, as a social problem, has

been able to muster a great deal of attention in the United States (Poppendieck 1995; 1998; 2000). However, the way that hunger has been recognized, and thus the remedies presented, have varied considerably (Poppendieck 1995).

Responses to the problem of hunger take different forms depending on the assumptions and the goals that drive them. Janet Poppendieck (1994) has argued that responses to hunger can be divided into “Justice” and “Charity” approaches (1994; see also 1995; 2000). The charity model is characterized by emergency food which focuses on the immediate needs of individuals and households. It is characterized by “voluntarism, neighborliness, localism, spiritual good, and personal involvement” (Poppendieck 1994:69).

By contrast, the justice model is more concerned with the underlying system of food provision and food as a human right (Poppendieck 1994). This approach is more concerned with “dignity, entitlement, accountability, and equity” (Poppendieck 1994:69). This approach places hunger in the broader context of human rights, and proposes to place food entitlement within the realm of “democratic debate and control” (Riches 1999:207). Food entitlement approaches encourage political reform at the highest levels. This course is slower and more complex, but arguably more far reaching in consequence.

These two approaches can come into conflict with each other as solutions to hunger and food insecurity are sought, and they highlight the underlying tension that is within the efforts to reform the food system. On the one hand, immediate food needs should be recognized as they are very real—people need to eat everyday and not just in the long term. On the other hand, these needs are embedded within a system that reproduces them (Poppendieck 1994, 1998).

'Justice'

Riches (1999) argues that the real issue surrounding hunger in the world is whether we can “break out of [the] current welfare state mold and address the right of food free from the requirement always to be satisfying the marketplace” (205). As a commodity, food is available for purchase in the marketplace. But it is a different kind of commodity, an essential one and one that can be defined as a physical, social and cultural good (Riches 1999). Within the “free” market approach, food is subject to the control and rules of that system. This ignores the underlying entitlement to food for all people as “liberal welfare regimes do not regard the right to food as inalienable” (Riches 1999).

But Riches (1999) argues that because the rules and controls of the market do not recognize food as a unique commodity, it is not the appropriate place for

dealing with food entitlement issues. Again, the real question is whether we can change the way we think about food and if we can address this need without the requirement to satisfy the market. The depoliticization of food as a human right has been a barrier to eliminating hunger (Riches 1999). As food is increasingly (over)commodified, it becomes subject *only* to the market and eaters become defined only as consumers. Like others, Riches (1999) advocates placing food security concerns in the democratic sphere and treating it as a public good.

States have been reluctant to view hunger and poverty in this way and instead usually focus on approaches for ameliorating food insecurity and hunger that continue to reify the market system through a reliance on government and emergency programs to take care of hungry households. Government sponsored programs are widely criticized for inefficiency and for creating dependency among participants. Recently, the right to food and food entitlement have been undermined through welfare reform, and the safety net available to hungry Americans has been reduced (Riches 1997, Poppendieck 1997; Piven 2001a; 2001b; Duncan et al 2002). For example, between 1996 and 2000, the Department of Health and Human Services report that TANF caseloads fell by just over half and FSP caseloads by over one-third, due in part to sweeping welfare reforms as

well as a strong economy (U.S. Department of Health and Human Services 2005).

However, Nord (2002) reports that it is unlikely that these declines are solely due to a decrease in food needs. Indeed he argues that the number of eligible households is also declining (Nord 2002).

Policy makers have generally assumed that maximizing agricultural production would guarantee adequate supplies of food and keep food prices down so that all Americans could be food secure (Allen 1999). However as emergency food programs, USDA, and other surveys attest, there continues to be a problem of food insecurity in this country.

'Charity'

The current U.S. approach to hunger, relying on emergency food assistance programs, fits under the 'charity' approach as defined by Poppendieck (1994). Emergency food programs are usually non-governmental, or private, voluntary programs in the form of soup kitchens, food pantries/ food banks, and food rescue operations. Soup kitchens are organizations that serve hot meals to hungry people. These are a diverse group and the size and quality of food and meals vary widely from ongoing and continuous offerings to supporting only one or two meals a week or even fewer. Food pantries also come in many sizes,

but focus instead on supplying groceries or commodity foods for families and households. Pantries are usually linked to food banks which solicit, purchase and distribute surplus or donated foods to community pantries. Food rescue organizations are interested in finding food that is marked for waste or for secondary markets and rerouting it to any of these food assistance venues (Poppendieck 1994).

Poppendieck (1994) outlines the major strengths and weaknesses of the emergency food system in order to explain how this fits into the larger debate about food security and human right to food. Emergency food providers (such as pantries and soup kitchens) offer a kindlier and more approachable opportunity to secure food for hungry families. They can also provide information and outreach to needy people, directing them toward public programs that can help them. As these programs rely on volunteers and donations, it allows communities to be involved and for “regular” people to become acquainted with the problem as well as to eliminate waste from the food system. These programs also offer opportunities to build advocacy, bringing people together that care about hunger (Poppendieck 1994).

However, many weaknesses are also associated with an emergency food centered approach. Because it does nothing to change the underlying system of food entitlement and accessibility, participants remain vulnerable and dependent on food assistance, as these programs are not designed for long-term change or amelioration. One major problem with the emergency food programs is that hungry people served in these programs are given no specific protected rights about their participation or receipt of food. These programs are themselves highly dependent on volunteers and donations. The food available to these programs is often disposal driven instead of need driven, and therefore not concerned about nutritional necessities (Poppendieck 1994).

Emergency programs are not always available in areas where people need them because they are formed to be convenient to those who run them. Therefore, some programs offer more continuous service and others are temporary or seasonal. Therefore, some areas/times are well served and some are underserved (Poppendieck 1994). Lastly, and most important perhaps--although most of these 'emergency' programs were started as temporary responses to an emergency situation, they have continued to operate because of continued need. As a result these programs are not really emergency programs anymore in that

sense. Rather they are arguably an alternative to the welfare state--or a diversion from the responsibilities of the state to provide a safety net for its citizens (Poppendieck 1994).

The food assistance programs of the United States are embedded in a capitalist logic. Food is part of an economic (market) logic, which excessively rewards those who have purchasing power (money). Every economic arrangement has rules for participation and typically, not all people participate equally. For capitalism, groups and individuals may be excluded based on access to money and capital, and this has implications for participation and inequality generally. In this case exclusion has extreme consequences – malnutrition and even death. Food programs, policies and practices therefore wield enormous power over individual lives and livelihoods.

Food Programs

McMichael (2000) asserts that food is as important as money for world relationships. Certainly food is related to economic circumstances. Wallenstein (1976) call U.S. food assistance the “political use of economic instruments” (280). American international aid has been criticized for creating dependence and hegemonic relations. By turning economic commodities, such as food, into

political tools, powerful agents (nations) are able to reward or punish behavior to secure their own desires and interests. Multiple strategies are used in the application of power including “both the stick and the carrot” (Wallensteen 1976:293).

Individual food assistance programs, both public and private, are embedded in the larger economic food system context where food is sometimes manipulated for gain and for power. The primary United States policy issues surrounding agricultural politics turn around managing surplus and supporting prices in the global market, despite domestic hunger. Several studies show a relationship between U.S. food assistance and political and economic interests. Wallensteen (1976) concludes that the disposal of surplus grain, the policy of containment (promoting anti-communist governments) and humanitarian concerns have been the primary drivers for international food policy in the United States. Diven (2000) documents the relationship between U.S. food assistance and levels of commodity productions internationally over 35 years. He concludes that U.S. food assistance increases when U.S. commodity producers have surplus and is not strongly related to grain production in the recipient countries (or need). The most important international food assistance

example of this for the United States is Public Law 480 (PL480), which first passed in 1954 and was updated in 1975 (Wallenteen 1976). Huge stocks of American grain from overproduction in the 1950's resulted in low or fluctuating prices in the market internationally. This law worked to stabilize prices by creating a mechanism to regulate the supply of grain. The principle strategy works by increasing/ reducing international food assistance in times of reduced/ increased demand and thus controlling the level of food available to the market. In compromise to differing national interests, the stated goals of PL480 made no distinction in foreign policy between food aid and food trade reflecting national interests (Wallenstein 1976). As a result the rhetoric of food assistance is often overshadowed by the actual trade interests and the economic focus of the U. S.

Domestic Programs

As one of the most resource rich countries in the world, food needs in U.S. communities are often overlooked. The structure of welfare and food assistance programs in the United States has been created largely at the national level in response to widespread need. However, even food assistance within the United States has been subject to the same assumptions and policies that abound in international development and aid programs.

During the depression of the 1930s, public outcries about the agricultural surplus led to creation of the Federal Surplus Relief Corporation which allocated surplus food to the needy. This program bought surpluses from farmers - especially from farmers who were at risk of going on assistance- and then distributed them through the state relief administrations. This program was soon transferred to the Department of Agriculture and changed to the Federal Surplus Commodities Corporation and “declare[d] that the federal role in relief, emergency relief, was over and that this was agricultural assistance” (Poppendiek 1998; Poppendiek 2000). The focus of the program changed and “as soon as the [Agriculture] department got a hold of the program it did indeed adjust it to make its primary clientele, the growers” (Poppendiek 2000).

Arguably, federal food assistance has continued to reflect this pattern of priorities. In fact the major food assistance programs available today including Food Stamps, commodity food programs, and the Women, Infants and Children Supplemental Food Program are still run through the USDA. There is increasing literature that suggests that there are substantial barriers for using these programs, especially for the poorest families (Finegold et al 2005; Strege-Flora

2004; Hiwalker et al 2000; Huffman et al 2003; Lee et al 2001; Miller 1996; Ward et al 2000, Zedlewski et al 2001).

Existing Opportunities for Food Assistance

Individual and household strategies to cope with hunger and food insecurity are shaped in part by the policies and programs, both public and private, which exist in relation to this problem. There are many ways that households may work to secure food for their families, including both formal and informal methods. Informal approaches vary widely and can range from general social support to specific adaptations for mediating hunger. For example, households may seek information from friends and associates about how to access community resources, or they may pick up odd jobs or participate in the informal economy. Reports of selling blood for money for food, or even committing petty crimes are more dramatic examples of ways that people may cope. Formal programs are often publicly funded although private programs are increasingly important. For example, private emergency services such as food banks/pantries and soup kitchens are available to some households and may provide some relief.

Informal practices such as sharing of food between households are important characteristics of low-income neighborhoods (Ahluwalia et al 1998; Fitchen 1988; Stack 1974). “Food is a non-fixed cost, and money set aside for food may go to the bill collector instead” (Fitchen 1988:319; Corbett 1988). Types and amounts of food vary significantly by time of the month, with food often running low during the second part of the month as resources wane and bills come due. Additionally, household members experience this differently, as parents often defer food to children and aging parents in the home. These findings suggest that patterns of eating reflect a complicated system of food acquisition and highlight the difficulties of food choices for the poor (Fitchen 1988). Households and family members often work together with each person contributing something to the group (NCSPP 2004). For some households, gardening and/or hunting may be used for food. Odd jobs and selling of beadwork, for Native Americans, contribute to the household food economy as well (Hiwalker et al 2002). In more extreme cases, household items may be pawned to secure money for food (Hiwalker et al 2002; Ward et al 1999; Kempson et al 2003).

Government Programs

Formal food programs that focus on alleviating hunger have traditionally been more popular with Congress and legislators than income programs. There are 12 current federal anti-hunger programs and numerous state programs. Some programs provide cash assistance that can be used for food among other things, but many programs are specifically related to food distribution and acquisition.

Table 3-1 shows the most important federal food assistance programs with selected information. Programs often used for food include cash assistance from government programs, including Temporary Assistance to Needy Families (TANF) and Social Security. Federal food assistance programs, such as Food Stamps, WIC, and commodity foods, are available to qualifying individuals and families and are used to help secure food each month (Kempson et al 2002, 2003). Research shows that while welfare reform has largely been successful at decreasing applications for cash assistance, demand for food assistance is growing (Riches 1997; Allen 1999; Zedlewski et al 2001). Through an extensive review of research literature, Finegold and associates (2005) document the extensive use of food assistance on Native American reservations.

Table 3-1 Major Federal Assistance Programs

<i>Programs</i>	<i>Type of Assistance</i>	<i>Income Eligibility</i>	<i>Additional Eligibility</i>
Temporary Assistance to Needy Families (TANF)	cash	Differs by state (for Montana--78.5 of the federal poverty thresholds)	State residence, citizenship (alien status), SSN,
USDA Food Stamps	vouchers	“Categorically eligible” if you qualify for cash assistance programs (TANF/ GA/ SSI). 135% of federal poverty threshold	State residence, \$2000 or less, Vehicles of value under \$4650,
USDA Commodity Food Distribution Program on Indian Reservations (FDPIR)	commodity food	Follows the Food Stamp guidelines	low-income HH that reside on a reservation, and HH with member of a Federally-recognized tribe in approved areas near a reservation or in Oklahoma. May not receive Food Stamps during the same month
USDA Special Supplemental Nutrition Program for Women Infants and Children (WIC)	vouchers	“Categorically eligible” if you qualify for cash assistance, Food Stamps/Commodities and/or Medicaid. State income standard must be between 100 percent and not more than 185 percent of the Federal poverty guidelines	Age, pregnancy/ lactation requirements, State residence, nutritional/ medical risk factors

TANF

Temporary Assistance to Needy Families (TANF) is the name of the new federal welfare program providing cash assistance replacing the former program Aid to Families with Dependent Children during the welfare reform of 1996. One of the most interesting aspects of the changes to this program was the emphasis on state participation. As a consequence, states are now given block grants determined by the level of need (allocations are based on states' historical spending levels under the AFDC program), and are required to develop their own programs with individual eligibility requirements and rules. In addition, new time limits were placed on participants with some leeway for states to determine exactly how this is carried out.

Cash assistance has traditionally been very important for families who struggle with poverty and hunger and this program plays an important role in the food acquisition process. Families that qualify for this program are automatically eligible for other programs such as Food Stamps, although application to these additional programs is still required and level of assistance is determined separately. Because TANF provides cash assistance to needy

families, this money can be spent on any household needs and it is very likely often used for food.

Families Achieving Independence in Montana (FAIM) is the program that currently operates in Montana. The initial eligibility requirements center around having residency in the state of Montana, having citizenship (alien status requirements) and social security number, and cooperating with the program and staff procedures. In addition, age limitations apply, which generally refer to dependent children and caretaker arrangements. Financial requirements include having less than \$3000 of "countable resources" or property excluding the home residence and basic items for day to day living, and income (earned or unearned) must be below the cutoff levels based on family size. Finally, the right to child support payments must be assigned to the state (Montana 2006). Eligibility cutoffs tend to be between 75% and 80% of federal poverty thresholds (U.S. Bureau of the Census 2004). For example, a family of four is allowed a gross monthly income of \$1066 to qualify for assistance in the program. This compares to a federal poverty threshold of \$1555 a month for a family of two adults and two children.

The Food Stamp Program

Although suffering major cuts in the 1996 welfare reform, the Food Stamp program continues to be the primary federal food entitlement program available to low income households. Its acknowledged mission is to reduce hunger in America by providing purchasing power for nutritional food. Households may have \$2,000, such as a bank account (\$3,000 if at least one person is age 60 or older, or is disabled). Primary home and property are not counted and the resources of people who receive Supplemental Security Income (SSI) and benefits from TANF are excluded. Vehicles with a fair market value under \$4,650 are allowed. Households have to meet income tests unless all members are receiving TANF, Supplemental Security Income or, in some places, General Assistance. Gross income cutoffs are 135% of the federal poverty guidelines. For example, a family of four is allowed \$2097 a month while the federal poverty threshold indicates a cutoff of \$1555 for a family of four.

Because participation is based on income and assets, welfare recipients, as well as the working poor have access to this assistance (Rank and Hirschl 1995; Jensen 2002). Food Stamps are becoming increasingly important to poor and food constrained households as other assistance programs are cut back.

Participation rates vary but many studies find that a number of households that are eligible do not participate (Gundersen and Oliveira 2001; Jensen 2001; Huffman and Jensen 2003; Nord 2002).

According to Nord (2002), Much of the overall decline in the Food Stamp caseload from 1995 to 1999 resulted from rising income, which lowered the proportion of households eligible for food stamps. However, a substantial part of the caseload decline resulted from decreased Food Stamp use among low-income households, and much of this decline appears to have resulted from less access to Food Stamps, rather than less need for food assistance (Nord 2002). According to the Food and Nutrition service of the USDA, the rates of participation for eligible households nationwide are estimated to be about 54% in 2003. This represents a decline in participation rates from the year 2000 partially due to increasing poverty rates and unemployment rates as more people become qualified for this program. (FNS 2006). This compares to estimates of 50% for residents of Montana, which is a decline from levels in 2000 and 2001 of 59-61% (FNS 2006). The effectiveness of the Food Stamp program is important to the issue of food security (Basiotis et al 1998; Gundersen and Oliveira 2001; Huffman and Jensen 2003; Jensen 2002; Nord 2002).

Several research projects focus on the impact that the Food Stamp (FSP) program has on food security. There is some indication that participation in FSP “smoothes the volatility of both income and food consumption” (Gundersen and Ziliak 2003:1069). Gundersen and Oliveira (2001) look specifically at how effective the FSP is at providing basic protection from hunger. They find that Food Stamp participants have higher food insufficiency rates (which are calculated differently than food insecurity) than other households that are eligible for participation but that do not participate, even after controlling for other factors. However these authors posit that selection biases undergird these differences. In other words, households that are more likely to be food insufficient are also more likely to use the FSP. After controlling for this bias, they find that there is no difference between Food Stamp recipients and non-recipients, and that taking part in the Food Stamp Program has no causal influence on ameliorating food insufficiency (Gundersen and Oliveira 2001).

Other research shows that the FSP is able to reduce food insecurity and do so more effectively than pure cash transfers (Jensen 2001; Huffman and Jensen 2003). These authors look at the effects of FSP participation, household characteristics and macroeconomic conditions on food security with hunger.

They find that increases in the FSP benefits are more likely to increase levels of participation in the program and improve levels of food security (Jensen 2002; Huffman and Jensen 2003).

USDA Commodity Food Distribution Program

The USDA has several commodity food distribution programs for needy families. They target different groups but are all interested in providing healthy commodity foods to low-income families. The Food Distribution Program on Indian Reservations (FDPIR) is intended for low-income American Indian and non-Indian households that reside on a reservation, as well as households living in approved areas near a reservation or in Oklahoma with at least one person who is a member of a Federally-recognized tribe. Unlike most food programs, participants only need qualify once a year (instead of monthly). However, they must choose between Food Stamps and commodity foods and may not receive benefits from both programs during the same month. This program uses the same financial eligibility requirements as the Food Stamp program and adjusts eligibility every October. On the reservation, participation rates fluctuate relative to the Food Stamp program as participants may go back and forth between these programs.

Miller (1994) suggests that the role of this program is important on reservations in Montana. He reports that FDPIR is the main source of food for almost 52% of participating households and the only source for 7% of participating households. Because food commodity programs are smaller and designed for more specific populations, research has not been as extensive.

Usher and associates (1990) found that FDPIR participants tended to be older and with incomes closer to program limits. This is in part due to the more tolerant requirements as FDPIR benefits are calculated based on household size and are not decreased as income rises, as are Food Stamps. However, there is some concern over the quality of food available for reservation populations through USDA food distribution (termed the “commod bod” by reservation residents).

Some argue that health problems increasingly prevalent among Natives on reservations are linked to poor diet and food availability associated in part with the FDPIR program (Geishirt Cantrell 2001; Dilliger et al 1999; Finegold et al 2005). Beginning in 1998, this concern has led to a stronger effort from the USDA to provide fresh and culturally appropriate food. Although still limited in the scope of this new direction, there is some evidence that this is making a big impact for participation on some reservations (Ward et al 2000). Additionally,

because FDPIR is created especially for tribes and tribal members, there is a sense that this program has fewer barriers for local participants and a stronger connection to local communities (Ward et al 2000; Miller 1996, 1998; Usher et al 1990). Nevertheless, some research indicates that participation rates are declining although it is not clear whether this is due to increasing participation in the Food Stamp program or whether it represents households that are going without food assistance (Finegold et al 2005).

Special Supplemental Nutrition Program for Women, Infants and Children

Women qualify for assistance in the WIC program while they are pregnant and up to 6 months after pregnancy or a year while breastfeeding. Infants qualify up to their first birthday and children up to their fifth birthday. Like all programs, applicants must reside in the state where they are seeking benefits. In addition, state income standards must be between 100 and 185 percent of the Federal poverty income guidelines. While most states use the maximum guidelines, states may set lower income limit standards. Those who participate in other benefits programs such as the Food Stamp Program, Medicaid, or Temporary Assistance for Needy Families automatically meet the income eligibility requirement. As part of program's interest in the health and nutritional

status of participants, all applicants must be evaluated by a health professional for nutritional risk. To qualify for assistance, applicants must have at least one medical or dietary risk (anemia, poor diet, etc).

Although, relative to other food programs the WIC program has a substantial research literature associated with it, most of this research is related to the medical and nutritional goals of the program. A surprisingly high number of Americans participate in WIC due to the higher income cutoffs (185% of poverty) and the nutritional focus that has broad appeal. WIC has enjoyed popularity as compared to other government assistance programs. In May of 1997, the Secretary of Agriculture who oversees this program stated that:

WIC works, perhaps better than any other government program in existence. It is a litmus test of our values, and for a simple reason: Children come into this world utterly helpless. How they are received and cared for says a lot about our nation (Glickman 1997).

These four federal programs are very important to food assistance in the United States. However, there are hundreds of others, both formal and informal, that may be important to other specific contexts and groups. There is no question that emergency food assistance and especially federal programs are relevant to the choices that households must make in food

provisioning. We now turn to the food provisioning choices available to residents of the Northern Cheyenne Reservation.

Table 3-2 Available Food Programs on the Northern Cheyenne Reservation

<i>Programs</i>	<i>Administered by</i>	<i>Funded by</i>	<i>Type of Assistance</i>
Families Achieving Independence in Montana (FAIM-TANF)	County	Federal/State	cash
Food Stamps	County	Federal	vouchers
General Assistance	County	State	cash
Women Infants and Children	County	Federal	vouchers
Commodities (Tribal Food Distribution)	Tribe	Federal/USDA	food
Tribal Food Vouchers	Tribe	Tribe	vouchers
NC Food Bank	Tribe	Private	Non-perishable food
Shoulderblade Complex for the Elderly	Tribe	Federal	Prepared meals
Headstart/ School lunches	Tribe	Federal	Prepared meals
Churches	Local Ministers	Private	Non-perishable food/vouchers

Northern Cheyenne Choices

While there is one small non-Indian grocery store located on the reservation for purchasing food with income and or food stamps, there are many other strategies for obtaining food. An investigation of food assistance programs on the Northern Cheyenne Reservation shows that use and acquisition

of assistance has changed over time, especially those associated with policy changes affecting eligibility and duration of benefits due to welfare reform (Davis et al 1999; Hiwalker et al 2000). The food programs available to residents on the Northern Cheyenne reservation range from large public programs to very small local and private ones. Table 3-2 shows the range of programs that are available on the Northern Cheyenne reservation. These programs vary in importance as resources for securing food in this community.

The largest programs are federally funded and run by the state of Montana or the Northern Cheyenne Tribe. The State's Office of Public Assistance serves the Northern Cheyenne reservation in both Rosebud and Big Horn counties and oversees Families Achieving Independence in Montana (FAIM) (changed from AFDC in 1997), which provides Food Stamps, childcare and related services to clients who meet state income guidelines. Cash assistance that can be used for food is available through General Assistance, which is operated by Tribal Social Services. Women, Infants and Children (WIC), operated through the Indian Health Service, provides food vouchers for dairy and other nutrition supplements for women who are pregnant and/or with children under five years of age and who meet income requirements. The Tribal Food Distribution

Program (FDPIR) provides government commodity foods for households that meet the income requirements (Hiwalker et al 2002; Ward et al 2000).

Smaller programs based at the local level include The Northern Cheyenne Food Bank, which provides boxes of donated foods to local families, and a number of local churches also provide meals and/or groceries with a range of requirements. The Tribal Assistance Committee also provides emergency assistance such as food vouchers and Low Income Home Energy Assistance Program (LIHEAP) to enrolled Tribal members.

Several programs serve prepared meals to specific needy populations. These include the Shoulderblade Elderly complex run by the Tribe, the privately funded Boys and Girls Club, the federal Headstart programs, local public and private primary schools, and the Tender Hearts Daycare associated with Chief Dull Knife College (Hiwalker et al 2002; Ward et al 2000).

Challenges and Participation

Food assistance program statistics on the reservation indicate that the numbers are declining. For example, the percentage of the Rosebud County population receiving Food Stamps declined between 1998 and 2000, from 12.3%

to 1.8%, and in Big Horn County from 21.6% to 17.8% (Ward et al 2000).

Ward and Associates (2000) suggest that despite the decline in Food Stamp participation on the reservation, food needs are still high. In addition, program figures show a surprising transfer of households and individuals requiring food assistance shifting to Tribal commodities (FDPIR) and other sources rather than choosing Food Stamps (Ward et al 2000). These authors discovered that cultural and community insight enabled the FDPIR program to serve the interests of the people in a better more appropriate manner. This is reflected in the growing number of Cheyennes served by Tribal food programs (both commodities and community food sources) during that same time period. "As a result, local food sources are strained" (Ward et al 2000).

Qualitative data systematically collected from 1996-2000 indicate that the problems clients encounter with maintaining eligibility for the Food Stamp program post welfare reform can be seen as representing a serious threat to the local food safety net, which makes this rural reservation population increasingly vulnerable to food insecurity and poor nutrition. Participants on the reservation report difficulty finding transportation and childcare to make it to required visits in order to meet state determined obligations for assistance. Other challenges

are also important, including language, miscommunication and other cultural barriers. Sanctions resulting in loss of benefits, as well as other interruptions in food assistance can result in food insecurity and can be devastating for households.

In addition, there is evidence among the Northern Cheyenne that food program choices are constrained by various community and program barriers (Davis et al 1999; Hiwalker et al 2000; Hiwalker et al 2002; Miller 1996; Ward et al 2000; see also Brown and Cornell 1999). For example, Ward and associates (2000) show that cultural and community sensitivity enabled the USDA commodities food distribution program (FDPIR) managed by the Tribe to serve the interests of the people in a better and more appropriate manner (Ward et al 2000). Consistent with the Cheyenne Nation's interests in protecting the well-being of its people, the tribal FDPIR program on the Northern Cheyenne Reservation has shown greater capability than county programs developing ways to meet new food assistance needs. Tribal program efforts reflect a model of community development that facilitates responsive, culturally based solutions to community needs. (Ward et al 2000).

For example the USDA tribal commodities food distribution program is able to be more effective in this community because it is able to take local views and needs into account, can communicate in the language of the clients, and work more closely with members. Preferences of reservation residents for certain kinds of foods, e.g., buffalo and venison are more easily considered as well as other needs such as food delivery to the elderly and handicapped. These findings suggest that program differences, rooted in historical meanings, may be important to understanding choices related to program use for this economically depressed reservation community.

Conclusions

The food system in the United States has historically been oriented toward ensuring assistance to producers and growers. Food assistance, both formal and informal, to poor and limited-resource households has developed over time and is embedded in the logic of the marketplace. Although the opportunities for food acquisition are diverse, some vulnerable households struggle to provide adequate levels of food for their families. Households often rely on others for social support and formal programs have an important role in this process as well.

Although formal programs are designed to ameliorate food insecurity and improve household access to adequate levels of food, research indicates that the programs are organized in diverse ways and serve different needs. On the Northern Cheyenne reservation, there are several food resources for hungry households. These are summarized in table 4-2 and show the range of programs for special needs sub-populations. For example, the WIC program is designed to supplement the nutritional needs of pregnant women, nursing mothers, and young children. School lunch programs and elderly feeding programs are likewise designed to assist certain populations. The question is how these programs are used by the various households on the reservation and the relationships that these programs have for food security levels. This project seeks to answer these questions by looking at food sources in depth and analyzing the relationships to food security levels.

Chapter 4: Livelihoods and Strategies for Coping with Poverty and Hunger

While acknowledging the importance of macro political and economic conditions, this project focuses on the ways in which individuals and households adapt within a specific context. The livelihoods framework offers a way to examine the links between the choices of actors and the larger structural context within which they are embedded. Because this framework focuses attention to the everyday experiences of households, while attempting to understand the macro level forces relevant to choices, it is a powerful way to acknowledge both aspects without falling into the trap of determinist models. As assets and resources (all kinds of capitals) inhabit both the individual and structural realms, the focus is on the negotiations requisite each day to access and use the capital to ameliorate life. According to the livelihoods framework, it is important to look for and document a full range of resources—tangible and non-tangible—available to households in a specific context. This framework may be especially helpful for understanding household food acquisition strategies because it acknowledges agency as a bridge between actors and structures (de Hann 2000).

I believe that this can be applied to food provisioning generally and for the Northern Cheyenne specifically.

The livelihoods perspective points us toward the actual behavioral choices that people make to cope with hunger and insecurity. In the next section, I begin by detailing more specifically the livelihoods perspective as a way to examine choices and adaptations of individuals and households within that context. I then explore how people adapt and cope with food insecurity and hunger in economically impoverished and politically vulnerable conditions as revealed in the current research.

Theoretical Background

Within dynamic political and economic contexts households make choices in food provisioning. The rural livelihoods framework is particularly useful as a way to think about household choices within a structured context. Although this research is usually focused on developing countries, concepts relating to the interaction between individual choices and the larger environmental context are broadly applicable. In fact, de Haan (2000) argues that the concept of developing countries or the “third world” is no longer important. With the increasing reach of global markets, household exclusion, or the inability to participate

in the market, is a more important criterion for understanding poverty and vulnerability.

The concept of livelihoods is concerned in the household's ability to achieve a particular standard of living. Assets are especially important and widely defined in the literature as anything owned which can produce future economic benefit. Livelihoods are constructed through a continual set of negotiations with the social and political structures and are specific to particular settings and pressures (Valdivia and Gilles 2001; Ellis 1998). Valdivia and Gilles (2001) emphasize that these are daily experiences and ongoing negotiations about how households can use resources and assets to provide for needs and wants.

Portfolios and Capitals

In finance, a portfolio is thought of as a collection of investments. The livelihoods perspective follows this idea by using this term to describe the specific assets of each household that can be used in livelihood strategies. The key components of portfolios are capitals, or assets and resources (de Haan 2000; Bebbington 1999; Chambers and Conway 1992). These are specified in the literature as: 1) Human, 2) Natural, 3) Social 4) Physical, 5) Financial 6) Cultural and 7) Produced (Chambers and Conway 1992; Bebbington 1999). Some

of these are tangible assets, including stocks and stores, and others are non-tangible including access and claims to resources (Chambers and Conway 1992; de Haan 2000). In this literature and from this perspective, capitals represent different kinds of assets that can be exchanged for needs, and that are part of the negotiations in managing a livelihood strategy.

Figure 1 The Seven Capitals of Household Livelihood Portfolios



Figure 1 is a visual depiction of each of the seven capitals highlighted by these authors. The symbols represent examples and types of assets that typically correspond to specific categories of capital. For example, natural capital is represented with a plant, signifying that households with access to geographical or environmental resources can use that as part of their household livelihood

strategy. Good farm land, for example, may be exchanged for food (produced capital), or even perhaps other forms of capital (economic financial capital, etc). Natural capital can also include helpful weather and a balanced ecosystem and other natural resources. As an illustration, the land of the Northern Cheyenne reservation has not been a good resource in terms of agriculture; however as one of the most desirable sources of coal in the country it could be viewed as natural capital for the Tribe. Yet, the Tribe has famously resisted efforts to exploit this resource taking the view that the social and political costs are not worth any benefits--or that it is not a resource that will promote a sustainable livelihood. Physical capital is best understood as the ability to acquire other capitals due to health and physical capacities. In one case, for example, the ability to work a physically demanding job such as some forms of agriculture or building construction might translate into a viable livelihood resource. Several of these 'capitals' are particularly conceptual and warrant a more detailed look.

Financial and Produced Capital

Not all research distinguishes between financial (sometimes termed economic) capital and produced capital. Strictly speaking money or wealth (financial capital) is not always produced as it can be inherited or even acquired by lottery or theft. Produced capital can include all other forms of goods, such

as food, crafts, and other materials that can be exchanged for money or other capitals. Financial capital is the most easily used, or exchanged. It acts as an intermediary capital, or the uniform value for which other capitals are assessed. These two capitals are obviously important for securing food. Especially in the United States, food is usually treated as a commodity for sale in the marketplace. If households have adequate financial capital, or enough produced capital to acquire financial capital, they have a much better chance of meeting food needs.

Human Capital

Human capital represents a set of assets that are in the form of skills, such as education or training that can be exchanged for other capitals—most notably economic or financial capital. Economic analysis is traditionally interested in land, labor and capital as it relates to production. Human capital was introduced to this equation to explain differences in the human contribution rather than treating all people exclusively as labor. Just like in physical capital, one can invest in human capital (via education, training, etc) and the return is measured in the level of income generated by the investment.

According to Becker (1964) education adds to our human capital just as other investments add to physical capital. The unique characteristics of knowledge lead to the importance of this term and concept. Unlike physical

investments, knowledge is easily shared and does not diminish; in fact it grows as it is used. This changes the way that economists must think about the concept of scarcity. Of course, knowledge itself may not be as important as other factors for understanding human capital. For example, often the prestige of the credential or degree received is more important than the level of knowledge actually attained.

