

**FOOD COST AND AVAILABILITY
IN TWO HAMILTON NEIGHBORHOODS**

**DETERMINANTS AND PUBLIC HEALTH EFFECTS
OF FOOD COST AND AVAILABILITY
IN TWO NEIGHBORHOODS OF HAMILTON, ONTARIO**

By

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Abstract

Diet can powerfully shape human health. Biocultural theory suggests that variation in the cost and availability of food is one factor that affects the health of individuals of differing affluence in dissimilar ways. Though appreciation for the importance of social determinants of healthy eating is growing, very few Canadian studies address links between economic and nutritional variation. To partially address this knowledge gap, this thesis employs a mixed-methods approach including mapping, interviews, face-to-face surveys, and surveys of food cost and availability to investigate whether the cost and availability of food varies between socioeconomically distinct areas of Hamilton, Ontario, and how these differences, if they exist, might differently influence public health in the two areas. Food cost was not found to vary between the two areas, though the availability of food, especially produce, differed. It is suggested that reduced food availability, along with lower incomes and reduced access to transportation, combine to make purchasing foods consistent with a healthy diet more difficult in the less-affluent study area. Interviews with public health workers suggest that this, in conjunction with divergent shopping habits, negatively influences public health in the less-affluent area, but robust quantitative public health data to support or disprove this assertion are lacking at present. As low-income is a strong determinant of inadequate diets, economic approaches designed to make healthy diets more affordable for and readily available to lower-income Canadians are discussed. Links between economics and nutrition are complex; future research into the determinants of healthy eating will need to take into account the dietary, linguistic, and cultural diversity found in contemporary Canadian society, along with temporal and spatial variation in food cost and availability.

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Chapter 1: Introduction

The overarching goal of this thesis is to investigate whether differences in food cost and availability exist between two socioeconomically contrasting areas of Hamilton and how these differences, if they exist, might play a role in shaping differences in health between more- and less-affluent residents of Hamilton.

This project builds on an ecological approach that investigates the interaction of cultural, physical, and biological environments and how these shape human behavior and biology (Goodman and Leatherman 1998). Recently, this approach has been applied to studies of the urban environment. Many such studies have found that the neighborhood or area in which one lives has health effects independent of individual or population-level characteristics. These findings are beginning to enjoy wider currency among social scientists, though debate continues and some researchers maintain that individual- and population-level differences will, once properly accounted for, account for all measured variation in health (Kawachi 2002, Macintyre et al. 2002).

The research project presented in this thesis was designed to complement two larger projects currently underway at McMaster University; like this project, they investigate variation in local conditions—be they environmental, cultural, or social—in two or more areas of Hamilton, Ontario, and how these act as determinants of health. The Deconstructing the Determinants of Health at the Local Level Project (Dr. John Eyles, School of Geography and Geology, Principal Investigator) is a multidisciplinary project that aims to improve our understanding of how local-level determinants of health such as income, social support, and exposure to environmental pollution operate in four areas of Hamilton (Eyles 1999). The second, and more closely related, project is the Child Nutrition and Food Insecurity in an Urban Canadian Context Project, directed by Dr. Tina Moffat, who chairs this thesis committee. The Child Nutrition Project examines whether and how poverty and food insecurity affect the health and well-being of children attending three Hamilton elementary schools. Using a variety of research approaches, including anthropometry, dietary recalls, physical activity studies, and focus groups, the Child Nutrition Project compares children in affluent and less affluent schools in an effort to discern which nutritional problems are poverty-related and which are related to living in an urban Canadian environment (Moffat 2000).

Many areas of Hamilton would have been appropriate study sites. In order to maximize the potential usefulness of this project's results, I selected areas that were being studied as part of the larger, ongoing projects discussed above. The more-affluent study area in this project, Westdale, was chosen because one of the schools participating in the Child Nutrition Project is located in that neighborhood. The boundaries of the less-affluent area included in this study, the Downtown, correspond to those used by the Determinants of Health Project and encompass most of the area from which the less-affluent elementary schools in the Child Nutrition Project draw their students.

Some might question why a biological anthropologist would study socioeconomic variation in food availability. Goodman and Leatherman (1998:11) argue that attention to the social context in which humans live “aids us in understanding biologies: who becomes ill and what are the consequences, who gets food when food is limited, and why

is food limited in the first place.” This biocultural perspective insists that anthropology not separate the biological and social/cultural dimensions of human behavior and experience. The biological and cultural realms are not seen as separate, but as interactive and inseparable. The biocultural theoretical perspective guiding this research project is not the first in anthropology to attempt to combine biology and culture, though its attempt to combine insights from anthropological political economy the human ecology/adaptation studies is novel (Goodman and Leatherman 1998).

In this biocultural perspective, the conditions in which humans live and which influence their health and biology—whether in a Canadian city or an Andean village—are not thought of as natural, but the result of historical processes shaped by power relations (Goodman and Leatherman 1998). In the context of this thesis, these conditions could include zoning restrictions, tax structures, and neighborhood voting rates and activism that influence whether a supermarket is to be built or a school closed.

Local conditions can interact with human biologies in positive and negative ways. Biocultural theory tends to focus on the negative as a result of political economy’s focus on inequality and anthropology’s history of working with less-powerful groups (Goodman and Leatherman 1998). This perspective has been given the nickname the “biology of poverty” and, indeed, its dominant interest has been described as how “sociocultural and political-economic processes affect human biologies, and then how compromised biologies further threaten the social fabric” (Goodman and Leatherman 1998: 5). Yet the focus need not be solely on the negative. The emphasis on historical processes implicitly allows thoughts of change: local conditions and current power structures are not part of a fixed, natural order—they can be altered, though the existing power imbalances will make change difficult. The identification of ways in which the health of some is compromised points the way to ameliorating these conditions (Goodman and Leatherman 1998).

Using this biocultural perspective, this thesis investigates Hamilton’s food distribution system with an eye towards discerning whether this system makes it more difficult for the less affluent residents of the Downtown study area to acquire a healthy diet on a consistent basis. Because of the complexity of this system, a mixed-methods approach is adopted in an attempt to arrive at a set of “comprehensive and valid” answers (Baum 1995: 463).

The first avenue of investigation was to map the supermarkets, grocery stores, variety stores, and specialty stores in the two study areas¹. In addition to providing the sampling universe for the measures of food availability discussed below, this allowed an assessment of how the food distribution system of Hamilton is serving (or failing to serve) the residents of the two neighborhoods. The food distribution system of Hamilton is further assessed through the use of interviews with food outlet owners and managers,

¹ Store types are defined fully on page 51. For this study, supermarkets are the largest store type, offering a wide range of grocery items and often other services; grocery stores are smaller than supermarkets and offer a similar range of grocery and other items; variety stores are small stores offering some food items but focusing on non-prescription drugs, tobacco, and other products.

which attempt to elicit information on the structure of the industry, how pricing and stocking decisions are made, and how this affects the food supply available to consumers.

Another avenue of investigation is the distribution of foods in the two study areas. In addition to the mapping described above, food distribution is measured in two ways: by measuring the availability of a large list of foods in selected supermarkets, grocery stores, and variety stores in the two areas, and by measuring the availability of produce in a larger sample of these store types. The first approach is adopted because the cost of a healthy diet has been identified as a barrier to healthy eating for some Canadians. Special attention is paid to produce availability as many studies have suggested that micronutrients and antioxidants can powerfully influence health. Comparisons of food cost and produce availability are made across store types and between the two areas in order to discern which differences are due to store type and which may be attributable to area affluence.

Political-economic and ecological approaches can be criticized for ignoring the role of the individual. In an attempt to provide balance to the thesis, and to provide insight into how individuals in the two study areas negotiate the urban environment in light of the differing constraints of time, money, and resources, a face-to-face survey of shopping behavior is included in the research project. The survey includes questions on income, family size, access to transportation, and number of shopping trips per week to the various food outlets available in Hamilton. By including individual-level data, this thesis investigates not only the political-economic structures shaping health inequalities, but also the behaviors that individuals use to navigate within these structures.

As the health impacts of diet are the ultimate interest of this thesis, interviews with public health professionals were carried out to elicit their knowledge of the public health impact of diet-related disorders in the two study areas. Additionally, public health data, to the extent it is available, for the two areas is compared.

Combining the findings from these different methods, this thesis makes the following arguments:

- Differences in food cost and availability, including produce availability, are more apparent between types of stores than between study areas.
- The consumer survey found that Downtown residents are less affluent, shop more often in variety stores, and are less likely to have access to vehicles with which to do their shopping.
- The sparse distribution of Downtown food outlets, combined with low affluence and vehicle access, makes shopping at supermarkets, with their greater selection and cheaper prices, more difficult for Downtown residents.
- The combination of lower affluence and more difficult access to a wide range of foods could be detrimental to public health in the Downtown. Interviews with public health workers suggest that this may be the case, but quantitative data to support or disprove this assertion are lacking at this time.

Chapter 2 reviews the scholarly literatures on the topics most relevant to this thesis: biocultural theory, nutritional anthropology, the relationship between area affluence and food cost and availability, linkages between diet and health, and how food access and food insecurity are linked with socioeconomic health disparities.

Chapter 3 discusses the study areas and describes socioeconomic and demographic differences that are important in shaping health. In addition to the quantitative data of the 2001 Census of Canada, qualitative sketches are included to provide a more thorough picture of the study areas.

Chapter 4 describes the various methods employed in the course of this study. A mixed-methods approach was adopted in the hope that increased investigative power would result from the use of multiple methods and the ability to interpret the results of one method in light of the results of the others.

The results of the research project are discussed in Chapter 5. Briefly stated, accessing food, especially produce, seems a more pressing problem than does food affordability. Interview results provide some partial explanations for this, and the face-to-face survey identifies differences in food-acquisition behavior between the two research areas.

Chapter 6 discusses how the results of the different methods used in this study relate to one another and to other research findings.

Conclusions are presented in Chapter 7 along with discussion of future research goals.

Chapter2: Literature Review

Introduction

This research is rooted in biocultural and nutritional anthropology and draws upon investigations of inter-neighborhood food-cost variation, the links between diet and health, and socioeconomic variation in health. These literatures are reviewed below.

Biocultural and nutritional anthropology

Biocultural anthropology

Alan Goodman and Thomas Leatherman (1998) are among the most recent researchers to argue that biological anthropology needs to combine biological and cultural research approaches. The “cultural” in biocultural is mainly anthropological political economy, a Marxist-influenced materialist approach that focuses on power and social relations, rather than cultural meanings or practices and how these influence health. This is not to say that beliefs and cultural practices do not influence health; Helman (2000), Kleinman (1980) and others documented that they do. Rather, Goodman and Leatherman focused on tracing “the roots of human biological conditions...to the interaction of political-economic processes and local conditions” Goodman and Leatherman (1998: 5), arguing that biological variation should be examined in

terms of *social relations* through which individuals gain access to basic resources and labor. Simply stated, these social relations are key to resource production and distribution...and are thus key to forming proximate environments—what individuals eat; their exposure to pathogens, temperature stress, and toxic substances; and what resources may be brought to bear to adjust to these stressors and constraints (Goodman and Leatherman 1998: 19, original italics).

This approach is similar to that of political economy of health advocated by Morsy (1990), among others, though Goodman and Leatherman’s focus is more on the interaction of local conditions with human biologies than on global processes.

Local Conditions, Health and Place, and Individual Influences on Health

Biocultural theory holds that “local conditions” are important in influencing health. This calls to mind the ongoing debate centering on whether and how area (also, “neighborhood” or “place”) characteristics influence the health of individuals (Kawachi 2002, Macintyre et al. 2002). It is important to distinguish between “local conditions” and “place effects.” To this end, the debate on place effects is briefly discussed below, after which the terms “place effects” and “local conditions” are compared and contrasted.

Place effects can be described as health effects independent of individual characteristics that stem primarily from aspects of the local environment (Macintyre et al. 2002, Kawachi 2002). Support for place effects comes from studies finding independent, area-linked differences in health outcomes after multivariate adjustment for many different behavioral, ethnic, baseline, and socioeconomic variables (Macintyre et al.

2002). Environmental features that cause health disparities have not been well defined, nor have causal pathways been clearly demarcated, empirically or theoretically (Macintyre et al. 2002); researchers have suggested air and water quality, housing conditions, safe play areas (or lack thereof), the provision of services (e.g. education, street cleaning, and policing), crime levels, degree of community integration, and area reputation may influence neighborhood-level health variation (Macintyre et al. 2002). Some researchers argue, however, that individual-level variables are more important and these, once properly accounted for, will explain the observed geographical variation. Curtis et al. (2004) found strong associations between neighborhood quality and children's health and well-being when both factors were measured multidimensionally.

The individual/place effects debate also includes differences over how to determine causality (Kawachi 2002, Macintyre et al. 2002) and define and delineate neighborhoods (Luginaah et al. 2001). Oakes (2004a) criticizes social scientists who have studied place effects for their lack of attention to causation and use and interpretation of multilevel methods and statistics; he claims that this method of research will not produce valid answers and that randomized community trials should be used to properly assess the presence and strength of place effects. See Diez-Roux (2004) and Subramanian (2004) for replies and Oakes (2004b) for a rebuttal.

Clearly, the issue of individual versus place effects is not settled. Popay (2000: 401) argued that rather than attempting to separate people and places, research should focus on the "close and compelling linkages between people and the places they live in." Macintyre et al. (2002), reviewing the individual versus place effects debate, sound a similar note, pointing out that research from the late 90s found interactions between people and places (i.e. individual and place effects) that varied with gender, age, social class.

In contrast, the term local conditions refers to factors such as food availability, labor, shelter, exposure to pathogens, toxins and temperature stress—biological or environmental variations in the natural or built environment—and socioeconomic differences (Goodman and Leatherman 1998). Rather than being seen as characteristics of places, local conditions are viewed explicitly as products of historical processes and as resulting from power imbalances on local and/or global scales (Goodman and Leatherman 1998). The emphasis on historical processes differentiates "local conditions" from "place effects"; while many of the environmental factors mentioned above that are thought to contribute to place effects are affected by historical processes, how these processes operate does not often come under detailed study.

There is obviously some overlap between the two concepts, and matters of emphasis account for many of the differences: local conditions, *sensu* Goodman and Leatherman, can be distinguished from place effects by the explicit theoretical focus on power, the greater emphasis placed on historical processes, and the tendency of local conditions to be more often physical and biological in nature when compared to place effects.

Nutritional Anthropology

Anthropologists have long studied food and nutrition and how these interact with human cultures on social, cultural, biological, and medical levels. As food is so important in all of these spheres, research that falls under the category of nutritional anthropology is both diverse and difficult to classify. This section briefly discusses some classificatory themes that have attempted to describe the various research endeavors that comprise nutritional anthropology and then locates this project within the discipline. An appreciation for the breadth of nutritional anthropology can be gained from the recent collections of Goodman et al. (2000) and Counihan and van Esterik (1997), both of which gather studies from across the discipline and stress that food has both biological and cultural import.

The “anthropology of food and eating” includes the study of food as single commodities and substances, food and social change, food insecurity, eating and ritual, eating and identities, and other topics (Mintz and Du Bois 2002: 99). Nutritional anthropology might be expected to be a narrower enterprise than this; indeed, Haas and Harrison (1977) contended that as nutrition was rooted in the biological sciences, nutritional anthropology is an interface between biology and biological anthropology. Accordingly, their review of the discipline focused on adaptation and homeostasis and how these relate to food, food supplies, and the functional and medical outcomes of these. Sociocultural aspects of food and nutrition were relegated to the bibliography.

More recent reviews, however, include a wider array of research approaches. Messer (1984) divided nutritional anthropology into three sections: social, psychological, and ecological/materialist. In this scheme, social nutritional anthropology is understood to be focused on links between food production and social organization; psychological nutritional anthropology is understood to be focused on how food attitudes developed and affected social relationships in particular cultures; and ecological/materialist studies are understood to be focused on the ecology of humans and food production, as well as on nutrient intakes and their outcomes.

Boxill and Santopolo (1993) use a simpler—likely too simple—scheme, dividing nutritional anthropology into structuralist and materialist camps. For them, structuralists like Mary Douglas and Claude Levi-Strauss use culture as the dominant explanatory variable with respect to food habits; in contrast, materialists focus on material aspects of food, be they nutritional, as with Marvin Harris (1986, as cited in Boxill and Santopolo 1993), or economic, as with Sidney Mintz (1985, as cited in Boxill and Santopolo 1993).

Both of these classification schemes neglect to mention that nutritional anthropologists often carry out research into human growth (Galloway 2003). Until recently, little of this research has taken place in industrialized countries (Crooks 1998). More recently, political-economic perspectives have been incorporated into human growth research. Crooks (1998) and Bogin and Loucky (1997) explored the relationship between socioeconomic status, food intake, and the pattern of children’s growth. The Child Nutrition Project (Moffat 2000) mentioned in Chapter 1 provides another example of the incorporation of political-economic perspectives into nutritional anthropology.

It is clear from the breadth of inquiry addressed above, as well as from the difficulty in classifying it, that nutritional anthropology encompasses the study of a wide

range of human behaviors linked to food, ranging from conceptions of what is and is not edible to the impact of specific nutrient imbalances on health. This research project, like Crooks (1998) and Bogin and Loucky (1997), makes use of political-economic perspectives which focus attention on how structural inequalities are maintained and reproduced. Of interest is how socioeconomic inequalities might structure differences in health by influencing food cost and availability, and hence dietary adequacy. While the inclusion of political-economic perspectives is relatively new in nutritional anthropology, the study of the relationship between food and physical well-being is a time-honored subject of study, and it is this topic, the relationship between diet and medical health, that is reviewed in the next section.

Diet and Health

This section reviews the health effects, positive and negative, of diet in industrialized societies. Because many diseases, including appendicitis, diverticular disease, colon cancer, coronary heart disease, gallstones, hypertension, obesity, and diabetes, are common in the industrialized world and rare or unknown in areas where more traditional diets are consumed, Eaton and Konner (1985) and Eaton et al. (1988) argued that they are related to the shift, over the last few centuries, in Western diets to high-fat, high-sugar, low-fiber foods. More recent research has tended to support this hypothesis.

Diet contributes to the risk of gallstones, dental caries, osteoporosis, and certain cancers (Robertson et al. 1999). Mann (1994) discussed links between dietary trans fats and coronary heart disease, hypercholesterolemia, obesity, and insulin resistance. Diet is perhaps most clearly linked to health, including those conditions cited by Burkitt (1973, as cited in Helman 2000), through its influence on body weight. Overnutrition relative to activity level can lead to overweight and obesity, conditions which increase risk for cardiovascular disease, type 2 diabetes, stroke, and some cancers (Katzmarzyk 2002).

Deficiency, either of macronutrients or micronutrients, causes problems as well. Undernutrition increases the risk of developing anemia, infections, and other health problems in children (McIntyre et al. 1998) and increases mortality risk in adults (Katzmarzyk et al. 2001). Further, inadequate childhood nutrition is associated with decreased mental capacities and increased morbidity throughout life (Beaton 1989; Davey-Smith and Brunner 1997; Gleason and Suitor 2001; Tufts University Center on Nutrition, Poverty, and Policy 2002). In addition to these problems, there are many disorders linked to deficiencies of certain micronutrients (Scrimshaw 2000, Edmunds 2000, Kendall and Kennedy 1998 and references therein).

Lest we conclude eating is relentlessly fatal, many studies have found that diets low in saturated fat and sugar and high in fiber can help to prevent many cancers and coronary heart disease (Rimm et al. 1997, Robertson et al. 1999). More specifically, a wealth of evidence exists showing many health benefits can be gained by consuming high quantities of fresh produce. Zheng et al. (1992) found that a diet high in vegetables, garlic, and fruit was protective against laryngeal cancer. In Italian studies, consuming a wide variety of vegetables was found to reduce the risk of colon and rectal cancer while carrots and raw vegetables have been associated with lowered risk for colon, rectal and

breast cancer (Fernandez et al. 2000, Franceschi et al. 1997). The consumption of raw fruit had similar, though weaker effects; similar findings have been reported in Spain, France, Israel, and Greece (Franceschi et al. 1997). Williams et al. (1999) reported that the consumption of vegetables throughout the year reduced the risk of diabetes. Steinmetz and Potter (1996) reviewed over 200 epidemiological studies, both cross-sectional and cohort, looking at the relationship between vegetable and fruit consumption and cancer, finding that the consumption of these foods was protective for cancers of the stomach, esophagus, lung, mouth, pharynx, endometrium and colon. It has been suggested that micronutrients and antioxidants, which are abundant in fruits and vegetables, might be responsible for these health effects (Steinmetz and Potter 1996, Dowler and Calvert 1995 in Davey Smith and Brunner 1997, James et al. 1997, Facchini et al. 2000); several experimental studies support this (Facchini et al. 2000 and references therein, Williams et al. 1999).

Summary

Taken together, these studies show that diet can influence health both positively and negatively. The consumption of a diet low in fat and sugar and high in fiber appears to be especially beneficial. The consumption of vegetables, and to a lesser extent fruits, is not only consistent with this, but has other, independent positive health effects.

One factor that can influence whether or not a range of healthy foods is included in the diet is the cost of food. Drawing on biocultural theory, we might ask if the cost of food varies with neighborhood affluence. The next section addresses this question.

Inter-neighborhood variation in food cost

The biocultural perspective lends itself well to studies involving food (among other topics), especially in nations such as Canada and the United States where the majority of food is purchased. The market-based system of food distribution makes it possible for food availability and cost, among other factors, to influence what foods are included in, or excluded from, the diet. Consistent patterns of inclusion or exclusion of certain foods or food types can lead to the consumption of a chronically nutritionally inadequate diet. Abonyi (2001), for example, documented increased price and decreased availability of food, especially fresh produce, leading to unhealthy and relatively uniform diets in the northern Canadian community of Moose Factory, Ontario.

Whether the poor pay more for food has been debated since Caplovitz's (1963) finding that the poor pay more for durable goods. This finding spurred researchers to ask the same question of food prices (Curtis and McClellan 1995). This section reviews research undertaken in Canada, the United Kingdom, and the United States. Two types of studies are reviewed: large studies comparing the costs of food over many cities and smaller studies of single cities or portions of cities. This is done since the increased power and scope of the larger studies come at the potential cost of masking neighborhood-level variation, which could influence public health; also, these large studies sometimes rely on price data from a small number of foods. The potential advantage of local studies, increased resolution and a larger list of foods, comes at the

cost of geographic coverage. Using studies of both types helps to increase the reliability of the conclusions drawn.

Canada

Working at the national level, Horton and Campbell (1990) analyzed the 1984 Canadian Family Food Expenditure Survey, which included 37 basic foods. They found that while a higher percentage of the food expenditures of low-income households occurred at variety stores, where food is more expensive, this group purchased cheaper brands than did higher-income households; the net effect was little or no difference in food cost per item. Travers (1996) and Travers et al. (1997) investigated variation in food prices in Nova Scotia. Travers (1996) reported that food prices were approximately 5% cheaper in two suburban Halifax supermarkets when compared to two inner-city stores in the same chains; no statistical tests were reported. In a larger study, Travers et al. (1997) gathered price data for several food baskets containing between 64 and 68 foods at 19 supermarkets in urban Halifax County. The neighborhoods were classified as either low or mixed income; no significant differences in food cost were found between stores in low-income neighborhoods and stores in mixed-income neighborhoods; definitions for low and mixed-income neighborhoods were not provided; nor is it clear how neighborhood borders were defined.

According to a Health Canada researcher (Power 2004:34), the work of Travers (1996) and Travers et al. (1997) is “the only published Canadian study...[that] directly addresses the issue of food cost and nutritional quality.” Power (2004) identifies the lack of data on the cost of healthy eating in Canada as a significant gap in the available literature. It is unclear why this gap exists. Perhaps the importance of diet and other social determinants of health has only recently been recognized by governmental agencies with the power and funds to direct research priorities. The lack of data on socioeconomic gradients in diet and the prevalence of overweight and obesity (Power 2004), national monitoring of food insecurity (Power 2004), and national surveillance of overweight, obesity, and other important medical information that is not based on self-reported data (MacLellan et al. 2004, Tremblay 2004) suggests this might be the case. Because of this gap, this thesis makes a small but important contribution to the available knowledge on the cost of a healthy diet in Canada.

United Kingdom

Mooney (1990), using area designations developed by earlier research into unmet health needs, investigated the cost and availability of 15 healthy and 15 unhealthy foods in 9 London supermarkets, finding that food was slightly cheaper in deprived areas than in affluent areas, though the healthier food choices were relatively more expensive in the deprived areas. Hollington and Newby (1995) repeated the research protocol exactly (with the exception of a supermarket that had closed), finding that the less healthy basket was approximately 5% cheaper in the poor area than in the rich area, while the healthy basket was 1.5% more expensive in the poor neighborhood than in the rich. No statistical tests were reported in either study; considering the sample sizes and small percentage differences, the differences are likely not significant. Sooman et al. (1993), reporting

results from 20 Glasgow food shops, found that food was slightly more expensive in the poorer of two study areas; the area designations in this study, like those in Mooney (1990) were based on health measures from earlier studies. No statistical tests were reported for this study; in a later publication, one of the authors described the study as “exploratory” and of “insufficient power to detect differences between the areas” (Cummins and Macintyre 2002a: 437). In a much larger study of Glasgow’s “foodscape,” Cummins and Macintyre (2002b) assessed the price and availability of 57 foods at 250 Glasgow food retailers, finding that only 5 food items differed significantly in price between more and less affluent postal codes; of those items, 4 were cheaper in less-affluent areas. These foods were teacakes, sausages, burgers, and chocolate; apples were cheaper in more affluent areas.

United States

More studies of inter-neighborhood variation in food cost have taken place in the United States than in the United Kingdom or Canada. Using Bureau of Labor Statistics data on 18 food items gathered from food outlets in 6 cities, Groom (1966) found no relationship between market prices and neighborhood income. Marcus (1969) compared the cost of food in two southern California cities of differing affluence located ten miles apart. He gathered prices for 86 foods from a total of 49 stores, finding that total cost was not significantly different between the two cities. Alcaly and Klevorick (1971) reported similar results for price data on 31 foods from 46 neighborhoods in New York City. Kunreuther (1973) studied the issue in New Haven, Connecticut, using price data for 8 foods from 22 stores. He reports that food prices were more expensive in poorer neighborhoods, though this may be due to the design of the study, which compared large chain stores to small neighborhood stores. It is not clear, moreover, how the neighborhoods were designated. Working in Omaha, Nebraska, Ambrose (1979) compared food prices between non-overlapping areas defined by census characteristics such as age, ethnic make-up, and income, and housing type. Surveying the cost of 54 food items in 14 stores, he found that grocery prices in poor inner-city areas were not significantly different from prices in more affluent areas and were in some cases lower.

A similar pattern is seen when reviewing more recent studies. McDonald and Nelson (1991) used USDA supermarket food price survey data to compare the cost of a food basket representing the consumption patterns of food stamp recipients. Their sample included prices from 322 supermarkets in 10 large cities; prices were collected in March, April, and May of 1982. They found that retail food prices were 2% more expensive, on average, in poor zip (= postal) codes. This was true whether “poor” was defined as 10 or 20% of residents earning incomes below the poverty line. However, when only central city zip codes were compared, the difference between poor and non-poor zip codes is very small (0.38%) and not statistically significant. Chung and Myers (1999) surveyed the price of 50 food items in 55 stores in Minneapolis-St. Paul, Minnesota, finding no significant difference between poor and non-poor zip codes when comparing simple price totals or when the cost of a market basket was computed. Using Bureau of Labor Statistics, Hayes (2000) analyzed the prices of five food items—whole chicken, eggs, milk, oranges, and lettuce—in a sample of 2,181 stores in 43 states, finding that market

prices are up to 6% lower in poor zip codes than in non-poor zip codes. Frankel and Gould (2001) broadened the range of income groups from the poor/non-poor dichotomy to include poor (below the poverty line), lower-middle income (between one to two times the poverty line) and middle-higher income (greater than two times the poverty line) in comparing the cost of 5 foods—1 pound of Jimmy Dean brand sausage, 6.125 ounces of canned Starkist Tuna, 1/2 gallon of whole milk, a 5lb package of sugar, and one dozen grade A eggs—across 184 cities. In this study, lower food cost was not related to poverty rate but the presence of lower-middle income residents—the intermediate group of the three groups included in the analysis. Frankel and Gould found that “prices increase when the lower-middle income households in a community are replaced by either poor [low-income] or middle-higher income residents” (Frankel and Gould 2001:237). Frankel and Gould (2001: 238) tested several hypothesized mechanisms to explain their findings, but found the results to be “inconclusive, if not negative.”