Cultural Capital

In *The Forms of Capital* (1986), Pierre Bourdieu distinguishes between economic capital, cultural capital and social capital. Cultural capital in particular is defined as forms of knowledge, values, attitudes, beliefs, or any advantages that are prized and lead to higher status in society. Parents are the most important purveyors of cultural capital to their children as they teach them how to negotiate and manage different facets of society. According to Bourdieu (1986), cultural capital has an embodied state –what he terms cultural habitus, socialization or a way of thinking, and cultural objects such as specific tools or artwork. For Bourdieu this is important, in part, because of the implications of the reproduction of social status and class, as existing disadvantages and inequalities are passed from one generation to the next.

Individuals acquire human and cultural capital according to the context in which they are born (the resources of their families, etc) and can be dynamic over time. Additionally, individuals who lack human, cultural, and social capital experience challenges and crises more often in life, and with greater intensity than others (Rank 2004). This is especially clear in relation to the economic sphere, where research points out that social class mobility is quite small and that those without access to these capital resources are more likely to experience job loss and lower wages.

Social Capital

Social capital is related to trust, networks, and values that allow people to interact with each other. In other words, social capital is a resource of people and social relationships. In common vernacular, 'it is who you know.' Like human capital and cultural capital, social capital is not depleted by use, but in fact depleted by non-use. Bourdieu (1986) defines social capital as "the aggregate of the actual or potential resources which are linked to possession of a durable network of more or less institutionalized relationships of mutual acquaintance and recognition"(249). It is often talked about in terms of social networks (Putnam 1993; Granovetter 1973). For example, Putnam (2000), contends that it is the sum of all the social networks and resulting cooperative exchanges.

Fukuyama (1995) on the other hand, argues that social capital is simply the existence of a shared set of informal values or norms that allow cooperation among people in a group.

Social capital is shown to be significantly related to human capital (Coleman 1988), and cultural capital (Bourdieu 1986). Additionally, “the social capital embodied in norms and networks of civic engagement seems to be a precondition for economic development” (Putnam 1993:37). Although rather challenging to measure (similar to human and cultural capitals) there is no question that social capital –or the relationships in which we live and act out our lives—matters to our livelihoods.

The Verve of Capital

Obviously, these capitals are conceptual categories and are ideal types. The seven capitals outlined in this perspective are all important, but may work in very different ways to assist and sustain household livelihoods. As primarily an economic perspective, language and terminology embedded in the livelihoods perspective reflects the assumptions that environment and society function in the same way as traditional industrial infrastructural capital, and that it is appropriate to refer to different aspects of society and the environment as capital. These assumptions might telescope our look at social life and organization in

some ways, however this perspective allows us to look at household strategies more closely and see some of the implications for social and economic life.

Capital holdings can be part of common property—in other words legal title is not required. However, evaluation of household capitals should include the real access and ability to draw upon them when needed or desired. Non-tangible assets can be even more important in a certain sense than tangible ones. Bebbington (1999) argues that social capital is of particular interest because it can act as a gatekeeper to resources. Access is a critical resource in order to build sustainable livelihoods and access to other actors might be the most crucial link to material resources (Bebbington 1999).

Besides providing opportunities for the acquisition of material wants and needs, capitals can also enhance life in other ways. For example, cultural capital illustrates that assets are not only sources of sustenance, but can be empowering for gaining access and opening opportunities. Bebbington (1999) recognizes both the material and meaning centered aspects of livelihood strategies. He asserts that assets are not only resources but capabilities for action and distinguishes three specific pathways for action including instrumental action (making a living), hermeneutic action (meaning making), and emancipatory action (making

change in the fundamental structures of life). Capitals thus are powerful in the capabilities that they bring to the household.

Livelihood Sustainability

Sustainability is an important part of the research on livelihoods because it is interested in the ability of households to maintain a specific standard of living. Sustainable livelihoods are described as those that are adequate to sustain basic needs and that are resilient to shocks and stresses (de Haan 2000; Chambers and Conway 1992). Shocks are short-term, usually violent and unexpected, disruptions in household functioning. These are often due to dramatic weather—such as floods or tornados—or rapid changes to political and economic conditions—such as those arising from a political coup. Stresses are less dramatic, but usually more long-term and usually stem from underlying changes in political, economic, cultural, and social systems.

De Haan (2000) argues that a sustainable livelihood is dependent on social and economic inclusion. Therefore, groups that are excluded from economic markets and places of social exchange will not have sustainable livelihoods. Likewise, Chambers and Conway (1992) argue that the fundamental components of sustainable livelihoods are capability, equity and sustainability. These include both micro and macro conditions. They define capability as “what a person

is capable of doing or being” (Chambers and Conway 1992:4). Capability has varied meanings depending upon the criteria of well-being for specific groups (see also Sen 1984; 1987). For Chambers and Conway, equity refers to the distribution of resources in terms of “assets, capabilities and opportunities and especially enhancement of those of the more deprived” (1992:4). Sustainability is thus defined as the ability to maintain livelihoods or improve them “while maintaining the local and global assets and capabilities on which livelihoods depend” (Chambers and Conway 1992:5). In their view, all three of these components are both ends and means for sustainable livelihoods. For example, capabilities of an individual allow livelihoods to be gained while the livelihoods create space where capabilities may be practiced.

Coping and Adapting

Vulnerable, and/or excluded, households participate in activities to mediate risks and deal with changes. “Coping strategies” are temporary safety mechanisms households’ use when experiencing shocks or stresses. These are a form of livelihood strategies that are short term but can evolve into longer term “adaptive strategies” (de Haan 2000).

Livelihood diversification is important for coping and for the survival of vulnerable groups (Ellis 1998). Livelihood diversification is not the same

as income diversification as the former is interested in the wide-ranging collection of activities that people participate in to survive. It is important to remember that coping and adaptation to economic constraints is only one reason why households may diversify resources. Diversification is also spatially and temporally specific. Thus diversification is a matter of seizing the assets and opportunities that are available in a certain place and time. Ellis (1998) distinguishes between coping, which is related to maintaining consumption-- asset sales, using up food stocks, etc—in the immediate now, and managing risk, which is associated with deliberate strategies to anticipate and prepare for the future. Because people have access to resources depending on their household portfolios, or capital holdings, the construction of livelihoods is complex. For example, institutional impacts can mediate benefits and reward households differentially --suppressing opportunities for some and enhancing others (Ellis 1998).

Income smoothing is one adaptive strategy that places emphasis on market conditions. This happens when households adapt their household production and/or other possible income streams. Consumption smoothing also recognizes the market in its focus on adapting through change in purchasing

behavior or by borrowing and saving, insurance and using non-financial assets (Morduch 1995).

Morduch (1995) argues that households are more likely to smooth income when they anticipate not being able to borrow or insure themselves against possible shocks. He also asserts that in markets with access to institutions providing credit and insurance services, transitory shocks will not affect consumption because households will be able to draw upon these resources for income smoothing. However in incomplete markets, or markets that do not have these institutional supports, income smoothing is more closely related to consumption smoothing. Townsend (1995) demonstrates that shocks peculiar to individual households have a different set of insurance options relative to aggregate events and that we should account for these two kinds of risks. Income smoothing and consumption smoothing are difficult to separate empirically. Income smoothing anticipates risk and consumption smoothing usually occurs after shocks occur, although they usually act in concert with one another to deal with shocks (Morduch 1995). The implications are that households may make choices that are not economically beneficial in the long term, because they are risk averse and unable to access risk mediating assets (Morduch 1995; Townsend 1995). The relevant question for this literature is

whether markets and institutions are able to provide households the proper measures for mediating risk.

Additionally, some researchers question why some households are able to adapt and achieve sustainable livelihoods while others are not. Zimmerman and Carter (2003) find that the inability of poorer households to effectively deal with risk is related to asset smoothing, which often leads to a less profitable or advantageous portfolio than those that pursue consumption smoothing during times of stress or shock . They call this the “poverty trap” (Zimmerman et al 2003). In other words, the assets available to households have an effect on the choices and outcomes of the strategies pursued by them to overcome stress or shocks.

Maxwell and Weibe (1999) argue that wealthier households that experience food shortages are usually in a better position to leverage (borrow, access credit, etc). Those households that are food secure are in a better position to participate in riskier, often more productive, behavior. Households that are not food secure may be placed in situations where they have to deplete their assets (for example by pawning) even if they are more efficient at using their resources than most other households (Maxwell et al 1999). Food insecurity thus places households in a position of making choices that are often trade-offs

between the present and the future. Food security appears to be important for escaping the poverty trap and for full participation in a market economy because choices that households make are often trade-offs between the present and the future, and sustainability of the “resource base” which has implications over time (Maxwell et al 1999). Thus it appears that, at least in some sense, the poverty trap is significant.

The livelihoods framework provides a conceptual base for understanding household adaptations and coping with vulnerability and uncertainty. Through daily negotiations about management of household (and access to community) resources (assets and capitals), choices are made about how to provide a sustainable livelihood given the social, political and economic forces relevant to the particular circumstances.

Economic Adaptations

One typical adaptation to economic insecurity and hardship is that community members often pull together socially and economically to combat economic uncertainty. David Harvey (1993) and Carol Stack (1974) document the creation of reciprocal relationship structures within economically disadvantaged communities. They also document a kinship structure where people can enter into a kinship role, or be “adopted” into a family, without technically being part

of the family, according to their willingness to share resources (Harvey 1993; Stack 1974). Harvey (1993) explores the lives of a rural heartland community, while Stack (1974) participates in daily events of black families in the Flats, in a Midwestern town, showing the relevance for both urban and rural settings. Poor families adapt to their situation through a complex system of expanding social networks and social exchange. Stack (1974) reports: "I became poignantly aware of the alliances of individuals trading and exchanging goods, resources, and the care of children, the intensity of their acts of domestic cooperation, and the exchange of goods and services among these persons, both kin and non-kin." (Stack, 1974, 28). Limited resources are spread through these networks built through various exchanges that serve to obligate one another. This implies that they will help in times of need or as they come into additional resources. In this manner, resources are spread out over time and there is a greater sense of stability in the lives of these families (Harvey 1993; Stack 1974). Community members are dependent upon these structures to survive.

Other forms of adaptation are found in the subsistence literature.

Brown, Xu and Troth (1998) contrast the "informal economy" to "subsistence" activities and find them to be separate and qualitatively different. Although important to the informal economy, subsistence is characterized by the social

rewards that are present to motivate individuals to continue to participate in the system. “Consequently, participation in subsistence activities, to some degree, requires that one is identified as a participant by other participants” (Brown et al 1998:602). Subsistence activities favor the social exchange more than the financial reward. Defined this way, subsistence is a lifestyle orientation in addition to a household adaptation.

Research on livelihood strategies show the strategies employed by individuals and households in an attempt to acquire economic security. These strategies are well documented in the developing world, especially in times of famine or political unrest (Maxwell et al 2002; Davies 1996; Jaspers and Shoham 2002). Research on livelihood strategies in the U.S. or other more developed contexts is more lacking. Brown and Lichter (2004) recently investigated four strategies for single mothers in the United States. They look specifically at the role of employment, living with a partner, living with family, friends, or other non-partners, and government assistance in terms of food stamps and cash assistance for economic well-being in rural areas as compared to metro areas. They find that single mothers in rural areas receive fewer overall economic benefits with these strategies than those of metro areas, highlighting the

inconsistent effects of strategies across populations due to differences in market conditions, among other things.

Food Acquisition Strategies

Although limited, research examining household food coping strategies, including strategies for obtaining food, reveal a variety of mundane and remarkable food acquisition practices. These reflect many of the concepts in the livelihoods perspective, including drawing upon 'capitals' as well as coping and managing through daily negotiations. Overwhelmingly, research points to the stressful and anxiety-ridden nature of food provisioning for households vulnerable to food insufficiency (Tarasuk et al 1999; Campbell et al 1989; Ahluwalia et al 1998; Kempson 2002, 2003; Hoisington 2002; Hamelin et al 1999; Wu et al 2005).

Looking at the food management strategies of low-income households with children, Campbell and associates (1989) found that that household food provisioning strategies fell into three general categories: self-reliance, informal bartering, and formal institutions. Most interestingly, they found that "most households used multiple approaches to take maximum advantage of their resource environments" (Campbell et al 1989:166). While this is the only study to look at the resources and combinations of food sources and strategies used

by households, as a small inductive study of 20 households it is geared toward generating hypotheses to be tested later and is not generalizable. However, this research leads us to examine the number as well as the type of food sources that households use in food provisioning. Additionally, research corroborates the importance of informal, formal and self-reliance activities in food provisioning.

The majority of this food acquisition literature examines the coping and adaptive strategies that food insufficient households and limited resource individuals use in an effort to achieve food insecurity. These reports document the kinds of food provisioning activities that are used and available to uneasy households. This literature suggests that adult participants skip meals or cut down on the amount of food they consume so that children will not go hungry (Ahluwalia et al 1998; Kempson 2002, 2003; Hoisington 2002). Other often cited practices include borrowing and sharing food with social networks, accessing federal and community programs, as well as more extreme forms of food acquisition like salvaging food from dumpsters (Ahluwalia et al 1998; Kempson 2002, 2003; Hoisington 2002).

There are varying degrees of social support within reach and sometimes used by limited-resource families. Ahluwalia and associates (1998) found that low-income families in North Carolina relied on social networks to provide food

assistance, information, and emotional support to deal with food insufficiency. In this study, respondents reported family members were most important and the primary social support resource that they turned to. Friends were relied on next most often while people turned to neighbors and acquaintances last. Interestingly, reliance on anyone for support was reported as a distressing experience. These authors also found that reliance on social networks differed by ethnic group. African Americans in particular indicated that they turned to formal assistance to deal with food inadequacy more often than whites because the people in their networks were “just as destitute as they were” (Ahluwalia et al 1998:605).

When social networks failed, participants then reported turning to community organizations such as food pantries and other agencies (Ahluwalia et al 1998). Overall, these resources were regarded as being less desirable and more shaming than more casual assistance from family, friends and neighbors which were themselves distressing (Ahluwalia et al 1998; Campbell et al 1989).

Like others, Kempson and associates (2003) found that limited-resource individuals in New Jersey describe food acquisition strategies that include accessing community resources, informal support systems, supplementing, and shopping strategies, as well as food management practices in an effort to achieve

food security. Within each of these food acquisition strategies, are multiple practices representing the range of activities that individuals use to obtain food. For example, community resources include participation in federal food programs, specifically Food Stamps, head start, WIC and the school lunch / breakfast program. More informal activities such as attending events like church, happy hours, and stores on days that offer food samples are also represented in the experiences of these respondents. Hunting and gardening are also used to supplement food resources (Kempson et al 2002, 2003; Hoisington et al 2002). Additionally, locally sponsored food programs such as food pantries and soup kitchens and other local programs are important (Kempson et al 2002, 2003; Tarasuk 1999;).

Food acquisition practices identified by focus groups included practices that could be considered unsafe or pose risk to the individual or family (Kempson et al 2002, 2003; Hoisington et al 2002). Some examples included selling one's blood, salvaging food from garbage cans or restaurants, collecting and eating road kill, and stealing, or committing petty crimes in order to receive meals in jail (Ahluwalia et al 1998; Kempson et al 2002, 2003; Hoisington 2002). Participants also reported borrowing money or pawning items to make ends

meet, as well restricting children's access to cabinets containing food, begging, shoplifting food items and living in abandoned buildings (Kempson et al 2003; Hoisington et al 2002).

The severity of food insecurity may impact food acquisition choices. While social support from family and friends is noted as an important part of coping with food insufficiency, strategies may also include activities that indicate greater degrees of severity or need (Ahluwalia et al 1998; Hoisington et al 2002; Kempson et al 2002, 2003). "Coping strategies may be progressive in nature, such as living with family or sharing resources at less critical stages, as opposed to seeking emergency foods or eating from garbage as a last resort" (Hoisington et al 2002:327). Thus strategies appear to be dynamic over time and are based on changing conditions and contexts.

Households also report that food insecurity lead to atypical food sources including shared meals, emergency foods, and trading labor or other resources for food (Hoisington et al 2002). Hoisington and associates (2002) report that "it appeared that people used increasingly more desperate coping strategies as food became scarcer and other problems became more apparent in the household" (Hoisington et al 2002:329). This indicates that there may be a succession of

strategies depending on the severity of hunger and varying by other personal characteristics.

Hamelin and associates (1999) looked specifically at the social impacts of food insecurity among low income households. They found that the experiences associated with food insecurity were physical, psychological and socio-familial. In fact, they argue that food insecurity disturbed rituals of food consumption and although households may be reluctant to participate in certain activities at first, they eventually become comfortable with them as they become necessary. “Eventually, the search for food takes precedence over previously held values” (Hamelin et al 1999:527S).

In sum, it is clear that households at risk for food insecurity participate in myriad food acquisition strategies. While the range of strategies used by participants is significant and really stunning, the majority of existing research stops at documenting these sources. With the exception of Campbell and associates (1989), this literature does not take into account the ways in which these practices are used by households or how they are used in combinations together. In other words, there is no examination of what patterns of utilization exist with the food acquisition practices that are documented here. Additionally, because these studies are organized to look at strategies as outcomes of food

insecurity, there is no research that examines this question in reverse. In other words, what are the impacts that coping strategies may have on food security levels?

Because these questions are overwhelmingly being investigated by nutritionists and nutrition educators, very often the focus is in how to teach or provide more information to limited resource individuals to ameliorate their chances of achieving positive health outcomes despite food insecurity. Most of this research is therefore interested in how individuals and households cope with food insufficiency and the nutritional impacts that this may have. As such, this research does not examine many important aspects of food provisioning, focusing unduly on the individual coping behaviors such as shopping conduct, extensive meal planning, budgeting, staggering bills, conserving food through restricting access, etc, and the nutritional implications. While these coping behaviors may be important for gaining adequate levels or types of food or 'stretching' the food to meet food needs, this focus clearly neglects other important aspects of food provisioning at the household level. For example, how does using multiple sources of food impact the experience of food provisioning? Also, what are the differences in using food programs and sources for food security?

In addition, these research reports often represent preliminary projects aimed at organizing subsequent conceptual and methodological studies that are more in-depth. As this research represents the beginning of inquiry surrounding this topic, nearly all of these research reports are exploratory –conducted through the use of focus groups or qualitative interviews with select groups. This literature remains preliminary, and there is much that can be added to it to flesh out the real experiences and quandaries associated with food provisioning for low-income, limited resource households in the United States.

Several specific questions, yet unexplored, are important for the present research. First, how are sources used together as larger strategies and what impacts do adaptive strategies and practices have on household food security levels? In addition, how are these relationships specific to contexts such as those that exist on the reservation? These questions are explored in the following research chapters.

Chapter 5: Methodological Frame

Survey data for this research collected in the spring and summer of 2001 show the reliance on various food sources, including the use of federal food assistance programs and a range of community and other resources. This instrument was developed to obtain information found to be relevant in previous research about the range of programs and alternatives used by local community members (see Davis et al 1999; Hiwalker et al 2000; and Ward et al 2000). This project continued ongoing analysis of research on emergency food systems that builds on qualitative, exploratory work, with the survey instrument designed to examine food security, food program use, nutrition and stress. The research was partially funded by the U.S. Department of Agriculture, Economic Research Service as part of an effort to evaluate the effect of welfare reform on American Indian populations.

Background and Experience

Through my own limited participation in this community, I have been able to glean important insight into the specific context of this reservation community.

The project that serves as the basis for my dissertation evolved out of several

other projects on the Northern Cheyenne reservation over the last several years. Dr. Carol Ward introduced me to the Northern Cheyenne reservation when I was a student at Brigham Young University. I completed a Masters thesis in 1999 looking at the experiences and the meanings of this place as a community for this reservation. After graduation, I continued to work on various research projects on the reservation as a consultant for the local Tribal College, Chief Dull Knife College (CDKC). I have had opportunities to spend many hours both in formal and informal conversations regarding food and different aspects of the food system on the reservation because of the time I have been on the reservation over the last 7 years.

Qualitative interviews and discussions with individuals about their perceptions of welfare reform across the reservation informed the design for this project. Additionally, interviews with directors and staff from programs that contribute to food assistance/distribution of foods on the reservation add to my ability to understand the patterns reflected in the data. These interviews provide additional information about each food program and the perceptions of key informants about their programs within the community.

Food Security, Nutrition, and Health Survey

A survey questionnaire was developed in 2001 through a collaborative effort of researchers at Brigham Young University (BYU) and Chief Dull Knife College (CDKC). This survey includes an assessment of food use and acquisition decisions including the USDA Food Security Core Module (Bickel et al 2000), respondent use of food assistance programs and alternative food sources, standard assessments of nutrition and health risks (American Academy of Family Physicians 2000; Martin 1995), including risk factors associated with diabetes (American Diabetes Association 2000), and life experiences and changes related to increased levels of stress (Holmes-Rahe Social Readjustment Rating Scale). Additional data items include basic demographic data as well as household structure and educational levels of adults in the household (see Appendix A).

All parts of the instruments were field tested in the early spring of 2001 by project members at CDKC and revised as needed prior to use. This was done with 50 pilot surveys completed in Lame Deer over the course of three days with short respondent interviews for feedback. All respondents were informed that the purpose of the study was to provide an understanding of local food and health needs. Individuals who had problems with reading or understanding

English were provided assistance from interviewers who would read or translate questions while allowing the respondent to privately record their answers. Upon completion of the questionnaire, each participant was awarded a ten-dollar voucher that could be used at the local grocery store. Most respondents completed the questionnaire in about 20-25 minutes.

Three Tribal members and residents of the reservation acted as interviewers and facilitators for this project. This included one man and two women with extensive experience interviewing on this reservation. Additionally, interviewers were trained for this project and alerted particularly to the method of random targeted selection of participants. Because of their familiarity with the reservation and potential interviewees, they were able to effectively follow up with participants. Only two respondents refused participation and twenty-one surveys were not initiated or completed due to time constraints leaving a response rate of 95% (477/500). Seventeen cases were dropped from the final analysis due to missing data across variables indicating that they were not reliable, including two cases of missing data on the dependent variable. Thus the total number of usable cases dropped from 477 to 460, or a useable response rate of 92%. Information was imputed for additional missing data where possible

using means. Missing data variables are included in the modeling to check for systematic bias.

Sample

The instruments were administered to 477 reservation households using a stratified random sampling frame. Enrollment lists of the Northern Cheyenne Nation were used to select respondents. Efforts were made to develop a representative sample of both men and women across age groups in proportion to the population of the five primary communities on the reservation. Research team members at CKDC identified Northern Cheyenne tribal members who met the age, sex and community residence requirements of the sampling plan (see Appendix B) and then randomly selected individuals for participation (see also Hiwalker et al 2002).

The sample represents men and women across ages from each community on the reservation. Table 5-1 shows the breakdown of individual and household characteristics for this sample. Because of the sampling plan, respondents are well distributed across the five districts on the reservation. Fifty-two percent of respondents reside in Lane Deer which is the largest community and center of the reservation, 26% in Busby, 4% in Birney, 8% in Ashland and 10% in Muddy

Table 5-1 Demographic Characteristics of the Sample (N=460)

<i>Variables</i>	<i>Frequency</i>	<i>Percent</i>
<u>Age</u>		
18-24	65	14.2
25-34	113	24.6
35-44	103	22.4
45-54	91	19.8
55-64	46	10.0
65+	41	8.9
Total	459	99.8
missing	1	.2
<u>Gender</u>		
Female	255	55.4
Male	205	44.6
Total	460	100.0
<u>Marital Status</u>		
Married or with someone	221	48.0
Single/Divorced/ Widowed/ Engaged	216	47.0
Total	437	95.0
missing	23	5.0
<u>Employment (last 6mos)</u>		
Full-time	165	35.9
Part-time	74	16.1
Seasonal/ Contract	66	14.3
Not employed	105	22.8
Retired	32	7.0
Total	442	96.1
missing	18	3.9
<u>Education</u>		
Less than HS	76	16.5
HS diploma/GED	170	37.0
Some College/AA	153	33.3
College Degree	27	5.9
Graduate Degree	7	1.5
Total	433	94.1
missing	27	5.9
<u># of Children < 18 in HH</u>		
0	134	29.1
1	66	14.3
2-3	166	36.1
4-5	71	15.4
6-more	23	5.0
Total	460	100.0

Source: Food Security, Nutrition, and Health Survey, 2001

Creek. This sample includes 209 (44%) men and 265 (56%) women with 3 unreported. Just more than half (50.2%) of all respondents report being 'married or with someone' at the time of the survey. Most households have less than 3 children with 39% with 0-1 and 38% with 2-3. Fifteen percent of households report 4-5 children and 5% have more than 6 children under 18 in the household.

The age distribution of the sample reflects the sampling frame and resembles the distribution of the 2000 census (U.S. Census Bureau Report 2000). Most respondents are from 25 to 44 years old with 24% in the 25-34 category and 22% in the 35-44 yr old category. Slightly fewer are 45-54 (19%). Respondents reported full-time work (36%) and not employed (25%) most often, but about 17% reported part-time work and 15% seasonal work. Seventeen percent of respondents in this sample report less than a high school diploma, 37% had a high school diploma or GED, 34% had some college and 7.5% had an undergraduate or graduate degree.

Measures

Unlike studies of households that use multiple informants to draw information about the experiences of the household, this project relies on a single household member to report household level details. Hence, this project

uses both household level measures and characteristics of the individual respondents. Therefore, conclusions about households are carefully interpreted within this frame. Specifically, this project is limited by the lack of descriptive, demographic data at the household level. By using individual characteristics in lieu of household characteristics, this project cannot discuss in much detail the ways that household composition or descriptors at the household level impact the household level outcomes such as food security and food source use. Thus, this analysis is limited by the available information for this sample. However, as this data does represent a random sampling of people in this population, some important insight can be gained by understanding how demographic characteristics at the individual level may contribute to household outcomes.

Levels of household food security are measured through the 18 question USDA Food Security Core Module (Bickel et al 2000; see Appendix A). Of the 18 items, 10 are asked of all households while 8 pertain only to households with children under the age of 18. This measure examines experiences at the household level that have occurred in the last 12 months. The USDA Food Security Core Module “is concerned only with food insecurity/ hunger that occur because the household does not have enough food or money to buy food”

(Bickel et al 2000:6). It is not easy for a single indicator to fully measure all of the aspects of food security, and this scale does not describe all possible aspects of this condition. For example, it does not measure nutritional status, the safety of available food, or the sources of food for social acceptability or any other kinds of social or physical barriers.

Specifically, questions are designed to assess the frequency of reducing food intake or adjusting normal food use, and the consequences of this choice, such as hunger or weight loss, for both adults and children in the household.

Additional questions probe the perceptions of respondents about their experiences, including anxiety over food sufficiency and whether food was adequate in quality or quantity (Bickel et al 2000). The questions are based on research that describes a sequence of experiences as households move further along the continuum of food insecurity/hunger. This is generally described as beginning with anxiety about food sufficiency, followed by reduced intake for adults, and finally reduced intake for children (Bickel et al 2000).

The food insecurity/hunger measure is organized in two forms. The first is a continuous linear measure (0-18) representing an absence of indicators of food insecurity at 0 and the existence of all available indicators with a high score of 18

for families with children and 10 for those without. The second is a categorical measure where households are placed into three food security status levels; food secure, score range 0-2; food insecure without hunger, score range 3-7 for households with children, 3-5 for households without children; food insecure with hunger, score range 8 and above for households with children, 6 and above for households without children. In either case, food security is based on the underlying continuous scale (Bickel et al 2000). For this project, the coding process was assisted by Mark Nord at the Economic Research Service of the USDA. He estimates use of this instrument to provide a conservative estimate of food insecurity on the Northern Cheyenne Reservation.

The questions on food sources were developed from previous research in this population (Davis et al 1999; Hiwalker et al 2000, Hiwalker et al 2001; Ward et al 2000). The survey asked respondents to use a four point scale to indicate how often sixteen possible sources were used to buy or obtain food. The scale included "Don't use," "Use almost every month" "Some months but not every month," "Only 1 or 2 months," and "Don't Know" (see question 17 Appendix A). Because some of the sources were not used very much in this population and therefore many of the cells contained very small numbers, these categories

were collapsed into dichotomous categories of use and non-use for most of the analysis for this project. Missing data were infrequent, and were not found to be significant in any analysis.

Through in depth interviews on the Northern Cheyenne reservation for several years prior to the survey, sixteen food sources were identified as being relevant to food provisioning for this population. Besides wages, which is the most used food source in our sample, food sources include formal food programs such as Food Stamps, the FDPIR program (usually called commodities), and WIC. Other government programs like General Assistance and entitlement programs including Social Security and Disability are also included. The Northern Cheyenne Food Bank, churches, and tribal vouchers represent local programs and services. Additionally, relying on family, or other subsistence activities such as gardening, hunting, selling crafts, or working at odd jobs are also included. Finally, use of pawning is measured as this was an important source of food for many of the TANF clients in the interviews. Obviously, these sources can be grouped theoretically into different theoretical categories. For instance, pawning is a good example of resource depletion through “income smoothing” and is expected to have a negative impact on food security levels,

while using wages is an example of economic or financial capital that is expected to improve food security levels. This analysis is interested in understanding the relationships between different types of food sources, how they are used in combinations in the household, and the effect these sources and strategies have on household food security levels.

Additionally, respondents were asked about individual characteristics, represented in Table 5-2. These included categorical measures of basic demographic information including age, marital status, education level, and employment. One important household characteristic measured is the number of children under the age of 18 in the household. Missing data for these variables represents fewer than six percent of any variable and is nowhere found to be significant when included in preliminary modeling.

One potentially significant limitation to this study is the lack of an income variable. While income is clearly an important variable to consider in looking at issues of poverty and food distress, the project researchers felt it important that the particular needs of this population be considered. Respondents on the Northern Cheyenne reservation are uncomfortable reporting income for several reasons. Despite working very carefully to provide anonymity, to protect

Table 5-2 Description of Variables Used in Analysis

<i>Descriptions of the Variables</i>	
<u><i>Dependent Variable</i></u>	
Food Security Levels ^s	Food secure =0 (from 0-2); Food Insecure without Hunger =1 (3-5 without children and 3-7 with children); Food Insecure with Hunger =2 (6+ without children and 8+ with children)
<u><i>Primary Independent Variables</i></u>	
16 Sources of Food	Use as a source of food =1; Do not use as a source of food =0
Food Strategy Clusters	Cases clustered by food source use to find food strategies
Number of Food Sources	Scaled from 0-10
<u><i>Control Variables</i></u>	
HH # of Children <18	0 children=0; 1 child=1; 2-3 children=2; 4-5 children =3; 6 or more children=4.
HH Respondent age	18-24=1; 25-34=2; 35-44=3; 45-54=4; 55-64=5; 65+=6
HH Respondent gender	Men =1; Women =0
HH Respondent marital status	Married or with partner =1; Single/Widowed/Divorced, etc. =0
HH Respondent employment	Full time=1; Part time=2; Seasonal=3; Retired=4; Unemployed=5
HH respondent education	<HS=1; HS/GED=2; Some College/AA=3; College degree=4; Graduate degree=5

Source: Food Security, Nutrition and Health Survey 2001

^sBased on a scale from 0-18, with ten questions for everyone and 8 additional questions for households with children

information, and to communicate this to respondents, individuals may be especially reluctant because of their personal familiarity with survey facilitators. As local community residents, these facilitators were invaluable partners in this project and indeed without their contribution it would not have been possible. However, in this case they may have been a barrier to full disclosure because of the deep sensitivity of this particular information for this population. This is in part due to the strong norms regarding sharing and redistribution of resources. For many people, especially those with jobs, there is intense pressure to divide resources with extended families and friends, which can lead to social and economic problems. Additionally, families that participate in federal and other food programs are often uncomfortable specifying income because of the possible ramifications to program benefits and subsequently food security. As architects of the survey, we felt an ethical duty to be sensitive to these concerns and to protect the interests of respondents by eliminating this question.

Research Questions and Focus of Inquiry

This project seeks to add to this previous research work by taking a closer look at the food acquisition strategies of Northern Cheyenne living on the reservation in Montana. In particular, I investigate the food sources and

configurations of food acquisition strategies of households, as well as the role and associations with food security levels in this context. Specifically, I will answer the following nine research questions:

1. Which food source are used by households on the reservation?
2. What respondent and household characteristics are associated with food source use?
3. What characteristics are associated with using the most number of food sources?
4. How are food sources actually used in combinations (food strategies) in households?
5. What respondent and household characteristics are associated with these food strategy clusters?
6. What are the levels of food security for this population?
7. How do levels of food security vary across respondent and household characteristics?
8. How does food source use relate to household food security levels?
9. How does food strategy use relate to household food security levels?