The findings of Finke et al. (1997) run counter to this trend. They used reported food expenditure data from the 1987-88 Nationwide Food Consumption Survey, which included not only food expenditure data, but also individual sociodemographic characteristics; this allowed the authors to match individual characteristics with the prices paid for food. Finke et al. (1997) included in their analysis those foods they felt to have the fewest number of perceived or actual quality differences; these were whole milk, white flour, white sugar, large eggs, regular ground beef, pork chops, whole chicken, white potatoes, and bananas. Information from over 10,000 individuals was used in comparing food expenditures among urban and suburban Blacks and Whites. Households falling into the lowest income quartile were defined as low-income; other households were designated higher income. In this study, high-income urban consumers paid more for food than did low-income urban consumers. They found that low-income urban Blacks paid more for food than low- and high-income urban Whites and high-income urban Blacks, that high- and low-income households in suburban areas likely paid the same prices for food, and that low- and high-income Whites appear to pay equal food prices (Finke et al. 1997). Finke et al. (1997) suggested that these results stem from the fact that low-income Blacks are often less mobile than other groups and more often live in areas of concentrated poverty with many variety stores and few supermarkets.

Summary

In sum, there appears to be little to suggest that food prices are higher in less-affluent areas. This is true whether one looks at results of studies comparing the cost of a few foods over many cities or studies comparing a larger number of foods in a small number (usually one) of cities. Most studies of food prices from all three countries found no significant differences in food cost between more- and less- affluent areas; in all, 12 of 16 studies found no significant difference or that food cost less in poor areas (the mixed results of Hollington and Newby (1995) are not included in this tally). Of the four studies that found food prices to be more expensive in poorer areas, two (Sooman et al. 1993, Travers 1996) are not statistically valid, and the results of another, Kunreuther (1973), may have been influenced by study design. The findings of Finke et al. (1997) that lower-income Blacks pay more for food is consistent with the findings of Hayes (2000) who

found that though poor neighborhoods in general paid less for food, poor Black neighborhoods paid higher prices, on par with those of high-income Whites. That poor people pay more for food only when they are Black Americans suggests that racist attitudes in the US play a stronger role than poverty per se in determining food prices in poor neighborhoods. In sum, therefore, it is fair to conclude that food prices do not systematically vary with neighborhood affluence.

The findings of many of the above studies could be challenged on grounds that in place of neighborhood boundaries, areas designated for mail delivery were often used. As Hayes (2000) pointed out, such areas were delineated to ensure efficient mail delivery and may therefore not be reliable proxies for neighborhood boundaries. Finke et al. (1997) noted that when using this method, measurement error could arise when stores and residents are near the edge of a zip code, when there is high variation in income within a zip code, or when residents often shop outside their zip code. To have maximum applicability, future research should use neighborhood boundaries that have some degree of social reality (see Nakajima 1979, as cited in Chambers 1985), if census data can be acquired in a form that makes this possible.

Several studies from the UK contained findings suggesting that unhealthy foods were cheaper in more deprived areas, leading to a price disincentive for healthy eating in those areas. The temptation to conclude that unhealthy food is cheaper in some areas of the UK should be resisted. First, the studies reporting this result for London, Mooney (1990) and Hollington and Newby (1995), reported no statistical tests and sampled a small number of foods (30) from a small number of stores (9 and 8, respectively). Second, working in Glasgow, Sooman et al. (1993) reported similar results. In this case as well, the sample size was small and statistical tests were not reported; this was pointed out by one of the study's authors in a later publication (Cummins and Macintyre 2002a). Finally, in the most thorough study, Cummins and Macintyre (2002b) reported that 5 of 57 foods were significantly cheaper in poorer areas; of these, 4 were considered to be unhealthy. Such a small number of foods (under 10% of those studied) does not merit the claim that unhealthy food is cheaper in poor areas. If such a claim were to be made, it could be refuted by noting that whole wheat bread, Weetabix, carrots, tomatoes, onions, and other healthy foods did *not* vary with area deprivation (Cummins and Macintyre 2002b).

Based on the conclusion of this section and the one before it, it is possible to argue that socioeconomic health disparities in urban areas should not stem from differences in diet, as food prices do not appear to vary with neighborhood affluence. Lack of difference in food cost, however, does not mean that food is equally accessible to all members of society. The next section looks beyond food cost and into the cost of food relative to income and other budgetary constraints while reviewing evidence of socioeconomic health disparities in Western societies.

Socioeconomic Health Disparities, Food Access, and Food Insecurity

After briefly reviewing the consensus view regarding the socioeconomic gradient in health, this section discusses the possible roles of food security and food access in shaping health disparities.

Socioeconomic Health Disparities

It is well accepted that socioeconomic status strongly influences health. The relationship is a gradient, with the better off enjoying better health and decreased mortality. This relationship is seen across all levels of SES (regardless of the measure of SES used) for many measures of morbidity, as well as mortality (Feinstein 1993, Smith 1999, Adler and Ostrove 1999, Deaton 2002); this gradient has been found in nearly every industrialized nation (Feinstein 1993, Adler and Ostrove 1999) and holds for all age groups (Smith 1999); how this gradient interacts with gender does not appear to be well-studied. Deaton (2002) reported that the reduction in mortality per increased dollar of income is much larger at the lower end of the income distribution than at the top.

While a mechanism explaining this gradient has not been agreed upon, nor is there consensus regarding causality, the existence of the socioeconomic health gradient appears certain (Feinstein 1993, Smith 1999, Adler and Ostrove 1999, Marmot 1999, Deaton 2002, Coburn 2004) and remains after many risk factors that are more common among the less affluent are accounted for (Davey-Smith and Brunner, 1997, Marmot 1999).

Given this finding and the earlier discussion of the impact of diet on health, a review of studies investigating linkages between dietary adequacy, socioeconomic status, and health is appropriate. This is taken up in the next section, using the concept of food security.

Food Insecurity and Health

Recently, much attention has been focused on the relationship between dietary inadequacy, especially food deprivation, and health among the least-affluent members of Western society. McLeod and Veall (2002:3) point out that since “food deprivation is concentrated at lower socio-economic status, studying food deprivation is likely not relevant for the range of health and mortality differences” across society. Be that as it may, the topic merits discussion since it is the least affluent who have the worst health.

As was shown earlier, food-cost differences do not appear to vary with neighborhood affluence in Canada, the US, and the UK. But this does not mean that all residents have equal access to food. As Horton and Campbell (1990:38) point out, for the less-affluent, “non-food prices, especially for housing, may play an important role in determining the income that remains available for food.” This statement has been borne out by empirical studies. Vozoris et al. (2002) found that welfare incomes in Toronto, Ontario, were not sufficient to meet monthly costs for food, shelter, and basic services; Hanes and Macdonald (1988) reported similar findings for London, England, noting that for low-income people who require therapeutic diets (e.g. because of cystic fibrosis and diabetes), the financial situation is more difficult still. Recently, researchers have turned to the concept of food insecurity as a way of studying this problem.

Food insecurity may be defined as “the inability to acquire or consume an adequate diet quality or sufficient quantity of food in socially acceptable ways, or the uncertainty that one will be able to do so” (McIntyre 2003:46-47). Recent estimates using the 1998-99 (Canadian) National Population Health Survey (NPHS) suggest that food

insecurity is a problem for 10% of Canadians; 8% of the country reported compromising their diets because of a lack of money (Che and Chen 2001). Geographic variation in food insecurity was not discussed at length; however, those at greater risk for food insecurity include single parents, those on social assistance, and Canadians of aboriginal descent (Rainville and Brink 2001 in Power 2004). Interestingly, food insecurity is less prevalent in rural populations, at 8.4%, than it is in metropolitan areas, where it affects 10.2% of the population (Rainville and Brink 2001 in Power 2004). Tarasuk (2001 in Power 2004) pointed out that there is no coordinated plan for monitoring food insecurity at the national or provincial levels.

In 1995, a national survey carried out by the US Census Current Population Survey estimated that 11.9% of US households were food insecure (Carlson et al. 1999, as cited in Himmelgreen et al. 2000, USDA 1996, as cited in Kendall and Kennedy 1998); rates can be much higher in poor areas or among minority populations (Kendall and Kennedy 1998, Himmelgreen et al. 2000). The numbers cited above may be underestimates as it is more difficult to include poor and homeless persons in large-scale surveys, as well as those without telephones and/or stable housing; such people may be at greater risk of being food insecure than others.

Not surprisingly, food insecurity is associated with household income: in Canada, 35% of people in low-income households were considered to be food insecure, as were over 50% of residents of households living on social assistance; people in low-income households were eight times more likely than those in upper-middle or high-income households to be food insecure, and middle-income residents were four times more likely to be food insecure than the more affluent (Che and Chen 2001). Lone parent households are also at higher risk of food insecurity (Che and Chen 2001, McIntyre 2003).

There may be some skepticism that such a loosely defined variable as food insecurity can be useful. However, a series of studies have found relationships between food insecurity and health. Food insecurity is significantly correlated with inadequate nutrition for adults and children in the US and Canada (Kendall et al. 1996, Kendall and Kennedy 1998, Tarasuk and Beaton 1999, Che and Chen 2001 and references therein, Tarasuk 2001). Food insecurity is also linked with obesity in the NPHS sample (Che and Chen 2001) and in a sample of 193 US women (Olson 1999); several hypotheses exist to explain this apparently contradictory result, most of which relate to overeating when food is available (Dietz 1995, Olson 1999, Che and Chen 2001). McLeod and Veall (2002) analyzed the relationship between changes in food deprivation status and changes in health status using the combined results of the 1996-1997 and 1998-99 NPHS; they found no significant effect of 1996 food deprivation status on 1998 health status while the effect of 1996 health status on 1998 food deprivation status was strongly statistically significant, even after accounting for the effect of variables like age and employment. Based on this finding, they suggest that causality runs from health status to food deprivation, not the reverse (McLeod and Veall 2002). Whichever way causality flows, however, it seems clear that poor health and poor nutrition are related in mutually reinforcing ways.

The consumption of vegetables and fruits appears to be very closely linked to health, perhaps due to the micronutrient, antioxidant, and fiber content of these foods (see

above). It is therefore worth reviewing studies investigating socioeconomic differences in the consumption of fresh produce in light of socioeconomic variation in health. Davey-Smith and Brunner (1997) and James (1997) reviewed studies of dietary intake and social position in Britain, finding that micronutrient and antioxidant deficiencies were the most likely nutritional influences on health disparities. Power (2004) cited research from Europe, the US, and Canada, finding that it is generally true that being of higher socioeconomic status correlates with the consumption of diets closer to dietary recommendations than the diets consumed by the less affluent.

Studies from Canada (Cancer Care Ontario 2004 as cited in Power 2004, Perez 2002 as cited in Power 2004, Ricciuto 2002, 2003 as cited in Power 2004) and the UK (Wrigley 2002, Ellaway and Macintyre 1996) show that high-income households consume more fresh produce than lower-income households. Marret et al. (2003, as cited in Power 2004) found that fruit and vegetable consumption increased with education in Ontario. National surveys in the UK find that low-income households consume more fats, sugar, and preservatives and fewer fresh vegetables, fruits, and high-fiber products (Ministry of Agriculture, Fisheries and Food 1981, 1996, as cited in James et al. 1997) and lower intakes of micronutrients, especially vitamins C and E, carotene, iron (Bolton-Smith et al. 1991, Department of Health 1989, as cited in Donkin et al. 2000). In the US, Kendall et al. (1996) found that food-insecure individuals consumed fewer fruits, vegetables, vitamin C, and fiber. Turrell et al. (2002) found that in Brisbane, Australia, less-affluent individuals were less likely than their more-affluent counterparts to purchase foods that were low in fat, salt, and sugar and high in fiber; the less-affluent also purchased fruit less often than the more affluent.

While there is evidence for the existence of a socioeconomic gradient in both the consumption of fresh produce and the availability of these (and other) food items by neighborhoods, evidence for neighborhood-level differences in diets is hard to come by (Diez-Roux et al. 1999, Forsyth et al. 1994). Both of these studies—carried out in the US and UK, respectively—found that neighborhood-level differences were very slight, if they existed, after accounting for individual characteristics, especially individual income. This is perhaps unsurprising considering the complex array of factors that interact to influence what people eat. In light of the potential relationships between SES on one hand and produce consumption and access on the other, it clearly points to the need for more research into the factors influencing diets in urban centers (see Power 2004). Some have suggested that problems in accessing fresh produce is in part to blame for lower intake of these foods by low-income persons. Therefore, questions of food access are discussed below.

Food Access

Food access has several dimensions: economic access, availability, and physical accessibility (Whelan et al. 2002, Hoddinot and Yohannes 2002). Food security, discussed above, can incorporate elements of availability as well as economic and physical accessibility. Studies of food access are not as common as those treating food cost, in part because measuring the various facets of access can be difficult. Many of the food-cost studies reviewed above, especially those measuring food cost across many

cities, only included those foods that were widely available; studies using the “food basket” method often included data only from those stores carrying a majority of the food basket items.

There is some evidence that better food access, as measured by outlet availability, improves diets. Morland et al. (2002) found that residents of neighborhoods with one or more supermarkets were more likely to be eating diets that met dietary recommendations and reported higher fruit and vegetable intakes. Wrigley et al. (2002b), using food consumption surveys performed before and after the construction of a large supermarket, found that mean fruit-and-vegetable consumption increased as consumers shifted away from shopping at small, neighborhood stores toward the supermarket. The increased produce consumption in the low-income group was still below levels found in more affluent households, showing that access is not the whole story.

The concept of the food desert emerged from studies of food access (see Cummins and Macintyre 1999, 2002a; Wrigley et al. 2002a for discussion). Though variously defined, a food desert is a part of an urban area where residents do not have access to an affordable and healthy diet (Cummins and Macintyre 1999); in some policy circles, being more than 500 meters from a retailer “selling fresh food and vegetables at affordable prices” constitutes living in a food desert (Wrigley 2002:2034). Justifications for this distance criterion are not readily available. Some of the studies discussed below use this criterion, but the majority focus on the presence or absence of food outlets without using the food desert concept.

There is very little research addressing the topic of food deserts in Canada (Power 2004). Travers et al. (1997), working in Nova Scotia, found that the number of available food items increased with store size, resulting in more food types being more available in urban than rural areas, as more large stores were in urban areas. The study did not discuss intra-urban variation in availability. Woods (2003, as cited in Power 2004) researched food access in a low-income neighborhood of Saskatoon, Saskatchewan, finding that residents without a vehicle had greater difficulty accessing large grocery stores outside the neighborhood; within the neighborhood, however, were several small grocery stores, specialty shops, bakeries, and a farmers’ market. The Toronto Food Policy Council (1996 in Power 2004) found that the city’s core was well served by a mix of large and small, chain and independent, ethnic and specialty food stores. Whether this is still the case or applies equally across all levels of neighborhood affluence is unknown.