Analysis

To answer these questions I use an assortment of methods starting at the descriptive level and progressing toward more sophisticated analysis. Table 5-3 gives an overview of research questions within three specific research sections, and the associated methods used for answering them. This analysis includes frequencies, cross-tabulations, analysis of variance, binomial and multinomial

Table 5-3 Overview of the Research Agenda

Research Topic (DV)	Research Questions	Method (s)
<i><u>Food Sources</u></i>		
	1 Which sources are used by households on the reservation?	-Frequencies -distributions
	2 What respondent and household characteristics are associated with food source use?	-Cross-tabs -Binomial logistic regressions
	3 What characteristics are associated with using the most number of food sources?	-ANOVA
<i><u>Food Strategies</u></i>		
	4 How are food sources actually used in combinations in the Household?	-Cluster
	5 What respondent and household characteristics are associated with these food cluster strategies?	-Cross-tabs -Binomial Logistic Regressions
<i><u>Food Security</u></i>		
	6 What are the levels of food security for this population?	-Frequencies
	7 How do levels of food security vary across respondent and household characteristics?	-Cross-tabs -Multinomial Logistic Regression
	8 How does food source use relate to food security levels?	-Cross-tabs -Multinomial Logistic Regressions
	9 How does food strategy use relate to food security levels?	-Cross-tabs -Multinomial Logistic Regressions

logistic regressions and cluster analysis. These analyses are all performed using SPSS version 14. These different methodologies are discussed in the following subsections.

Frequencies

The first step in understanding patterns in the data is in the frequencies of the variables in which you are interested. A frequency is a simple count, or the number of times something occurred in our sample, indicating the range and distribution across the variable. It is important to know how often behavior is reported (or assessed) to gain a sense of context and to be able to begin the process of understanding more complex findings. In my analysis, frequencies are used to provide a starting point, context and a framework for interpreting the final results.

Cross-tabulations with Chi-square

Cross-tabs are useful to illuminate the relationship between two variables. Essentially, cross-tabs show the frequency counts across any two (or more) variables. In this analysis I compare percentages of frequency counts in a cross-tabulation of 6 demographic variables with three different dependent variables: food source use, cluster membership and food security level. I use the Pearson

Chi-square test of significance, with a p-value cut-off level of .05, for determining whether there are significant differences between groups across variables. A significant p-value (less than .05) associated with the Chi-square statistic indicates significant differences between the expected and the observed values in the analysis.

The Pearson Chi-square is the most common test for significance of the relationship between categorical variables. The value of the Chi-square and its significance level depends on the overall number of observations and the number of cells in the table. In fact, the only assumption underlying the use of the Chi-square, other than random selection of the sample, is that there are enough observations within each cell, because it tests the underlying probabilities in each cell. Without sufficient numbers in each cell, there is not enough power to run reliable analyses.

Analysis Of Variance (ANOVA)

In this project, a one-way (simple) analysis of variance (ANOVA) technique is used in the examination of food sources. The sixteen food sources are first recoded into a continuous count variable measuring the number of sources that each respondent uses. The six demographic characteristics are then

individually compared to this new continuous variable to see the mean food source use for each category. Post hoc analysis is conducted to look at the results in more detail.

Analysis of variance is used to test the null hypothesis that several means are equal. The one-way ANOVA compares differences in a continuous (interval) dependent variable among the categories, or groups of a single categorical independent variable. In addition to determining if differences exist among the means, post hoc tests compare the means across groups. The fundamental statistic in ANOVA is the F-test which tests the null hypothesis that there is no difference in a group of means. If the group means do not differ significantly then it is inferred that the independent variable did not have an effect on the dependent variable (Turner and Thayer 2001).

Like regression, ANOVA assumes that the dependent variable has a normal distribution for each value category of the independent variables (Iverson and Helmut 1987). One of the most important assumptions in ANOVA is that the groups formed by the independent variable(s) are relatively equal in size and have similar variances on the dependent variable (Iverson and Helmut 1987) which may present constraints at times.

Once differences among the means have been determined, post hoc range tests and pair-wise multiple comparisons can determine which means differ.

Range tests find homogeneous subsets of means that are not different from each other, while pair-wise multiple comparisons test differences between each pair of means, indicating significantly different group means at an alpha level of 0.05.

In this analysis the Scheffe and Tukey HSD tests were both used to look at the pairwise mean comparisons. Both of these tests are good ones for this analysis because they are very conservative pairwise comparison tests, in that they are more likely to accept the null hypothesis of no group differences (Turner and Thayer 2001). The Tukey method is preferred when the number of groups is large as this threatens to inflate Type I errors, while the Scheffe test is exact for unequal group sizes (Turner and Thayer 2001). This analysis controls for errors by comparing the results of these two tests. As the results are the same, we can be sure that there is no bias from unequal group sizes and/ or large numbers of groups.

Binomial Logistic Regression

Binomial logistic regression is used in this analysis to look at both food source use and cluster membership (see Table 5-3). Demographic variables

are regressed on food sources and cluster membership to find important predictors for food acquisition behavior at these two levels. In each of these two examinations, dependent variables are dichotomous measures (use/don't use food source and belong/don't belong to cluster).

Logistic regression is the primary tool used by researchers when dependent variables are dichotomous. In this analysis the dependent variables are the probability that an event will occur, therefore it is constrained between 0 and 1. As Pampel states in his primer on logistic regression, regression coefficients with a dichotomous dependent variable are valuable in that "they show the increase or decrease in the predicted probability of having a characteristic or experiencing an event due to a one-unit change in the independent variables" (2000:1-2).

Logistic regression is helpful in two main applications. First, it is used in the prediction of group membership. Results of logistic regression are in the form of an odds ratio because this technique calculates the probability of success over the probability of failure. This is helpful when the result of the analysis is the probability of belonging to a group or categories after controlling for other variables. Secondly, logistic regression provides information about the

relationships and strengths among the variables. In other words, analysts can see what variables are most likely to lead to the result (Menard 1995; Tabachnick and Fidell 1996).

Like all statistical analytical tools, logistic regression makes several assumptions. This method follows some of the assumptions of linear (OLS) regression, including the assumptions of independence (non-multicollinearity) and a linear relationship between the independent variables and the logged odds (logit) of the dependent variable. However, logistic regression is popular in part because it allows researchers to overcome many of the restrictive assumptions of OLS regression. Unlike OLS regression logistic regression does not assume linearity in the relationship between the independent variables and the dependent variable. Additionally, it does not require normally distributed variables or error terms, it does not assume homoscedasticity, and in general has fewer requirements than OLS or discriminant analysis (Tabachnick and Fidell 1996). Nevertheless, in spite of the fact that logistic regression does not have many assumptions it does require a larger sample size. Estimates for accurate hypothesis testing suggest that at least 50 cases per independent variable

might be required, especially when the dependant variable has many groups (Tabachnick and Fidell 1996).

Parameter estimates, or the b coefficients, are logits of predictor variables used to estimate the logged odds that the dependent variable equals 1 in binomial logistic regression, or that the dependent variable equals its reference value in multinomial logistic regression.

Multinomial Logistic Regression

Multinomial logistic regression is used in answering questions in part three of the research agenda. These questions seek understanding of household food security levels. First, multinomial logistic regression is used to look at the effect of respondent and household characteristics on food security levels. Likewise, it is used to evaluate the relationships of the food source use, and then food strategy cluster membership on the three levels of food security.

Much of the discussion in the above section on binomial logistic regression also applies for this method. As in binomial logistic regression, multinomial logistic regression works when dependent variables are discrete categories of group membership. However, in multinomial logistic regression the dependent variable has more than two categories. In this case the dependent variable,

food security, has three levels or groups. In multinomial logistic regression, each explanatory variable has $(k - 1)$ logits, where k is the number of categories in the dependent variable. Typically the k th category is the reference category (Tabachnick and Fidell 1996). However, in this analysis, the middle group is selected as a reference category to create thresholds of food security. In this analysis, food secure and food insecure with hunger categories are compared to the middle category of food insecure without hunger. This allows us to check for thresholds and differences in food sources across these three levels in more detail. In other words, by estimating the log odds that households will be food insecure without hunger (the middle category) we can more clearly establish the variables that make the most impact on whether households will achieve food security or experience hunger.

Cluster Analysis

One of the most interesting questions in this analysis has to do with the way that households organize their food sources. In order to understand how people and households combine food sources to seek food security, I perform a cluster analysis to identify observable groupings or 'acquisition strategies.' In

other words, I examine the data for patterns of combining food sources to see if there are some common ways that respondents work to secure food through multiple food source use.

Cluster analysis is largely a descriptive method. It is helpful for classification and is often used in medical, anthropological, political science and biological sciences (Aldenderfer and Blashfield 1984). Cluster analysis, also called segmentation analysis or taxonomy analysis, includes many different methodological procedures that seek to identify homogeneous subgroups within a sample. In other words, cluster analyses try to find a set of groups which both maximize between-group variation and minimize within-group variation (Aldenderfer and Blashfield 1984). There are several kinds of analysis that cluster variables and choosing an appropriate measure of association depends on the question and the data (Aldenderfer and Blashfield 1984).

Despite a wide array of clustering methods, clusters do have certain properties. Literature suggests examining 5 properties as relevant to the specific data and analysis. These include density, variance (dispersion), dimension (radius), shape and separation (degree of overlap or nearness of boundaries between clusters) (Aldenderfer and Blashfield 1984). Cluster analysis makes

several assumptions. First, this method assumes that all variables included are equally important and independent. It works better when it is used with more variables and those which are theoretically appropriate.

Due to the relatively large number of cases in my sample, I use K-Means cluster analysis to sort cases into groups according to patterns of food acquisition, or food source usage using the SPSS statistical software program. This is a non-hierarchical, iterative partitioning method that uses the Euclidean Distance-- the square root of the observed distance of each case from a cluster center --to calculate distances between all cases and initial centroids after k-number of clusters is specified (Aldenderfer and Blashfield 1984). This method seeks discrete groupings and does not allow for overlapping clusters. Means are given for each food source variable included in the analysis and can be interpreted as the relative importance of that variable for the cluster (SPSS). A new variable that represents the distance of each case is from the center of the cluster to which it is assigned is saved. With this variable, we are able to measure the deviation scores—or the degree of dispersion of each cluster. In addition, variables indicating cluster membership for each case are also saved in order to be used in further analysis.

Conclusion

Nine questions divided into three research sections are analyzed in this project as outlined in Table 5-3. Multiple research methods are used to investigate these question including frequencies, cross-tabulations, ANOVA, binomial logistic regression, multinomial logistic regression and cluster analysis. The assumptions of each method are outlined and addressed in this chapter and considered throughout the analysis. The findings from each question are elaborated in the following three chapters.

Chapter 6: Food Acquisition Sources

Food security is impacted by food acquisition, which can be a complex process. This investigation into food security and food acquisition strategies on the reservation begins with an effort to place food security within a context of food source use on the Northern Cheyenne reservation. This chapter will discuss the first three questions of this analysis interested in understanding the relationships between respondent and household characteristics and food source use (see Table 5-1). This analysis begins with frequencies and cross-tabulations and then uses a binomial logistic regression to predict food source use by demographic characteristics in an effort to understand who is most likely to use each of the 16 individual food sources for food. An analysis of variance then shows the relationships between respondent and household characteristics and the number of food sources used.

As previously discussed in the last chapter, this analysis uses both individual level data and household level data. In this section, five demographic variables describe characteristics about the individual member of the household that was interviewed. These variables are used to explore the relationships

between respondent characteristics and household food source use. One household level variable is also used to look at household food source use. As with all analysis of this type, certain limitations result from using individual level data to describe household events and it is important to keep in mind through this chapter.

Sixteen food sources are assessed in this analysis. Table 6-1 shows the frequencies and distributions of these variables for this sample. The livelihoods perspective introduces a framework for looking at these food sources as household resources or capitals. Fitting this framework to the sixteen sources that are measured in this analysis allows for a better understanding of the choices and daily negotiations that households make when using these sources for food. We can think of these food sources as assets that are on a continuum of stable to risky, with wages at one end and pawning at the other. Although this is not a perfect way to conceptualize the gamut of choices available to households, it presents a new way to start looking at household food provisioning.

Wages are easily seen as economic (financial) capital that can be used most easily to exchange for food. Social Security and Disability payments are examples of fixed income entitlements that are usually forms of stable income

Table 6-1 Frequency and Distribution of Food Source Use

	Total Use	%	Every Month	%	Some Months	%	1 or 2 Months	%	Don't Use	%
1 Wages	326	71	289	63	31	7	6	1	136	29
2 Commodities	143	31	91	20	35	8	17	4	319	69
3 Food Stamps	135	30	110	24	18	4	7	4	327	71
4 Family	132	29	63	14	57	12	12	3	330	72
5 Tribal Vouchers	129	28.5	25	5	73	16	31	7	333	72
6 Odd Jobs	116	25	59	13	43	9	14	3	346	75
7 WIC	107	24	100	22	4	.8	4	.8	354	77
8 Hunting	105	23	33	7	50	10	23	5	356	77
9 Pawning	99	22	43	9	36	8	20	4	363	79
10 Social Security	69	15	65	14	3	.6	1	.2	393	85
11 Food Bank	67	15	16	3	36	8	15	3	395	86
12 Crafts	60	13	25	5	24	5	11	2	402	87
13 General Assistance	43	9.5	28	6	6	1	9	2	419	91
14 Disability	40	9	36	8	4	.8	0	0	422	92
15 Gardening	37	8	8	2	17	4	12	3	425	92
16 Churches	33	7	8	2	17	4	8	2	429	93

Source: Food Security, Nutrition and Health Survey, 2001

as well. Other institutional income transfers are represented in the formal food and income programs including Food Stamps, WIC, FDPIR commodities, tribal vouchers and General Assistance. Each of these programs and resources varies in terms of rules and length of use and eligibility, and are not generally as stable as the income entitlements. Local, community and subsistence activities are perhaps riskier still. Cultural and physical capital is represented in using odd jobs, gardening, hunting and making crafts for food as they require labor and special knowledge. These sources are also arguably related to social capital as are family, churches the food bank and even perhaps tribal vouchers as sources of food. Finally, pawning for money to use for food is a good example of income smoothing and household resource depletion. By thinking of food sources as forms of capital resources, this analysis expects that households will use the food sources that reflect their assets and opportunity structures, or in other words the respondent and household characteristics.

Use of the 16 Food Sources on the Reservation

In an effort to be clear and organized, this chapter presents the results of these questions for the 16 food sources in order of the frequency of use as shown in Table 6-1. Wages are the most used food source followed by commodity

foods and Food Stamps. It is interesting to note the frequencies in which these food sources are reportedly used with some being important every month and others only some months. Table 6-1 reflects the frequency of use for all of the 16 food sources. Only 136 respondents indicate that they do not use wages at all for food. Of the 70% of respondents that use wages for food, 89% use wages “almost every month.” Commodity foods and Food Stamps are the next most used food sources with around 30-31% of respondents indicating that they have used them for food in the last 12 months. Family and tribal vouchers are also important for obtaining food with about 29% of respondents indicating that they use them as a source of food. On the other hand, fifteen percent or less indicate that they use the food bank, Social Security and crafts for food and less than ten percent of people indicate that they have used General Assistance, Disability, gardening and churches for food in the last 12 months. Because these are federal income programs, it is not surprising that Food Stamps, WIC, Social Security, and Disability programs in particular show that people who use them usually use them every month. For example, ninety-three percent of the people who indicate that they have used WIC in the last 12 months, and ninety-four percent

of those who say they have used Social Security say that they use it “almost every month.”

This section will look at the relationships between the 16 individual sources of food and the individual and household demographic variables. First the individual food sources are cross-tabulated with the descriptive categories and the Pearson’s Chi-square is used to show significant associations. Then 16 binomial logistic regression models show how demographic characteristics predict food source use. Due to the high level of variability within and between food source use, for this analysis we look only at whether participants use, or don’t use, these food sources for food in the last 12 months. Three food use categories including use 1 or 2 months, use some months, and use almost every month, were collapsed into one category measuring use of the food source by the household in the last 12 months. This is then compared to the never use category. In a few cases the numbers in the cells were still too small to reach conclusions and categories on the independent variable were collapsed for the analysis.

Table 6-2 Percentages of Food Source Use for Select Demographic Variables (n=460)

	Wages		Commodities		Food Stamps		Family		X ² sig	Use	X ² sig
	Don't use	Use	Don't use	Use	Don't use	Use	Don't use	Use			
Age											
18-24	14.2	12.6	14.8	13.2	16.2	14.5	13.3	9.2	0.180	0.000	26.5
25-34	24.6	17.8	27.5	24.9	23.9	21.9	31.1	24.5			25.0
35-44	22.4	18.5	24.1	21.5	24.6	21.9	23.7	19.9			28.8
45-54	19.8	14.1	22.2	19.6	20.4	22.5	13.3	23.5			10.6
55-64	10.0	18.5	6.5	11.0	7.7	10.2	9.6	21.2			4.5
65+	8.9	18.5	4.9	9.8	7.0	9.0	8.9	10.7			4.5
Gender									0.036		0.387
Female	55.4	55.6	55.4	52.2	62.2	52.3	63.0	56.7			52.3
Male	44.6	44.4	44.6	47.8	37.3	47.7	37.0	43.3			47.7
Education									0.000		0.523
> highschool	17.6	39.5	9.7	16.2	20.4	13.9	26.8	17.4			17.8
HS /GED	39.3	42.1	38.2	37.5	43.1	36.1	47.2	40.5			36.4
Some college/AA	35.3	16.7	42.0	36.5	32.8	40.3	22.8	33.2			40.3
College Degree	6.2	1.8	7.8	7.4	3.6	7.7	22.4	6.9			0.7
Graduate Degree	1.6	0.0	2.2	2.4	0.0	1.9	0.8	2.0			0.8
Employment									0.000		0.000
Full-time	37.3	0.8	51.1	40.6	30.2	46.3	15.0	42.8			24.0
Part-time	16.7	10.7	19.0	15.5	19.4	15.9	18.9	12.5			27.1
Seasonal/contract	14.9	14.9	15.0	14.9	15.1	13.0	19.7	15.7			23.2
Not employed	23.8	53.7	12.5	20.5	30.9	18.7	26.2	20.8			31.0
Retired	7.2	19.8	2.5	8.6	4.3	6.0	10.2	8.3			4.7
Marital Status									0.321		0.041
Married	50.6	36.6	56.1	53.3	44.5	52.1	46.9	53.7			43.1
Single	49.4	63.4	43.9	46.7	55.5	47.1	53.1	46.3			56.9
# of Children									0.001		0.194
0	29.1	43.7	23.1	29.6	28.2	33.8	17.8	32.3			21.2
1	14.3	10.4	16.0	15.4	12.0	13.8	15.6	14.3			14.4
2 or 3	36.1	28.1	39.4	34.9	38.7	36.0	36.3	34.1			40.9
4 or 5	15.4	12.6	16.6	16.0	14.1	12.3	32.0	14.6			17.4
6 or more	5.0	5.2	4.9	4.1	7.0	4.0	7.4	4.6			6.1

Table 6-2 cont.2

	Total		Tribal Vouchers		Odd Jobs		WIC		Hunting		Use	X ² sig
	Don't use	Use	Don't use	Use	Don't use	Use	Don't use	Use	Don't use			
Age	0.000											
18-24	14.2	17.3	6.2	21.6	11.7	10.8	25.2	12.4	20.0	0.013		
25-34	24.6	24.5	24.8	25.0	24.5	18.5	44.9	24.3	25.7			
35-44	22.4	21.8	24.0	31.0	19.5	24.1	16.8	21.2	26.7			
45-54	19.8	21.2	16.3	15.5	21.3	24.4	4.7	19.8	20.0			
55-64	10.0	8.5	14.0	5.2	11.7	11.4	5.6	11.3	5.7			
65+	8.9	6.7	14.7	1.7	11.4	10.8	2.8	11.0	1.9			
Gender	0.001											
Female	55.4	53.5	60.5	42.2	59.9	52.1	66.4	59.7	41.0	0.009		
Male	44.6	46.5	39.5	57.8	40.1	47.9	33.6	40.3	59.0	0.062		
Education	0.493											
> highschool	17.6	11.8	32.8	16.1	18.1	17.4	18.0	18.2	15.4	0.349		
HS/GED	39.3	37.9	42.9	39.3	39.3	36.6	48.0	41.3	32.7			
Some college/AA	35.3	41.4	15.3	40.2	33.6	36.3	32.0	32.8	43.3			
College Degree	6.2	7.0	4.2	3.6	7.2	7.8	1.0	6.1	6.7			
Graduate Degree	1.6	1.9	0.8	0.9	1.9	1.8	1.0	1.5	1.9	0.060		
Employment	0.000											
Full-time	37.3	48.3	8.9	13.3	45.6	38.7	32.7	38.2	34.6	0.209		
Part-time	16.7	16.0	18.7	12.2	12.2	15.0	22.8	14.5	24.0			
Seasonal/contract	14.9	13.2	19.5	24.8	11.6	14.4	16.8	14.2	17.3			
Not employed	23.8	16.9	41.5	27.4	22.5	23.8	23.8	24.6	21.2			
Retired	7.2	5.6	11.4	4.4	8.2	8.2	4.0	8.6	2.9	0.011		
Marital Status	0.224											
Married	50.6	52.4	45.9	41.6	53.7	47.1	61.3	51.8	46.5	0.355		
Single	49.4	47.6	54.1	58.4	46.3	52.9	38.7	48.2	53.5	0.003		
# of Children	0.089											
0	29.1	31.1	24.0	18.1	32.8	33.1	15.9	31.3	22.9	0.303		
1	14.3	14.5	14.0	15.5	14.0	15.0	12.1	14.6	13.3			
2 or 3	36.1	36.9	34.1	45.7	32.8	33.4	44.9	33.8	43.8			
4 or 5	15.4	13.9	19.4	16.4	15.1	13.6	22.4	15.2	16.2			
6 or more	5.0	3.6	8.5	4.3	5.2	5.1	4.7	5.1	4.8			

Table 6-2 cont.3

	Total		Pawning		Social Security		Food Bank		Crafts		Use	X ² sig
	Don't use	Use	Don't use	Use	Don't use	Use	Don't use	Use	Don't use			
Age	0.328											
18-24	14.2	13.9	15.2	4.3	15.9	4.3	15.6	6.0	14.0	15.0	0.001	
25-34	24.6	23.3	29.3	7.2	27.7	7.2	21.4	43.3	24.6	25.0	0.956	
35-44	22.4	21.7	25.3	5.8	25.4	5.8	22.7	20.9	22.8	20.0	0.001	
45-54	19.8	20.0	19.2	11.6	21.3	11.6	21.4	10.4	20.1	18.3	0.001	
55-64	10.0	11.1	6.1	29.0	6.7	29.0	9.2	14.9	9.5	13.3	0.001	
65+	8.9	10.0	5.1	42.0	3.1	42.0	9.7	4.5	9.0	8.3	0.001	
Gender	0.265											
Female	55.4	56.8	50.5	60.9	54.5	60.9	53.4	67.2	55.3	56.7	0.037	
Male	44.6	43.2	49.5	39.1	45.5	39.1	46.6	32.8	44.8	43.3	0.037	
Education	0.716											
> highschool	17.6	17.3	18.7	37.9	14.4	37.9	16.2	25.8	17.9	15.5	0.081	
HS/GED	39.3	38.5	40.7	32.8	40.3	32.8	38.0	46.8	39.5	37.9	0.081	
Some college/AA	35.3	35.4	35.2	22.4	37.3	22.4	37.7	21.0	35.2	36.2	0.081	
College Degree	6.2	6.4	5.5	6.9	6.1	6.9	6.5	4.8	5.9	8.6	0.081	
Graduate Degree	1.6	2.0	0.0	0.0	1.9	0.0	1.6	1.6	1.6	1.7	0.081	
Employment	0.000											
Full-time	37.3	43.1	16.7	9.7	41.8	9.7	40.4	19.0	39.7	21.1	0.008	
Part-time	16.7	15.3	21.9	6.5	18.4	6.5	16.1	20.6	15.8	22.8	0.008	
Seasonal/contract	14.9	15.3	13.5	9.7	15.8	9.7	15.0	14.3	15.3	12.3	0.008	
Not employed	23.8	18.5	42.7	37.1	21.6	37.1	21.4	38.1	21.6	38.6	0.008	
Retired	7.2	7.8	5.2	2.4	2.4	37.1	7.1	7.9	7.5	5.3	0.008	
Marital Status	0.351											
Married	50.6	51.8	46.4	37.9	52.5	37.9	50.3	52.4	51.1	47.4	0.756	
Single	49.4	48.2	53.6	62.1	47.5	62.1	49.7	47.6	48.9	52.6	0.756	
# of Children	0.158											
0	29.1	31.0	22.2	40.6	27.1	40.6	30.3	22.4	30.8	18.3	0.073	
1	14.3	15.0	12.1	11.6	14.8	11.6	15.5	7.5	15.3	8.3	0.073	
2 or 3	36.1	35.7	37.4	29.0	37.3	29.0	35.6	35.8	34.0	50.0	0.073	
4 or 5	15.4	13.6	22.2	11.6	16.1	11.6	14.0	23.9	15.0	18.3	0.073	
6 or more	5.0	4.7	6.1	7.2	4.6	7.2	4.6	7.5	5.0	5.0	0.073	

Table 6-2 cont.4

	Total		Gen Assist		Disability		Garden		Churches		X ² sig
	Don't use	Use	Don't use	Use	Don't use	Use	Don't use	Use	Don't use	Use	
Age	0.338										
18-24	14.2	18.6	13.7	18.6	15.5	0.0	13.7	18.9	15.0	3.0	0.154
25-34	24.6	20.9	25.0	20.9	26.5	5.0	25.4	16.2	24.6	24.2	
35-44	22.4	18.6	22.8	18.6	22.9	17.5	22.5	21.6	22.5	21.2	
45-54	19.8	23.3	19.5	23.3	20.5	12.5	19.0	29.7	20.0	18.2	
55-64	10.0	16.3	9.4	16.3	7.4	37.5	10.0	10.8	9.2	21.2	
65+	8.9	2.3	9.6	2.3	7.2	27.5	9.5	2.7	8.7	12.1	
Gender	0.361										
Female	55.4	48.8	56.1	48.8	55.7	52.5	55.3	56.8	55.7	51.5	0.638
Male	44.6	51.2	43.9	51.2	44.3	47.5	44.7	53.2	44.3	48.5	
Education	0.054										
> highschool	17.6	27.5	16.5	27.5	16.0	36.4	18.2	10.8	16.8	27.6	0.001
HS /GED	39.3	50.0	38.2	50.0	40.0	30.3	40.4	27.0	40.1	27.6	
Some college/AA	35.3	22.5	36.6	22.5	36.0	27.3	34.3	45.9	35.6	31.0	
College Degree	6.2	0.0	6.9	0.0	6.3	6.1	6.1	8.1	6.4	3.4	
Graduate Degree	1.6	0.0	1.8	0.0	1.8	0.0	1.0	8.1	1.0	10.3	
Employment	0.018										
Full-time	37.3	17.1	39.4	17.1	39.9	8.3	30.8	29.7	38.8	18.8	0.117
Part-time	16.7	22.0	16.2	22.0	18.2	0.0	15.8	27.0	16.3	21.9	
Seasonal/contract	14.9	24.4	14.0	24.4	15.8	5.6	15.1	13.5	14.9	15.6	
Not employed	23.8	34.1	22.7	34.1	21.4	50.0	23.7	24.3	23.4	28.1	
Retired	7.2	2.4	7.7	2.4	4.7	36.1	7.4	5.4	6.6	15.6	
Marital Status	0.683										
Married	50.6	47.5	50.9	47.5	51.3	43.2	51.0	45.7	51.5	38.7	0.171
Single	49.4	52.5	49.1	52.5	48.8	56.8	49.0	55.3	48.5	61.3	
# of Children	0.734										
0	29.1	30.2	29.0	30.2	26.9	53.5	30.0	18.9	27.6	48.5	0.099
1	14.3	14.0	14.4	14.0	15.0	7.5	13.9	18.9	14.8	9.1	
2 or 3	36.1	32.6	36.5	32.6	37.4	22.5	35.0	38.6	36.8	27.3	
4 or 5	15.4	14.0	15.6	14.0	15.7	12.5	15.8	10.8	15.9	15.2	
6 or more	5.0	9.3	4.6	9.3	5.0	5.0	5.2	2.7	5.4	0.0	

Cross-tabulations

By comparing the expected frequency in each cell with the observed frequency in each cell in a cross-tabulation, the Pearson's Chi-square tests the associative relationship among categorical variables. Using this statistical test, I cross-tabulated demographic variables with each food source. Table 6-2 shows the percentages and p-values for each relationship.

Using wages is significantly associated with respondent age, education, employment, marital status and number of children under 18 in the household. This means there are differences across these demographic variables in the way that wages are used. Percentages show that few people over the ages of 55 use wages for food in their households. In fact only a little more than 11% of people 55 and older report using wages as a source of food while they represent more nearly 19% of the sample. People who report using wages as a source of food in their households are more likely to have some college or an associate's degree with 42% as compared to 35% for the sample. Additionally, those who use wages as a source of food in their households report having college degrees and graduate degrees more often as compared to the sample.

Employment is intuitively related to use of wages for food, and indeed this analysis shows that people report wages as a source of food in their household are very likely to work full-time jobs with 50% of all people using wages for food reporting full-time work. However, percentages for part-time workers and seasonal workers are also above sample levels for people who use wages for food. Retired and unemployed people are far less likely to use wages for food. Percentages of households using wages for food for households with children in the home are slightly above sample levels. People who report using wages as a source of food in their household are more likely to be married than to be single.

The use of commodity food program as a source of food is associated with respondent gender and employment. Specifically, a disproportionate number of women are represented in households that use commodities with 62.2% as compared to 55.4 for the sample. Additionally, people who use commodity food programs are more likely to be unemployed (30.9%), or work part-time (19.4%), and less likely to work full-time (30.2%) as compared to sample distributions.

Household Food Stamp use is associated with gender, education, employment and number of children under 18 in the household. This means that

there are differences in the way Food Stamps are used for these demographic groups. Like those who use commodities, more women report household Food Stamp use (63%). A large percentage of Food Stamp users report having among the lowest levels of education. Percentages for Food Stamp users having a high school degree or GED are 47.2% and less than a high school degree is 26.8%. This compares to 39.3% high school/GED completion and 17.6% less than a high school degree for the sample. Surprisingly, levels of college completion for those who report household Food Stamp use are also relatively high with 22% compared to their 6% composition of the sample. People who report using Food Stamps for food in their households also report being unemployed or retired in higher numbers than in the sample. There are far lower percentages of full-time workers (15%) who use Food Stamps as a source of food compared to 37.3% for the sample. Finally, households who use Food Stamps as a source of food have more children in their homes as compared to the sample levels. For example, 17% report having no children under 18 in the home as compared to 29% for the sample, while 32% of those who use Food Stamps report having 4 or 5 children as compared to 15% for the sample.

Age, employment and marital status are significantly related to using family in their household as a source of food. This means there are differences across demographic variables in the way that family is used as a source of food. More people in the younger age categories report using family as a source of food for their households. For example, 26.5% of those using family as a source of food are between the ages of 18 and 24 as compared to the sample level of 14%. Those over the age of 55 are less likely to report using family as a source of food with 9% as compared to 19% sample representation. Only 24% of people who report using family as a source of food in the household also report working full-time as compared with 37.3% for the sample. In contrast, 27% of respondents who report using family as a source of food indicate that they work part-time (16.7% sample), 3.2% say they work seasonally (14.9% for the sample) and 31% are unemployed (23.8% for the sample). Additionally, more single people report using family as a source of food (57%) in their households as compared with the sample (49.4%).

Respondents that report using tribal vouchers as a source of food in their households are less educated, report higher percentages of unemployment or being retired, and are more represented in the older age categories. In fact,

nearly 29% of those who use tribal vouchers for food are over the age of 55 as compared to 19% for the sample. The majority of people who use tribal vouchers for food have a high school diploma or less education (75.5%) as compared to 57% in sample. Finally, 41.5% of those who use tribal vouchers are not employed as compared to 23.8% for the sample. Conversely, of those who use tribal vouchers as a source of food, only 8.9 percent report working full-time.

Working odd jobs as a source of food for the household is significantly associated with respondent age, gender, employment, marital status and number of children under the age of 18 in the household. Of those who report using odd jobs as a source of food, only 6.9% are over the age of 55, while nearly 19% of the sample are reflected in these age categories. A greater percentage of men report using odd jobs as a source of food (57.8%) compared with for the sample (44.6%). As we might expect, part-time and seasonal work is associated with using odd jobs as a source of food. Of those who report using odd jobs for food in their household, 30% report working part-time (16.7 sample) and nearly 25% report working seasonal or temporary jobs (14.9% sample). In contrast, only 13.3% report working full-time as compared to 37.3% in the sample. Respondents that living in households that use odd jobs as a source of food report being single

with 58.4% as compared to 49.4% for the sample. Finally, using odd jobs as a source of food is related to having children under the age of 18 in the home.

Forty-six percent of households that use odd jobs as a source of food have 2 or 3 children under 18 in the household.

Respondents that report household use of the Women Infants and Children program (WIC) as a source of food tend to be young, female, married and live in households with 2 to 5 children under 18 in the home. Specifically, 70% of those who report using WIC are under the age of 35 and only 8% are over the age of 55. This compares to about 40% and 19% for the sample. Sixty-six and a half percent of those who report using WIC are female compared with 55.4% for the sample and 61.3% report being married as compared with 50.6% for the sample. Of those who report using WIC as a source of food in their households, 44.9% report having between 2 and 3 children and another 22.4% report having between 4 and 5 children under 18 in the home totaling 67.3% as compared with 51.5% for the sample.