The most comprehensive studies of food availability (often using outlet type as a proxy) were carried out in the UK. Cummins and Macintyre (1999, 2002b) found that food outlets in general and large stores (which carried a greater number of food items) in particular were *more* common in more deprived postal codes and localities in the greater Glasgow area (Cummins and Macintyre 1999) and that the availability of only 11 of 57 food items varied with area deprivation; 10 were less available in more deprived areas (Cummins and Macintyre 2002b). Of these 10 foods, most were meat or meat products. As with the Nova Scotia study, store type was the most important variable in explaining variation in food availability. Clarke et al. (2002) used GIS modeling in an attempt to identify food deserts in two British cities, Cardiff and Leeds/Bradford. Combining measures of low neighborhood affluence and using the 500-meter criterion, they

identified six possible food deserts in the two cities. Also working in the UK, Mooney (1990) reported that healthy foods were more available in a more-affluent area of London and less available in less-affluent areas; as discussed above, this study included only nine stores in two areas of London. Hollington and Newby (1995), working in the same areas found that availability had improved in the less-affluent areas, but was still below that of more-affluent areas. These last two studies did not report statistical tests. Finally, Rex (2002), compared access to shops selling fresh fruits and vegetables to that of shops selling any type of food in Sandwell, West Bromwich, UK. He found that nearly 90% of houses were within 500 meters of an outlet selling any type of food while less than 20% were within 500 meters of an outlet selling fresh produce.

In the US, Chung and Myers (1999) found that chain stores, which had larger selections and lower prices, were less likely to locate in poor zip codes in Minneapolis-St. Paul, MN; differences in food availability were greatest for fruits and vegetables. Unfortunately, Chung and Meyers (1998) do not report statistical tests for the produce availability differences. Wechsler et al. (1995) found that low-fat milk was statistically significantly more available more often in neighborhoods composed of roughly equal numbers of white and Latino residents than it was in neighborhoods that were dominantly Latino.

Using information from the 1990 census and data giving the location of supermarkets with over \$2 million in annual sales in 21 metropolitan areas, Cotterill and Franklin (1995) analyzed the location of supermarkets with respect to income and other demographic variables measured at the level of the zip code. They find that low-income areas tend to be underserved by supermarkets; there is, however, a degree of variability in the data, and in at least one city, low-income areas are well provisioned with supermarkets. Morland et al. (2001), in a study of food outlets in Mississippi, North Carolina, Maryland, and Minnesota, found that there are more than three times as many supermarkets in high-medium and high-wealth areas than there are in the lowest wealth areas. Shaffer (2002) found that neighborhoods with low levels of poverty (< 10% of households) averaged over two times as many supermarkets as high poverty (> 40% of households) areas. Statistical tests are not reported in this study, which analyzed the distribution of every supermarket (n = 56) with sales of over \$10 million within a 52-square mile area of Central Los Angeles. Looking at the availability of food by store type in San Diego, CA, Sallis (1986) found that supermarkets stocked an average of twice as many “heart healthy” foods as did grocery stores and four times as many of these foods as did variety stores; one-way ANOVA found these means to be significantly different.

This section attempts to answer the question of whether food was less available in low-income areas. As there is not a large body of literature on this topic, it is not possible to draw a firm conclusion. However, the results of the studies cited here suggest that the distribution of food outlets varies with geographic location; US studies are more likely to find differences in supermarket provision than are studies from the UK. When considering questions of food access, it worth noting with Clarke et al. (2002) and Whelan et al. (2002), that individual circumstances, including access to a car, will determine whether an area is perceived as a food desert. Morland et al. (2001) and Turrell et al. (1996 in Morland et al. 2001) have found a smaller percentage of residents in less-

affluent areas have access to a car for food shopping. Travers (1996) and Whelan et al. (2002) have provided qualitative data that access to a car is important in shaping residents' perceptions of living in a food-deprived area. Relative lack of mobility would make the location of food outlets more important for low-income consumers, both in terms of food availability and food cost (Turrell 1996 in Morland et al. 2001). The use of a car would obviously increase one's ability to access food, as would sufficient income to use a taxi. Public transport is often available, and cheaper than a taxi or private automobile, but transporting food on public transport is much more difficult than in a car or taxi.

Summary

Most researchers agree on the existence of a socioeconomic health gradient. While mechanisms and causality continue to be debated, one plausible linkage between SES and health is nutrition. Food insecurity is correlated with decreased dietary adequacy and health. Further, food consumption patterns among the less affluent suggest that the former could be partially responsible for some of the health problems that are seen more often in this group. In many locations, the dearth of food outlets, especially supermarkets in poor areas, could contribute to the difficulty of acquiring a nutritionally adequate diet.

Chapter Summary

Biocultural theory suggests we look for political-economic causes for health disparities. Socioeconomic health gradients are mirrored by socioeconomic variation in diet adequacy in general and with respect to the consumption of vegetables and fruit, which was found to be especially important in promoting good health. Inter-neighborhood variation in food cost is unlikely to be driving these differences, though patterns of food access and food insecurity may be linked with poor health and diets among the less-affluent.

This thesis investigates political-economic determinants of nutrition and health in two areas of Hamilton, Ontario. The distribution and cost of food, as well as the availability of produce have been shown to be important variables in shaping health. Especially notable is the dearth of studies investigating variation in the price and availability of food within Canadian cities. This thesis will therefore contribute much-needed data on an important social determinant of health.

The following Chapter, Chapter 3, briefly describes socioeconomic and demographic differences between the two areas. Chapter 4 then describes the methods used in the course of this project to measure these variables, investigate some of their determinants, and assess the response of Hamilton consumers, in the form of their food-shopping behavior.

Chapter 3: Demographic and Socioeconomic Characteristics of the Study Areas

Introduction

This chapter provides brief descriptions of the two study areas, Westdale and Downtown, primarily using data from the 2001 Canada Census (Statistics Canada 2001). As variation in socioeconomic status (SES) is strongly linked with health (see Chapter 2), much of the material presented in this chapter focuses on differences in measures of SES between the two neighborhoods. In addition to this quantitative data, brief qualitative sketches of the two areas are also included.

Figure 3.1 shows the boundaries of the study areas superimposed on a map of Hamilton's street grid. The Westdale neighborhood is located near McMaster University and includes several large green spaces; the Downtown area, in contrast, is located in Hamilton's "downtown core" and away from large green or open spaces. Figures 3.1 (below), 5.1, and 5.2 (pages 23 and 24) show this.

These study areas were selected because they are also being studied as part of larger, ongoing projects at McMaster University: the Deconstructing the Determinants of Health at the Local Level Project (Dr. John Eyles, School of Geography and Geology, Principal Investigator) is a multidisciplinary project that aims to improve our understanding of how local-level determinants of health such as income, social support, and exposure to environmental pollution operate in four areas of Hamilton (Eyles 1999), and the Child Nutrition and Food Insecurity in an Urban Canadian Context Project, directed by Dr. Tina Moffat, Department of Anthropology, examines whether and how poverty and food insecurity affect the health and well-being of children attending three Hamilton elementary schools. The Child Nutrition Project compares children in affluent and less affluent schools in an effort to discern which nutritional problems are poverty-related and which are related to living in an urban Canadian environment (Moffat 2000).

The more-affluent study area in this project, Westdale, was chosen because one of the schools participating in the Child Nutrition Project is located in that neighborhood. The Westdale area covers census tracts 045 and 046. The street borders are as follows: the neighborhood is bounded by Highway 403 to the east and south, and by Main Street to the south. Forsyth Avenue, McMaster University, and Churchill Park form the western border of the neighborhood. The northern border of the study area is the border between Hamilton and Dundas.

The less-affluent area in this study, Downtown, was defined by the Determinants of Health Project using a combination of multivariate, spatial statistical techniques and geographic information systems (Luginaah et al. 2001). The area also encompasses most of the area from which the less-affluent elementary schools in the Child Nutrition Project draw their students. The Downtown area covers tracts 034, 035, 036, 049, 050, 062, and 063. The Downtown area is bounded by the escarpment rim, the CN railway, James Street, and Wentworth Street.

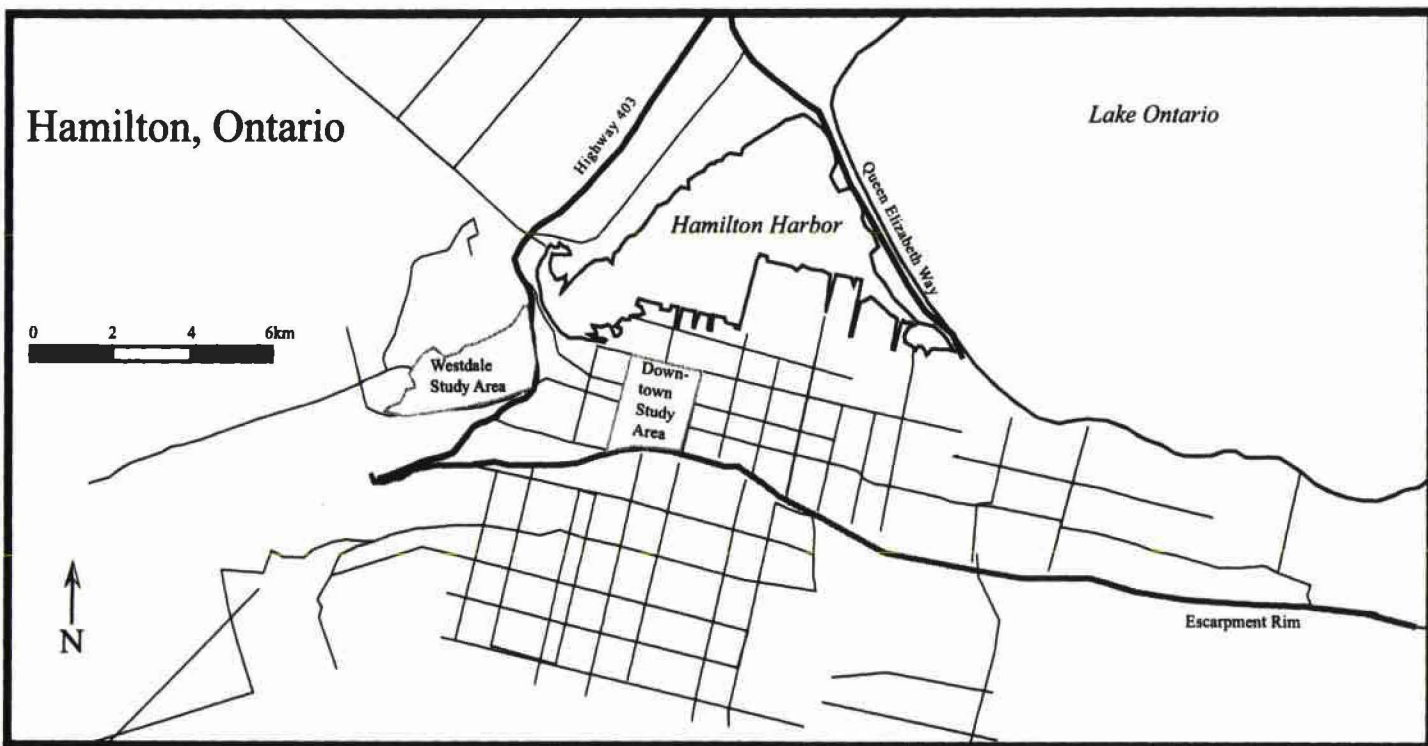


Figure 3.1: Location of study areas in Hamilton, Ontario, Canada. (Map adapted from Statistics Canada 2001).

Demographic and Socioeconomic Characteristics of the Study Areas

Census Data

Table 3.1 presents socioeconomic and demographic indicators for Westdale, Downtown, and Hamilton. The study areas are composed of multiple census tracts. To provide a measure of diversity as well as one of central tendency, I present for each tract the range and mean values for each variable. All data is from Statistics Canada (2001).

In 2001, Westdale housed 6,951 people, while 25,342 lived in the Downtown area. Both areas, as well as the City, saw population growth since the 1996 Census. The average Downtown growth rate of 3.9% masks a range that stretches from -11.2% to 9.9%. The population growth contributed to making an already densely populated area more so: population density in the Downtown averages 6,548 individuals per square kilometer, more than four times Westdale's average of 1,580 individuals per square kilometer and over 10 times the city-wide figure. The Downtown's most sparsely settled census tract is twice as densely packed as the denser of Westdale's two tracts.

In the Downtown area, 37% of residents are immigrants, including more than half of the population in one census tract; this is greater than the Westdale and Hamilton averages of 27% and 26%, respectively.

Median and average family incomes are approximately twice as great in Westdale compared to Downtown. Only 8.5% of Westdale families live below the 2001 low-income cut off (LICO)—\$29,653 for a family of four in a city of Hamilton's size—half the rate of Hamilton as a whole. In contrast, the percentage ranges from 38 to 57 in the Downtown, with an average of 43.2% of families below the LICO.

Table 3.1: Selected socioeconomic and demographic indicators for Westdale, Downtown, and Hamilton. (Statistics Canada 2001)

	Westdale	Downtown	Hamilton
Population	6951	25342	490268
% Population change	0.4-4.4 (2.3)	-11.2-9.9 (3.9)	4.8
Square km	4.4	3.9	1,117.1
Population density	1194-2551 (1580)	5277-9404 (6548)	438.9
% lone parent family	14-20 (16)	22-35 (26)	16.6
% immigrants	23-33 (27)	24-51 (37)	26
% unemployed	5.2-6.1 (5.7)	6.1-23.1 (11.5)	6.4
Average family income (\$1000s)	65-110	32-42	66
Median family income (\$1000s)	60-95	23-38	58
% below LICO*	3.1-14.7 (8.5)	38-57 (43.2)	16.1
commute to work as driver	56-61 (59)	46-63 (55)	77
education: % less than Grade 9	1.7-4.3 (2.9)	7-25 (17)	10
education: % trade certificate or diploma	3.1-6.8 (4.8)	5-10 (7)	11
education: % any university	48-69 (58)	7-24 (16)	20

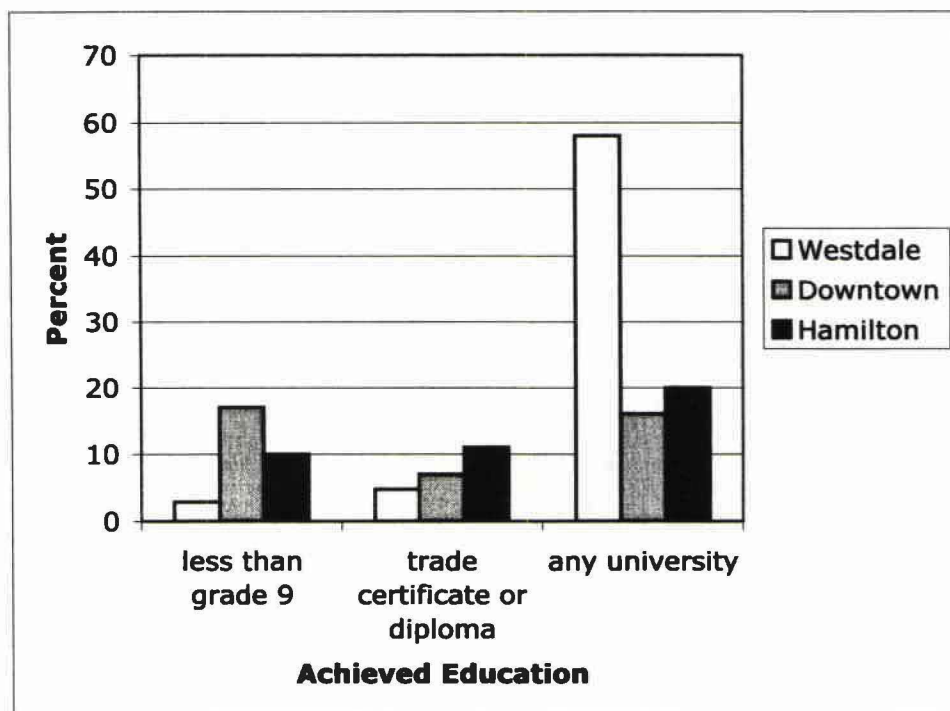
Values in parentheses are means. Other values show the range for the study area.