Using hunting as a source of food in the household is associated with age and gender and using pawning as a source of food at the household level is associated with employment. Of those who use hunting as a source of food, only

7% are over the age of 55 compared with 19% for the sample. Fifty-nine percent of those who use hunting are male compared with 44.6% of the sample. A higher percentage of respondents who report using pawning as a source of food in their households also report unemployment or part-time work as compared to the sample. Indeed, nearly 43% of those who use pawning as a source of food are not employed as compared to 23.8% for the sample, and 21.9% work part-time as compared with 16.7% for the sample. Conversely, only 16.7% of those who report using pawning as a source of food are employed full-time as compared to 37.3% for the sample.

Using Social Security as a source of food in the household is associated with respondent age, education, employment, and marital status. As we might expect, older age groups are represented-- specifically people older than age 55, and especially those older than 64. Of those that use Social Security for food, 29% are between the ages of 55 and 64, and 42% are over the age of 65 totaling 71% as compared to the combined 19% for these age categories in the sample. In addition, nearly 71% of those who report using Social Security for food have a high school degree or less of education as compared to 57% for the sample. Also as expected, the majority of those who use Social Security as a source of food are

Table 6-3 Summary Chi-Square Significance Values for the 16 Food Sources (n=460)

	N	%	Age	Gender	Education	Employment	Marital Status	# of Children
Wages	362	70	0.000		0.000	0.000	0.000	0.000
Commodities	143	31		0.037		0034		
Food Stamps	135	30		0.036	0.000	0.000		0.001
Family	132	29	0.000			0.000	0.041	
Tribal Vouchers	129	28.5	0.002		0.000	0.000		
Odd Jobs	116	25	0.000	0.001		0.000	0.027	0.029
WIC	107	24	0.000	0.009			0.011	0.003
Hunting	105	23	0.013	0.001				
Pawning	99	22				0.000		0.048
Social Security	69	15	0.000		0.000	0.000	0.039	
Food Bank	67	15	0.001	0.037		0.008		
Crafts	60	13				0.012		
General Assistance	43	9.5			0.054	0.018		
Disability	40	9	0.000		0.057	0.000		0.016
Gardening	37	8			0.005			
Churches	33	7			0.001			

Source: Food Security, Nutrition and Health Survey, 2001

not employed. Specifically, 37.1% of those who use Social Security as a source of food are unemployed and another 37.1% are retired. Finally, 62% of those who use Social Security as a source of food report being single as compared to 49.4% in the sample.

The use of food banks as a source of food for households is related to respondent age, gender and employment. Of those reporting using food banks as a source of food in their households, the majority are between the ages of 25 and 34 with 43.3% as compared to 24.6% for the sample. In addition, 67.2% of those using the food bank as a source of food are women compared to 55.4% for the sample. Thirty-eight percent of respondents who report using the food bank as a source of food in their households are unemployed and only 19% report having full-time jobs. This compares to the sample with 23.8% for being unemployed and 37.3% for those who work full-time.

Using crafts as a source of food in the household is related to respondent employment status. Specifically, of those who report using crafts as a source of food 38.6% report being unemployed, 22.8% report working part-time and 21.1% report full-time work. These percentages compare to 23.8% unemployed, 16.7% part-time work, and 37.3% full time work in the sample.

Using the General Assistance program for food in the household is associated with respondent education and employment. More people who report using General Assistance as a source of food are represented in lower education categories. Specifically, 77.5% report a high school degree or less education with no one reports a college degree or above. This compares to 57% of the sample who report having a high school diploma or less education. Additionally, respondents who report using General Assistance as a source of food in their households tend to be unemployed or work seasonally. In fact, of those who use General Assistance as a source of food, 34.1% are unemployed as compared to 23% for the sample and another 24.4% report working seasonal or temporary jobs compared to 23.8% for the sample. Conversely, 17% reported working full-time as compared to 37.3% for the sample.

Respondents who reporting using Disability payments as a source of food in the household tend to be older than 55, have less than a high school degree, unemployed or retired and have fewer children. Of those who use Disability for food 65% are over the age of 55 as compared to 19% for the sample. Thirty-six percent of those who use Disability for food have less than a high school certificate. Of those who use Disability for food, 50% are not employed and

another 36% are retired. This compares to 23.8% and 7.2% respectively for the sample. Finally, fifty-three percent of those who report using Disability as a source of food in the household report no children under 18 in the household.

Both gardens and churches as sources of food for the household are associated with respondent education. Both using gardens and churches as sources of food are associated with high educational levels. For example, 45.9% of those who use gardens as a source of food have attended some college, 8.1% have a college degree and another 8.1% have graduate degrees. This totals 62.1% of all those who use gardens as a source of food as compared to 43% in these categories across the sample. Of respondents who report using churches as a source of food in their households, 10.3% have graduate degrees as compared to 1.6% for the sample. However, it is also interesting to note that those without a high school degree are also more likely to use churches as a source of food. Nearly 28% of those who use churches as a source of food have less than a high school education as compared to 17.6% for the sample.

Table 6-3 shows the summary significance values across the different respondent and household characteristics. Twelve of the sixteen food sources were associated with respondent employment status making it the

Table 6-4 .1 Logit and Odds Ratios for Selected Demographic Groups^s on Food Sources (reference groups) (n=460)

	Model 1- Wages		Model 2- Commodities		Model 3- Food Stamps		Model 4- Family	
	Exp (B)	B	Exp (B)	B	Exp (B)	B	Exp (B)	B
<i>Constant</i>	8.383		-5.020		-.846**		-.845**	
<i>-2Log Likelihood</i>	239.850		481.728		400.383		432.109	
<i>Model X²</i>	208.361***		28.124		82.900***		66.854***	
	Exp (B)	B	Exp (B)	B	Exp (B)	B	Exp (B)	B
Age (18-24)								
25-34	1.405	.340	.763	-.310	1.436	.362	3.59**	-1.024
35-44	.662	-.412	1.071	.068	1.383	.324	.565	-.570
45-54	.959	-.042	1.010	.010	1.011	.011	.181***	-1.709
55-64	.642	-.443	.674	-.395	.553	-.592	.171**	-1.766
65+	1.378	.321	.570	-.562	.185*	-1.687	.087**	-2.439
Gender (Female)								
Male	1.240	.215	.630*	-.461	.554*	-.591	1.220	.199
Education (<HS)								
HS /GED	1.873	.628	.814	-.206	.789	-.237	.701	-.355
Some college/AA	5.852***	1.767	.606	-.500	.345**	-1.063	1.265	.235
College Degree	4.659	1.539	.438	-.825	.324	-1.127	1.052	.051
Grad Degree	182152670.5	19.020	.000	-20.628	.839	-.175	.884	-.123
Employment (Full-time)								
Part-time	.000	-19.211	1.566	.448	3.342***	1.207	3.909***	1.363
Seasonal/Temp	.000	-19.829	1.274	.242	5.484***	1.702	1.345	.296
Not employed	.000	-21.327	1.934*	.660	5.238***	1.656	2.972***	1.089
Retired	.000	-21.902	.599	-.513	17.706***	2.874	3.802	1.336
Marital Status (Married)								
Single	.360**	-1.023	1.429	.357	1.738*	.553	1.822**	.600
# of Children (0)								
1	2.613	.961	.840	-.174	2.786*	1.024	1.381	.323
2 or 3	1.895	.639	1.056	.055	2.632**	.968	1.648	.500
4 or 5	3.085*	1.127	.799	-.224	4.651***	1.537	2.074	.730
6 or more	.298	.821	1.426	.355	4.595**	1.525	2.640	.971

Table 6-4 cont.2

	Model 5- Tribal Vouchers		Model 6- Odd Jobs		Model 7- WIC		Model 8- Hunting	
	Exp (B)	B	Exp (B)	B	Exp (B)	B	Exp (B)	B
<i>Constant</i>	-.793*		-1.261***		-1.963***		-1.464***	
<i>-2Log Likelihood</i>	363.714		368.336		340.206		413.119	
<i>Model X²</i>	106.018***		101.395***		101.031***		39.605**	
	Exp (B)	B	Exp (B)	B	Exp (B)	B	Exp (B)	B
Age (18-24)								
25-34	3.072*	1.122	.931	-.072	.755	-.281	.771	-.260
35-44	4.290**	1.456	1.558	.443	.143***	-1.946	1.030	.029
45-54	3.577**	1.274	.838	-.177	.065***	-2.733	.825	-.192
55-64	3.744*	1.320	.414	-.881	.096**	-2.345	.397	-.925
65+	7.134**	1.965	.062**	-2.783	.018**	-3.993	.085*	-2.461
Gender (Female)								
Male	.754	-.282	2.137**	.760	.393**	-.935	2.398***	.875
Education (< HS)								
HS/GED	.572	-.558	1.163	.151	1.264	.235	.598	-.514
Some college/AA	.292**	-1.231	2.112	.748	.736	-.306	1.235	.211
College Degree	.566	-.570	.818	-.201	.194	-1.640	1.019	.019
Grad Degree	.718	-.331	2.338	.849	1.908	.646	.882	-.125
Employment (Full-time)								
Part-time	6.921***	1.933	9.952***	2.298	1.613	.478	1.639	.494
Seasonal/Temp	9.059***	2.204	8.711***	2.165	1.613	.478	1.168	.155
Not employed	13.507***	2.603	5.541***	1.712	.790	-.236	.960	-.041
Retired	4.070*	1.404	26.221***	3.267	4.052	1.399	1.252	.225
Marital Status (Married)								
Single	1.676	.517	2.797***	1.028	.546*	-.605	1.645*	.498
# of Children (0)								
1	2.507*	.919	2.837*	1.043	.946	-.055	1.267	.237
2 or 3	2.152*	.766	4.485***	1.501	1.964	.675	1.945*	.665
4 or 5	2.908**	1.068	2.424*	.885	3.030*	1.108	1.782	.578
6 or more	4.280**	1.454	2.341	.851	1.573	.453	1.554	.441

Table 6-4 cont.3

	Model 9- Pawning		Model 10- Social Security		Model 11- Food Bank		Model 12- Crafts	
	Exp (B)	B	Exp (B)	B	Exp (B)	B	Exp (B)	B
<i>Constant</i>	-5.127***		-5.674		-1.963***		-1.609***	
<i>-2Log Likelihood</i>	372.476		165.111		265.296		291.465	
<i>Model X²</i>	48.939***		117.443***		60.173***		30.324*	
	Exp (B)	B	Exp (B)	B	Exp (B)	B	Exp (B)	B
Age (18-24)								
25-34	1.314	.273	1.534	.428	4.792**	1.567	1.046	.145
35-44	1.479	.391	.959	-.042	1.689	.524	.830	-.186
45-54	1.543	.434	2.492	.913	1.374	.318	.981	-.019
55-64	.553	-.593	16.648**	2.812	1.694	.527	1.385	.326
65+	.433	-.836	67.399***	4.211	.157	-1.852	.886	-.121
Gender (Female)								
Male	1.448	.370	.735	-.307	.409**	-.895	.978	-.022
Education (< HS)								
HS /GED	1.041	.041	1.783	.578	1.096	.092	1.782	.578
Some college/AA	1.177	.163	1.721	.543	.456	-.785	2.079	.732
College Degree	1.458	.377	7.099*	1.960	1.292	.257	4.325*	1.465
Grad Degree	.000	-18.726	.000	-18.123	3.096	1.130	4.959	1.601
Employment (Full-time)								
Part-time	3.638***	1.291	2.312	.838	2.608*	.958	3.461**	1.241
Seasonal/Temp	2.096	.740	6.002*	1.792	2.232	.803	1.995	.691
Not employed	5.903***	1.775	12.608***	2.534	3.864**	1.352	4.777***	1.564
Retired	3.602	1.282	17.736***	2.876	6.907	1.933	3.969	1.379
Marital Status (Married)								
Single	1.755*	.562	1.440	.365	1.475	.389	1.318	.276
# of Children (0)								
1	1.408	.342	.531	-.632	.880	-.128	1.279	.246
2 or 3	1.718	.541	1.959	.673	2.170	.755	3.265**	1.183
4 or 5	2.665*	.980	1.735	.551	3.898**	1.361	3.002*	1.099
6 or more	2.408	.879	3.357	1.211	3.758	1.324	2.781	1.023

Table 6-4 cont.4

	Model 13- General Assist		Model 14- Disability		Model 15- Garden		Model 16- Church	
	Exp (B)	B	Exp (B)	B	Exp (B)	B	Exp (B)	B
<i>Constant</i>	-9.774		-16.235		-2.158***		-6.077	
<i>-2Log Likelihood</i>	220.213		114.861		217.649		168.155	
<i>Model X²</i>	27.379		93.933***		20.633		24.920	
	Exp (B)	B	Exp (B)	B	Exp (B)	B	Exp (B)	B
Age (18-24)								
25-34	.668	-.403	32516252	17.297	.679	-.386	5.973	1.787
35-44	.938	-.064	1299874	18.683	.966	-.034	5.489	1.703
45-54	1.318	.276	5263156	17.779	1.768	.570	6.583	1.884
55-64	2.228	.801	38715180	19.774	.862	-.149	4.776	1.564
65+	.352	-1.044	100223258	18.423	.220	-1.515	3.241	1.176
Gender (Female)								
Male	1.204	.186	2.174	.777	1.045	.044	1.286	.251
Education (< HS)								
HS/GED	.802	-.321	.483	-.728	.846	-.167	.508	-.678
Some college/AA	.410	-.892	.911	-.994	1.892	.638	.693	-.367
College Degree	.000	-19.284	2.219	.756	1.982	.684	.466	-.763
Grad Degree	.000	-19.176	.000	-17.643	11.571*	2.448	10.294*	2.332
Employment (Full-time)								
Part-time	3.108*	1.134	.000	-17.289	2.202	.789	2.848	1.047
Seasonal/Temp	3.901*	1.361	.000	-16.839	1.739	.553	1.878	.630
Not employed	2.427	.887	11.200***	2.416	2.128	.755	2.711	.997
Retired	1.111	.106	22.527***	3.115	5.191	1.647	4.134	1.419
Marital Status (Married)								
Single	1.268	.238	2.555	.813	1.415	.347	2.625*	.965
# of Children (0)								
1	1.323	.280	.117	-2.148	2.340	.850	.547	-.604
2 or 3	1.243	.217	.467	-.762	2.836	1.042	.619	-.480
4 or 5	.754	-.282	.387	-.949	1.498	.404	1.035	.035
6 or more	2.576	.946	.420	-.867	1.092	.088	.000	-18.960

Source: Food Security, Nutrition and Health Survey, 2001

Missing variables originally included in models were deleted due to insignificance
 Values that are statistically significant are distinguished in bold type. *p<.05, **p<.01, ***p<.001

most significant demographic characteristic associated with food source use. In general as we might expect, except for wages, those who are under or unemployed tend to report food source use in their households more frequently. Respondent age and education are also frequently significant as demographic characteristics associated with food source use in this examination. More than half of the food sources are associated with these characteristics however, unlike employment these characteristics vary considerably in how they are distributed across food sources. Although in general, respondents in younger age categories seem to be represented in households that use the majority of food sources, there are some notable and expected exceptions.

For example, the majority of people who report using Social Security and Disability as sources of food in the household are 55 and older. Additionally, those who report the use wages tend to be in the middle age categories.

Respondent educational attainment is generally at the high school and less than high school levels across food sources although there are two striking exceptions: college and graduate education is associated with using gardens and graduate education is associated with using churches for food.

Respondent gender and marital status, and the number of children under 18 in the household are only significant for about a third of the food sources. Women respondents are more likely to report using commodity foods, Food Stamps, WIC, and the Food Bank as sources of food in their households. On the other hand, men tend to be more likely to report using hunting and odd jobs as sources of food in their households. Married people report using wages and WIC as sources of food in their households and those who are single report using family, off jobs and Social Security more often. As we might expect, households that use Food Stamps and WIC have more children under 18 in the home, while households who use Disability are the least likely to have children in the home. Using wages and odd jobs for food are also associated with the number of children in the home, typically between 2 and 3 children under 18 at home. While this analysis provides some interesting findings about how these six characteristics are associated with food source use, the next section looks at how they predict food source use to see if there are additional patterns that provide more detail in answering this question.

Binomial Logistic Regressions

Binomial logistic regression models were constructed in order to predict the use or non-use of each of the 16 food sources by demographic characteristics. Table 6-4 shows the results of these regressions. Significant findings are presented in bold.

The first model predicts the use or non-use of wages as a source of food in the last 12 months. The overall model is significant; however, only a few demographic categories are significant. Not surprisingly, the odds of using wages as a source of food in the household are 5.9 times higher for respondents who have some college or an associate's degree than for those who have less than a high school degree. Additionally, the odds of using wages for food in the household are 64% lower for respondents who are single than for those who are married. However, the odds of using wages for food is 3.1 times higher for those who have 4 or 5 children under 18 in the home than for those who have no children in the home.

Surprisingly, although employment is significant overall, it is not significantly different as a predictor of using wages for food across employment categories as compared to full-time work. As demonstrated in Table 6-2 and

in the cross-tabulations above, wages are reportedly used by people and households across employment categories. This is partly due to the ways that these variables are measured, with food source use being measured over the last 12 months and employment only over the last 6 months. Additionally, past research with this population indicates that households may use wages from outside the household. In other words households without direct access to wages through employment sometimes receive wages through redistribution of resources across household boundaries (see Hiwalker et al 2001). Perhaps due to the popularity of this food source, using wages does not significantly differ by employment. In other words, there is not enough variation in using wages across employment categories in comparison to full-time work.

The second model, looking at the use and non use of commodities as a source of food in the last 12 months has a model chi-square that is not statistically significant. This means that there is not enough explanatory power in this model to interpret the individual effects of the demographic characteristics.

Model three predicts the use and non-use of Food Stamp use in the last 12 months and is significantly predicted by respondent age, education, employment, marital status as well as the number of kids in the household.

The odds of using Food Stamps in the household are 81.5 percent lower for respondents 65 yrs or older than for those between the ages of 18-24.

Additionally, the odds of those who use Food Stamps having some college or an associate's degree is 65.5 percent lower than those that have less than a high school degree. The odds that people who use Food Stamps in their households as a source of food have a full-time job are very low. Indeed, the odds of using Food Stamps as a source of food is 3.3 times higher for those who work part-time, 5.5 times higher for those who work seasonal or temporary jobs, 5.2 times higher for those who are unemployed and 17.7 times higher for retired people than for those who have full-time employment. The odds of household Food Stamps use are 1.7 times higher for those who are single than for those who are married.

However, respondents who report using Food Stamps as a source of food in their households are also likely to have children under 18 in the household. The odds of Food Stamp use are 2.8 times higher for households who have 1 child, 2.6 times higher for those who have 2 or 3 children, 4.7 times higher for those who have 4 or 5 children, and 4.6 times higher for those who have 6 or more children in the home as compared to households with no children.

In the fourth model predicting using family as a source of food in the last 12 months, age, employment and marital status appear to be significant. In fact, the odds of using family as a source of food in the household are 3.6 times higher for those between the ages of 25-34 than for those between the ages of 18-24. Similarly, the odds of using family as a source of food are .18 times or 82% lower for those between the ages of 45-54, and .17 times or 83% lower for those who are between the ages of 55-64, and .09 times or 91% lower for those who are over 65 as compared to those who are between the ages of 18-24. Therefore it appears that those most likely to use family as a source of food in the household are between the ages of 18-34. The odds of using family as a source of food are 3.9 times higher for those who work part-time and 3 times higher for those who are not employed than for those who work full-time. Finally, the odds of using family as a source of food are 1.8 times higher for those that are single as compared to those that are married.

Model 5 predicts the use of tribal vouchers as a source of food in the last 12 months. Respondent age, education, and employment, as well as the number of children under 18 in the home are all predictors of using tribal vouchers as a source of food in the household over the last 12 months. The odds of using tribal

vouchers as a source of food are 3.1 times higher for people between the ages of 25 and 34 as compared to those between the ages of 18 and 24. The odds of using tribal vouchers for food are 4.3 times higher for those between the ages of 35 and 44, 3.6 times higher for those 45 to 54, 3.7 times higher for people between the ages of 55 and 64 and 7.1 times higher for those over 65 as compared to people between the ages of 18 and 24. Therefore, it appears that people who use tribal vouchers as a source of food in their households are more likely to be in the older age categories. The odds of using tribal vouchers as a source of food are 70% lower for those who have some college as compared with those with less than a high school degree. Although other educational categories are not statistically significant, the pattern suggests that besides those with less than high school education, people with some college are the least likely to use tribal vouchers for food. Employment is also a strong predictor of using tribal vouchers. The odds of using tribal vouchers for food is 6.9 times higher for those who work part-time, 9.1 times higher for those who work seasonal or temporary jobs, 13.5 times higher for those without any job, and 4.1 times higher for those who are retired as compared to those who work full-time jobs. Having children under 18 in the home is also associated with using tribal vouchers as a source of food.

Compared with those who have no children, the odds of using tribal vouchers for food is 2.5 times higher for those who have 1 child in the home, 2.2 times higher for those with 2 or 3 children in the home, 2.9 times higher for those with 4 or 5 children in the home and 4.3 times higher for those with more than 6 children under 18 in the home.

Model 6 looks at the use of odd jobs as a source of food in the household over the last 12 months. Using odd jobs is predicted by respondent age, gender, and marital status, as well as the number of children under 18 in the home.

Compared with those who are between the ages of 18 and 24, the odds of using odd jobs as a source of food are 94% lower for people over 65. In addition, the odds of using odd jobs as a source of food are 2.1 times higher for men than for women. The odds of using odd jobs as a source of food are higher for those without full-time work. Specifically, this is 10 times higher for those who work part-time, 8.7 time higher for those who work seasonal and temporary jobs, 5.5 times higher for those without employment and 26.2 times higher for those who are retired. Single people are 2.8 times more likely to report using odd jobs in their households for food as compared to those who are married. Finally, as compared to households without children under 18 in the home, the odds of

using odd jobs as a source of food is 2.8 times higher for households with 1 child in the home, 4.5 times higher for those with 2 or 3 children, and 2.4 times higher for those with 4 or 5 children in the home.

Model 7 predicts using WIC as a source of food in the household over the last 12 months. Using the Women Infants and Children (WIC) program for food is predicted by respondent age, gender, and marital status, as well as number of children under 18 in the home. Compared to those between the ages of 18 and 24, the odds of using WIC for food is 86% lower for those between the ages of 35 and 44, 93.5% lower for those between the ages of 45 and 54, 90.4% lower for those between the ages of 55 and 64 and 98.2% lower for those over 65. Additionally, the odds of using WIC are 60.7% lower for men than for women and 45.4 percent lower for single people than for those who are married. The odds of using WIC are 3 times higher for households who have 4 or 5 children in the home as compared to those without children under 18 in the home. This shows the use of WIC by a younger, female group, which reflects the targeted profile of the program of young mothers, and those with young children.

Model 8 looks at hunting use as a source of food for the household in the last 12 months. When predicting the use of hunting as a source of food,

respondent gender and marital status are significant, as well as age and the number of children under 18 in the household. The odds of using hunting as a source of food is 91.5% lower for those over the age of 65 as compared to those between the ages of 18 and 24. Additionally, men are 2.4 times more likely than women to use hunting as a source of food. The odds of using hunting as a source of food are 1.6 times higher for single people than for those who are married. Finally, the odds of using hunting as a source of food is 1.9 times higher for those with 2 or 3 children as compared to those without children under 18 in the home.

Model 9 shows that using pawning as a source of food in the household over the last 12 months is predicted by respondent employment status and the number of children under the age of 18 in the household. The odds of using pawning as a source of food is 3.6 times higher for those who work part-time, and 5.9 times higher for those who are not employed as compared to those who work full-time. Additionally, the odds of using pawning as a source of food are 2.7 times higher for those who have 4 or 5 children as compared to those without children under 18 in the home.

Model 10 shows the predictors of using Social Security as a source of food for the household over the last 12 months. As we might expect, using

Social Security as a source of food is predicted by respondent age, education, and employment. The odds of using Social Security as a source of food are 16.6 times higher for those between the ages of 55 and 64 and 67.4 times higher for those over the age of 65 as compared to those between the ages of 18 and 24. Compared to those without a high school degree, the odds of using Social Security as a source of food in the household is 7.1 times higher for respondents who have some college education. Additionally, the odds of using Social Security as a source of food are 6 times higher for those who work seasonally, 12.6 times higher for the unemployed and 17.7 times higher for those who are retired as compared to those who work full-time.

Using the food bank as a source of food in the household is predicted by respondent age, gender, employment, as well as the number of kids in the household as shown in model 11. The odds of using the food bank as a source of food are 4.7 times higher for those between the ages of 25 to 34 than those 18 to 24. Additionally, the odds of using the food bank as a source of food are 59% lower for men than for women. The odds of using the food bank as a source of food are 2.6 times higher for those who work part-time and 3.9 times higher for those who are unemployed as compared to those who work full-time. Finally,

the odds of using the food bank as a source of food are 3.9 times higher for households with 4 or 5 children under the age of 18 in the home as compared to those without children in the home.

Model 12 shows how crafts are used as a source of food in the household over the last 12 months. Craft use is predicted by respondent education, employment, as well as the number of children under 18 in the household. The odds of using crafts as a source of food are 4.3 times higher for those who have a college degree than for those without a high school diploma. Likewise, the odds of using crafts as a source of food are 3.5 times higher for those who work part-time, and 4.8 times higher for those who are not employed as compared to those who work full-time. Additionally, compared to those without children in the home, the odds of using crafts as a source of food is 3.3 times higher for those who have 2 or 3 children in the home and 3 times higher for those with 4 or 5 children under the age of 18 in the home.

Model 13, looking at household General Assistance use over the last 12 months is not a statistically significant model. Model 14 looks at Disability as a source of food for households over the last 12 months. The use of Disability for food is predicted by respondent employment level. In fact, the odds for using

Disability payments as a source of food are 11.2 times higher for those who are not employed and 22.5 times higher for those who are retired as compared with those who work full-time. Finally, models 15 and 16 are not statistically significant.

Models 2, 13, 15, and 16 did not have model Chi-square p-values values that reached statistical significance, indicating that these models did not have enough explanatory power to predict the use of commodities, General Assistance, gardening and churches as sources of food. The 12 statistically significant models show how respondent and household demographic characteristic predict food source use. Overall, respondent employment is significant in 9 of the 12 models, respondent education and the number of children under 18 in the home were significant in 7 models, respondent age was significant in 8 models, respondent marital status was significant in 6 models and respondent gender was significant in 4 models.

In general, full-time respondent employment was related to less use of food sources. As we might expect, the exception to this is using wages as a source of food in the household, which appears to be important for all employment categories. Respondents who are retired have the highest odds for

using food sources overall. This is especially true for households that use Food Stamps, odd jobs, Social Security and Disability for food. Again this is perhaps not surprising given that these food sources are generally more available to respondents that are older and retired. Excluding those who are retired, those with part-time jobs are the most likely to use odd jobs as a source of food as compared to those who work full-time. Unemployed respondents appear to be most likely to use tribal vouchers, Social Security and Disability payments as compared to those who work full-time.

Respondent education is a bit more complicated. Respondent reporting some college is associated with households using wages, a college degree is associated with using Social Security and crafts, and graduate education is associated with using gardening and churches. In contrast, respondents with some college are less likely than those without a high school degree to use Food Stamps.

Having children under 18 in the household is especially connected with using Food Stamps, tribal vouchers, and odd jobs as sources of food. In general, more children under 18 in the household is related to higher use of food sources in the household, especially when compared to households without children

under 18 in the home. This is especially true for households with more than 4 children under 18 in the household.

It appears that respondent age has interesting and varied relationships to household food source use. Generally, older age groups report using tribal vouchers and Social Security more, and younger age groups are more likely to use family and the food bank as household sources of food. Additionally, the likelihood of using WIC decreases with respondents who are older than 24. Finally, odd jobs, Food Stamps and hunting appear to be unlikely sources of food for those over age 65. Furthermore, single respondents appear more likely to use Food Stamps, family, and odd jobs as sources of food in the household, while married respondents are more likely to use wages and WIC. Male respondents are more likely to use odd jobs and hunting as sources of food in their households and female respondents report likelihoods of using commodities, WIC, and the food bank.

Number of Food Sources Used

This section builds on the previous section by looking the food sources in a different way. It is very likely that people and households are not using sources

Table 6-5 Means, Standard Deviations, and One-way ANOVA for the Number of Food Sources Used

Variable	Mean	Standard Deviation	F	Significant Mean Differences (SD)	Homogeneous Groups
Age			1.951		
18-24	3.87	2.19			1
25-34	3.84	2.36			1
35-44	3.67	2.34			1
45-54	3.02	2.32			1
55-64	3.56	2.34			1
65+	3.15	1.56			1
Gender			.024		
Female	3.56	2.22			
Male	3.53	2.36			
Education			1.315		
> HS	3.97	2.16			1
HS/GED	3.62	2.21			1
Some College	3.44	2.38			1
College degree	2.93	2.54			1
Graduate degree	3.14	2.79			1
Employment			15.903***		
Full-time	2.55	1.87			1
Part-time	4.45	2.31		FT= 1.89*** (.30)	2
Seasonal/Temporary	3.86	2.15		FT= 1.31*** (.31)	2
Unemployed	4.32	2.47		FT= 1.77*** (.26)	2
Retired	3.63	1.91			2
Marital Status			1.828		
Married	3.43	2.18			
Single	3.73	2.40			
# of children >18			4.950***		
0	2.93	1.95			1
1	3.30	2.33			1, 2
2-3	3.84	2.39		0= .911** (.26)	1, 2
4-5	4.08	2.29		0= 1.16** (.32)	2
6 or more	4.17	2.18			2

Source: Food Security, Nutrition and Health Survey, 2001

Values that are statistically significant are distinguished in bold type. *p<.05, **p<.01, ***p<.001

independently. Rather than focus on the specific food sources themselves, this section answers the question of how many sources are used together for different respondent and household demographic characteristics. By creating one variable that counts the number of food sources used by each respondent, we can look at how these distributions look across demographic groups. Six simple analysis of variance (ANOVA) tests are used to compare the means of the number of food sources used by demographic characteristics and to evaluate whether there are significant differences between the means. Post hoc analysis, using both the Tukey's honestly significant difference (HSD) and Scheffe tests are used to see how the means differ across categories within each demographic variable. Both tests show identical results and they are presented with the ANOVA results in Table 6-5.

ANOVA

Significant differences in mean number of food sources used in the household were found across categories of respondent employment and the number of children in the household. Additionally, post hoc pair-wise differences were significant ($p=.05$) among some levels or categories of

employment and number of children under 18 in the household. The other variables were not significant in this analysis.

Respondents who report full-time employment show a mean of 2.5 food sources, while those with part-time work show almost double the number of food sources with a mean of 4.5 food sources in the household. Respondents that work seasonally and/or temporary jobs have a mean of 3.9 food sources in their households. A mean of 4.3 food sources is reported for respondents without work and those who are retired use an average of 3.6 food sources in the household. Two homogeneous groups emerged in post hoc testing. Full time work represents the first group and the other four categories, including part-time work, seasonal/temporary work, unemployed and retired, grouped separately. Pair-wise comparisons reveal that there is a significant difference between full-time workers and those who work part-time with a mean difference of 1.9, seasonally/temporary with a mean difference of 1.3, and unemployed respondents with a mean difference of 1.7 in terms of how many food sources they use in the households as compared with those who report full-time work.

It appears that households with more children tend to use more sources of food in the household. In fact, households without children report a mean

of 2.9 food sources, households with 1 child show a mean of 3.3 food sources, those with 2 or 3 children use an average of 3.8 food sources, households with 4 or 5 children use an average of 4.1 food sources and those with more than 6 children use 4.2 food sources on average in the household. The groups of homogeneous means show an overlap of two categories. Households with 0, 1, and 2 or 3 children form group 1 while group 2 consists of households with 1 or more children. Pair-wise comparisons flesh this out a bit further showing that households with 2 or 3 children have a mean difference of .91 more food sources than those without children. Additionally, households with 4 or 5 children show a mean difference of 1.2 more food sources as compared to households without children.

This analysis shows that the number of food sources used in households differs by respondent employment status and the number of children under the age of 18 in the home. Full-time work is obviously important for being able to secure food through the use of wages, but this analysis shows that it also means using fewer total sources. Additionally, the number of children in the household is relevant to the number of food sources used. Households with more children in the home also use more food sources. Overall, most of the descriptive

variables were not significant indicating that there were no differences between the means of the categories within the variables. In other words, the number of food sources used by a household was not related to categories of respondent age, education, gender, or marital status.

Discussions and Conclusions

As we see in Table 6-1 there is variation in how the households represented by the survey participants use the food sources that are available to them. Clearly, wages are important to the acquisition of food for the Northern Cheyenne Reservation population. Households in this sample report using wages far more often than any other source of food. Additionally, as might be expected, food programs are often used by households to obtain food. This includes USDA commodity foods (2), Food Stamps (3), tribal vouchers (5), WIC (7), and less often the Northern Cheyenne food bank (11). Other informal sources that are particularly important in terms of frequency of use are family (4), odd jobs (6), hunting(8), and pawning (10).

Besides documenting the sources of food used by households, this chapter is primarily interested in understanding the relationships between food source use and respondent and household characteristics. Specifically, is the acquisition

of food through food sources significantly different for different household and respondent characteristics? Frequencies, cross-tabulations, binomial logistic regressions and analysis of variance are used to answer this question.

This analysis supports the research expectation that food source use is mediated by available resources and access and is consistent in bivariate and multivariate analyses. For example, older age categories are overwhelmingly represented as respondents that indicate household use of Social Security and Disability for food, while hunting, doing odd jobs and Food Stamps appear to be unlikely sources of food for this group. This reflects the expectation that older respondents are more likely to be retired with access to fixed income entitlements and reluctant to engage in physically strenuous activities to secure food. Likewise, female respondents report using commodity foods, WIC, and the food bank as sources of food in their households, while male respondents are more likely to report using odd jobs and hunting, reflecting gender norms and program requirements. Having children under the age of 18 at home is associated with using more food sources, as we might expect given the increasing demand for food in these households.

Clearly there is a division between those who are employed full time and those who work part-time and seasonal work, are retired or are not employed. This is intuitive given the context of work and opportunity in this reservation community. Households with respondents indicating that they have full time work are more likely to use wages for food, while those working part-time are more likely to report using odd jobs for food. This is expected given our assumption that households will use the food sources that are available to them.

Using the livelihoods perspective to understand the different types of food sources, we can see that as we expected, households used the characteristics that reflected their capitals and capabilities. It also appears that households will use the most “productive” or reliable food sources first. For example, households with respondents that have higher levels of education and full-time work are more likely to use wages for food. However, it is difficult to completely tease this out, in part because this analysis looks only at whether households use a food source and does not differentiate across levels of use. More refined research looking more closely at the levels of use would be a great addition to this preliminary analysis.

Chapter 7: Food Acquisition Strategies

Hungry households are faced with choices about how to fulfill their food needs. As discussed previously, there are many programs and methods for obtaining food within the context of the Northern Cheyenne reservation. The research questions for this chapter focus on how households combine food sources to form food acquisition strategies. Because households are likely to use more than one source at a time to secure food for their families, this project is interested in the combinations of food sources used-- termed food strategies. The first question asks what relationships exist between the food sources themselves and if there are identifiable food strategies (see Table 5-3). A cluster analysis of the food sources answers this question. The next question seeks to understand the differences between users of these clusters of food sources (ie, food strategies--see Table 5-3). In other words, which sub-groups of survey respondents, based on various demographic criteria, are most likely to be using each food strategy? This is answered by looking at cross-tabs and by regressing the household and respondent characteristics on food strategy clusters created through the cluster analysis.

This analysis expects that food sources will group into clear demarcations of food strategies based upon the types of food sources across the sample. Specifically, I expect that food sources hang together according to the rules and regulations for their use. In addition, households are expected to utilize the food strategies that match their characteristics, resources and assets.

Cluster Analysis

This analysis was performed using version 14 of the SPSS statistical software. As described earlier, K-Means cluster analysis was used to group cases into clusters according to which food sources they used to obtain food. Because K-means clustering requires specification of the number of clusters as part of the input, several different solutions were attempted in order to reach a valid cluster solution. Analyses specifying 4, 6, and 7 clusters showed uneven distributions across clusters indicating that these solutions were a poor fit to the data. The distribution of the sample across food sources favored a 5 cluster solution. The Euclidean distance of each case to the cluster center of the cluster to which it is assigned is used to determine the variance of each cluster according to the standard deviation and is reported in Table 7-1. In addition, although somewhat

controversial test in this application, an F-test was done to look at the differences among clusters along the variables and shows significances at the $p = .000$ level.

Means of use are given for each food source included in the analysis and indicate the relative importance of that food source for the food strategy cluster.

Table 7-1 shows the mean scores of each food source within each cluster. Because the food source variables are dichotomous, a mean cutoff score of .50 was used for inclusion of a food source in the food strategy cluster. Means are ranked hierarchically on the cluster, with higher means representing more important food sources. Five of the 16 food sources did not present high enough mean scores ($>.50$) to be included with any specific food strategy cluster.

Food bank, crafts, General Assistance, gardening and churches do not seem to be important food sources in any of the food strategy clusters. Less than 13 percent of respondents reported using any of these food sources in the last 12 months. These variables have rather low frequency of reported use, although interestingly, Disability shows a high mean on food strategy cluster 4 despite a low frequency of reported use. There are other reasons that these 5 food sources may not have reached a high enough mean to load onto food strategy clusters. For example, the food bank on the Northern Cheyenne is very

Table 7-1 Means of Food Source Use for Food Strategy Clusters on the Northern Cheyenne Reservation (n=460)

	Frequency	Cluster 1 Wages	Cluster 2 Commodities Wages	Cluster 3 Food Stamps WIC	Cluster 4 Social Security Disability/ TV	Cluster 5 Family/Wages/Odd Jobs/ Hunt/Pawn/ TV/Commodities
Wages	362	.93	.86	.38	.07	.88
Commodities	143	.00	1.00	.15	.27	.50
Food Stamps	135	.03	.14	.97	.25	.38
Family	132	.11	.22	.23	.17	.94
Tribal Vouchers	129	.01	.27	.42	.56	.57
Odd Jobs	116	.09	.15	.27	.08	.86
WIC	107	.14	.24	.51	.10	.25
Hunting	105	.20	.18	.06	.03	.69
Pawning	99	.03	.14	.32	.15	.67
Social Security	69	.03	.06	.04	.83	.10
Food Bank	67	.01	.13	.27	.17	.35
Crafts	60	.05	.06	.08	.19	.42
General Assistance	43	.03	.05	.24	.10	.13
Disability	40	.00	.00	.01	.56	.08
Gardening	37	.07	.04	.01	.05	.24
Churches	33	.02	.09	.06	.14	.14
N	460	173	78	78	59	72
% of Sample		38	17	17	13	16
Std of distance from Cluster Center		.45	.41	.25	.34	.22

Source: Food Security, Nutrition, and Health Survey 2001

Variables with scores over .50 were included as part of the cluster and are highlighted in bold.

All variables were significant at the p= .000 level

small, and although it appears to be a valuable resource when open, it often experiences food shortages necessitating closure. Likewise, General Assistance is a program that is increasingly used for individuals that do not qualify for any other programs. This may contribute to the indeterminate role of this program in the cluster analysis. Crafts come closest to being relevant on cluster 5, which makes sense given the overall emphasis on community and subsistence resources for this cluster, however the mean is still relatively small. This might be due to the fact that residents have many cultural reasons for making crafts, in addition to selling crafts to obtain food.

Descriptive statistics show that wages are vastly more used than any other strategy. This is represented in food strategy cluster 1 which captures nearly 38 percent of the whole sample. This cluster is characterized by the overwhelming importance of wages and the relative unimportance of any of the other variables. Wages also appear as part of two other food strategy clusters pointing to the importance of wages for gaining food for this population.

Clusters 2 and 3 represent households that rely on government food assistance programs. If we compare the two principal food programs, Food Stamps and food commodities, we see interesting similarities and differences in

how these food sources are packaged in the food strategy clusters. For example, cluster 3 contains Food Stamps and is uniquely accompanied by WIC. In both of these programs participants receive food vouchers as they meet monthly eligibility requirements. The food commodity program, on the other hand, gives commodity food to participants who qualify annually for benefits. Cluster 2 represents households that use commodities with wages as a supplement. Interestingly, cluster 5 also shows commodities as a source of food; however it is in the context of a collection of other sources and resources.

We see the central role of entitlement programs in cluster 4. With only 13 percent of the sample falling into this group, this food strategy cluster represents the smallest group of people. Here Social Security is complimented by Disability and tribal vouchers. This may represent a segment of the population that is older and more dependent on programs geared toward retirement ages. With a mean equal to Disability, tribal vouchers are clearly important to this group and as this group appears to represent people with fixed incomes who primarily rely on entitlement programs this raises the question of the adequacy of these programs in providing enough money for food.

Cluster 5 represents an eclectic and broad based group of food sources. Family is the most important source of assistance, followed by wages and odd jobs. Hunting, pawning, tribal vouchers and commodity foods are also used to secure food. Notably missing are government programs on this cluster, with the exception of commodity foods, which technically is a USDA federal food program. However, commodity foods are administered through the Tribe and is seen as a tribal program (see Ward et al 2000). Indeed, every other food source is represented on food strategy cluster 5 except formal government programs and those food sources that did not present high enough mean scores to be included on any food strategy cluster. This finding may signal a reluctance of cluster members to use government programs. Food strategy cluster 5 is in many ways the most interesting of the five clusters because it is not immediately clear how the food sources work together. Food strategy cluster 5 may represent a group of people who are more vulnerable to food insecurity due to an inability to meet eligibility requirements for government programs. However, this cluster might represent exactly the opposite group—one that is oriented toward being self-sufficient and not desperate enough to seek government assistance.

Cluster Membership

These five clusters characterize five different food acquisition strategies used on the reservation. It is now necessary that we take a closer look at these food strategy clusters to determine which households and respondents are likely to be members of each group. I will begin my analysis by looking at cross-tabulations with Chi-square analyses to assess which groups of people are most likely to use which food acquisition strategies. I then use a series of regression analyses to analyze the relationships between various demographic variables and membership in these five clusters.

Cross-Tabulations

Pearson's Chi-square tests of significance can be used to test the associative relationship between two categorical variables, in a cross-tabulation, by comparing the expected frequency in each cell with the observed frequency in each cell. Using this statistical test, I cross-tabulated respondent and household demographic variables with each food strategy cluster derived from my cluster analysis and arrived at some interesting preliminary findings. Table 7-2 shows the percentages and p-values for each cluster. Gender is the only demographic category that is not associated with food strategy clusters. Respondent age,

Table 7-2 Percentages of Demographic Characteristics across Cluster Membership (n=460)

	Cluster 1 Wages	Cluster 2 Commod/Wages	Cluster 3 FS/ WIC	Cluster 4 SS/ Diss/ TV	Cluster 5 FM/ Wage/ OJ/ Hunt/ Pawn/ TV/ Commod	Total	X ² _{sig}
Age							0.000
18-24	13.4	11.5	17.9	2.1	21.4	14.2	
25-34	25.6	26.9	38.5	2.1	20.2	24.6	
35-44	22.7	25.6	21.8	4.3	29.8	22.4	
45-54	26.2	21.8	12.8	10.6	16.7	19.8	
55-64	8.1	5.1	3.8	42.6	6.0	10.0	
65+	4.1	9.0	5.1	38.3	6.0	8.9	
Gender							0.118
Female	51.4	64.1	62.8	57.4	47.6	55.4	
Male	48.6	35.9	37.2	42.6	52.4	44.6	
Education							0.000
< high school	5.4	16.2	29.2	45.9	20.7	17.6	
HS /GED	35.1	47.3	52.8	29.7	32.9	39.3	
Some college/AA	45.8	33.8	18.1	18.9	37.8	35.3	
College Degree	10.1	2.7	0.0	5.4	7.3	6.2	
Graduate Degree	3.6	0.0	0.0	0.0	1.2	1.6	
Employment							0.000
Full-time	66.9	41.6	9.6	0.0	15.9	37.3	
Part-time	11.2	20.8	21.9	0.0	28.0	16.7	
Seasonal/contract	10.7	16.9	23.3	12.2	15.9	14.9	
Not employed	10.1	15.6	39.7	43.9	35.4	23.8	
Retired	1.2	5.2	5.5	43.9	4.9	7.2	
Marital Status							0.006
Married	58.5	54.7	52.0	38.1	35.8	50.6	
Single	41.5	45.3	48.0	61.9	64.2	49.4	
# of Children <18							0.038
0	32.2	29.1	17.9	51.1	21.4	29.2	
1	16.1	11.4	167.0	10.6	13.1	14.3	
2 or 3	36.2	34.2	38.5	21.3	42.9	35.9	
4 or 5	12.1	17.7	23.1	10.6	15.5	15.4	
6 or more	3.4	7.6	3.8	6.4	7.1	5.2	

Source: Food Security, Nutrition and Health Survey, 2001
 Values that are statistically significant are distinguished in bold type. *p<.05, **p<.01, ***p<.001

education, employment, marital status and number of children in the household all show statistically significant Chi-square p-values, indicating that there is an association of these demographic variables with the food strategy clusters.

We can see the distribution of age groups within each food strategy clusters through the cross-tabulation analyses. The most dramatic differences in age group categories are observed in cluster 4. Nearly 81% of respondents in this cluster are over the age of 55. More than 38 percent are 65 or older. Cluster 5 has the most people from the 18-24 age group, which is the youngest age assessed. However, food strategy cluster 3 has the higher number of people in both the 18-24 age group and the 25-34 age group with 56.4 percent, making it the cluster with the most number of young people. The age distribution of food strategy clusters 1 and 2 seem to generally mirror the distribution of age in the overall sample, with the exception of having slightly higher representation in the 45-54 age group.

Educational levels of the survey sample vary across food strategy cluster groups. As we might expect, members of food strategy cluster 1 who are households who rely primarily on wages for food are the most likely to have high levels of formal education. Almost 60 percent of members of this cluster

have at least an associate's degree or some college with more than 10 percent having attained a college degree and another 3.6 percent finishing graduate school. This compares with about 43 percent of the sample having attended some college or attained any degree. Members of food strategy cluster 4 are the least likely to have graduated from high school with nearly 46 percent of people from this cluster in that category, as compared with 17.6 percent for the sample. Similarly, fifty-three percent of people in food strategy cluster 3 have attained a high school degree or GED compared with 39 % for the sample and also show a higher representation of people who have less than a high school degree (29.3%). In addition, members of this cluster are the least likely to have gone to college with only 18.1 percent in this category, as compared with 35.3 for the sample. Furthermore, no one in this food strategy cluster has a college or graduate degree. Cluster 2 also has a high number of respondents in the high school degree or GED attainment category with 47.3 percent versus 39.3% in the sample, though this cluster still has less respondents in that category than food strategy cluster 3. Interestingly, cluster 5 shows a higher than expected percentage for respondents with college degrees with 7.3 percent as compared with 6.2 for the sample.

Employment status varies dramatically for members of different food strategy clusters in rather the same directions and patterns as educational levels. While overall, 37.3 percent of the sample indicate that they work full-time, when we break it down by food strategy cluster, less than 10 percent of people in cluster 3 indicate that they work full-time. Similarly, less than 16 percent of people in cluster 5 indicate that they work full-time. Both of these clusters also show high percentages of people who report not being employed. Food strategy cluster 4 differs the most of the sample distribution of employment status. No one in this cluster reports working full-time or part-time, and there are low percentages of people who engage in seasonal work. As mentioned earlier, this cluster has the highest representation of people in the oldest age categories and thus members are most likely rely on entitlement programs more than people in other food strategy clusters. As expected, cluster 4 has the most people indicating that they are retired, with 44% in comparison to 7.2 percent reporting retirement in the sample. In contrast, 67 percent of people in food strategy cluster 1 report working full-time jobs. Cluster 2 also has higher percentages than the sample in terms of people who work full-time (41.6 %) as well as for

Table 7-3 Binomial Regression Coefficients for Clusters across Selected Demographic Variables (Reference Category, n=460)

	Cluster 1		Cluster 2		Cluster 3		Cluster 4		Cluster 5	
	EXP (B)	B	EXP (B)	B	EXP (B)	B	EXP (B)	B	EXP (B)	B
Constant		-1.051**		-5.903		-9532		-9.546		-7898
-2 Likelihood		410.177		359.969		285.320		118.096		291.541
Model X²		132.436***		19.117		74.766***		147.412***		71.800***
Age (18-24)										
25-34	.940	-.062	1.242	.217	1.378	.320	2.523	.925	.558	-.583
35-44	.636	-.453	1.326	.282	.874	-.134	2.371	.863	1.430	.358
45-54	1.043	.042	1.348	.299	.773	-.257	3.822	1.341	.572	-.558
55-64	1.060	.058	.612	-.491	.089*	-2.419	35.567**	3.571	.586	-.534
65+	.669	-.402	1.784	.579	.075*	-2.597	44.694**	3.800	.000	-18.593
Gender (Female)										
Male	1.649	.500	.567*	-.567	.469*	-.756	1.023	.023	1.715	.539
Education (<HS)										
HS/GED	2.001	.694	1.221	.200	1.000	.000	.513	-.668	.682	-.383
Some College/ AA	3.692**	1.306	.825	-.192	.303**	-1.195	.944	-.058	1.267	.237
College Degree	3.666*	1.299	.369	-.997	0.000	-19.394	2.071	.728	2.346	.853
Grad Degree	10.730	2.373	0.000	-19.995	0.000	-18.422	0.000	-16.876	2.186	.782
Employment (Full-time)										
Part-time	.172***	-1.760	1.047	.046	5.290***	1.666	0.000	-15.995	5.745***	1.748
Seasonal/Temp	.169***	-1.780	1.012	.012	8.737***	2.168	16.399*	2.797	3.628**	1.289
Not employed	.116***	-2.153	.533	-.628	7.168***	1.970	69.513***	4.242	4.317***	1.462
Retired	.022***	-3.838	.313	-1.162	20.123**	3.002	98.787***	4.593	000	-16.622
Marital Status (Married)										
Single	.426***	-.854	.857	-.154	1.137	.128	.813	.131	3.122***	1.138
# of Children <18 (0)										
1	.742	-.299	.752	-.284	1.997	.691	.134*	-2.013	3.795*	1.334
2 or 3	.477*	-.740	.763	-.271	1.999	.693	.288*	-1.246	5.277***	1.663
4 or 5	.382*	-.962	.997	-.003	2.131	.757	.269	-1.313	4.305**	1.460
6+	.342	-1.072	1.172	.159	1.059	.057	.550	-.599	7.287**	1.986

Source: Food Security, Nutrition and Health Survey, 2001

Values that are statistically significant are distinguished in bold type. *p<.05, **p<.01, ***p<.001

§ Missing variables originally included in models were deleted due to insignificance

people who work part-time and seasonally, reflecting more diverse working arrangements for people in that food strategy cluster.

Marital status is pretty evenly divided between married and single people in the sample. However, it appears that food strategy clusters 4 and 5 represent respondents that are more likely to be single (including divorced or widowed). In particular, more than 64 percent of people in food strategy cluster 5 are single, compared with 49.4 percent in the entire sample. Food strategy cluster 1 reflects those most likely to be married or “with someone.” Almost fifty-nine percent of people in this food strategy cluster fall in that category, as compared with 50.6 percent married for the sample.

Household composition, as measured by number of children in the household under the age of 18, also varies across food strategy clusters. More members (51%) of food strategy cluster 4 indicate that they have no children in their household than members in any other food strategy cluster as compared to around 30 percent for the sample. Cluster 1 has a slightly higher percentage of people in this category than does the sample, as well, with 32.2 percent indicating they have no children under 18. Sixty-one percent of members of food strategy cluster 3 have 1 to 3 kids under 18 in the home. This is compared

with 51% for the sample. Interestingly, cluster 2 has the highest percentages of people reporting 4 or more children under the age of 18 in the home. However, food strategy cluster 5 also appears to have high percentages of people with 2-3 children in the home (43%) as well reporting more than 6 children (7.1%) when compared with sample distributions (see Table 7-2).

In general the clusters of food strategies reflect expected demographic compositions. Food strategy cluster 1 reflects a highly educated, working group that relies primarily on wages for food. Food strategy cluster 3 reflects a younger group that is still working on education and finding employment, with several children in the home. This group relies on federal and food voucher programs. Food strategy cluster 4, with members that rely heavily on entitlement programs (Social Security/ Disability), reflects an older, single and retired population. Food strategy clusters 2 and 5 are more eclectic, yet appear to share some common characteristics. They both appear to be a relatively young and/or middle age group with more children in the home than other food strategy clusters. However, members of food strategy cluster 2 are more likely to be married and work full-time while members of food strategy cluster 5 work more part-time or

seasonal jobs, filling in the gaps by using community resources largely without relying on government programs.

Binomial Logistic Regression Analysis

A series of binomial logistic regression models were constructed to further investigate the demographic make-up of people in each food strategy cluster. By regressing respondent age, gender, education, employment, marital status, and number of children in the household on cluster membership, we can evaluate the likelihoods of belonging to each cluster, based on membership in each of these demographic categories. Five binomial logistic regression models were constructed to assess the likelihoods of belonging to each food strategy cluster. Table 7-3 shows the results of these analyses, including the odds (Exp b) and the logits or logged odds (b), for each demographic category, of belonging to each food strategy cluster. The model predicting membership in food strategy cluster 2 was the only one of the five regressions that did not reach statistical significance.

As expected, education and employment were significant predictors of membership on cluster 1. For example, the odds of membership on food strategy cluster 1 are 3.69 times larger for those who have some college, or 269%

higher than those without high school degrees. In addition, when predicting membership on food strategy cluster 1 the odds of membership are 3.66 times larger (266%) for those who have a college degree as compared to those without a high school degree. Likewise, people who worked full-time were more likely to be members of cluster 1. In fact, the odds of belonging to food strategy cluster 1 for people who worked part-time were 82% lower, seasonal or temporary jobs were 83% lower, unemployed were 88.4% lower, and retired were 98% lower than those with full-time employment.

Marital status and number of children under 18 in the household also predict membership on cluster 1. The odds of membership on cluster 1 are .43 or 57% lower for those who are single as compared to those who are married. Additionally, the odds of membership in cluster 1 for people who have 2 or 3 children are 52% lower as compared to those who have no children. The odds of membership on cluster 1 were 68% lower for people with 4 or 5 children as compared to people with no children. Respondent age and gender do not appear to significantly predict membership on food strategy cluster 1.

Respondent age, gender, and education significantly predict membership on food strategy cluster 3. Overall, it appears that members of this cluster

are in the younger age categories. In fact, odds for being a member of cluster 3 are .089 or 91% less likely for people who are between the ages of 55-64 than for those people who are between the ages of 18-24. Additionally, the odds for membership in cluster 3 are .075 or 92.5% less likely for people who are 65 or older, than for people between the ages of 18-24. Gender is also a significant predictor of membership on teach food strategy cluster 3. The odds of membership in this cluster 53% lower for men than for women. Lower educational attainment also seems to predict membership in food strategy cluster 3. The odds of membership in cluster 3 are nearly 70% lower for those with some college than for those without a high school degree.

Employment is also a significant predictor of membership on cluster 3. It appears that respondents who have full-time work are not likely to be part of this cluster. In fact, the odds of being a member of food strategy cluster 3 are 5.3 times more likely for those who have a part-time job as compared with those who work full time. Additionally, the odds of membership in this cluster are 8.7 times higher for those who work seasonal and temporary jobs than for those with full-time jobs, and are 7.2 times higher for those with no job than for those who

work full-time. Additionally, the odds of membership in this cluster are 20 times higher for retired people than for those who have full-time jobs.

As we expected, membership in food strategy cluster 4 appears to be associated with being older. Furthermore, employment and number of children under 18 are also significant predictors of membership on this cluster. The odds of membership on cluster 4 are 35.6 times higher for those between the ages of 55-64 and 44.5 times higher for those over 65 years of age as compared with those who are between the ages of 18-24. Going along with this, the odds of membership in food strategy cluster 4 are 98.8 times higher for those who are retired than for those who have full-time jobs. Similarly, the odds of membership in cluster 4 are 70 times higher for those not employed and 16.4 times higher for those who work seasonally as compared with those who work full-time. Additionally, membership in food strategy cluster 4 seems to be associated with having fewer children in the home. In fact, the odds of membership in cluster 4 are 87% lower for those with one child under 18 in the household and 71% lower for those with 2 or 3 children in the home, as compared with people who have no children at home.

Employment, marital status and number of children in the home are significant predictors of membership on food strategy cluster 5. It appears that the odds of membership on this cluster are best predicted by not having full-time employment. This trend is similar to the trend observed in clusters 3 and 4. Specifically, the odds of membership in cluster 5 are 5.8 times higher for those who work part-time jobs, 3.6 times higher for seasonal and temporary workers, and 4.3 times higher for the unemployed, as compared to those who work full-time. Interestingly, odds of members in food strategy cluster 5 are 212% higher for those who are single as compared to those who are married. However, membership in this cluster is also significantly predicted by having children in the home. The odds of membership in cluster 5 is 3.8 times higher for people with 1 child in the home, 5.3 times higher for those with 2-3 children in the home, 4.3 times higher for those with 4-5 children and amazingly 7.3 times higher for those who have 6 or more children in the home as compared to people who have no children in their homes.

These clusters represent distinct groups that differ on key respondent and household characteristics. Cluster 1 clearly represents working people with relatively high levels of educational attainment. They are more likely to

be married without children. Cluster 2 is the most enigmatic cluster because demographic variables do not appear to be significant predictors of membership. However, women are more likely to be members of this cluster than are men. Cluster 3 represents a young group that is also more likely to be female. Educational levels are low and employment is also part-time, seasonal, with high levels of unemployment. Cluster 4 is the oldest demographic group with the most likelihood of being over 55 and retired or unemployed. Seasonal work is also common for this group, although it is less predictive than being retired or unemployed. Like cluster 1, this group is not likely to have children in their home. Cluster 5, on the other hand, represents single households that have the highest numbers of children under 18 in the household. They are likely to be working part-time and seasonal/temporary work and after cluster 1 are the least likely to be unemployed.

Discussion and Conclusions

As expected, clustering the food sources led to clear demarcations of food source types in some cases. For example, although they represent very different groups, clusters 3 and 4 both show populations that rely on government programs. Cluster 3 corresponds to federal food voucher programs including

Food Stamps and WIC, while cluster 4 typifies federal entitlement programs including Social Security and Disability. Analyses describe what we would expect demographically for these two groups with very young participants for cluster 3 and older participants for cluster 4. Likewise, cluster 1 shows independent households that have access to jobs and therefore use primarily wages for food.

Clusters 2 and 5 however are not as clearly classified. Although features of cluster 2 are seemingly not well captured in this analysis, both of these food cluster strategies appear to represent households that are not directly aligned with a particular simple strategy for acquiring food. Indeed, one of the most interesting features of this analysis, highlighted in cluster 5, is the complexity of food variables that make up the food strategies. It appears that some households are using a complicated, multifaceted collection of food sources to fulfill their food needs. Cluster five represents households that use a sizeable assortment of food sources, especially relying on family and varied community resources to fill in the gaps. From this analysis it appears that households in cluster 5 are more likely to contain single parents, who are working, but not usually full-time. The

most remarkable difference about this cluster is the relatively high number of children under the age of 18 that are represented in the home.

Table 7-1 shows that the standard deviation scores of all the clusters for this cluster solution. This represents the dispersion of distance scores of cases to the center of each cluster. The standard deviation for cluster 5 is not any larger than the other clusters. Indeed, this cluster manifests the smallest standard deviation score indicating that members of this cluster are similar in their food source usage despite the relatively high number of food sources being used. It is clear that although many food sources are represented for this cluster, it is not a 'catch all' or a 'left over' group. It represents a consistent grouping of households that participate in these myriad food acquisition practices to provide food to the household. What is not totally clear in this analysis is exactly what motivates households to participate in this food strategy. In other words, why are these households using this complex food acquisition strategy and what does it mean for food security?

We see interesting patterns in the way that these demographic characteristics predict membership in the five food strategy clusters. To a large extent, we find that people in certain demographic groups tend to be in

households that use food strategies that fit the situation and available food programs. What seems clear through this analysis is that households, in large part, rely on programs and resources that reflect their demographic make-up.

The question remains of how these food cluster strategies may resolve hunger and food insecurity for this population. We still do not know the relative effectiveness of each of these strategies for meeting food needs. Previous analysis shows that this population is particularly vulnerable to food insecurity making this question especially relevant and important. This will be the focus of the next chapter.

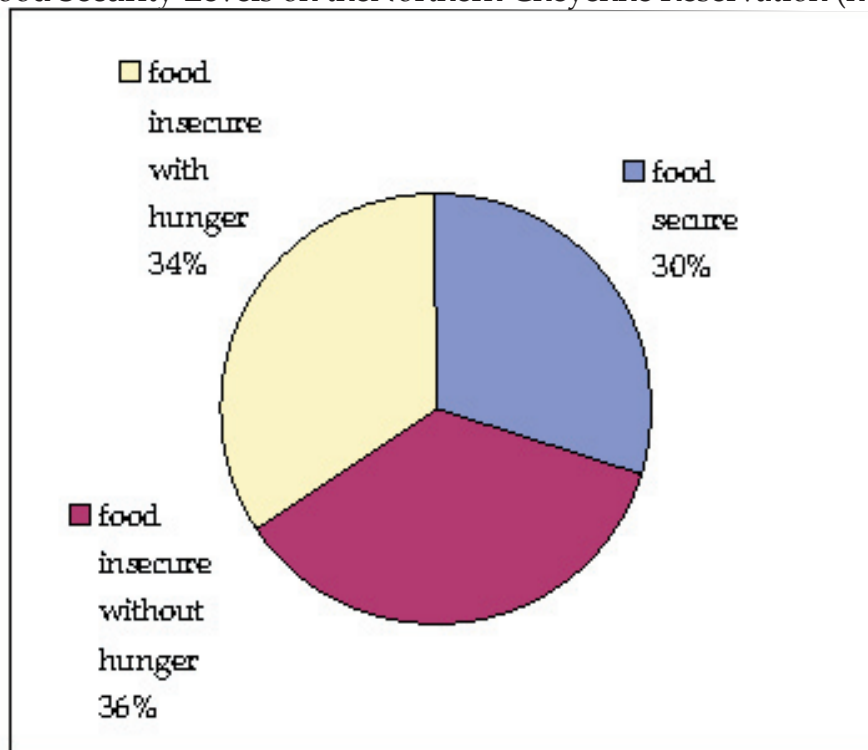
Chapter 8: Food Security

This research has so far examined individual food source use, as well as the use of food strategies among the Northern Cheyenne. This chapter turns the focus toward understanding food security by building on this preparatory analysis. Specifically, this chapter will look at the distribution of food security levels on the reservation, the associations of food security levels across household and respondent characteristics and how these characteristics predict food security levels. Finally, this chapter culminates in answering the questions of how the use of various food sources and the food strategy clusters predict household food security levels.

Based on the literatures and concepts presented in earlier chapters, we expect that food security levels will be lower for households with fewer assets and with more household demands. In addition, households that utilize more valuable food sources (i.e. wages or fixed income sources) will have higher levels of food security. Similarly, food strategy clusters that represent a greater number of advantageous food sources will also be related to higher levels of food security. We also expect that households and food strategy clusters that utilize a

higher number of food sources will have lower levels of food security. In other words, we expect that households that have access to a greater number of sources as well as access to more stable and reliable sources will be better able to achieve food security.

Figure 2 Food Security Levels on the Northern Cheyenne Reservation (n=460)



Food security is measured as a 3 part scale: food secure, food insecure without hunger, and food insecure with hunger. Figure 2 represents the distribution of food security levels for this sample. Nearly 70% of Northern Cheyenne residents experience some form of food insecurity while 30% experience food security. These rates represent a

dramatic difference when compared to the 2001 national average of about 10-11% (Nord et al 2002). This research indicates that about 30% of Northern Cheyenne households are food secure.

Respondent and Household Characteristics

When looking at the relationships between food security and demographic variables, I use a cross-tabulation of the variables to look at distributions through percentages. Pearson's Chi-square tests of significance can be used to test the associative relationship between two categorical variables, in a cross-tabulation, by comparing the expected frequency in each cell with the observed frequency in each cell. Using this statistical test, I cross-tabulated demographic variables with food security levels. This question is then again examined through a multinomial regression looking at how demographic variables regress on food security levels.

Cross-tabulations

Table 8-1 shows the percentages and significance values for the cross-tabulation of households and respondent characteristics and food security levels. Respondent age, employment level and marital status were significantly different according to the Person's Chi-square p-values. It appears that people in the

Table 8-1 Percentages of Food Security Levels across Demographic Characteristics (n=460)

	Food Secure	Food Insecure	With Hunger	Total	χ^2 sig
Total Sample	30.0	36.0	34.0	100.0	
Age					0.015
18-24	22.1	15.5	7.0	14.2	
25-34	29.4	22.3	22.9	24.6	
35-44	19.1	24.7	22.9	22.4	
45-54	15.4	21.1	22.3	19.8	
55-64	7.4	10.2	12.1	10.1	
65+	6.6	7.2	12.7	8.9	
Gender					0.721
Female	52.6	56.6	56.7	55.4	
Male	47.4	43.4	43.3	44.6	
Education					0.127
< high school	12.2	17.6	22.4	17.6	
HS /GED	35.1	42.8	39.2	39.3	
Some C/AA	40.5	34.6	31.5	35.3	
College	9.2	3.8	6.3	6.2	
Graduate	3.1	1.3	.7	1.6	
Employment					0.000
Full-time	51.1	38.8	23.5	37.3	
Part-time	18.8	17.5	14.1	16.7	
Seasonal/ contract	10.5	17.5	16.1	14.9	
Not employed	14.3	20.0	36.2	23.8	
Retired	5.3	6.3	10.1	7.2	
Marital Status					0.002
Married	61.5	51.0	40.7	50.6	
Single	38.5	49.0	59.3	49.4	
# of Children <18					0.237
0	28.5	29.9	29.1	29.2	
1	16.8	13.2	13.3	14.3	
2 or 3	39.4	37.7	31.0	35.9	
4 or 5	13.1	15.0	17.7	15.4	
6 or more	2.2	4.2	8.9	5.2	

Source: Food Security, Nutrition, and Health Survey, 2001
 Significant values are distinguished in bold type.

two youngest age categories (18-24 and 25-34) are more likely to be food secure. These ages represent 51.5 percent of those who are food secure while only 38.8 percent of the sample. In contrast, 19 percent of the sample are over age 55, yet they are nearly 25 percent of those who experience food insecurity with hunger. People in the middle age categories (35-54) represent more than 42 percent of the sample and have just slightly inflated percentages as compared with the sample with 45.8 percent food insecurity without hunger and 45.2 percent food insecure with hunger.