*Low-income cut off (LICO) for a family of four in a city the size of Hamilton was \$29,653 in 2001.

Two other measures of SES, education and percentage of families headed by lone parents, are discussed here. Nearly 60% of Westdale residents have received some university education, compared to 16% of Downtown residents. Conversely, greater proportions of Downtown residents have not finished grade 9 or completed a trade certificate or diploma. In fact, the Downtown has a greater percentage of residents who have not completed grade 9, 17%, than the city average of 10%; only 7% of Downtown residents have a trade certificate or diploma, compared to the City average of 11%. Education statistics are summarized in Figure 3.2. In the Downtown, 26% of families are headed by a single parent, compared to 16% in Westdale, which is within a percentage point of the city figure.

The potential of vehicle ownership to influence dietary adequacy was raised in Chapter 2. A proxy measure of access to a car is therefore included in this area comparison. For the purposes of this study, access to a car will be approximated by the percentage of residents who commute to work as the driver of a car, truck, or van, as the census data does not include information on vehicle ownership. For this variable, there is little difference between the two areas. The value for Westdale is 59%, compared to

Figure 3.2: Education statistics: Westdale, Downtown, and Hamilton

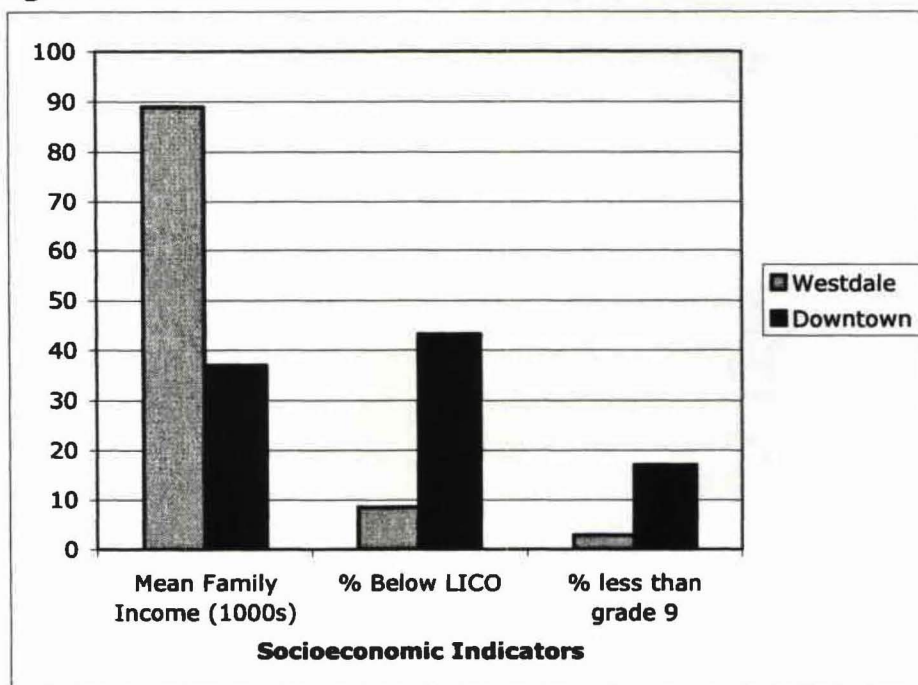


55% Downtown; the City average is 77%. It is likely that the lower relative affluence of the Downtown contributes to the percentage of drivers in this area being lower than the Hamilton average. This variable likely does not accurately reflect car ownership in Westdale, given the affluence of the neighborhood; instead, it likely relates to the fact that a relatively high proportion of residents either work or are students at McMaster

University, which is within walking distance even in the winter months. It should also be noted that the City average includes suburban and outlying areas where a vehicle might be required more often than in Westdale or Downtown. Increased availability of public transit in these areas might also be indicated by the relatively low levels of vehicle ownership.

McMaster University, located at the edge of the Westdale neighborhood, affects the neighborhood in various ways; one is that a large number of university students live in Westdale during the academic year. While some students own their homes, the majority rent apartments or bedrooms. Such students may or may not be included in the census counts for Westdale: Statistics Canada asks students to list their parents' address as their place of residence if they plan to return home at the end of the year (Statistics Canada, personal communication, 2004). Information on what percentage of students did so and for what reason is not available. Therefore, the population present in Westdale during the data-gathering phase of this study may differ from that described in the 2001 Canada Census results, which could lead to differences between the demographic profiles of the Census population and sample of individuals surveyed as part of this research project. Figure 3.3 summarizes some of the socioeconomic differences between the two areas.

Figure 3.3: Socioeconomic contrasts: Westdale and Downtown



Qualitative Sketches

The following sketches are based primarily on impressions formed while carrying out the various portions of the project. Westdale is an affluent neighborhood bordering McMaster University. Not surprisingly, a large number of faculty, students, and others associated with the university reside there. There is a large amount of green space: a large park, the Royal Botanical Gardens, and a nature preserve are all in or adjacent to Westdale (Figure 5.1 on page 67 gives a sense of the green space available to Westdale residents. This can be contrasted with Figure 5.2 on page 68 for the Downtown.) Most of the commercial activity in Westdale occurs along King Street between Paradise Road and the university: there is a large number of cafes, shoe stores, and small restaurants, along with variety stores, book shops, specialty food outlets, several banks, and a library. The residential sections of Westdale generally enjoy wide, quiet streets with mature trees; high-rise apartment buildings are rare, and, except for two streets, automotive traffic is generally quiet and slow moving. Most of the houses are large and appear to be well maintained and valuable. A portion of the Westdale neighborhood is adjacent to Highway 403. This area is not located near the commercial area described above, the houses in this area are not as nice, and several high-rise apartment buildings are located here.

The Downtown area is quite different. Included within its boundaries are areas that were among the first in Hamilton to be settled by Europeans; immigrants to Hamilton continued to settle in this area throughout the city's history and do so in this day. A dominant feature of the Downtown is the proximity of Hamilton Harbor and associated heavy industries (Ehrlich et al. 2001). Though there are several parks, these are small and often include evidence of drug dealing and the sex trade (Ehrlich et al. 2001). Many of the homes, factories, and other buildings are in poor repair, high-rise apartment buildings are common, and many of the streets carry rapid, loud, one-way traffic on multiple lanes (Ehrlich et al. 2001); these traffic arteries give the sense of barriers between different areas of the neighborhood. The residential sections vary: some are well maintained and clean, while others show signs of chronic neglect; similarly, some commercial areas appear to be up and coming, while others appear to be rotting away. Though there is significant variation, the Downtown is clearly less affluent than Westdale: most storefronts are either variety stores; discount, thrift, or secondhand shops; or other businesses, such as strip clubs, that require low rents. Running counter to this trend, there are several gourmet food shops and other attractions; the City of Hamilton has set up a business improvement area to encourage economic growth in this area, known as International Village, and several other parts of the Downtown study area (City of Hamilton 2004).

Though it is not within the boundaries of the Downtown Study Area, the Hamilton Farmers Market is located nearby, at the corner of MacNab Street and York Blvd (see Figure 5.2, page 68), next to the Hamilton Public Library; the market moved to this location in 1980 (Cummings et al. 1999). The Farmers Market consists of two levels of shopping space and is open four days a week selling fresh produce, meat, fish, baked goods, dairy products, and flowers; the market operates year round (Cummings et al. 1999). The farmers market therefore represents a food acquisition option outside of supermarkets, grocery stores, and variety stores. The ability of many residents to take

advantage of this option is limited by the market being open only four days a week; access is further limited as the market closes at 6 p.m. on these days. Many vendors close their stalls an hour before the market as a whole closes.

Summary

The brief socioeconomic and demographic profiles presented here shows that the two study areas are quite different in terms of population density, relative affluence, and education. This is unsurprising, as they were chosen to provide contrasting examples of the city. The two areas are similar in measures of immigrant population and apparent access to motor vehicles, but this does not detract from the overall higher SES in Westdale (see Figure 3.3).

The next chapter describes the research methods employed to measure the similarities and differences between Westdale and the Downtown in terms of the cost and availability of food, as well as to gather information on consumer food-shopping habits and the food distribution system in the city as a whole.

Chapter 4: Methods

Introduction

As this thesis investigates a complex, multifaceted topic, I used both qualitative and quantitative methods in an attempt to find “comprehensive and valid” (Baum 1995:463) results. I used the following quantitative approaches: food outlet mapping, food-price survey, a produce availability survey, and a face-to-face survey of food-shopping behavior; the only qualitative method I used was the semi-structured interview, conducted with food outlet owner/managers and public health workers.

As discussed above, this research was designed to complement two ongoing research projects, the Child Nutrition and Food Insecurity in an Urban Canadian Context Project (Moffat 2000) and the Deconstructing the Determinants of Health at the Local Level Project (Eyles 1999). As discussed in Chapter 1, the Westdale neighborhood is the same as that used in the Child Nutrition Project while the Downtown area corresponds to that used in the Determinants of Health project and encompasses the catchment areas of the Downtown schools included in the Child Nutrition project. These areas were chosen because they represent socioeconomically contrasting areas within the same city, the comparison of which will allow the identification of characteristics to do with living in an urban environment generally, as well as those to do with living in a less-affluent area (Moffat 2000). For a description of the boundaries of the study areas, see page 20.

Ethics Clearance

As this study included the use of human subjects, ethics clearance was required. I therefore submitted an application to the McMaster University Research Ethics Board, which was approved. This application detailed the human subjects to be involved in the study and the extent of their involvement. Advanced drafts of the interview and survey guides were included with the application form for review. For each method described below all subjects were unpaid volunteers and all had the right to cease participating at any time. Food cost and availability surveys were only carried out with the permission of the outlet owner or manager. All interview subjects agreed to participate after reading an information letter describing the project and their rights as subjects; these individuals also signed a consent form prior to the beginning of the interview process. I obtained oral consent from survey respondents. These individuals were read a one-paragraph statement describing the project and their rights as subjects prior to beginning the survey process.

Quantitative Methods

I used quantitative methods to quantify the availability and cost of food and investigate the determinants of food-shopping behavior.

Mapping

Maps of food outlets in the study areas were constructed to provide a sampling universe for the food cost and availability surveys and to visualize spatial variation in the number and type of food outlets. To create the maps, I walked the streets of the study areas and collected address information for food outlets. Geopinpoint software (Desktop Mapping Technologies, Inc.) converted the address information into geographical

coordinates plotted on a map of the Hamilton street grid generated by ArcView (ESRI). (Pat Deluca of the GIS Lab, School of Geography and Geology, created the maps.) The food outlets were classified using a scheme based on Nevraumont's (1987) categories.

- *Supermarkets*: Large retail stores offering a wide variety of grocery items and often other services, such as deli and butcher counters and photo finishing.
- *Grocery stores*: Retail stores smaller than supermarkets that offer a variety of grocery items, without the specialty counters and other services.
- *Variety stores*: Retail stores offering a smaller variety of grocery items and devoting relatively large amounts of space to items such as non-prescription drugs, tobacco products, and other products.
- *Specialty stores*: Retail stores specializing in fewer food types, such as bakeries, butcher shops, or shops specializing in religious/ethnic foods.

Food Cost Survey

I assessed the cost and availability of healthy food using the 1998 Ontario Nutritious Food Basket (ONFB) (Health Canada 1998). Only supermarkets, grocery stores, and variety stores were included in the survey as only these stores could be expected to stock a reasonable percentage of ONFB items: I sampled 4 of 6 Westdale outlets and 13 of 49 Downtown outlets. As much as possible, sampled stores were evenly distributed throughout the study area, but for both areas, final sample composition depended on the owner/manager granting access.

Produce Availability Survey

Because of the health benefits of eating fresh produce (see above), I surveyed 6 of 6 Westdale and 46 of 49 Downtown non-specialty food outlets with a list of 18 fruit and vegetable items based on the ONFB, noting what produce was available, if any. The list of items is reproduced in Appendix 1.

Consumer Survey

I investigated the determinants of food acquisition decisions at the individual level with a brief, face-to-face consumer survey designed to gather input from individual neighborhood residents about how they make food-shopping choices in light of the political-economic constraints discussed above and measured as part of this study. The survey guide is reproduced in Appendix 2.

I designed the survey instrument myself using Woodward and Chambers' (1980) *Guide to Questionnaire Construction and Question Writing* and Woodward et al.'s (1982) *Guide to Improved Data Collection in Health and Health Care Surveys* to guide how I formatted and phrased questions. Several drafts of the survey were submitted to the thesis committee chair and to Dr. Wayne Warry, Department of Anthropology, McMaster University, who has experience with health-related questionnaire research, for comments and suggestions. After incorporating their suggestions into the survey instrument, I pilot-tested it in both study areas. Five responses were gathered in each area. The pilot survey found that people were willing to answer the questions and that their answers provided the information sought.

A sample of 50 consumers drawn from each study area participated in the survey at various times of the day and night and in different parts of the study areas. The survey included demographic and economic questions, questions pertaining to the frequency of shopping for food at variety stores compared to grocery stores and supermarkets, and questions about numbers of shopping trips per week, the distance traveled to shop for food, and the type of transportation used when shopping for food.