As we might expect, respondents with full-time jobs are more likely to be food secure. In fact more than 50 percent of those who are food secure report having full-time jobs. However, it is somewhat surprising that so many households that report being food insecure have respondents that report having full-time jobs, including 38.8 percent of those food insecure without hunger and 23.5 percent with food insecurity with hunger, perhaps pointing to the inadequacy of jobs on the reservation.

In addition, married respondents were more likely to be food secure than single respondents. More than 60 percent of those who are food secure are

married or “with someone” and more than 59 percent of those who were food insecure with hunger are single (including divorced and widowed).

Multinomial Logistic Regression

The dependent variable, food security level, is in three categories. Food secure and food insecure with hunger are compared to the middle reference category food insecure without hunger. Table 8-2 shows the groundwork results of how demographic variables predict food security levels for this population. The first set of columns of results compares the logged odds (B) and odds (EXP B) of whether a household is food secure as compared to food insecure but not hungry. If a demographic category is associated with an increased chance of a household being secure then a positive coefficient is expected. A non-significant finding suggests that the demographic category has no effect on the likelihood of food security versus food insecurity without hunger.

Similarly, the second set of columns reports the results comparing food insecurity with hunger to food insecurity without hunger. This comparison shows the demographic characteristics that may be most relevant for those with greatest degree of food insecurity. In this case, a positive coefficient indicates that the demographic characteristic is related to households with the highest

Table 8-2 Odds and Logged Odds for the Baseline Model of Demographic Characteristics on Food Security Levels (reference groups; n=460)

		Baseline Model			
-2 Log Likelihood		707.347			
Model X ²		94.320***			
		Food Secure		Food Insecure with Hunger	
		EXP (B)	B	EXP (B)	B
Age (18-24)					
25-34		.718	-.331	2.262	.816
35-44		.347**	-1.057	2.587*	.950
45-54		.251**	-1.383	2.927*	1.074
55-64		.300*	-1.203	1.983	.685
65+		.037	-1.181	3.018	1.105
Gender (female)					
Male		1.304	.265	1.190	.174
Education (<HS)					
HS/GED		.985	-.015	.853	-.159
Some College/ AA		1.484	.395	.946	-.055
College Degree		2.868	1.053	1.728	.547
Graduate Degree		2.352	.855	.867	-.143
Employment (Full-time)					
Part-time		.708	-.345	1.542	.433
Seasonal/ Temp		.376	-.978	1.801	.588
Not Employed		.555	-.589	3.659***	1.297
Retired		.725	-.321	1.805	.591
Marital Status (single)					
Married		.504**	-.686	1.944**	.665
# of Children <18 (0)					
1		1.129	.121	1.322	.279
2-3		.783	-.244	1.144	.135
4-5		.848	-.165	1.448	.370
6+		.681	-.383	2.868	1.054

Source: Food Security, Nutrition and Health Survey, 2001

Reference group for dependent variable is food insecure without hunger

§missing variables originally included in models were deleted due to insignificance

Values that are statistically significant are distinguished in bold type. *p<.05, **p<.01, ***p<.001

level of severity of food insecurity. Non-significant findings mean that there is no effect on the likelihood of food insecurity with hunger versus food insecurity without hunger. The comparison of the two extreme categories –food security and food insecurity with hunger—to the middle category—food insecurity without hunger—allows us to see food security thresholds. With this analysis, demographic categories that have the strongest relationship to household food security levels will become more apparent.

Respondent age, marital status and employment are significant predictors of food security levels in this analysis. The odds of being food secure as compared with food insecure without hunger are 65% lower for people between the ages of 35 and 44, 75% lower for those between the ages of 45 and 54, and 70% lower for those who are between the ages of 55 and 64 than for those between the ages of 18 and 24. Accordingly, the odds of being food insecure with hunger as compared to food insecure without hunger are 2.3 times higher for those between the ages of 35 and 44, 2.9 times higher for those between the ages of 45 and 54 as compared with those between the ages of 18 and 24. It appears therefore, that respondents between the ages of 35 and 54 are more likely to be food insecure as compared to those between the ages of 18 and 24.

The odds of being food secure as compared with food insecure without hunger are 50% lower for respondents who are single as compared with those who are married. Additionally, the odds of being food insecure with hunger as compared to food insecure without hunger are 1.9 times higher for those who are single as compared with those who are married. This indicates that married people are more likely to be food secure than single people. In addition, the odds of being food insecure with hunger as compared to food insecure without hunger are 3.7 times higher for those who are unemployed as compared to those who work full-time.

This analysis points to the importance of respondent age, employment and marital status in predicting food security levels. In general, it appears that people between the ages of 25 and 55, single and unemployed are the most at risk of food insecurity. This is consistent with other research on food security in the United States which shows that people in their middle ages as well as households headed by single adults are more likely to be food insecure (Wu et al 2005; Bickel et al 1999; Olsen et al 2004). It is also interesting that unemployment, which we expect to be associated with low income levels, is related to food insecurity. Literature suggests that households with incomes below the official

Federal poverty rate are more likely to be food insecure (Bickel et al 1999). It is somewhat unexpected that the number of children under 18 in the home is not a significant predictor of food security for this population. Research literature suggests that households with children are at much higher risk of being food insecure and those households with a higher number of people are also more likely to be food insecure (Bickel et al 1999; Olsen et al 2004).

Individual Food Sources and Food Security

This section looks at the 16 food sources discussed in chapter 6 of this report to see how household use of these sources is related to food security.

Table 6-1 shows the frequencies and distributions of these household food sources. This analysis begins with a cross-tabulation of the 16 food sources and food security levels to identify preliminary relationships. A series of multinomial logistic regressions is then used to look at how selection and number of food source use predicts food security levels.

Cross-tabulations

Percentages of food security across food sources are shown in Table 8-3. Five of the food sources did not present significant Chi-square p values including WIC, hunting, Social Security payments, Disability payments, and gardening.

Table 8-3 Percentages of Food Security for Food Source Use (n= 460)

	N	Food Secure	Food Insecure without Hunger	Food Insecure with Hunger	X ² Sig
1 Wages	326	35%	36%	29%	15.945***
2 Commodities	143	20%	42%	39%	9.959**
3 Food Stamps	135	16%	42%	42%	16.876***
4 Family	132	14%	42%	44%	23.484***
5 Tribal Vouchers	129	08%	36%	57%	55.719***
6 Odd Jobs	116	15%	41%	44%	17.519***
7 WIC	107	33%	36%	32%	.640
8 Hunting	105	32%	36%	32%	.246
9 Pawning	99	03%	29%	68%	73.522***
10 Social Security	69	19%	33%	48%	7.895
11 Food Bank	67	09%	33%	58%	24.973***
12 Crafts	60	12%	40%	48%	11.974**
13 General Assistance	43	12%	49%	40%	7.792*
14 Disability	40	15%	38%	48%	5.533
15 Gardening	37	32%	35%	32%	.139
16 Churches	33	09%	24%	67%	17.519***

Source: Food Security, Nutrition and Health Survey 2001

*p<.05, **p<.01, ***p<.001

This indicates that there is not a strong associative relationship between these food sources and food security levels as there is not a big enough difference between the observed and expected frequencies in each cell.

Use of wages as a source of food in the household is the food source most associated with being food secure with 35% food secure as compared to 30% for the sample. In addition, only 29% of household that use wages as a source of food report being food insecure with hunger as compared to 34% for the sample. In other words, 65% of households that use wages for food are food insecure reflecting the complex role of employment and use of wages across households on the reservation.

Eighty percent of households that use commodities as a source of food report being food insecure as compared to 70% for the sample with 39% reporting the more severe form of food insecurity with hunger as compared to 34% for the sample. Households that use Food Stamps as a source of food report even higher levels of food insecurity, with 84% food insecure and 42% reporting the more severe form of food insecure with hunger. Similarly, 86% of households that use family as a source of food report food insecurity with 44% experiencing food insecurity with hunger. Only 8% of households using tribal vouchers

indicate that they are food secure compared to 30% for the sample. Higher than expected percentages are reported for food insecurity with 57% of households that use tribal vouchers reporting food insecurity with hunger as compared to 34% for the sample. Households using odd jobs to make money for food report food security levels at 15% food security as compared to 30% for the sample, and 44% of households using odd jobs are food insecure with hunger.

Households that use pawning to get money for food represent the households with the lowest levels of food security. Only 3% of households report food security compared to 30% for the sample and 68% report food insecurity with hunger as compared to 34% for the sample. Nine percent of households using food bank as a source of food are food secure and 58% are food insecure with hunger. While 30% of households in the sample are food secure, households using crafts for food and those using General Assistance report 12% food security. However, 48% of households using crafts are food insecure with hunger compared to 40% using General Assistance and 34% for the sample. Forty-nine percent of households using General Assistance as a source of food report being food insecure without hunger compared to 34% for the sample. Finally, 67% of households using churches for food report food insecurity with

hunger as compared to 34% for the sample making this the second lowest food source in this category. Nine percent of households using churches as a source of food are food secure.

Table 8-3 shows that overall, it appears that using wages as a source of food is the food source most associated with being food secure, while pawning and using churches for food are the least associated with food security. Indeed, wages is the only food source with statistical significance in this analysis that has higher than sample percentages in the food security category. Preliminary patterns suggest that tribal vouchers, food banks, and especially pawning and churches are strategies that are most associated with the highest levels of food insecurity. Family, commodities, General Assistance, Food Stamps, odd jobs, and crafts show less dramatic levels of food insecurity, however they are still high. Overall, food insecurity is high across this sample. This question is now examined more closely through a series of multinomial logistic regressions.

Multinomial Logistic Regressions

Summary results of the multinomial logistic regressions are presented in Table 8-4. The first set of columns compares the odds of being food secure and food insecure with hunger as compared to food insecure without hunger for

Table 8-4 Summary Odds and Logged Odds for Food Sources on Food Security Levels for Individual and Final Models[‡] (n=460)

Model X ² (-2 Log Likelihood)	Food Sources	Individual Nested Models						Full Model					
		Food Secure		Food Insecure w/Hunger		Food Secure		Food Insecure w/Hunger		Food Secure		Food Insecure w/Hunger	
		EXP	B	EXP	B	EXP	B	EXP	B	EXP	B	EXP	B
95.140*** (715.656)	Wages	1.462	.380	1.244	.219	2.221	.798	.852					
100.705*** (738.394)	Commodities	.481**	-.732	.875	-.133	.571	-.561	.654				-.424	
101.668*** (724.037)	Food Stamps	.425**	-.856	.966	-.035	.759	-.276	.625				-.470	
130.082*** (699.652)	Family	.166***	-1.796	1.305	.266	.234***	-1.453	.867				-.143	
120.003*** (696.338)	Tribal Vouchers	.210***	-1.560	1.688	.524	.390	-.942	1.553				.440	
109.680 (722.016)	Odd Jobs	.322**	-1.134	1.335	.289	.589	-.529	1.056				.055	
94.470*** (723.728)	WIC	1.009	.009	1.133	.125	1.324	.281	.692				-.368	
94.321*** (735.989)	Hunting	1.004	.004	.991	-.009	1.501	.406	.708				-.345	
164.406*** (661.874)	Pawning	.073***	-2.615	4.338***	1.467	.130**	-2.042	5.767***				1.752	
95.633*** (714.587)	Social Security	.555	-.589	.664	-.410	.777	-.252	.785				-.242	
112.398*** (706.139)	Food Bank	.299*	-1.206	2.360**	.859	.722	-.325	1.418				.349	
102.527*** (714.860)	Crafts	.367*	-1.001	1.344	.296	.752	-.284	.814				-.205	
100.329*** (705.732)	General Assistance	.269*	-1.313	.673	-.396	.503	-.687	.448				-.803	
97.098*** (710.350)	Disability	.491	-.711	.440	-.820	1.216	.196	.188**				-1.669	
94.475*** (717.131)	Gardens	1.183	.168	.993	-.007	1.123	.116	1.049				.048	
106.396*** (699.430)	Churches	.423	-.860	3.656**	1.296	.664	-.409	4.600**				1.526	
142.661*** (730.626)	# of Food Sources	.656***	-.422	1.123*	.116								
228.910*** (651.309)	Full Model												

Source: Food Security, Nutrition and Health Survey, 2001

Reference group for dependent variable is food insecure without hunger

§ Missing variables originally included in models were deleted due to insignificance

‡ Values after controlling for respondent age, gender, education, employment, marital status and household number of children under 18.

Values that are statistically significant are distinguished in bold type. *p<.05, **p<.01, ***p<.001

each individual food source. In addition, the number of food sources used by households is examined as it predicts food security levels, although this variable is not included in the final model. The model Chi-square and -2 log likelihoods are shown in the initial column indicating the significance and explanatory power of each model for explaining the individual food source use. The second set of columns shows the results of a full model that includes the use of all of the individual food sources. This also shows the values of being food secure and food insecure with hunger as compared to food insecure without hunger for the full model. A significant positive coefficient (B) is expected if a food strategy is associated with increased odds of being food secure or food insecure with hunger as compared to food insecure without hunger. This analysis looks at the relationships between using different food sources and levels of food security when controlling for various household and respondent characteristics. The full results are shown in Table 8-5.

Commodities, Food Stamps, family, tribal vouchers, odd jobs, pawning, food bank, crafts, General Assistance, and churches are significantly related to food security levels in the individual models. However, many of these effects drop out when controlling for other food strategies. Nested models show that

the odds of being food secure as compared to food insecure without hunger are lower for household that use commodities, Food Stamps, family, tribal vouchers, odd jobs, crafts, and General Assistance. Pawning and food bank as sources of food show odds that are lower for food security and higher for food insecurity with hunger as compared to food insecure without hunger.

Looking at the nested models first, the odds of being food secure for those who use commodities as a source of food is 52% lower as compared to food insecure without hunger. Likewise, households that use Food Stamps have odds of being food secure are 58% lower compared to food insecure without hunger. The odds of being food secure are 83% lower for households that use family as a source of food as compared to being food insecure without hunger. Households that use tribal vouchers as a source of food have odds of being food secure that are 78% lower as compared to food insecure without hunger. The odds of being food secure as compared to food insecure without hunger for households that use crafts as a source of food is 63% lower. Finally, the odds of being food secure are 73% lower for households that use General Assistance as a source of food as compared to food insecure without hunger. Additionally, the odds of being food

insecure with hunger are 3.7 times higher as compared to food insecure without hunger for households that use churches as a source of food.

Using pawning and food banks for food are not only associated with lower levels of food security, but also higher levels of food insecurity with hunger as compared to food insecure without hunger. The odds of being food secure is 93% lower and 4.4 times higher for food security with hunger as compared to food insecure without hunger for households using pawning as a source of food. Likewise, the odds of being food secure are 70% lower and 2.4 time higher for food insecurity with hunger as compared to food insecure without hunger for households using the food bank as a source of food.

Several interesting results appear in the full model. Using Disability payments as a source of food, which is not significant in the individual model, becomes significant in the full model with the odds of being food insecure with hunger as compared to food insecure without hunger 81.2% lower with households that use Disability payments for food. Additionally, pawning, family, and churches have significant results in the individual models that appear in the full model as well. Pawning is consistently associated with higher levels of food insecurity. When controlling for other strategies in the full model, the odds

of being food secure as compared to food insecurity without hunger changes from nearly 93% lower in the individual model to 87% lower in the full model for households that use pawning. Similarly, the odds of being food insecure with hunger as compared to food insecure without hunger increase from 4.4 times higher in the nested model to 5.8 times higher in the full model for these households. This suggests that households who use pawning as a source of food are less likely to be food secure and more likely to be food insecure with hunger as compared to food insecure without hunger.

Using family as a source of food is related to low odds of food security as compared with food insecurity without hunger. When controlling for other food sources, the odds of being food secure as compared to food insecure without hunger for households that use family as a source of food decreased from 83% lower in the individual model to 77% lower in the full model for households that report using family as a source of food. Using churches as a source of food is related to higher odds of being food insecure with hunger as compared to food insecure without hunger. This is even more pronounced when controlling for other food sources. The odds of being food insecure with hunger as compared

to food insecure without hunger are 3.7 times higher for households that use churches for food in the individual model and 4.6 times higher in the full model.

Interestingly, the number of food sources used is also a significant predictor of food security level. In fact, the odds of being food secure as compared to food insecure without hunger are 34.4% lower for each additional food source used. Accordingly, the odds of being food insecure with hunger as compared to food insecure without hunger are 1.1 times higher for each additional food source that households use.

Demographic control variables follow consistent patterns in the nested and full models. These variables include respondent age, gender, employment, education, and marital status, as well as the number of children under 18 in the household. The results are presented in Table 8-5 and a discussion of the general trends follows. Two variables --gender and education-- are not significant in any of the 17 individual models or in the full model. Number of children under 18 in the home is only significant in one model. The odds of being food insecure with hunger as compared to food insecure without hunger are 3.3 times higher for households that have 6 or more children under 18 in the home as compared to households without children in the model that includes using churches as a

source of food. In contrast, marital status is significant every model and follows the same pattern in each case. It appears that single respondents have lower odds of being food secure and higher odds of being food insecure with hunger as compared to food insecure without hunger as compared to married respondents.

Employment status is a bit more complex, with two emerging patterns.

Twelve of the models show odds of being food secure that are lower for respondents that indicate seasonal or temporary employment as compared to full-time employment. Additionally, odds of being food insecure with hunger are higher for respondents that are unemployed as compared to full-time employment in 15 models. The effect of respondent age on food security is the most complex of the control variables. In general, it appears that respondents over the age of 25 have lower odds of being food secure and higher odds of being food insecure with hunger as compared to food insecure without hunger as compared to respondents between the ages of 18 and 24. In addition, this appears to be most profound for respondents between the ages of 45 and 54. In other words, although all age categories follow this pattern in comparison to respondents between the ages of 18 and 24, relative to other age categories, respondents between the ages of 45 and 54 have odds that are lower for food

security and higher for food insecurity with hunger as compared to food insecurity without hunger indicating that food security is even lower for this age group than for other groups.

Some of these effects fall out of the full model, however results are consistent with these same general trends. For example, compared to those between the ages of 18 and 24, respondents between the ages of 35 and 44 have 72% lower odds of being food secure, those between the ages of 45 and 54 have 88% lower odds of being food secure, and those over the age of 55 have 83% lower odds of being food secure as compared to food insecure without hunger. Additionally, unemployed respondents as compared to full-time workers have 3.1 times higher odds of being food insecure with hunger as compared to food insecure without hunger. Finally, compared to married respondents, single respondents have 2.1 times higher odds of being food insecure with hunger as compared to food insecure without hunger.

Using family, and especially pawning and churches for food is related to higher likelihoods of food insecurity in both individual and full models. Using commodities, Food Stamps, tribal vouchers, odd jobs, food bank, making crafts, and General Assistance for food are all related to lower levels of food

security in the individual models but do not maintain their effects in the full model. Additionally, Disability becomes relevant in the full model with a lower likelihood of being hungry. Marital Status, employment and respondent age all continue to be associated with food security levels in this analysis as well. As in the initial modeling, households with single respondents, and those unemployed are more likely to be food insecure. The effect of respondent age is the most complex, however it appears that risk of food insecurity generally increases with age, however those between the ages of 45 and 54 are the most at risk.

Surprisingly, using wages as a source of food is not a significant predictor of food security. This may seem counter-intuitive, given the relative stability and economic efficiency of this source of food. Although we cannot explain this entirely, perhaps using wages for food is not completely straight forward for this population. Qualitative research suggests that although unemployment rates are relatively high on the reservation, households may distribute the wages that are available across households. In other words, extended family systems mandate that those who work and have access to wages share these resources with members of the family that may or may not be in separate households.

Table 8-5.1 Logit and Odds Ratios For Food Sources With Demographic Variables on Food Security (reference groups) (n=460)

	Wages				Commodities				
	715.656				738.394				
	95.140***				100.705***				
	Food Secure		Food Insecure with Hunger			Food Secure		Food Insecure with Hunger	
	Exp (B)	B	Exp (B)	B	Exp (B)	B	Exp (B)	B	
<i>-2Log Likelihood</i>									
<i>Model X²</i>									
Age (18-24)									
25-34	.709	-.344	2.255	.813	.677	-.390	2.221	.798	
35-44	.352**	-1.044	2.619*	.963	.353**	-1.040	2.583*	.949	
45-54	.250**	-1.386	2.931*	1.075	.241**	-1.423	2.902*	1.065	
55-64	.303*	-1.194	2.004	.695	.289*	-1.241	1.945	.665	
65+	.299	-1.208	2.975	1.090	.300	-1.205	2.978	1.091	
Gender (Female)									
Male	1.288	.253	1.186	.170	1.231w	.208	1.173	.160	
Education (<HS)									
HS /GED	.935	-.068	.824	-.194	.912	-.092	.842	-.172	
Some college/AA	1.346	.297	.891	-.115	1.351	.301	.926	-.077	
College Degree	2.642	.972	1.636	.492	2.522	.925	1.694	.527	
Grad Degree	2.158	.769	.817	-.202	1.761	.566	.816	-.204	
Employment (Full-time)									
Part-time	.736	-.307	1.590	.463	.746	-.249	1.545	.435	
Seasonal/Temp	.408	-.879	1.890	.637	.389*	-.945	1.805	.590	
Not employed	.673	-.396	4.132***	1.419	.591	-.526	3.699***	1.308	
Retired	.911	-.093	2.081	.733	.649	-.433	1.762	.566	
Marital Status (Married)									
Single	.521*	-.652	1.997**	.692	.539*	-.618	1.964**	1.052	
# of Children (0)									
1	1.092	.088	1.291	.255	1.141	.132	1.321	.278	
2 or 3	.763	-.271	1.124	.117	.790	-.236	1.149	.139	
4 or 5	.806	-.215	1.403	.339	.864	-.147	1.451	.372	
6 or more	.667	-.405	2.826	1.039	.682	-.383	2.863	1.052	
Food Source (non-use)									
Use of source	1.462	.380	1.244	.219	.481**	-.732	.875	-.133	

Table 8-5 cont.2

	Food Stamps			Family		
-2Log Likelihood	724.037			699.652		
Model X ²	101.668***			130.082***		
	Food Secure		Food Insecure with Hunger		Food Insecure with Hunger	
	Exp (B)	B	Exp (B)	B	Exp (B)	B
Age (18-24)						
25-34	.760	-.275	2.293		2.537*	.931
35-44	.351**	-1.047	2.595*		2.838*	1.043
45-54	.245**	-1.405	2.945*		3.385**	1.219
55-64	.272*	-1.304	1.984		2.279	.824
65+	.260	-1.346	3.033		3.572	1.273
Gender (Female)						
Male	1.254	.227	1.199		1.181	.166
Education (<HS)						
HS/GED	.965	-.036	.855		.863	-.147
Some college/AA	1.298	.261	.944		.917	-.087
College Degree	2.473	.906	1.700		1.631	.489
Grad Degree	2.248	.810	.857		.815	-.204
Employment (Full-time)						
Part-time	.780	-.248	1.541		1.424	.353
Seasonal/Temp	.457	-.782	1.813		1.762	.566
Not employed	.671	-.399	3.689***		3.439***	1.235
Retired	.930	-.073	1.821		1.679	.518
Marital Status (Married)						
Single	.518*	-.658	1.942**		1.926**	.655
# of Children (0)						
1	1.208	.189	1.316		1.264	.234
2 or 3	.832	-.184	1.135		1.111	.106
4 or 5	.968	-.032	1.447		1.392	.331
6 or more	.834	-.182	2.904		2.658	.978
Food Source (non-use)						
Use of source	.425**	-.856	.966		1.305	.266

Table 8-5 cont.3

	Tribal Vouchers			Odd Jobs		
	696.338			722.016		
<i>-2Log Likelihood</i>	120.003***			109.680***		
<i>Model X²</i>						
	Food Insecure with Hunger			Food Insecure with Hunger		
	Exp (B)	B	Exp (B)	Exp (B)	B	Exp (B)
Age (18-24)						
25-34	.832	-.184	2.029	2.341	-.424	.851
35-44	.426*	-.852	2.308	2.596*	-1.115	.954
45-54	.287**	-1.249	2.661*	3.058*	-1.517	1.118
55-64	.352	-1.044	1.761	2.127	-1.375	.755
65+	.381	-966	2.504	3.362	-1.424	1.213
Gender (Female)						
Male	1.261	.232	1.222	1.142	.401	.133
Education (<HS)						
HS/GED	.808	-.213	.902	.836	-.027	-.180
Some college/AA	1.116	.110	1.059	.889	.465	-.117
College Degree	2.261	.816	1.783	1.702	1.012	.532
Grad Degree	1.888	.635	.851	.796	.926	-.228
Employment (Full-time)						
Part-time	.892	-.114	1.301	1.364	.005	.311
Seasonal/Temp	.489	-.716	1.509	1.619	-.707	.482
Not employed	.763	-.271	2.919	3.407***	-.428	1.226
Retired	.792	-.234	1.635	1.603	.002	.488
Marital Status (Married)						
Single	.531*	-.633	1.909*	1.869*	-.590	.626
# of Children (0)						
1	1.260	.231	1.218	1.238	.253	.214
2 or 3	.874	-.135	1.071	1.064	-.053	.062
4 or 5	1.052	.051	1.341	1.407	-.049	.342
6 or more	.861	-.149	2.588	2.784	-.355	1.024
Food Source (non-use)						
Use of source	.210***	-1.560	1.688	1.335	-1.134	.289

Table 8-5 cont. 4

	WIC			Hunting		
<i>-2Log Likelihood</i>	723.728			735.989		
<i>Model X²</i>	94.470***			94.321***		
	Food Insecure with Hunger			Food Insecure with Hunger		
	Exp (B)	B	Exp (B)	Exp (B)	B	Exp (B)
Age (18-24)						
25-34	.718	-.332	2.271	.718	-.332	2.260
35-44	.348*	-1.055	2.687*	.347**	-1.058	2.585*
45-54	.251**	-1.381	3.059*	.251**	-1.383	2.924*
55-64	.301*	-1.199	2.072	.300*	-1.203	1.981
65+	.308	-1.176	3.188	.307	-1.180	3.011
Gender (Female)						
Male	1.305	.266	1.209	1.303	.264	1.192
Education (<HS)						
HS /GED	.986	-.014	.854	.986	-.014	.853
Some college/AA	1.486	.396	.954	1.484	.394	.946
College Degree	2.873	1.056	1.762	2.868	1.054	1.729
Grad Degree	2.343	.852	.849	2.352	.855	.867
Employment (Full-time)						
Part-time	.708	-.346	1.527	.708	-.345	1.544
Seasonal/Temp	.377*	-.976	1.795	.376*	-.78	1.801
Not employed	.555	-.589	3.675***	.555	-.589	3.659***
Retired	.726	-.320	1.789	.725	-.321	1.805
Marital Status (Married)						
Single	.503**	-.687	1.959**	.503**	-.687	1.945**
# of Children (0)						
1	1.129	.121	1.325	.681	.121	1.322
2 or 3	.784	-.244	1.136	.848	-.245	1.145
4 or 5	.847	-.166	1.424	.783	-.165	1.449
6 or more	.683	-.381	2.861	1.128	-.384	2.870
Food Source (non-use)						
Use of source	1.009	.009	1.133	1.004	.004	.991
			.125			-.009

Table 8-5 cont. 5

	Pawning			Social Security				
-2Log Likelihood	661.874			714.587				
Model X ²	164.406***			95.633***				
	Food Secure		Food Insecure with Hunger		Food Insecure with Hunger			
	Exp (B)	B	Exp (B)	B	Exp (B)	B		
Age (18-24)								
25-34	.654	-.425	2.562	.941	.726	-.320	2.287	.827
35-44	.314**	-1.158	3.314*	1.198	.349**	-1.052	2.592*	.952
45-54	.217***	-1.526	3.752**	1.322	.256**	-1.364	2.990*	1.095
55-64	.243*	-1.414	3.045	1.113	.339	-1.082	2.236	.805
65+	.259	-1.349	4.831*	1.575	.392	-0.936	3.746	1.321
Gender (Female)								
Male	1.413	.346	1.069	.067	1.285	.251	1.178	.164
Education (<HS)								
HS/GED	.920	-.084	.773	-.258	1.003	.003	.862	-.148
Some college/AA	1.467	.384	.801	-.222	1.508	.411	.957	-.044
College Degree	2.658	.976	1.378	.320	3.040	1.112	1.804	.590
Grad Degree	2.212	.794	.967	-.033	2.293	.830	.836	-.179
Employment (Full-time)								
Part-time	.861	-.149	1.095	.091	.724	-.323	1.561	.445
Seasonal/Temp	.365*	-1.007	1.723	.544	.396*	-.925	1.854	.617
Not employed	.717	-.332	2.625**	.965	.606	-.500	3.911***	1.364
Retired	.771	-.260	1.373	.317	.895	-.111	2.058	.722
Marital Status (Married)								
Single	.516*	-.661	1.969*	.677	.513**	-.668	1.970**	.678
# of Children (0)								
1	1.130	.122	1.249	.222	1.124	.117	1.311	.271
2 or 3	.808	-.213	1.019	.019	.799	-.224	1.169	.156
4 or 5	1.103	.098	1.176	.162	.858	-.153	1.473	.387
6 or more	.755	-.282	2.531	.928	.728	-.317	2.976	1.091
Food Source (non-use)								
Use of source	.073***	-2.615	1.338***	1.467	.555	-.589	.664	-.410

Table 8-5 cont. 6

	Food Bank			Crafts		
	706.139			714.800		
<i>-2Log Likelihood</i>	112.398***			102.527***		
<i>Model X²</i>	Food Insecure with Hunger			Food Insecure with Hunger		
	Exp (B)	B	Exp (B)	Exp (B)	B	Exp (B)
Age (18-24)						
25-34	.794	-.231	1.841	.719	-.330	2.323
35-44	.358*	-1.026	2.570*	.339**	-1.081	2.723*
45-54	.247**	-1.397	2.938*	.245**	-1.407	3.039*
55-64	.307*	-1.183	1.953	.311*	-1.168	2.054
65+	.292	-1.230	3.476	.287	-1.248	3.112
Gender (Female)						
Male	1.232	.208	1.325	1.328	.283	1.200
Education (<HS)						
HS /GED	.945	-.057	.836	.983	-.017	.825
Some college/AA	1.381	.323	1.020	1.476	.389	.899
College Degree	2.794	1.028	1.684	3.106	1.133	1.573
Grad Degree	2.358	.858	.672	2.549	.936	.759
Employment (Full-time)						
Part-time	.754	-.283	1.436	.774	-.256	1.479
Seasonal/Temp	.382*	-0.963	1.754	.380*	-0.967	1.767
Not employed	.598	-.514	3.309***	.620	-.479	3.435
Retired	.758	-.277	1.580	.807	-.215	1.724
Marital Status (Married)						
Single	.514*	-0.666	1.931**	.523*	-0.649	1.957**
# of Children (0)						
1	1.082	.079	1.336	1.104	.099	1.306
2 or 3	.804	-.219	1.077	.866	-.144	1.084
4 or 5	.968	-.032	1.262	.926	-.077	1.391
6 or more	.734	-.310	2.639	.779	-.250	2.785
Food Source (non-use)						
Use of source	.299*	-1.206	2.360*	.367*	-1.001	1.344
			.859			.296

Table 8-5 cont.7

	General Assistance			Disability		
<i>-2Log Likelihood</i>	705.732			710.350		
<i>Model X²</i>	100.329***			97.098***		
	Food Secure		Food Insecure with Hunger	Food Secure		Food Insecure with Hunger
	Exp (B)	B	Exp (B)	B	Exp (B)	B
Age (18-24)						
25-34	.677	-.390	2.231	-.310	2.354	.856
35-44	.331**	-1.107	2.562*	-1.003	2.799*	1.029
45-54	.242**	-1.420	2.918*	-1.349	3.124*	1.139
55-64	.301*	-1.207	2.023	-1.084	2.431	.888
65+	.280	-1.272	2.907	-1.118	3.213	1.167
Gender (Female)						
Male	1.337	.291	1.202	.288	1.237	.213
Education (<HS)						
HS/GED	.999	-.001	.840	-.033	.826	-.191
Some college/AA	1.410	.343	.912	.391	.928	-.075
College Degree	2.602	.956	1.623	1.052	1.713	.538
Grad Degree	2.178	.779	.820	.812	.800	-.223
Employment (Full-time)						
Part-time	.778	-.251	1.601	-.354	1.519	.418
Seasonal/Temp	.397*	-.923	1.880	-.991	1.767	.569
Not employed	.577	-.549	3.755***	-.493	4.149***	1.423
Retired	.708	-.345	1.799	-.040	2.465	.902
Marital Status (Married)						
Single	.511*	-.672	1.962	-.664	2.013**	.700
# of Children (0)						
1	1.094	.090	1.334	.073	1.205	.187
2 or 3	.776	-.253	1.147	-.270	1.075	.073
4 or 5	.832	-.184	1.433	-.199	1.360	.308
6 or more	.766	-.267	3.017	-.385	2.679	.985
Food Source (non-use)						
Use of source	.269*	-1.313	.673	-.711	.440	-.820

Table 8-5 cont.8

	Gardening				Churches			
<i>-2Log Likelihood</i>	717.131				699.430			
<i>Model X²</i>	94.475***				106.396***			
	Food Secure		Food Insecure with Hunger		Food Secure		Food Insecure with Hunger	
	Exp (B)	B	Exp (B)	B	Exp (B)	B	Exp (B)	B
Age (18-24)								
25-34	.719	-.329	2.262	.816	.730	-.315	2.067	.726
35-44	.347**	1.058	2.588*	.951	.360*	-1.021	2.423	.885
45-54	.249**	-1.392	2.927*	1.074	.248**	-1.393	2.726*	1.003
55-64	.301*	-1.200	1.985	.686	.304*	-1.190	1.853	.617
65+	.310	-1.170	3.018	1.105	.323	-1.131	2.943	1.079
Gender (Female)								
Male	1.307	.268	1.192	.175	1.317	.275	1.175	.161
Education (<HS)								
HS /GED	.988	-.012	.853	-.159	.972	-.028	.893	-.113
Some college/AA	1.471	.386	.946	-.055	1.456	.376	.958	-.043
College Degree	2.840	1.044	1.728	.547	2.870	1.054	1.801	.588
Grad Degree	2.230	.802	.864	-.146	2.668	.981	.395	-.930
Employment (Full-time)								
Part-time	.701	-.355	1.543	.434	.731	-.313	1.441	.366
Seasonal/Temp	.373*	-.986	1.800	.588	.380*	-.969	1.787	.581
Not employed	.551	-.597	3.664***	1.299	.553	-.593	3.534***	1.262
Retired	.716	-.335	1.808	.592	.769	-.262	1.600	.470
Marital Status (Married)								
Single	.501**	-.691	1.944**	.665	.506**	-.681	1.857*	.619
# of Children (0)								
1	1.124	.117	1.327	.283	1.118	.112	1.406	.341
2 or 3	.777	-.252	1.47	.137	.786	-.241	1.211	.191
4 or 5	.852	-.160	1.451	.372	.864	-.147	1.466	.383
6 or more	.685	-.379	2.875	1.056	.674	-.395	3.285*	1.189
Food Source (non-use)								
Use of source	1.183	.168	.993	-.007	.423	-.860	3.656**	1.296

Table 8-5 cont.9

	Number of Food Sources			
<i>-2Log Likelihood</i>	730.626			
<i>Model X²</i>	142.661***			
	Food Secure		Food Insecure with Hunger	
	Exp (B)	B	Exp (B)	B
Age (18-24)				
25-34	.640	-.447	2.367	.861
35-44	.276**	-1.288	2.854*	1.049
45-54	.156***	-1.859	3.338**	1.205
55-64	.190**	-1.660	2.168	.774
65+	.193*	-1.647	3.660	1.297
Gender (Female)				
Male	1.334	.288	1.188	.172
Education (<HS)				
HS /GED	.866	-.143	.837	-.178
Some college/AA	1.375	.318	.888	-.119
College Degree	2.479	.908	1.537	.430
Grad Degree	2.372	.864	.676	-.392
Employment (Full-time)				
Part-time	1.300	.262	1.194	.177
Seasonal/Temp	.514	-.666	1.566	.449
Not employed	.793	-.232	2.973**	1.090
Retired	1.265	.235	1.432	.359
Marital Status (Married)				
Single	.554*	-.591	1.874*	.628
# of Children (0)				
1	1.157	.146	1.208	.189
2 or 3	1.027	.027	.983	-.017
4 or 5	1.325	.282	1.237	.213
6 or more	1.077	.074	2.494	.914
Food Source				
# of sources used	.656***	-.422	1.123*	.116

Table 8-5 cont. 10

	FULL MODEL			
<i>-2Log Likelihood</i>	651.309			
<i>Model X²</i>	228.910***			
	Food Secure		Food Insecure with Hunger	
	Exp (B)	B	Exp (B)	B
Age (18-24)				
25-34	.429	-.845	1.935	.660
35-44	.284*	-1.258	2.761	1.015
45-54	.116***	-2.156	2.961	1.086
55-64	.166**	-1.793	3.167	1.153
65+	.167*	-1.791	3.297	1.193
Gender (Female)				
Male	1.351	.301	1.108	.103
Education (<HS)				
HS /GED	.512	-.670	.717	-.332
Some college/AA	.757	-.278	.727	-.319
College Degree	1.368	.313	1.195	.178
Grad Degree	.919	-.084	.306	-1.184
Employment (Full-time)				
Part-time	1.671	.513	.957	-.044
Seasonal/Temp	.530	-.634	1.587	.462
Not employed	2.028	.707	3.062*	1.119
Retired	1.669	.512	2.204	.790
Marital Status (Married)				
Single	.682	-.383	2.109**	.746
# of Children (0)				
1	1.066	.064	1.175	.161
2 or 3	.921	-.082	1.033	.032
4 or 5	1.094	.090	1.144	.135
6 or more	.718	-.331	2.747	1.011
Food Source (non-use)				
Wages	2.221	.798	.852	-.160
Commodities	.571	-.561	.654	-.424
Food Stamps	.759	-.276	.625	-.470
Family	.234***	-1.453	.867	-.143
Tribal Vouchers	.390	-.942	1.553	-.440
Odd Jobs	.589	-.529	1.056	.055
WIC	1.324	.281	.692	-.368
Hunting	1.501	.406	.708	-.345
Pawning	.130**	-2.042	5.767***	1.752
Social Security	.777	-.252	.785	-.242
Food Bank	.722	-.325	1.418	.349
Craft	.752	-.284	.814	-.205
General Assistance	.503	-.687	.448	-.803
Disability	1.216	.196	.188**	-1.669
Gardening	1.123	.116	1.049	.048
Churches	.664	-.409	4.600**	1.526

Source: Food Security, Nutrition and Health Survey, 2001

Values that are statistically significant are distinguished in bold type. *p<.05, **p<.01, ***p<.001

Reference group for the Dependent Variable is Food insecure without hunger

§missing variables originally included in models were deleted due to insignificance

To some extent this may be true for other food sources as well. There is some evidence that households on the reservation share commodity foods (FDPIR) with the extended family when needed (Ward et al 1999; Hiwalker et al 2000). Certainly food sources, like wages, that are used and shared more easily will be distributed more widely on the reservation due to cultural and social norms that suggest a redistribution of resources. Because this analysis does not take account of the frequency of food source use, it is possible that the effect of using wages as source of food is masked by the variation in the different levels and ways that households may use wages as source of food. One would expect that households that use their own wages as a source of food would have different food security conditions than those who use redistributed wages periodically.

Also surprising is the fact that the number of children in the home is significant in only one nested model (churches). Research looking at food security in the United States suggests that households with children, or those that have larger households size, generally have higher levels of food insecurity (Bickel et al 1999; Olsen et al 2004). It is hard to understand why this is not manifest in this analysis as well and it clearly needs to be examined further. Otherwise, this research corroborates findings that single headed households

are more likely to be food insecure and is compatible with research that shows households with low income (related to unemployment) are also at risk. In addition, the literature points to people in the middle age categories having the highest levels of food insecurity or food insufficiency and this is also apparent in this research (Wu et al 2005).

Food Strategy Clusters and Food Security

The food strategy clusters discussed and analyzed in chapter 7 are used here to look at how food acquisition strategies impact food security levels. Table 7-1 shows these clusters and the food strategies associated with them. This analysis begins by looking at the associations between membership in each food strategy cluster and food security levels through a cross-tabulation. A multinomial logistic regression is then used to determine how membership in each cluster predicts food security level.

Cross-Tabulations

Table 8-6 shows the percentages for each cluster for food secure, food insecure without hunger, and food insecure with hunger. Three of the clusters have significant Pearson's Chi-square p-values at or above the .05 level. Over 48% of the members of food strategy cluster 1 are food secure, representing

the highest percentage for this category in any of the clusters. Conversely, only 20.7% of the members of food strategy cluster 1 are food insecure with hunger, which is the smallest percentage in this category in of all the clusters. Additionally, this cluster represents the smallest percentage of households

Table 8-6 Percentages of Food Security levels across Food Strategy Clusters (n=460)

	Food Secure	Food Insecure	Food Insecure with Hunger	χ^2
Cluster 1				0.000
not member	18.4	39.2	42.4	
member	48.3	31.0	20.7	
Cluster 2				0.817
not member	30.0	35.5	34.5	
member	27.8	39.2	32.9	
Cluster 3				0.043
not member	32.0	34.6	33.3	
member	17.9	43.6	38.5	
Cluster 4				0.067
not member	31.3	36.2	32.5	
member	18.6	35.6	45.8	
Cluster 5				0.000
not member	33.6	35.9	30.5	
member	8.3	37.5	54.2	

Source: Food Security, Nutrition and Health Survey, 2001
 Values that are statistically significant are distinguished in bold type.

with food insecurity without hunger. This is not surprising because this cluster represents people who primarily use wages for food. One would expect that people who use wages for food would have more flexibility in meeting their food needs and therefore be in a better position reach food security.

Food strategy cluster 3 reflects people that use the federal food voucher programs, including Food Stamps and WIC, as sources of food. Of members of cluster 3, 43.6% are food insecure without hunger, while another 38.5% are food insecure with hunger. These percentages are slightly higher than sample percentages (see Figure 2). Food strategy cluster 5 represents people who use a variety of personal, community, and tribal resources, largely without relying on federal food programs. Of these people, a striking 54.2% are food insecure with hunger—the more severe form of food insecurity. In contrast, only 8.3% report being food secure. This compares to sample distributions of 30% food security and 34% food insecure with hunger.

Food strategy cluster 2 represents people who use wages and commodities as sources of food and food strategy cluster 4 represents those who largely use entitlement programs. Although food strategy clusters 2 and 4 do not reach statistical significance at the $p=.05$ level, p -values for cluster 4 are under $p=.10$.

While it is customary to use the $p=.05$ level as an appropriate significance cutoff level, because this analysis is keenly interested in the effects of these clusters on food security, the general trends for these clusters are reported none-the-less, yet are regarded as less important. Percentages of members of food strategy cluster 2 tend to be slightly higher for food insecurity without hunger and slightly lower in the food secure categories than for the sample. More than 45% of members of food strategy cluster 4 are food insecure with hunger and lower than sample percentages for food security following the pattern of cluster 3.

There is an interesting distribution of food security across the food clusters. It appears that the clusters progress toward higher levels of food insecurity in order, with food strategy cluster 1 being the most food secure, and cluster 5 the most food insecure. Although food strategy clusters 2 and 4 do not meet the requirements for statistical significance at the $p=.05$ level, they follow this overall pattern. Although this could be organized in any fashion, this emergent pattern is helpful in guiding and maintaining order to our understanding of the relationships between cluster membership and food security levels.

Multinomial Logistic Regression

The initial multinomial logistic regression, showing the effects of the demographic variables on food security levels, is used as a baseline model for which to compare the effects of the five food strategy clusters. Summary results of all six multinomial logistic regressions are presented in Table 8-7. Again, it is important to remember that the first set of columns reflects the comparison between food secure and food insecurity without hunger and the second set of columns represents the comparison between food insecurity with hunger and food insecurity without hunger. The goal in this analysis is to determine how clusters are associated with the most severe food insecurity and hunger.

As in the baseline model presented above, gender, education, and the number of children under the age of 18 in the home are not significant in any of the models. Respondent age, employment and marital status are consistently significant across all models. For the demographic control variables, patterns remain generally the same as in the baseline model. Each food strategy cluster model is statistically significant and is described below.

Model 1 shows us the effect of including membership in food strategy cluster 1 with the demographic variables for predicting food security levels.

Table 8-7 Logit and Odds of Cluster Membership on Food Security (Reference Category, n=460)

<i>Model X²</i>	Cluster 1		Cluster 2		Cluster 3		Cluster 3	
	121.195***	714.320	94.403***	736.507	97.363***	717.618	Exp(B)	B
<i>-2Log Likelihood</i>	Food Secure		Food Secure		Food Insecure with Hunger		Food Secure	
	Exp (B)	B	Exp (B)	B	Exp (B)	B	Exp (B)	B
Age (18-24)								
25-34	.686	-.377	2.263	.817	2.253	.812	.748	-.291
35-44	.347**	-1.057	2.568*	.943	2.583*	.949	.338**	-1.084
45-54	.201***	-1.606	2.925*	1.073	2.917*	1.071	.240**	-1.426
55-64	.260*	-1.348	1.978	.682	1.992	.689	.268*	-1.316
65+	.296	-1.219	2.993	1.096	2.998	1.098	.272	-1.302
Gender (Female)								
Male	1.177	.163	1.196	.179	1.196	.179	1.257	.228
Education (< HS)								
HS/GED	.841	-.173	.852	-.160	.848	-.165	.993	-.007
Some college/AA	1.088	.084	.948	-.054	.945	-.057	1.376	.319
College Degree	2.138	.760	1.718	.541	1.732	.549	2.636	.969
Grad Degree	1.411	.344	.887	-.120	.876	-.133	2.242	.807
Employment (Full-time)								
Part-time	1.118	.111	1.379	.321	1.540	.435	.765	-.269
Seasonal/Temp	.592	-.524	1.676	.516	1.801	.588	.427*	-.850
Not employed	.926	-.077	3.349***	1.209	3.682***	1.303	.630	-.462
Retired	1.649	.500	1.649	.500	1.821	.599	.832	-.183
Marital Status (Married)								
Single	.573*	-.558	1.920**	.652	1.951**	.668	.494**	-.706
# of Children (0)								
1	1.229	.206	21.343	.295	1.330	.286	1.158	.147
2 or 3	.891	-.116	1.115	.109	1.148	.138	.797	-.227
4 or 5	1.074	.071	1.438	.363	1.452	.373	.865	-.145
6 or more	.857	-.154	2.826	1.039	2.867	1.053	.709	-.343
Cluster								
Member	3.948***	1.373	.839	-.175	1.071	.068	.501	-.692
							.863	-.147

Table 8-7 cont .2

	Cluster 4		Cluster 5		Food Insecure with Hunger		Food Secure		Food Insecure with Hunger	
	98.644***		120.340***		Exp (B)		Exp (B)		Exp (B)	
	708.568		692.653		B		B		B	
	Food Secure		Food Secure		Food Insecure with Hunger		Food Insecure with Hunger		Food Insecure with Hunger	
	Exp (B)	B	Exp (B)	B	Exp (B)	B	Exp (B)	B	Exp (B)	B
Age (18-24)										
25-34	.731	-.313	2.384	.869	.594	-.522	2.649*	.974	2.649*	.974
35-44	.356**	-1.034	2.753*	1.013	.313**	-1.161	2.836*	1.042	2.836*	1.042
45-54	.262**	-1.339	3.236**	1.174	.201***	-1.603	3.496**	1.252	3.496**	1.252
55-64	.368	-.999	2.771	1.019	.263*	-1.337	2.335	.848	2.335	.848
65+	.385	-.955	4.301*	1.459	.253	-1.375	3.712	1.312	3.712	1.312
Gender (Female)										
Male	1.295	.259	1.210	.191	1.510	.412	1.145	.135	1.145	.135
Education (< HS)										
HS /GED	.950	-.051	.786	-.241	.916	-.088	.858	-.153	.858	-.153
Some college/AA	1.442	.366	.892	-.114	1.522	.420	.885	-.123	.885	-.123
College Degree	2.808	1.032	1.635	.492	3.230	1.173	1.480	.392	1.480	.392
Grad Degree	2.173	.776	.742	-.298	2.522	.925	.729	-.316	.729	-.316
Employment (Full-time)										
Part-time	.708	-.345	1.545	.435	.931	-.072	1.276	.243	1.276	.243
Seasonal/Temp	.396*	-.927	1.896	.640	.410*	-.891	1.633	.490	1.633	.490
Not employed	.657	-.419	4.560***	1.517	.612	-.492	3.301***	1.194	3.301***	1.194
Retired	1.166	.154	2.879	1.057	.679	-.387	1.769	.570	1.769	.570
Marital Status (Married)										
Single	.511**	-.672	2.007**	.697	.577*	-.550	1.815*	.596	1.815*	.596
# of Children (0)										
1	1.063	.061	1.202	.184	1.248	.222	1.201	.184	1.201	.184
2 or 3	.753	-.283	1.075	.072	.940	-.062	1.006	.006	1.006	.006
4 or 5	.811	-.210	1.357	.305	1.034	.034	1.326	.282	1.326	.282
6 or more	.687	-.375	2.710	.997	.750	-.287	2.508	.919	2.508	.919
Cluster										
Member	407	-.898	.365*	-1.008	.163***	-1.812	1.874	.628	1.874	.628

Source: Food Security, Nutrition and Health Survey, 2001

Reference group for dependent variable is food insecure without hunger

Food strategy cluster 1 is comprised of people who largely use wages as a source of food. The odds of being food secure as compared to food insecure without hunger for members of cluster 1 are 3.9 times higher than for those who do not belong to cluster 1. In other words, membership in cluster 1 is associated with greater food security. Although it is not a significant effect, the odds of being food insecure with hunger as compared to food insecure without hunger are also low following this same pattern.

Model 2 includes the effect of membership in food strategy cluster 2 however; this effect is not significant in the model. Interestingly, a new finding appears in this model surrounding employment. The odds of being food secure as compared to food insecure without hunger are 62 percent lower for those who work seasonal and/or temporary jobs as compared to those who work full-time.

As demonstrated in model 3, the effect of membership in food strategy cluster 3 is not statistically significant, suggesting that there is not an effect on levels of food security. Here too, employment in seasonal and/or temporary work as compared with full-time work is associated with lower odds (57% lower) of being food secure as compared to food insecure without hunger.

Membership in food strategy cluster 4 is associated with a reliance on entitlement programs such as Social Security and Disability, as well as tribal vouchers. The odds of being food insecure with hunger as compared to food insecure without hunger for members of this cluster are 63 percent lower than for non-members. Although not statistically significant, the odds of being food secure as compared to food insecure without hunger are also lower for members of this cluster, perhaps demonstrating that members of food strategy cluster 4 are most likely to be food insecure without hunger. Additionally, the odds of being food secure as compared to food insecure without hunger are 60% lower for those who work seasonal/ temporary jobs as compared to those who work full-time.

Food strategy cluster 5 is the most diverse including a number of personal, family and community resources as sources of food. As a dramatic finding, the odds of being food secure as compared to food insecure without hunger are nearly 84% lower for members of this cluster as compared to non-members, making this the cluster with members least likely to be food secure. Additionally, although not statistically significant, this trend may continue as it appears to be more likely that members of this cluster will be food insecure with hunger as

compared to food insecure without hunger. Like the other models, the odds of food security are lower for those who work seasonal/temporary jobs as compared to those who work full-time.

Including the food strategy clusters in the analysis tells us a bit more about the ways that food security is distributed in this population. Demographic control variables did not change very much, but seasonal/ temporary work emerged as an important predictor of food security as compared to food insecure without hunger. Although membership in food clusters 2 and 3 did not have significant effects on food security in this analysis, the pattern presented in the cross-tab analysis is still somewhat apparent here. It appears that members of food strategy cluster 1 are the most food secure and members of food strategy cluster 5 are the most food insecure. Cluster 4 is interesting because it appears to be the most likely to represent those who are food insecure but not hungry.

Discussion and Conclusions

These analyses shows that more than two-thirds of this sample of Northern Cheyenne residents experience food insecurity, and about a third experience the more grave situation of food insecurity with hunger (see Figure 2). However, emerging patterns in a more detailed analysis show that

this phenomenon is related to the food sources and food strategies used by households.

Several interesting things emerge in looking at how individual food sources predict food security levels. Four sources really stood out in final modeling, including using Disability payments, family, churches and pawning for food. These food sources represent different levels of stability across the food source continuum.

Households that use Disability payments for food are less likely to be food insecure with hunger as opposed to food insecure without hunger. This is interesting because it represents a fixed income source that is theorized as a relatively stable source of food. It appears that, in fact, it does offer some relief from food insecurity, but perhaps not as much as we might expect. Other sources of fixed income such as Social Security and even other income transfers such as General Assistance, Food Stamps and WIC are not significant in the final model, which introduces questions about how these programs are related to food security. It seems improbable that these important sources of food are not related to food security and therefore further research is needed to investigate these relationships more thoroughly.

Family as a food source seems to play a similar role. Households that use family as a source of food, are more likely to be food insecure without hunger as compared to being food secure. This is born out in both the individual model and the final model. Social networks, and especially family, are clearly important to supporting household food provisioning. However, as described in the literature, it can be difficult to rely extensively on family for long periods of time and when family resources are not abundant (Ahluwalia et al 1998).

Use of churches for food is related to food insecurity with hunger as compared to food insecurity without hunger. Because churches differ in the assistance provided, and are not consistent in that assistance, it represents a food source that is less stable on the continuum. As expected, this source is related to the highest levels of food insecurity. This food source may represent a more desperate avenue to food, or a way that households seek food when there is not a better option. Thus, it is not surprising that it would be related to low levels of food security.

The most dramatic findings are unmistakably related to pawning behavior in this analysis. Households that use pawning as a source of food are much less likely to achieve food security. This is pronounced in the individual and final

models. The effect of pawning on food security typifies the idea of the poverty trap described by Zimmerman and Carter (2003). The poverty trap explains how households without many other options will use income smoothing behavior to cope with stresses in the short run, which can begin an adaptive behavior that is destructive to household livelihood sustainability in the long run. This research expected that income smoothing behavior such as pawning, which is an extremely risky behavior on the food source continuum, would lead to higher levels of food insecurity. This appears to be validated in this analysis.

Similar patterns emerge in looking at the food sources organized into food strategy clusters. Membership in the food strategy clusters predicts food security differently. The cluster solution follows the theoretical continuum beginning with the most simple and stable cluster and ending with the most complex and risky strategy. The three food strategy clusters in the middle represent various combinations of sources that are all less stable than cluster 1 and more stable than cluster 5.

The expectation for this analysis was that strategies that represent more stable sources will be less likely to be food insecure. Interestingly, as expected, food security levels followed the same continuum, with cluster 1 being the most

likely to be food secure and cluster 5 the most likely to be food insecure with hunger. Cluster 4 also follows this pattern with the highest likelihood of being food insecure without hunger, although clusters 2 and 3 were not statistically significant in the regression analysis. Thus, the most stable strategies have the highest levels of food security, while the strategy representing the middle ground is most likely to represent the middle level of food security –food insecure without hunger—and households that use the least stable strategy are most likely to experience the highest level of food insecurity – with hunger.

As with previous analysis in this project, marital status was important to food security levels as were respondent employment and respondent age. Within clusters, we see these variables play out in terms of which clusters achieved higher levels of food security as well. For example, cluster 5 which represents the cluster with the lowest level of food security also represents single respondents and households with the most number of children. This fits the research literature that suggests that single parents, households with children, and large households are more vulnerable to food insecurity (Bickel et al 1999; Olsen et al 2004). In contrast, cluster 1 which represents the cluster with the highest level of food security is generally related to higher educational

attainment, more employment, being married and having fewer children in the home. This fits with our research expectations that households with access to more stable and valuable assets, that experience fewer demands, will be more likely to achieve food security. The research literature also points to the importance of age in attaining food security. Specifically, middle age categories are more vulnerable to food insufficiency (food insecurity with hunger) (Wu et al 2005). This has also been seen in this analysis and although less obvious here, is also apparent. Older age categories are represented in cluster 4, and younger age categories are represented in cluster 3. As predicted by the literature, these clusters represent the middle ground of food security and are therefore somewhat protected from the more severe levels of food insecurity, including food insecurity with hunger.

Overall, it appears that the research expectations for this analysis have played out, both in looking at the ways that the individual food sources predict food security and especially when looking at how households actually use these food sources as food strategies. One potential difference lies in the role of income transfers and fixed income sources. This research theorized that income transfers, and especially fixed income sources would be relatively stable sources

of food and lead to higher levels of food security. However, in this analysis, it appears that although these government assistance programs do tend to lead to a lower likelihood of being hungry, they still do not appear to lead to food security. This is consistent with previous research that raises questions about the ability of federal food programs to completely remedy food insecurity while moderating hunger (Poppendick 1999; Ward et al 2000).

Additionally, by looking at food sources and food strategies, this research is able to compare the findings of food source use to food strategy use. Since this has not been done before, it is interesting to note how organizing the information differently impacts the results. In this case, the results are consistent and follow a similar pattern for understanding household choices. However, by looking at the ways that food sources are actually used together as strategies, we can see a clearer and more coherent result.

Chapter 9: Food Provisioning and Food Security

Food is a distinctive ingredient of human existence. It plays an important role in the daily creation of meaning as well as being physically necessary for human survival. Food carries greater significance for human life than other social artifacts including money. However, as a commodity, it is part of an economic (market) logic which excessively rewards those who have purchasing power. In this case non-participation in the market can have extreme consequences as denying access to food can result in death. As much as food is related to economic trends and patterns, it is also embedded in social and cultural life. As we have seen throughout this analysis, food provisioning is an interesting and complex affair.

This study shows that some households work hard to secure food, often using risky and unreliable food sources, in the context of their personal, social, political and economic circumstances. Frankly, this analysis merely offers a starting point for looking at food provisioning choices and the relationship of household food provisioning choices to food security. However, what this project has really been able to do is to introduce into current research on food

acquisition how to look at household food provisioning in a different way methodologically, and start to ask questions that probe more deeply into the real choices that households must make in these daily provisioning activities. This analysis classifies household food sources into intra-related clusters of food acquisition, showing the ways that these sources are actually used together by households. This is helpful in several respects. Not only is this analysis able to show how households actually organize food provisioning, but it looks at the methodological differences between conceptualizing food provisioning in different ways. It is important to think about how households use food acquisition strategies holistically in order to understand the experiences that are relevant to resource-poor households and to link these findings to real ameliorative solutions.

Furthermore, this research has attempted to add additional insight into specific aspects of food provisioning that have been missing from research literatures. Food coping research, mostly found in the nutrition literature has so far been able only to describe the possible ways in which households acquire food. What has been missing is the quantifiable importance of each source, which this study only begins to investigate, as well as the relationship that these

food sources have to outcomes like food security and hunger which is central to this research.

Several interesting findings in this analysis corroborate existing research. As expected, based upon the livelihoods literature, households appear to use resources to which they have access and to which they are eligible. This is especially apparent with formal programs, however even informal activities are used by households according to understandable and expected patterns. For example, Social Security was often identified by household respondents in the older age categories as an important source of food for the household. This is what we might expect for households with members who are older and likely retired. Additionally, as suggested by the livelihoods literature, food sources and strategies fit along a continuum of resources from more valuable and very stable or reliable to very risky and unreliable. Thinking about food sources this way allows for a pointed examination of food provisioning strategies and the relationship between them and food security levels.

This analysis is able to show that the types of food sources and food strategies used by households matter in the maintenance and sustenance of livelihoods, and for food security. This is especially apparent for particular

food sources and strategies. For example, one of the most remarkable findings in these analyses relates to households that use pawning for food. Pawning usually entails placing valuable household assets (items) in trust in exchange for a money advance with an arrangement that the items will be available for sale, or until households can repay the loan and accrued interest charges. This coping mechanism is very risky because typically the funds received for pawned items are well below the value of items pawned, interest rates are high and there is often considerable financial difficulty in retrieving valued items.

Qualitative research points to this practice being used as a last resort for many Northern Cheyenne households, and not as a way to reduce extra stores or household surplus. In other words, households that use pawning for needed funds often expect to recover the items that were placed into pawn as soon as they can. Results from this analysis indicate that pawning is used as a source of food by 22% of the sample, and is related to being unemployed or having part-time work. Additionally, pawning is part of the food strategy cluster 5, which represents the most diversity of food source use, including sources with the most risk and which represents the strategy with the most risk of food insecurity. As

expected, pawning itself as a source of food has a strong negative relationship to food security.

Pawning items for money that can be used for food is a good example of income smoothing. Income smoothing is used when there are incomplete markets and no institutional supports, which is evident for some households on the reservation (Morduck 1995; Townsend 1995). This coping mechanism is problematic because it represents coping through depleting assets and potentially forfeiting future income. This clearly demonstrates the concept of the *poverty trap* described by Zimmerman and Carter (2003). Because pawning is used most often by households with respondents that are unemployed or have only part-time work, and is represented as part of a cluster that is characterized by single respondents in households with high numbers of dependent children, it is arguable that pawning is used by households with low levels of assets and high demands. Therefore, choices are so constrained that households are forced to deplete their assets to tolerate the present stresses, but by doing so these households undermine the sustainability of the future. (Maxwell et al 1999; Zimmerman et al 2003).

More uncertain are findings related to the role of fixed income entitlements and federal income transfers. Findings indicate that as a whole, household use of these sources match the criterion for their use as outlined in the requirements (i.e., women with children use WIC, those who are retired use Social Security, etc). However, for this population Federal food assistance and entitlement programs do not show a strong relationship to food security, which raises issues of their efficacy. It appears that they are able to relieve some of the stress of food insecurity, especially hunger, but there is not convincing evidence for achieving food security. According to food assistance literatures, food assistance programs, and especially Food Stamps, are criticized for being inadequate or running out before the end of the month (Jensen 2002; Huffman and Jensen 2003; Dillinger et al 1999; Basiotis et al 1998; Gundersen et al 2001). This has been specifically verified in relation to Food Stamp use in this population (Ward et al 2000; Davis et al 1999; Hiwalker et al 2000).

Previous research has raised the questions of the importance of culturally appropriate food and food provisioning systems. For example, the FDPIR program has seen high participation rates and enjoys recognition as a “good” program on the Northern Cheyenne reservation because although funded by the

USDA, it is administered through the Tribe and has made great efforts to meet local needs and demands (Ward et al 2000). Additionally, previous research has found that concerns over racism and discrimination for Federal food program users influence participation and even may play a role in sanctions and/or maintaining continuous eligibility (Hiwalker et al 1999; Ward et al 2000).

One thing that is unambiguous in this analysis is the relationship between the number of food sources used by households and household food security levels. As expected, the higher the number of food sources used, the lower the level of food security in the home. In other words, households that use fewer sources are more likely to be food secure, while households that use a lot of sources are more likely to be food insecure and potentially have hunger. As hinted at in some of the food provisioning research, it appears that using a greater number of food sources is a measure of the desperation of households rather than representing a strong resource base (Ahluwalia et al 1998; Kempson 2002, 2003; Hoisington 2002; Tarasuk et al 1999; Campbell et al 1989). This makes sense given the amount of work that is involved with securing food through the majority of food sources examined in this analysis. In consequence it appears that excepting for salaries and wages each of the other myriad food acquisition

sources only contribute a small amount to the overall food security needs of a household.

While overall diversification of assets may be important to the long term sustainability of household livelihoods, food security is likely more related to the transformation of these assets into food resources and stores. Therefore, it appears that diversification of food sources does not follow the same pattern as diversification of assets. The types of food sources used by households matter significantly in terms of how these resources can be translated into food for the household. Perhaps, this is because food differs from other aspects of household livelihood provisioning. This is an interesting question that would benefit from further research into how food provisioning really fits into the larger system of overall household livelihood provisioning. It seems that the more time and energy that is put into securing basic needs, such as food, the less time and energy is available for accumulating other stocks and stores. However, this is an empirical question that begs further attention.

Several demographic characteristics are important in understanding food security for this population and show consistent patterns throughout this analysis for individual food sources and as they relate to food strategies.

Gender, educational levels, and the number of children under 18 in the home are generally not significant in these analyses; however, respondent age, employment and marital status are clearly relevant to understanding the way that food security is distributed on the reservation. It is somewhat surprising that the number of children under 18 in the home is not more significant as a predictor of food insecurity. The literature clearly points to this as being important in previous research. Additionally, while we might expect that unemployment and/or underemployment may be related to low levels of food security, it is surprising that full-time employment is not more strongly associated with food security. This analysis shows that even households with full-time employment are fairly likely to be food insecure perhaps pointing to the inadequacy of jobs on the reservation, and pointing to the importance of looking at income levels rather than employment status as suggested in the literature.

Age and marital status are also found to be relevant to food security status in previous research. As expected, middle age categories were more likely to experience food insecurity, as although it appears that risk of food insecurity generally increases with age, those between the ages of 45 and 54 are the most at risk. These age groups are perhaps most vulnerable in part due

to the lack of programs specifically targeted for them as well as the increased likelihoods of facing higher demands for caring for children and/or aging relatives. Additionally, this analysis clearly shows that married respondents are more likely to be food secure than single respondents. In this analysis respondents indicated whether they were “married or with someone” or “single, divorced, separated or widowed.” Being single thus reflects a certain sense of independence from social support and perhaps also collaboration in the labor market. Being married or with someone may very well be related to food security as it reflects additional resources for work, employment and/or wages as well as childcare and other necessities.

One of the most noteworthy findings of this study is that the Northern Cheyenne reservation population suffers from very high levels of food insecurity. There are some reasonable explanations for why this is so. The severe under-development of the economic market is often identified as a source of vulnerability and has implications for food provisioning for this population. As a rural community that has historically been isolated physically and culturally, economic exclusion is not surprising. As previously shown, this particular rural reservation context is riddled with hurdles to full economic

participation that have been set in motion from the beginning of U.S. and Native American dealings. A capitalist agricultural political agenda first ignored the real economies of Natives and then sought to impose a system in the interests of capitalism that ignored the needs and realities of tribes.