Qualitative Method

Interview Sample and Design

Food outlet owners and managers and public health workers were interviewed to gain insight into the structure and effects of the food-distribution system in Hamilton. I used the semi-structured format because the interview subjects were professional or business people with busy schedules, and semi-structured interviews are preferred when subjects are busy and subsequent interviews are not feasible (Bernard 1994). The two groups of interview participants are discussed below.

As with the survey instrument, I designed the interview guides myself. In addition to consulting Woodward and Chambers (1980) and Woodward et al. (1982), I consulted Bernard (1994) and Ervin (2000) for guidance in preparing the questions and carrying out the interviews themselves. In addition to these sources, I received comments and suggestions from the thesis committee chair and Dr. Warry on drafts of the interview guides. The size of the potential interview sample was small enough that it was not possible to pilot-test the interview questions. The semi-structured format of the interviews allowed me to rephrase any question that did not make sense to the subject, though this was not often necessary.

Interviews with food outlet owners and managers investigated determinants of the costs and availability of food, as well as other aspects of the food-distribution system in Hamilton. In the food distribution system, food outlet owners and managers are positioned between consumers and distributors of food. This allows them to observe both industry workings and consumer behavior; in the parlance of biocultural theory, they are positioned in a place where resource distribution acts to shape local conditions. This makes food outlet owners and managers ideal candidates for inclusion in this study.

I conducted seven interviews with food outlet owners and managers: two variety store owner/managers (one Westdale, one Downtown), two grocery store owner/managers (both Downtown), and two supermarket owner/managers (one Westdale, one Downtown). Attempts were made to include a grocery store owner/manager from Westdale, but the individuals declined to participate in the study; similarly, no food distributors agreed to be interviewed.

The food outlet owner/managers were asked questions regarding food acquisition and retailing, which items were profitable, and other questions relating to the operation of the store. Their views on consumer food purchasing and consumption habits and the importance of nutrition and the obesity epidemic were solicited as well, both to provide a comparison sample to the public health workers and because the views of food industry workers on these issues are relevant to the planning, implementation, and success of any

market-based strategies designed to reduce the prevalence of overweight and obesity. The interview guide for food outlet owner/managers is reproduced in Appendix 3.

Three public health workers were interviewed to gain insight from those working in the study neighborhoods about the most pressing nutrition-related public health problems. The study design called for a larger sample, but overburdened schedules and/or supervisor disapproval prevented public health workers from participating. In addition to being small in size, the sample is dominated by individuals who work primarily with children or youth in downtown Hamilton. Like the small sample size, this was not part of the research design, though it will be helpful when interpreting the results of this project alongside those of the Child Nutrition Project discussed in Chapter 1. The interview guide for public health workers is reproduced in Appendix 4.

The first public health worker is a public health nurse who has worked in the Downtown area for over a decade, the second is a public health dietician who works for the City of Hamilton's Public Health and Community Services Department, and the third is a coordinator for Partners in Nutrition, an organization funded by Breakfast for Learning, a national-level nonprofit organization dedicated to supporting child nutrition. Interviews with public health workers focused on identifying nutrition-related public health problems, eliciting what the public health workers saw as causing these problems, describing what was being done by the city or other organizations to ameliorate these, and asking what other solutions the public health workers thought should be tried

Analysis

I used the NVivo software package (QSR International) to analyze the interviews for emergent themes and to compare and contrast the answers of respondents. Nvivo is a multipurpose software program designed to facilitate the organization and analysis of qualitative data (Bazeley and Richards 2000). For this project, NVivo was primarily used to "code" interview transcripts, which entails assigning passages of text to one or more nodes (Bazeley and Richards 2000). Answers to the same question can be assigned to the same node, allowing all answers to the same question to be compared. Similarly, nodes can be created for each mention of topics of interest; an example from this project is a node containing comments relating to changes in obesity prevalence over time. There are two main types of nodes: tree nodes and free nodes. Free nodes are nodes that do not assume relationships with other concepts, while tree nodes contain concepts with hierarchical relationships (Bazeley and Richards 2000). After the interviews have been coded, NVivo allows easy retrieval of the highlighted comments, as well as the passage (or paragraph or document) from which they were taken (Bazeley and Richards 2000).

Food outlet interviews were first coded such that each question was assigned a free node, allowing respondents' answers to the same questions to be easily compared. Second, answers were coded into a set of tree nodes on the topics of malnutrition, profits, cost determinants, availability of produce, and food distribution system. Interviews with public health workers were coded using the hierarchical nodes only. Figure 4.1 shows the tree nodes used. Free nodes are not shown as they correspond to interview questions.

Figure 4.1: Tree nodes used to analyze interview data.

Where necessary, notations in parentheses describe the node.

1. **Malnutrition**
 - a. **undernutrition**
 - i. **undersolve** (strategies to prevent/reduce undernutrition)
 - ii. **undercause** (factors causing undernutrition)
 - iii. **underfail** (reasons strategies might fail)
 - b. **not see** (does not feel malnutrition is a problem)
 - c. **overnutrition**
 - i. **oversolve** (strategies to prevent/reduce overnutrition)
 - ii. **overcause** (factors causing overnutrition)
 - iii. **overfail** (reasons strategies might fail)
 - d. **environmental** (relating to North American food culture)
 - e. **change over time** (change over time in malnutrition prevalence)
 - i. **underchange** (changes in undernutrition)
 - ii. **overchange** (changes in overnutrition)
 - iii. **no change** (interviewee sees no change over time)
 - f. **general** (general responses about malnutrition)
 - g. **malcause** (factors that cause malnutrition)
 - i. **envirotime** ('little time' or 'being busy' causing malnutrition)
 - ii. **poverty** (linking poverty and malnutrition)
 - iii. **marketing** (marketing as a cause of malnutrition)
 - iv. **access** (access to healthy foods and malnutrition)
 - v. **activity** (activity levels linked to malnutrition)
 - h. **malimpact** (health and other impacts of malnutrition)
 - i. **choices**
2. **Profits**
 - a. **profit –** (items that sell for little or no profit)
 - b. **overall** (overall profit margins, goals)
 - c. **profit +** (items that sell for 'good' margin)
 - d. **profit + why** (reason why an item makes good margin)
 - e. **profit – why** (reason why an item makes little margin)
3. **Cost Determinants**
 - a. **consumer expectations**
 - b. **competition prices**
 - c. **store type** (how store type impacts cost)
 - d. **source** (how source of goods impacts cost)
4. **Availability of Produce**
 - a. **spoilage**
 - b. **consumer expectations**
 - c. **expense**
5. **Distributors** (describing distributors and ownership of)
 - Supermarket in area** (about supermarkets in the area)

Statistical Tests

Statistical tests make several assumptions about the data under scrutiny and the manner in which it was collected (Madrigal 1998, Norman and Streiner 1994). Madrigal (1998) lists three common assumptions: random samples are used, the collection of one observation does not influence the collection of the second, and the data are normally distributed. If these assumptions are not met, the data either must be transformed or a different test used. Throughout the design and implementation of this study, I endeavored to ensure that the first two assumptions were met.

To check the validity of the third assumption—normally distributed data—I used the Lilliefors test. The Lilliefors test can be used to test the hypothesis that a data set is normally distributed (Norusis and SPSS, Inc. 1993). Exploration of the data sets for the food-cost, produce availability, and face-to-face survey found sufficient evidence to reject the hypothesis that the samples were normally distributed (data not shown).

Parametric statistical tests assume normally distributed data (Madrigal 1998). Because the data sets used in this thesis are not normally distributed, only non-parametric tests, which do not assume normally distributed data, are used. Non-parametric tests are also appropriate because some age and income data were collected in ranges rather than as continuous variables; the small sample sizes in the food-cost and produce-availability surveys also makes non-parametric statistics appropriate (Madrigal 1998; Norman and Streiner 1994). The Mann-Whitney U test was used to compare two means; for comparisons of three or more means, the Kruskal-Wallis test was used. Only two-tailed tests were used.

Chi-square tests are used to compare frequency data (Madrigal 1998). The chi-squared test was used in comparing frequency results from the face-to-face survey (e.g. sex ratios, percentage of households with children) between the two study areas. As a non-parametric test, the chi-square test makes no assumptions about the parameters or distribution of the population under study; in addition to the standard assumptions discussed above, the test only assumes that the expected frequencies be at least five. When this assumption is not met, Yate's correction must be used (Madrigal 1998). This occurred several times in the analysis, and the Yate's correction was applied as appropriate. All Chi-square tests had one degree of freedom.

Face-to-face survey results were further analyzed using multiple regression analyses. For all tests, a $p\text{-value} \leq 0.05$ was used to identify significant results. All statistical analyses were carried out using SPSS version 10.1 (SPSS Inc.), with the exception of the Chi-squared tests, which were performed using Statcalc version 6.0 (CDC 1993).

Limitations

The Ontario Nutritious Food Basket

Standardized food baskets are widely used by government agencies, academics, and advocates for the poor (e.g. Travers et al. 1997; Vozoris et al. 2002; Canadian Association of Food Banks 2001). Therefore, this study's use of the Ontario Nutritious

Food Basket (ONFB) produces results that are comparable to other studies of food cost in Ontario and phrased in terms familiar to policy makers and advocates for the poor. This serves to increase the study's relevance and potential usefulness. This general use and acceptability comes at some cost, however.

The ONFB is designed to represent the average purchasing patterns of all Ontario households (Health Canada 1998). Inspection of the ONFB (Figure 4.2) reveals that it includes many foods acceptable to and commonly eaten by European-descended Canadians and relatively few foods that are either unacceptable or not often eaten by them. These statements are not necessarily true for Hamiltonians not of European descent, a serious limitation for a city such as Hamilton in which 26% of the population are immigrants (Statistics Canada 2001) and who may therefore have food beliefs and practices that differ from the European-derived model embodied in the ONFB; Torchetti's (1998) food ethnography of Vietnamese residents of Hamilton and Mississauga provides one such example. Because of the bias of the ONFB, the results of this study are more relevant to those Ontarians who consume a diet closer to the provincial norm than to those who for cultural, political, religious, or other reasons consume another type of diet or rely on alternative means of acquiring their food. In view of these issues, Donkin et al. (2000) conducted parallel food basket studies using four "ethnic baskets" (see Figure 4.3); this approach, which is desirable and provides an interesting potential avenue for future research, is beyond the scope of the present study in terms of time and resources.

Age Structure of the Face-to-Face Survey Sample

Preliminary analysis of the face-to-face survey sample revealed that the Westdale sample included more individuals aged 18 to 24 years of age than would be expected based on census results. Part of this may be due to the way in which university students are enumerated by Statistics Canada. The census form asks students to list their parental address if they plan to return home at the end of the school year (Statistics Canada, personal communication 2004). Additionally, young people may have been more willing to participate in the survey than were older residents of the neighborhood. The analysis of survey data attempts to correct for this problem by performing analyses with and without the age class likely to include the greatest number of students (those aged 18 to 24 years). See Chapter 5 for more details

Other Limitations

Several other limitations should be noted. First, over the course of the study, several variety stores and other food outlets either opened or went out of business. Therefore, this thesis analyzes the food-retailing industry as it existed in Hamilton in the Fall of 2002. Second, by focusing on purchased foods, this study is not as applicable to those who rely on food banks, soup kitchens, or other sources for some or all of their food. Third, the face-to-face survey was only carried out during the week, albeit during morning, afternoon, and evening hours. Surveying on the weekend may have produced slightly different results. Fourth, all data collection was done in English. Conducting the face-to-face survey in other languages, especially Eastern European and Asian languages, would

Figure 4.2: Ontario Nutritious Food Basket Items (1998)

<u>Milk Products</u>	<u>Citrus Fruits and Tomatoes</u>
2% milk	oranges
yogurt, fruit, 2% butter fat	apple juice, canned or Tetra Pak
cheddar cheese	orange juice, frozen, concentrate
processed cheese slices	tomatoes
mozzarella cheese	whole tomatoes, canned
vanilla ice cream	tomato juice
<u>Eggs</u>	<u>Other Fruit</u>
grade A large	apples
<u>Meat, Poultry, Fish</u>	bananas
round steak	grapes
boneless stewing beef	pears
ground beef, medium	raisins, seedless
pork chops, loin	fruit cocktail, canned in juice
chicken legs	<u>Vegetables</u>
wieners, beef & pork	potatoes, fresh
sliced ham, 11% fat	French fries, frozen
frozen fish fillets	broccoli
pink salmon, canned	cabbage
tuna, canned, in water	carrots
<u>Meat Alternatives</u>	celery
baked beans, tomato sauce, canned	cucumber
white beans, dry	lettuce, iceberg
peanut butter	lettuce, Romaine
<u>Grain Products</u>	onions
bread, enriched, white	green peppers
bread, whole wheat	turnips (rutabaga)
hot dog/hamburger rolls	mixed vegetables, frozen
flour, all purpose	kernel corn, canned
flour, whole wheat	green peas, canned
spaghetti/macaroni	<u>Fats and Oils</u>
rice, long-grained, white, parboiled	Margarine, tub
macaroni/cheese dinner	Butter
oatmeal, regular/quick-cooking	Canola oil
corn flakes	Dressing, mayonnaise, < 35% oil
Shreddies™	<u>Sugar and Sweets</u>
soda crackers	sugar, white
social teas	strawberry jam

Figure 4.3: Examples of ethnic food baskets from Donkin (2000)

White UK/Irish	Caribbean	African	Gujarati Hindi
Wholemeal bread	Wholemeal bread	Wholemeal bread	Wholemeal bread
White bread	White bread	White bread	White bread
White pasta	White pasta	White pasta	White pasta
Potatoes (old)	Potatoes (old)	Potatoes (old)	Potatoes (old)
Potatoes (new)	Potatoes (new)	Potatoes (new)	Potatoes (new)
Cornflakes	Cornflakes	Cornflakes	Cornflakes
Weetabix	Weetabix	Weetabix	Weetabix
Long grain rice	Yam	Yam	Basmati rice
Frozen chips	Ripe plantain	Ripe plantain	Mid brown chapatti
Semiskimmed milk	Green plantain	Green plantain	flour
Cheddar	Long grain rice	Long grain rice	Semiskimmed milk
Low-fat fruit yogurt	Semiskimmed milk	Semiskimmed milk	Cheddar
Polyunsaturated spread	Cheddar	Cheddar	Low-fat fruit yogurt
Olive oil	Semiskimmed milk	Semiskimmed milk	Polyunsaturated spread
Sunflower oil	Cheddar	Cheddar	Olive oil
Eggs	Low-fat fruit yogurt	Low-fat fruit yogurt	Sunflower oil
Apples	Polyunsaturated spread	Polyunsaturated spread	Eggs
Bananas	Olive oil	Olive oil	Apples
Oranges	Sunflower oil	Sunflower oil	Bananas
Satsumas or similar	Eggs	Eggs	Oranges
Pears	Apples	Apples	Satsumas or similar
Grapes	Bananas	Bananas	Pears
Strawberries	Oranges	Oranges	Coconut
Tinned tomatoes	Satsumas or similar	Satsumas or similar	Tinned tomatoes
Onions	Pears	Pears	Onions
Fresh tomatoes	Mango	Mango	Fresh tomatoes
Carrots	Tinned tomatoes	Pineapple	Carrots
Cabbage	Onions	Tinned tomatoes	Cabbage
Frozen peas	Fresh tomatoes	Onions	Frozen peas
Lettuce	Carrots	Fresh tomatoes	Karella
Cucumber	Cabbage	Carrots	Okra
Pepper	Frozen peas	Cabbage	Lettuce
Broccoli	Ackee	Pepper	Cucumber
Mushroom	Okra	Lettuce	Aubergine
Baked beans	Pepper	Okra	Spinach
Kidney beans (canned)	Chowchow	Cucumber	Baked beans
Lean beef mince	Aubergine	Chowchow	Lentils (masoor dhal)
Pork fillet/escalope	Spinach	Mushroom	Lentils (moong dhal)
Whole frozen chicken	Baked beans	Baked beans	Lentils (toor dhal)
Fresh chicken portions	Kidney beans (dried)	Lentils	Kidney beans (dried)
Fish fingers	Goat	Black eye beans	
Fresh/frozen	Pork fillet/escalope	Pork fillet/escalope	
cod/haddock fillets	Whole frozen chicken	Whole frozen chicken	
Fresh mackerel/herring	Frozen chicken portions	Frozen chicken portions	
Tinned Sardines	Fresh chicken portions	Fresh chicken portions	
	Fish fingers	Fish fingers	
	Fresh/frozen	Fresh/frozen	
	snapper/malabar	cod/haddock fillets	
	Salted fish	Fresh mackerel/herring	
	Tinned Sardines	Tinned Sardines	

have led to a different sample composition. Fifth, people in the Downtown area near Barton Street participated in the face-to-face survey at very low rates, partially because of language barriers, and partly for reasons I was unable to identify. Location played another role in biasing the sample. With few exceptions, people I approached were generally unwilling to participate unless they were in or very near the parking lot of a food outlet. Sixth, very few stores stocked yogurt in the 500 g container listed in the ONFB. Rather than leave out yogurt from the majority of the sample, I collected the price of 175 g containers. Similarly, different store types stock breakfast cereals in different sized boxes. In order to include as many cereal products as possible, rather than use the ONFB sizes, I have computed cereal price per 100 g. These changes affect slightly the ease with which these results can be compared to other studies, but do not otherwise affect the study. Seventh, when classifying stores into types, I found that the range of businesses between the categories of “grocery store” and “variety store” to be quite large; separating this continuum into two categories was difficult, and other schemes might have yielded different divisions. Finally, given the time and resources available, it was not possible to collect finer-grained data on food purchasing decisions, food-preparation techniques, or how food is distributed in households, all of which can have important implications for how food affects individual and public health.

Summary

This research is among the first to investigate the political-economic structures influencing individual behavior and how individuals make constrained choices in light of these structures. Such a goal required that I employ a variety of methods. This attempt to produce comprehensive and valid results that incorporate insights derived from quantitative and qualitative perspectives, as well as from the ability to “triangulate”, or interpret the results of one method in light of the results of the other, while potentially very powerful, comes at the cost of gathering larger sample sizes in any one method. Whether the hoped-for benefits outweigh these costs may be partially judged in the next chapter, which presents the results of the study.

Chapter 5: Results

Introduction

This chapter presents the results of the various research methods used in the study: mapping, food-cost survey, produce-availability survey, semi-structured interviews, and face-to-face survey. Overall, the results indicate that while food cost does not vary greatly between the study areas, the constellation of low income, lack of transport, and low produce availability may make a healthy diet less accessible in the Downtown area.

Mapping

Figures 5.1 and 5.2 show the distribution of food outlets in the study areas. Table 5.1 shows the distribution of food outlets by type and area. A clear majority—64%—of downtown food outlets are variety stores, while Westdale has nearly as many specialty stores as variety stores. The greater number of variety stores in the Downtown can be seen in other ways as well: there are more than twice as many per 1000 population, and nine times as many per square kilometer.

When looking at Figure 5.1, it is noticeable that 7 of 9 Westdale food outlets are clustered along a 0.48-mile stretch of King Street, the major street in Westdale, while the remaining two are located near the intersection of the two other major streets, Longwood Road and Main Street. This clustered distribution of food outlets means residents who do not live close to the stretch of King Street between Longwood and Paisley will have to travel longer distances to buy food within the neighborhood, or shop at stores outside neighborhood boundaries.

Table 5.1 Distribution of food outlets by study area.

	Variety	Grocery	Supermarket	Specialty	Total
Westdale					
Number	4	1	1	3	9
Percent	44	11	11	33	
Number/1000 pop	0.58	0.14	0.14	0.43	
Number / km2	0.91	0.23	0.23	0.68	
Downtown					
Number	41	6	2	15	64
Percent	64	9	3	23	
Number/1000 pop	1.62	0.24	0.08	0.59	
Number / km2	10.5	1.54	0.51	3.85	
Total	45	7	3	18	73

Figure 5.1: Distribution of Food Outlets in the Westdale Study Area

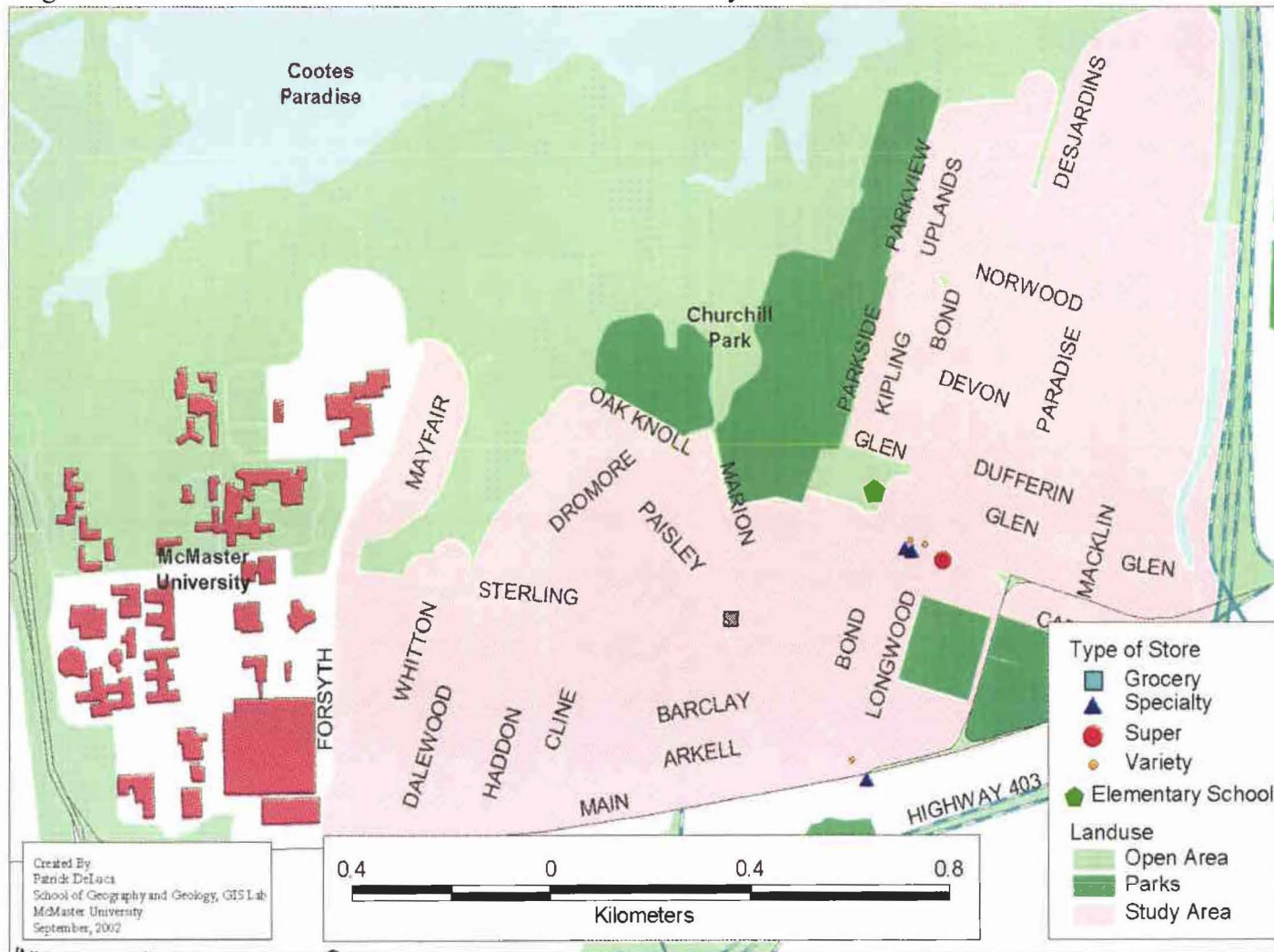
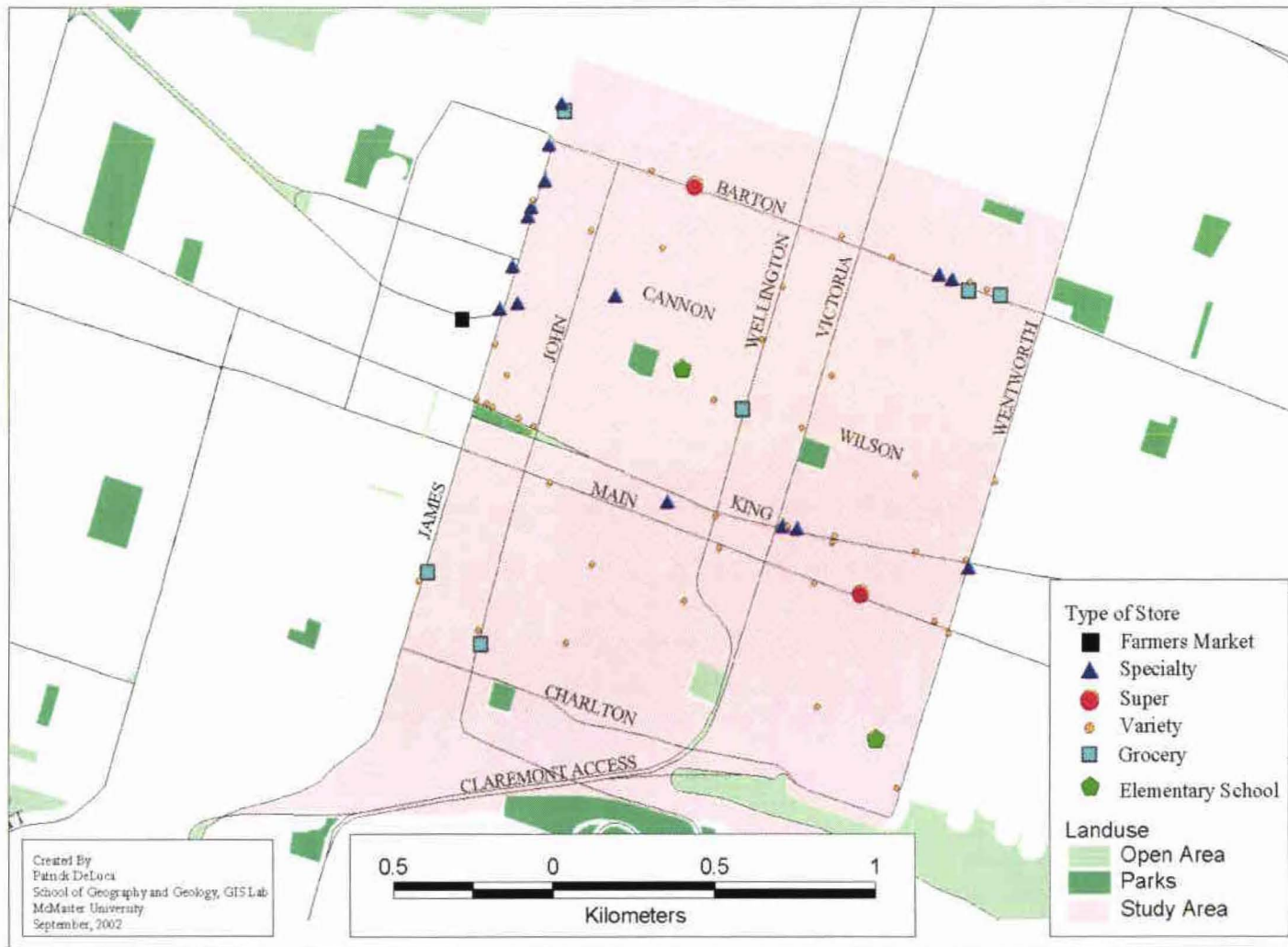


Figure 5.2: Distribution of Food Outlets in the Downtown Study Area



The Downtown is served by two supermarkets: one in the northwestern section of the neighborhood and one in the central-east section (see Figure 5.2). The most striking features of the map are the relatively even distribution of the variety stores throughout the neighborhood and the three clusters of specialty stores located near major streets: James Street North, on Barton Street between Victoria and Wentworth, and on King Street near Wellington and Victoria. In addition, the grocery stores are fairly evenly distributed throughout the Downtown. The exception to this is the lack of grocery stores in the section east of Victoria Avenue and south of Cannon Street. Food outlets for residents of this area seem limited to the supermarket on Main Street and variety stores.

Hamilton's Farmers' Market (discussed in Chapter 3) is located just outside the boundaries of the Downtown study area (see Figure 5.2). This represents an additional option for residents of the Downtown area, provided they can shop before the market closing time of 6 p.m.

Food Cost Survey

In Westdale, I collected price data from 4 of 6 non-specialty food outlets: 1 supermarket, 1 grocery store, and 2 variety stores. In the Downtown, the data set includes 2 supermarkets, 3 grocery stores, and 8 variety stores; these represent 13 of 49 non-specialty food outlets. Because different store types stock different food items, I analyze the price data in two ways. First, I compare food prices within store type and across the two areas. Second, for those items regularly available at all stores, I compare prices across store types, using all available price data.