However, there are many reasons to believe that Native American communities like the Northern Cheyenne, although culturally unique, are not separate from the dominant global economic and food system. Pickering (2000) argues that Native American populations have been studied as bounded and isolated communities leading to the false conclusion that they are outside of the broader economic systems. She documents unacknowledged human capital formation through the often sporadic and transitory experiences that Indians from the Pine Ridge reservation have from temporary migrations away from the reservation (Pickering 2000). As unrecognized human capital, however, these skills and knowledge capital are often under utilized or cannot find a place in the incomplete or inadequate economic markets of the reservation.

Indeed, although tribes were often separated from market centers, reservations suffered mostly because of their dependence on, and roles in (or lack of), the larger economic and food systems. Dependencies on the Federal

government, in particular, were often due to the political policies oriented toward Native tribes, and especially land encroachment which often deprived the people of the necessary economic base and social development for bona fide independence. It appears that the historical reliance on Federal food programs, and the treaties that created this system of dependence, continue to propagate a high levels of reliance on formal assistance. This may also be related to the continued high levels of poverty on the reservation where social and family networks are overstressed and unable to provide respite as is suggested elsewhere in the literature (Ahluwalia et al 1998). Due to the many historical reasons for the economic segregation, coupled with the paternalistic regulatory structures imposed upon this Native community, reservations typically developed only incomplete markets and still struggle to provide the necessary economic structures and opportunities necessary for economic independence and prosperity.

There may not be a simple solution for more inclusive economic participation in the wider economic capitalist system. However, control over their own food through self-reliant systems would go a long way in securing power for tribes. This would in turn allow tribes to negotiate political battles

over land and sovereignty that could lead to other sources of economic power.

Vine Deloria Jr. and others have argued that the real battles for the Indians are and always have been battles over sovereignty and this appears to be relevant for food and food systems as well (see also Kickingbird et al 1973).

Reservation Hunger

This research represents a case study where there is extreme poverty and food insecurity. In addition, the historical context of poverty for this Native population suggests that what is represented here are likely adaptations to long term poverty and resource deprivation. As such, this research reveals patterns of household adaptation and food provisioning on a larger scale. However, it is indicative of how households deal with food provisioning when confronted with difficult choices.

It is hard to understand such profound hunger in a country that has so many resources and is so economically prosperous. Janet Poppendiek questions this problem in the United States:

Certainly there is no lack of food. The figures of waste of food in this country are phenomenal . . . a pound a day for every man, women, and child in the country every day. . . It is not a problem that requires people to change their whole behavior . . . Hungry people are perfectly willing to eat. It is not a problem that requires

deep medical intervention. Well, why haven't we been able to solve it? . . . In a nutshell, I think our food programs do not go far enough to remove hunger, to solve hunger, because they are based on flawed assumptions in the first place" (Poppendiek 2000).

The assumptions and practices of policies in the United States fail to recognize the historical relationships that structure hunger as well as the methods and resources available to hungry households. As a consequence hunger persists, and no where is this more apparent than on Indian reservations.

Looking specifically at Native Americans, Pickering (1999) asserts that many policies that attempt to ameliorate poverty and foster economic development on Native American reservations are typically inappropriate because of an overall emphasis on personal responsibility that promotes cultural assimilation as the unacknowledged remedy to poverty by promoting job seeking off the reservation, and a failure to see structural remedies by insisting on wage work alone.

Overall, recent policies in the United States have relied on the perspective that places the root of poverty in the individual characteristics of the poor. Thus responses (and funding) have focused on programs to teach the poor to be better

citizens –usually defined as low-wage workers—without an acknowledgement of the economic context (Whiting et al 2005).

Although the Northern Cheyenne have made gains toward control over their land, this Tribe still has far to go in becoming more self-reliant. Controlling tribal resources through more robust tribal governance would allow for new approaches to economic development that are empowering instead of continuing to exploit tribes and tribal resources for the enrichment of others (Churchill and LaDuke 1988). The Northern Cheyenne Tribe seems to realize the importance of controlling the economic development of their community and refuses to fully develop natural resources available to them on the reservation until such time as they can control the process (Champagne 1996). However the question remains if this Tribe will be able to take the next step toward developing culturally and socially appropriate economic alternatives to capture the money and resources that currently flow to and from this reservation.

From ‘Charity’ To ‘Community’

This Native community suffers from dramatically inflated food insecurity levels and an over-reliance on a food system that embraces a “charity” model. Clearly, the reliance on an emergency food system for ameliorating hunger and

meeting food needs is insufficient and lacking. There are many problems with this approach, most importantly the impetus toward continued dependence on Federal and other sources of assistance. On the other hand, a 'justice' model seeks to break this cycle of dependence and create self-reliance and a strong safety net through entitlement rights (Riches 1999; Poppendieck 1994, 2000). The question is how to move from 'charity' to 'justice' within the context of the reservation and while taking into account the immediate needs of food insecure people and households.

Recognizing the real need of individuals and families to acquire food everyday, Poppendieck (1994) argues for somewhat of a compromise in any transition between the 'charity' and 'justice' models she proposes. While advocating a 'justice' approach that transforms the system, she acknowledges that emergency food charity programs can be important in this process as long as our focus remains on long term goals. Therefore, any sustainable strategy must remedy underlying problems of disempowerment and the loss of social relationships inherent in the dominant food system, while attending to the immediate needs of hungry people.

Native food systems were traditionally cooperative and inclusive, including “a complex network of rights and obligations that fulfilled the physiological need for sustenance, the economic need for livelihood, and the spiritual need for living in close association with the land and its environmental resources” (First Nations Developmental Institute 2006). For the Northern Cheyenne Indians specifically, traditional norms place food provisioning in the public realm. As a public good, food provisioning was historically a community activity and responsibility (Grinnell 1974). Indeed, Grinnell (1974) describes food provisioning traditionally as a central community action for this Tribe.

The Northern Cheyenne have an impressive historical background of being resourceful and flexible, accepting changes when necessary to accommodate this important social norm of sharing and meeting food needs for the community. Now the challenge is to once again adapt to new circumstances and challenges, in providing food within a commodified food system. One strategy might be to re-embed food back into the traditional social and cultural realms it once occupied in the Northern Cheyenne life through the focus on local empowerment and community food security.

Community Food Security (CFS) is essentially a community food provisioning strategy in response to the larger food system. While recognizing that there are immediate needs, CFS follows the 'justice' model as it focuses on long term political and economic changes that concentrate on building community and individual capacity and self-reliance. Fisher (1997) argues that CFS remedies the myriad problems associated with a food system by seeking to build the capacity of local communities to meet its own needs through re-linking consumers and producers (see also Allen 1999). CFS does not seek to replace entitlement programs but focuses on providing additional resources to decrease the need for such programs at the local, community level (Allen 1999; Fisher 1997). Thus Allen (1999) calls for a "reweaving" of the safety net through a marriage of entrepreneurship and entitlement. This is especially promising for the Northern Cheyenne because it connects to culturally seminal values related to food provisioning, while also building local capacity and opportunities necessary for long term economic independence.

Overall, CFS offers a way for communities to move toward self-reliance and decreased dependency on the dominant food system. However, this should not be confused with self-sufficiency, or an isolationist approach. In

fact, Community Food Security works through empowering local community members with the required tools in order to interact with the larger food system to provide an adequate amount and quality of food for the community. It is about building the capacity, enhancing social networks, and regaining control over the management of food production and consumption in the community. In other words, CFS is interested in making it easier for members of local communities to participate in the food market economy as empowered contributors rather than remaining detached and dependent. This is done through myriad ways, including cooperative strategies as well as pooling and/or redirecting community resources.

Community Food Security is interested in providing adequate and accessible food for low-income consumers and developing local food systems for local producers (Allen 1999). This new way of thinking about and organizing food provisioning could be one way of meeting these two important needs for this community on the Northern Cheyenne reservation. There is clearly a necessity for greater food security within this community and access to low cost, nutritionally acceptable food is crucial. Additionally, developing local food

systems could be an important step in re-embedding resources into the local economy.

There is some danger in oversimplifying the complex goals of the CFS movement. By focusing on local solutions to problems in the food system, there is a temptation to forget the challenges and real issues of power at the local level (Hinrichs 2003; Hinrichs et al 2002; Allen 1999). Furthermore, concentration of local control can be empowering, but not all problems can be effectively dealt with at the local level (Hinrichs 2003). Local communities are connected to regional and global systems. And so Allen (1999) calls for participatory democracy at the local level in addition to national and international work to build capacity at the local level.

The most promising opportunities for sustainable food security rest in food democracy (Hassanein 2003). The concept of food democracy is powerful in part because it transforms people from passive consumers to active citizens. It allows for different values and priorities to be included, but advocating change through the forum of discussion and grassroots negotiation. This facilitates the re-embedding of social relations in the food system and a democratic regulation

of food economies (Friedman 1995; see also Hassanein 2003; Allen 1999; and Riches 1997).

Alternative food movements, such as CFS, can take advantage of weaknesses in the dominant food system (Hendrickson and Heffernan 2002). The dominant food system has capitalized on the concentration and strategic alliances of global capital. However, through a focus on building authentic relationships in community, using time management and ecologically friendly approaches, relocalizing and personalizing consumption and production, food system alternatives can be successful (Hendrickson and Heffernan 2002).

Overall, although the economic and political situation of the reservation is related to historical events and forces that may be unique to Native Americans-- BIA control over land etc-- the ideals of Community Food Security can still apply. The concept of CFS is promising for this community as it includes capacity building incrementally along side the right to food (entitlements). With the high levels of food dependency and reliance upon the federal government for food assistance, this community can appreciate real benefits from a new approach to food, although implementing CFS may initially be more difficult. However, because CFS recognizes the immediate needs of hungry people while

simultaneously being interested in community capacity building it is promising as an approach to decreasing dependence and increasing local food democracy over time on this reservation.

In fact, there are several attempts to rebuild community-based food systems in Indian Country today. Although CFS is not widely used in Native American communities, there are several examples of how groups, including the Northern Cheyenne, have attempted to build Community Food Security through small programs and approaches. Much of this effort is spearheaded by the First Nations Development Institute which is interested in increasing food security through 'targeted and strategic funding, technical assistance, convenings and model dissemination to increase the effectiveness and number of reservation and Native community-based food enterprises" (First Nations Development Institute 2006:1). They currently fund fourteen Native Agriculture and Food System projects including one with the Northern Cheyenne Tribe.

In the year 2000, The Northern Cheyenne Tribe received a grant of \$1200 for a pilot project to establish a garden for producing winter feed from native grasses for the tribal bison herd. Projects like this may be small, but can lead to greater control and a stronger resource base for community action. Other

examples of CFS projects funded by this organization include money for buying seeds, plants and other garden stock, as well as funding efforts to establish a logo and marketing agenda for Native products among other things (First Nations Development Institute 2006). These small projects are important steps in the incremental process of establishing community food security because they allow for the development of infrastructure and resources for local control and capabilities over different aspects of the food system.

Although the land on, and adjacent, to the reservation is dry and somewhat limited for large scale agriculture, there are things that can be done to promote sustainable community food security. The tribal bison herd, which is a relatively new enterprise, will grow and begin to include more members of the reservation community. In addition, community gardens placed in each of the five districts can be powerful tools to re-localize the food system and re-empower, especially hungry, tribal members to participate in food provisioning in a constructive way. The Tribe, and/ or the Tribal College, can facilitate myriad small programs and projects that make sense in this context and for reservation residents, to re-orient the community toward self-reliance and hopefully greater food security. These efforts have incredible potential for increasing the number

of members in the community that are able to participate in the economy and/or have access to food that is appropriate and healthy. Greater tribal control also allows for the development of Native food projects that can address further nutritional concerns that are prevalent on the reservation as well. The preliminary efforts of the First Nations Development Institute are important, but future projects, especially for the Northern Cheyenne, need to take community capacity building and the development of community infrastructure to a new level.

Limitations and Suggestions for Further Research

This study draws from, and speaks to many literatures. This work contributes to initial groundwork research in understanding household food provisioning in the United States provoking further inquiry and makes several important contributions. However, as with any study, this project has been limited by several factors. As a 'first attempt' at looking at food provisioning in a new way, many things could be changed to improve future research looking at these questions. The most formidable and frustrating limitation has been the lack of good measures for distinguishing household characteristics. Because this survey was initially designed to evaluate the individual relationships between

health, stress, nutrition and food security, individual characteristics were focused on, unfortunately overlooking the importance of household characteristics as well. Therefore, this project had to rely a great deal on individual respondent information and make the assumption that these individuals represented their household on some level. Future research following up on this analysis would be strongly benefited by including more questions about household level characteristics and assets. There is no question that additional research needs to continue to address conceptual and methodological issues in food provisioning research, and future analysis would benefit from measures that are more precise and germane to this specific question.

Additionally, because this was an introductory study, although food sources were included based on previous interviews, more pointed research identifying important food sources would be very helpful in improving the query of possible food sources used by households. Furthermore, by dichotomizing these sources, this research cloaks the levels of food source use, thus losing potentially important details in how these sources are used and their importance for food provisioning.

There are also questions that were not able to be considered with this analysis but would be interesting to include in further research. For example, although literature suggests that choices of food source use are progressive in nature, related to severity of need, there is no observed confirmation of how this actually works for households (Ahluwalia et al 1998; Hoisington et al 2002; Kempson et al 2002, 2003; Hamelin et al 999). In general, while this research project is able to show how certain characteristics are related to household food provisioning choices, additional research is needed to look at how households make choices about food provisioning and what role severity of food insufficiency or food insecurity may play in those decisions.

Furthermore, there are questions about how these food sources are accessed including the social and cultural barriers that may exist beyond the economic barriers or specific program requirements. For example, using churches as a source of food appears to be a last resort for households in this sample, but the reasons why are not totally clear. Additional questions about how food assistance is distributed and realized might explain the decisions that are made by households to pursue different food sources. This would also

potentially shed further light on research literature examining why eligible households may not participate in Federal food programs.

Conclusions

The purpose of this study has been to document the lack of food security and the relationship to household and respondent characteristics, food sources, programs and strategies that Northern Cheyenne households use to acquire food. An understanding of the implications of choices that people must make to acquire enough food each month can inform future policies and programs. This information can assist programs and policies concerned with food insufficiency and hunger. This has implications for the Northern Cheyenne who could clearly benefit from a greater understanding of their situation to act to re-empower their community. But as a theoretical guide, this instrumental case study also has applications to other food insecure groups-- especially rural communities-- throughout the world.

The problem of hunger and poverty in the United States is unmistakably one of an inability to participate in the economic systems that surround food provisioning due to a lack of resources. Understanding the choices and options available to limited-resource individuals and households is important to

ameliorating programs and resources for the income poor. Furthermore, this can hopefully prompt new ways of thinking and organizing food and food programs and systems. This research points to the reality of food insecurity and hunger in the United States and will hopefully provoke more discussion about the resources and systems underlying food provisioning activities in this country.

Appendix A: Food Security Survey

1. Which of these statements best describes the food eaten in your household in the last 12 months? That is, over the past year have you and your family had:

- 1 Enough and the kinds of food wanted (Go to 2)
- 2 Enough but not always the kinds of food wanted (Go to 1b)
- 3 Sometimes not enough (Go to 1a)
- 4 Often not enough (Go to 1a)
- 5 Don't Know (Go to 1a)

1a. Here are some reasons why people don't always have enough to eat. Check the reason you did not have enough food. Do any apply to you?

- Not enough money for food
- 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. Here are some reasons why people don't always have the kinds of food they want or need. For each one, please tell me if that is a reason why YOU don't always have the kinds of food you want or need. **[MARK ALL THAT APPLY]**

- Not enough money for food
- Too hard to get to the store
- On a diet
- Kinds of food I want are not available
- Good quality food not available

Please indicate whether the following statements are OFTEN true, SOMETIMES true, -or NEVER true for you and your household in the last 12 months.

2. "I worried about running out of food before I got money to buy more."

- 1 Often true
- 2 Sometimes true
- 3 Never true

3. "The food that I bought just didn't last, and I didn't have money to get more."

- 1 Often true
- 2 Sometimes true
- 3 Never true

4. "I couldn't afford to eat balanced meals." (Meats, breads, fruits and vegetables)

- 1 Often true
- 2 Sometimes true
- 3 Never true

If you have children, please answer the following. If not, go on to question 8.

5. "I relied on only a few kinds of low-cost food to feed my child/children because I was running out of money to buy food." ("I didn't have enough to buy what I needed.")

- 1 Often true
- 2 Sometimes true
- 3 Never true

6. "I couldn't feed my child/children a balanced meal, because I couldn't afford that."

- 1 Often true
- 2 Sometimes true
- 3 Never true

7. "My child /children are not eating enough because I just couldn't afford enough food"

- 1 Often true
- 2 Sometimes true
- 3 Never true

Please answer the following questions about your experiences in the last 12 months.

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

- 1 Yes (Go to 8a)
- 2 No (Go to 9)
- 3 Don't Know (Go to 9)

8a. How often did this happen --- almost every month, some months but not every month, or in only 1 or 2 months?

- 1 Almost every month
- 2 Some months but not every month
- 3 Only 1 or 2 months
- 4 Don't Know

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

- 1 Yes
- 2 No
- 3 Don't Know

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

- 1 Yes
- 2 No
- 3 Don't Know

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

- 1 Yes
- 2 No
- 3 Don't Know

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

- 1 Yes (Go to 12a)
- 2 No (go to 13)
- 3 Don't Know (Go to 13)

12a. How often did this happen --- almost every month, some months but not every month, or in only 1 or 2 months?

- 1 Almost every month
- 2 Some months but not every month
- 3 Only 1 or 2 months
- 4 Don't Know

*The next questions are about children living in the household who are **under 18 years old**. If you do not have children go on to Question 17 on page 4.*

13. In the last 12 months did you ever cut the size of your child's/ children's meals because there wasn't enough money for food?

- 1 Yes
- 2 No
- 3 Don't Know

14. In the last 12 months, did any of the children ever skip meals because there wasn't enough money for food?
- 1 Yes (Go to 14a)
 - 2 No (Go to 15)
 - 3 Don't Know (Go to 15)
- 14a. How often did this happen --- almost every month, some months but not every month, or in only 1 or 2 months?
- 1 Almost every month
 - 2 Some months but not every month
 - 3 Only 1 or 2 months
 - 4 Don't Know
15. In the last 12 months was your child/ children ever hungry but you just couldn't afford more food?
- 1 Yes
 - 2 No
 - 3 Don't Know
16. In the last 12 months, did your child/ children ever not eat for a whole day because there wasn't enough money for food?
- 1 Yes
 - 2 No
 - 3 Don't Know

17. For each of the following, please check how often you use each source to buy or obtain food.

	Don't Use	Almost every month	Some months but not every month	Only 1 or 2 months	Don't Know
Wages	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
General Assistance	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Food Stamps	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Commodities	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
W.I.C.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Social Security	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Disability	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Tribal Food Vouchers	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Food Bank	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Churches	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Hunting	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Gardens	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Odd Jobs	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Family	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Crafts for Sale	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Pawning Items	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

18. Do you or any other adults in the household use traditional foods in your meals?

- 1 Yes
- 2 No
- 3 Don't Know

18a. In the last 12 months, how often have you included traditional foods in your meals?

- 1 Every week
- 2 Every month
- 3 Once every few months
- 4 Don't Know

19. In the last 12 months, how often have you shared food with other people or helped other people who needed food?

- 1 Every week
- 2 Every month
- 3 Once every few months
- 4 Don't Know

Personal and Family Stress, Lifestyle, Nutrition and Health Survey

Personal Stress

For each of the following, circle the response that you *have personally experienced* in the last 12 months.

1. Death of a child or spouse	Yes	No
2. Divorce	Yes	No
3. Death of a close family member	Yes	No
4. Marital separation	Yes	No
5. Fired from work	Yes	No
6. Major personal injury or illness	Yes	No
7. Jail term	Yes	No
8. Being Raped	Yes	No
9. Finding out that you are HIV-positive	Yes	No
10. Being accused of rape	Yes	No
11. Death of a close friend	Yes	No
12. Contracting a sexually transmitted disease (other than AIDS)	Yes	No
13. Pregnancy	Yes	No
14. Concerns about being pregnant	Yes	No
15. Concerns about your partner being pregnant	Yes	No
16. Major business readjustment	Yes	No
17. Foreclosure on a mortgage or loan	Yes	No
18. Gain of new family member	Yes	No
19. Marital reconciliation	Yes	No
20. Having a boyfriend or girlfriend cheat on you	Yes	No
21. Change in health or behavior of family member	Yes	No
22. Ending a steady dating relationship	Yes	No
23. Change in financial state	Yes	No
24. Serious illness in a close friend or family member	Yes	No
25. Financial difficulties	Yes	No
26. Retirement	Yes	No
27. Drunk driving	Yes	No
28. Change in number of arguments with spouse	Yes	No
29. Change to different line of work	Yes	No
30. Marriage	Yes	No
31. Spouse begins or ends work	Yes	No
32. Cheating on your boyfriend or girlfriend	Yes	No
33. Sexual difficulties	Yes	No
34. Getting married	Yes	No
35. Child leaving home	Yes	No
36. Negative consequences of drinking or drug use	Yes	No
37. Mortgage or loan greater than \$10,000	Yes	No
35. Depression or crisis in your best friend	Yes	No
36. Change in responsibilities at work	Yes	No
37. Change in living conditions	Yes	No
38. Difficulties with family	Yes	No
40. Begin or end school	Yes	No
41. Trouble with in-laws	Yes	No
42. Outstanding personal achievement	Yes	No
43. Lack of sleep	Yes	No
44. Change in housing situation (hassles, moves)	Yes	No
45. Change in work hours or conditions	Yes	No
46. Change in schools	Yes	No
47. Getting in a physical fight	Yes	No
48. Job changes (applying, new job, work hassles)	Yes	No
49. Christmas activities	Yes	No

50. Trouble with boss	Yes	No
51. Change in recreation	Yes	No
52. Mortgage or loan less than \$10,000	Yes	No
53. Drinking or use of drugs	Yes	No
55. Change in eating habits	Yes	No
56. Change in social activities	Yes	No
57. Change in number of family get-togethers	Yes	No
58. Change in sleeping habits	Yes	No
59. Vacation	Yes	No
60. Going on a first date	Yes	No
61. Change in church activities	Yes	No
62. Minor violations of the law	Yes	No
63. Maintaining a steady dating relationship	Yes	No
64. Commuting to campus or work, or both	Yes	No
65. Peer pressures	Yes	No
66. Getting sick	Yes	No
67. Concerns about your appearance	Yes	No
68. Attending schooling beyond high school (including adult ed, college, vo-tech, etc..)	Yes	No

Family Stress

For the following statements, please circle the response that **best fits your family**.

69. We often talk about our feelings	Yes	Sometimes	No
70. It seems like we argue a lot.	Yes	Sometimes	No
71. We have enough money for the important things.	Yes	Sometimes	No
72. We have conflicts about how much to spend and on what.	Yes	Sometimes	No
73. Work is important, but family is our top priority.	Yes	Sometimes	No
74. We don't listen enough.	Yes	Sometimes	No
75. It seems as if someone's always mad at someone else.	Yes	Sometimes	No
76. Too much work is getting to me.	Yes	Sometimes	No
77. Tension in our house is rare.	Yes	Sometimes	No
78. The kids are doing well in school.	Yes	Sometimes	No
79. There's never enough time.	Yes	Sometimes	No
80. Everyone in the family has a job and does it without being nagged.	Yes	Sometimes	No
81. We eat together every day.	Yes	Sometimes	No
82. Vacations together turn out very well.	Yes	Sometimes	No
<i>If married or with someone: (if not, go to question 88.)</i>			
83. Sometimes marriage is disappointing	Yes	Sometimes	No
84. Our relationship is strong.	Yes	Sometimes	No
<i>If married and have children: (if not, go to question 95.)</i>			
85. We both feel good about our roles as parents.	Yes	Sometimes	No
86. The kids get upset when we argue.	Yes	Sometimes	No
87. We argue about who should do what with the kids.	Yes	Sometimes	No
<i>Now go to question 92.</i>			
<i>If single parent: (if not, go to question 95.)</i>			
88. I'm comfortable being single.	Yes	Sometimes	No
89. My kids are upset when I date.	Yes	Sometimes	No

90. The kids like my choice of dates.	Yes	Sometimes	No
91. Being single has been very hard for me.			
Now go to question 92.	Yes	Sometimes	No
<i>If you have children:</i>			
92. I know what's important to my kids	Yes	Sometimes	No
93. I've been called in to school to discuss my child's behavior.	Yes	Sometimes	No
94. It's impossible to get the kids to do anything around here.	Yes	Sometimes	No

Lifestyle and Health Concerns

For the following questions please circle the answer that applies to you.

95. If I get sick, it is my own behavior which determines how soon I get well again.	Yes	Sometimes	No
96. No matter what I do, if I am going to get sick, I will get sick.	Yes	Sometimes	No
97. Most things that affect my health happen to me by accident.	Yes	Sometimes	No
98. I am in control of my health.	Yes	Sometimes	No
99. My family has a lot to do with my becoming sick or staying healthy.	Yes	Sometimes	No
100. When I get sick, I am to blame.	Yes	Sometimes	No
101. Health professionals control my health.	Yes	Sometimes	No
102. If I take care of myself, I can avoid illness.	Yes	Sometimes	No
103. When I recover from an illness, it's usually because other people (for example, doctors, nurses, family, friends) have been taking good care of me.	Yes	Sometimes	No
104. No matter what I do, I'm likely to get sick.	Yes	Sometimes	No
105. If it's meant to be, I will stay healthy.	Yes	Sometimes	No
106. If I take the right actions, I can stay healthy.	Yes	Sometimes	No
107. I believe that as long as I have no symptoms of feeling sick, there is no need to seek medical help.	Yes	Sometimes	No
108. I have an illness or condition that made me change the kind and/or amount of food I eat.	Yes	Sometimes	No
109. I eat fewer than 2 meals per day.	Yes	Sometimes	No
110. I eat few fruits and vegetables and milk products.	Yes	Sometimes	No
111. I don't always have enough money to buy the food I need.	Yes	Sometimes	No
112. I eat alone most of the time.	Yes	Sometimes	No
113. I am not always physically able to shop, cook and/or feed myself.	Yes	Sometimes	No

Nutrition

Below, please circle the answer from each statement that applies to you.

114. I eat at least 2 servings of milk, yogurt, or cheese each day.	Yes	Sometimes	No
115. I eat 2 or more servings of fruit each day.	Yes	Sometimes	No

116. I eat 3 or more servings of vegetables each day.	Yes	Sometimes	No
117. I eat 6 or more servings of bread, cereal, rice or pasta each day.	Yes	Sometimes	No
118. I eat 2 or more servings from the meat, poultry, fish, dry beans, eggs and nuts group.	Yes	Sometimes	No
119. If I choose to eat a higher fat food, I balance it with lower fat foods.	Yes	Sometimes	No
120. I prepare my meals or my family's meals more than 3 times a week.	Yes	Sometimes	No
121. I eat frozen meals from the store more than 3 times a week.	Yes	Sometimes	No
122. I eat fast food meals more than 3 times a week.	Yes	Sometimes	No

Health

For the following questions please circle the answer that applies to you.

123. I have tooth or mouth problems that make it hard for me to eat.	Yes	No
124. I take 3 or more different prescribed or over-the-counter drugs a day.	Yes	No
125. Without wanting to, I have lost or gained 10 pounds in the last 6 months.	Yes	No
126. Have you been told by your Doctor that you have high blood pressure?	Yes	No
127. If you have high blood pressure, are you taking medication for it?	Yes	No
128. Are you or have you experienced heart trouble?	Yes	No
129. Do you now drink or have you ever drunk alcohol?	Yes	No
a.) I have 3 or more drinks of beer, liquor or wine almost every day.	Yes	No
b.) In the past, I have had 3 or more drinks of beer, liquor or wine almost every day.	Yes	No
130. Do you now smoke or have you ever smoked?	Yes	No
a.) If you smoke now, how much do you smoke in a day?-	<input type="checkbox"/> Less than a pack	
	<input type="checkbox"/> 1 pack	
	<input type="checkbox"/> 2 packs	
	<input type="checkbox"/> More than 2 packs	
131. Have you ever used hard drugs?	Yes	No
132. Do you have vision problems that cannot be corrected by glasses?	Yes	No

133.	Do you consider yourself overweight?	Yes	Sometimes	No
134.	Do you exercise every week?	Yes	Sometimes	No
135.	When you cut or scratch yourself, does it take longer to heal than it used to?	Yes	Sometimes	No
136.	When you go to the health care clinic, do you understand the instructions that you are given by the health workers?	Yes	Sometimes	No
137.	Do you follow the instructions (i.e. diet, medication, exercise) from the doctor when you go home?	Yes	Sometimes	No
138.	Do you follow the instructions from the nurse when you go home?	Yes	Sometimes	No
139.	Do you follow traditional ways of healing for health problems?	Yes	Sometimes	No
140.	Are you aware of any family member or relative who has or have had diabetes?	Yes		No
141.	Are you aware of any family member or relative who is at risk for diabetes?	Yes		No
142.	Have you ever had a darkening of skin or a dark ring around your neck?	Yes		No
	a) If Yes, how long does it last?	<input type="checkbox"/>	1-30 days	
		<input type="checkbox"/>	1-3 Months	
		<input type="checkbox"/>	4-6 Months	
		<input type="checkbox"/>	6-12 Months	
		<input type="checkbox"/>	More than a year	
143.	Have you ever been told/or are you at risk for diabetes?	Yes		No
144.	Have you been told by your Doctor that you have diabetes?	Yes		No

If you answered Yes to question 143 or 144, please complete the following Diabetes section. If you answered No, skip this section and go to the Individual Characteristics section on page 10.

Diabetes

145.	Have you seen a traditional healer for conditions related to diabetes?	Yes	No
------	--	-----	----

146. Have you received medical attention or have you been to the health care clinic within the last year?	Yes	No	
a) If yes, how often have you gone?	<input type="checkbox"/> Once a month	<input type="checkbox"/> Once every three months	
	<input type="checkbox"/> Twice a year	<input type="checkbox"/> Once a year	
147. Has the health care worker given you an exercise program to follow?	Yes	No	
a.) Are you following the exercise program given to you by the health care worker?	Yes	Sometimes	No
148. Has the health care worker given you a diet to follow?	Yes	Yes	
a.) Are you following the diet given to you by the health care worker?	Yes	Sometimes	No
149. Have you been given a prescription for medication related to diabetes?	Yes	Yes	
a.) Do you take the medication as prescribed?	Yes	Sometimes	No
150. Are the health care worker's instructions clear for:			
a.) Diet	Yes	Sometimes	No
b.) Exercise	Yes	Sometimes	No
c.) Tobacco	Yes	Sometimes	No
d.) Alcohol	Yes	Sometimes	No
e.) Insulin	Yes	Sometimes	No
f.) Shots	Yes	Sometimes	No
g.) Medication	Yes	Sometimes	No

Individual Characteristics

The next questions ask some basic information about you.

- Number of people who regularly stay in your household: _____
Number of children under 18 in household: _____
- How often do you need someone to babysit or watch your children?
 - Every few months
 - Once a month
 - Several times a month
 - Once a week
 - More than once a week

- 2a. How often do you have trouble finding childcare?
 Often
 Sometimes
 Rarely
3. Single/Divorced/Widowed
 Married or with someone:
 Engaged to be married
4. District:
 Lane Deer
 Busby
 Birney
 Ashland
 Muddy
 Other _____
5. Male: Female:
6. Current age: 18-24 25-34 35-44 45-54 55-64 65+
7. Were you a student in the last year? Full-time Part-time No
8. What best describes your employment situation over the last 6 months?
 Full-time Job Part-time Job(s) Seasonal/Contract Not employed
 Retired
- If employed, what job or jobs have you held in the last 6 months? _____
9. On average, about how many hours per week do you work at this job? _____
10. Years of school completed: Less than high school
 High school diploma/GED
 Some college/Assoc. degree
 College degree
 Graduate degree
11. What form of transportation do you most often use?
 I own a car
 I pay someone to drive me
 I have access to a car
 I hitchhike
 I walk

Appendix B: Distribution of the 500 Survey Respondents in 5 Northern Cheyenne Districts

DISTRICTS	AGES	<u>18-24</u>	<u>25-34</u>	<u>35-44</u>	<u>45-65</u>	<u>65+</u>	<u>Total</u>	<u>%</u>
Ashland								
	<i>Men</i>	4	5	5	4	2	20	
	<i>Women</i>	4	5	5	4	2	20	
	Subtotal	8	10	10	8	4	40	8
Birney								
	<i>Men</i>	2	2	2	3	1	10	
	<i>Women</i>	2	2	2	3	1	10	
	Subtotal	4	4	4	6	2	20	4
Busby								
	<i>Men</i>	12	14	13	12	4	55	
	<i>Women</i>	12	14	13	12	4	55	
	Subtotal	24	28	26	24	8	110	22
Lame Deer								
	<i>Men</i>	23	34	33	29	11	130	
	<i>Women</i>	23	34	33	29	11	130	
	Subtotal	46	68	66	58	22	260	52
Muddy								
	<i>Men</i>	5	11	11	6	2	28	
	<i>Women</i>	5	11	11	6	2	28	
	Subtotal	10	22	22	12	4	56	14
Totals		92	132	128	108	40	500	100

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