Supermarkets

As all three supermarkets carried nearly all ONFB items, comparison of the cost of the food basket is relatively straightforward. Three items that were not available to be priced or were priced in only one supermarket were excluded from analysis: social tea crackers, 900 g long-grained white rice, and 175 g sliced ham. Four items were carried at two of three supermarkets: 750 g raisins, 454 g dry white beans, 1.36 L can apple juice, and 1 kg turnips. In this case, the average price of the item at the two supermarkets was added to the tally of the supermarket missing the item—this was Westdale's supermarket for the raisins and a Downtown supermarket for the other three. Table 5.2 shows the cost of the 63 available ONFB items for the three supermarkets; Appendix 5 lists the items included for the supermarket comparison.

Table 5.2: Cost of ONFB items available in study area supermarkets.

Store	Cost
Westdale 1	\$160.22
Downtown 1	\$132.35
Downtown 2	\$132.17
Downtown Average	\$132.26

The cost of the ONFB is very similar at the two Downtown supermarkets, while the same food is approximately 20% more expensive at the Westdale supermarket. Statistical tests comparing these differences were not performed since the sample size in Westdale is one store. Comparing the relative cost of food categories within the ONFB for both stores suggests that Other Fruits and Vegetables cause most of the price difference. Other Fruits account for 11% of the total cost at the Westdale store and only 9.5%, on average, at sampled Downtown stores; for Vegetables, the percentages are 16% versus 13%, respectively. Comparing dollar-cost differences by category, Vegetables cost 32% more in Westdale, Fruit 17% more, and Meat, Poultry, and Fish 18% more.

Grocery Stores

Cost comparisons between the four sampled grocery stores were carried out in a similar manner, with 16 items available at two or fewer stores excluded from analysis and 16 prices for items available at three stores substituted for missing items. Of these, 8 average prices were added to the Westdale store and 8 to the same Downtown store. Items included and excluded in this analysis are shown in Appendix 6; excluded items were generally fresh cuts of meat and vegetables. Table 5.3 shows the cost of the 50 available ONFB items in Downtown and Westdale grocery stores. Statistical tests comparing these differences were not performed, as Westdale sample size is one store.

Table 5.3: Cost of ONFB items available in study area grocery stores.

Store	Cost
Westdale 1	\$119.64
Downtown 1	\$111.38
Downtown 2	\$127.40
Downtown 3	\$128.35
Downtown Average	\$122.38

The table shows that while the average Downtown cost is similar to the Westdale figure, prices vary by store: one Downtown grocery store has the lowest total, while the other two are much more expensive. The difference between the most and least expensive Downtown store is \$16.97, which represents 15% of the total of the cheapest store. Geographic variation within the Downtown does not explain the difference, as Downtown 1 and Downtown 2, which show quite different cost totals, are located near one another and quite far from either Downtown supermarket and grocery store Downtown 3, which is on the other side of the study area, on Barton Street. All three are part of different franchises, so this does not explain the difference either. Comparing the cost of food categories within each store shows roughly equal cost distributions, suggesting that cost differences between grocery stores are not linked to any one category of food.

Variety Stores

The analysis for variety stores was carried out in a similar manner. ONFB food items available at 70% of sampled stores were included in the analysis. A list of these 20

items, which are primarily dry, canned, dairy, and grain-based goods, is included in Appendix 7. Table 5.4 shows the cost of these items in the two areas of Hamilton.

The average cost of the available ONFB items is \$43.08 in Westdale variety stores and \$41.17 Downtown; the difference between the means is not statistically different (Mann-Whitney U Test, $p = 0.533$). The cost in the Downtown area ranges from \$35.42 to \$46.19, a range of \$10.77, which represents 30% of the cost of the cheapest store in the sample; the difference between the Westdale stores, \$4.47, is 12% of this value. In both cases, intra-area variation is greater than the average difference between the areas.

Table 5.4: Cost of ONFB items available in study area variety stores.

Store	Cost	Store	Cost
Westdale 1	\$40.84	Downtown 1	\$41.30
Westdale 2	\$45.31	Downtown 2	\$37.36
Westdale Average	\$43.08	Downtown 3	\$41.44
		Downtown 4	\$46.19
		Downtown 5	\$45.18
		Downtown 6	\$38.24
		Downtown 7	\$38.96
		Downtown 8	\$39.57
		Downtown Average	\$41.18

Means are not significantly different, $p = 0.533$ (Mann-Whitney U Test).

Comparison Across Store Types

Comparison across store types was limited to the 20 items available in 70% or more of variety stores; all adjustments for missing cost values reported above were retained. Table 5.5 presents the average cost of this list of foods for variety stores, grocery stores, and supermarkets. The Kruskal-Wallis Test found the means to be significantly different ($p = 0.019$, $df = 2$): supermarkets were cheapest, followed by variety stores; grocery stores were the most expensive. Mann-Whitney U Tests comparing individual pairings of store types found that supermarket prices were significantly cheaper than grocery store prices ($p = 0.034$) and variety store prices ($p = 0.011$); the difference between grocery and variety store prices was *not* significant ($p = 0.258$).

Surprisingly, the average cost of this list of food was cheaper (though not significantly so) at variety stores than at grocery stores. This may be because the list of foods was determined by variety store availability, thereby favoring those items that variety stores can acquire cheaply. Supermarkets were, on average, 25% cheaper than variety stores and 23% cheaper than grocery stores.

I also compared supermarkets and grocery stores using a list of foods widely available at both store types (see Appendix 8), rather than using the list determined by variety stores. The results are presented in Table 5.5. The cost of the 49 ONFB items is a surprising 46% greater in grocery stores than in supermarkets; the difference is significant (Mann-Whitney U Test, $p = 0.034$).

Table 5.5: Comparing ONFB cost across store types.

	Variety Stores (n = 10)	Grocery Stores (n = 4)	Supermarket (n = 3)
all store types, 20 items	\$41.44*	\$42.55^	\$32.12**
supermarkets & groceries, 49 items	--	\$119.84**	\$82.13**

Notes: *Difference is significant ($p = 0.011$, Mann-Whitney U Test).

^Difference is significant ($p = 0.034$, Mann-Whitney U Test).

**Difference is significant ($p = 0.034$, Mann-Whitney U Test).

The above discussion gives the strong impression that a greater number of foods is available at supermarkets than at grocery stores, which stock more items than variety stores. This impression is borne out statistically: supermarkets stocked an average of 62.3 of 66 ONFB items while grocery stores stocked 52.5 and variety stores 26.9; these differences are significant (Kruskal-Wallis Test, $p = 0.003$, $df = 2$).

Produce Availability Survey

The results of the produce availability survey are presented in Table 5.6. Variety stores in Hamilton stock an average of 2.28 produce items, while grocery stores and supermarkets average 12.67 and 17.67 items, respectively. The means are significantly different (Kruskal-Wallis Test, $p < 0.000$, $df = 2$). Grocery stores and supermarkets in the two neighborhoods stock, on average, very similar numbers of produce items. Downtown variety stores stocked an average of 2.49 produce items, compared to 0.25 in Westdale. This difference is not significant (Mann-Whitney U Test, $p = 0.120$). Three downtown variety stores stocked 10 or more items. Of these, two were located in or near high-rise apartment buildings. The third, which stocked 14 items, was not noticeably different in any way and had very small quantities of each item.

The most commonly stocked items, for all variety stores, were onions (42%), potatoes (33%) and bananas (28%). The first two items can be purchased in bulk, are relatively simple to transport, and do not require refrigeration; bananas, though they perish more quickly, can be bought unripe and sold in this condition or as they ripen.

Table 5.6: Mean number of available produce items, by store type.

Store Type	Westdale	Downtown	Combined*
Variety Stores	.25	2.49	2.28
Grocery Stores	11	13	12.67
Supermarkets	18	17.5	17.67

Sample sizes: Westdale: 4 variety, 1 grocery, 1 supermarket.

Downtown: 39 variety, 5 grocery, 2 supermarket

*The different types of store stock significantly different numbers of produce items (Kruskal-Wallis Test; $p < 0.000$, $df = 2$).

Semi-Structured Interviews

This section presents the results from the semi-structured interviews. Results from food outlet owner/managers dealing with food cost and availability are discussed first, followed by results from interviews with public health workers. Finally, the responses

from both groups dealing with strategies to improve public nutrition are discussed.

Food Outlet Owner/Managers

Food outlet owner/managers were interviewed to obtain information about the structure of the food distribution system in Hamilton. Figure 5.3 describes the sample; as discussed in Chapter 4, efforts to include additional interviewees were unsuccessful. More broadly, the goal was to gain an understanding of how local conditions and consumer demand interacted with larger industry patterns to influence the cost and availability of food. It quickly became clear that local demand had very little to do with the items on the shelves in Hamilton food outlets or the prices these items sold for. Decisions of this type were almost invariably made or tightly constrained in corporate or regional offices.

It also became clear that three companies owned most supermarkets and grocery stores, as well as the two main food distributors in Hamilton. Because this finding plays a key role in determining the price and availability of food in Hamilton food outlets, I first discuss industry structure and then turn to determinants of food cost and availability.

Figure 5.3: Food outlet owner/manager interview sample

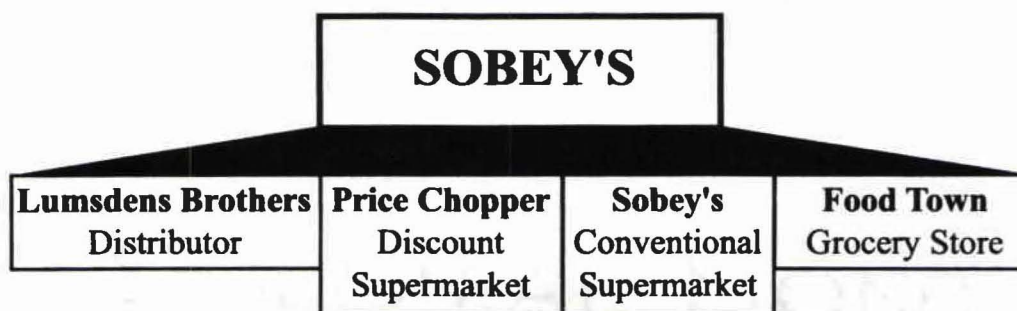
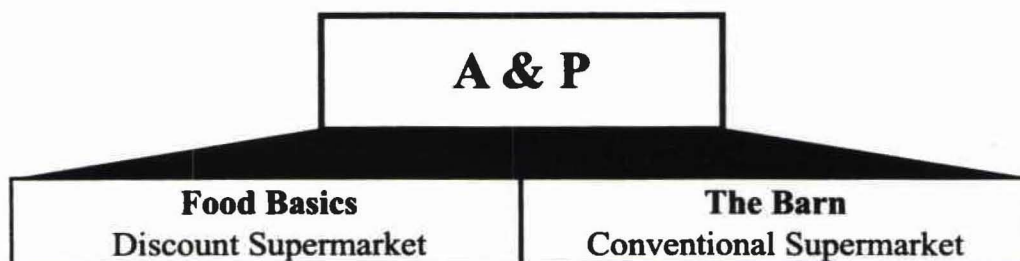
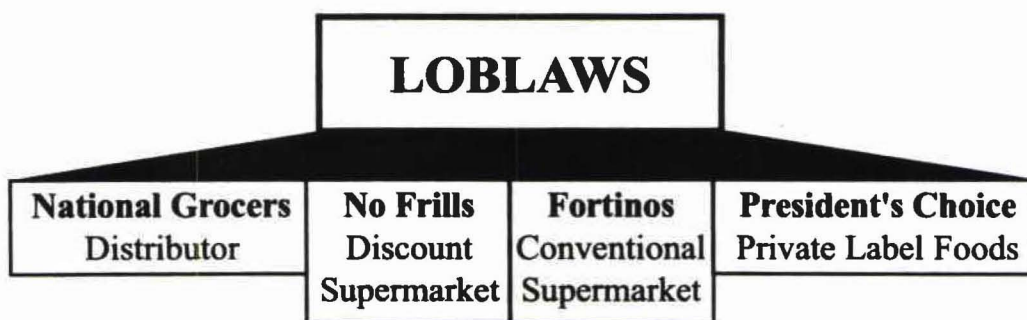
Position	Store Type	Study Area	Alias
Owner	supermarket	Downtown	S1
Manager	supermarket	Westdale	S2
Manager	grocery store	Downtown	G1
Owner	grocery store	Downtown	G2
Owner	variety store	Downtown	V1
Manager	variety store	Westdale	V2

Industry structure. Figure 5.4 shows the ownership structure of some of the main food outlets operating in Hamilton, including all stores operated by participants in this project. The information in this figure is derived from the companies' websites as well as from the interviews themselves.

That the majority of the larger food outlets in Hamilton are either franchises or subsidiaries of the same companies limits local control and input. As one supermarket interviewee, S1, phrased it, "The franchisee has no control. It wouldn't be a franchise if everybody did their own thing, would it?" He explained how local input only happens when customers repeatedly ask for something, at which point the franchisee can ask the franchise to consider stocking the item. "Whole departments analyze" market trends and consumer desires in making these decisions. Decisions about what items to stock, like decisions about setting prices, are made by the franchise, which is to say, the decision is made "not here" (S1).

The other supermarket respondent (S2) described the inputs to decisions about stocking in similar terms: "Consumer demand, Nielsen report [a publication reporting consumer preference surveys], competition, everything." His chain went to great lengths to ensure that all stores were selling items at the correct prices, as evidenced by the existence of a position titled Field Merchandiser; the duties of which are to "check prices,

Figure 5.4: Ownership of some Hamilton food outlets.



stores, make sure the displays are right...Field [Merchandiser] checks all the stores". S2 related that, in addition to the roving price-checker, an employee at each store is charged with setting and checking prices and writing ads informing the public of the prices. Grocery store franchises appear to work in a similar manner. In the two study areas, 2 of 7 grocery stores in the study area are franchise/corporate operations; unfortunately for the representativeness of this interview sample, only the owner/managers of these stores agreed to participate.

Both described a system of inventories and prices strongly influenced by corporate headquarters. The best description came from a grocery franchise owner, G2, talking about setting prices:

Usually, prices are set, called suggested retails, by the distributors...if you have a franchise, which this is, they suggest the retail. So that's a guideline for you, but you can set your own retails if you want. But, like you said, if you set it too high, it can affect your volume because people don't buy the stuff...it's like an industry thing, too, I get reports from the head office with a general overall view of how the other stores are selling milk, bread, or Kraft Dinner, Tide...give you an idea, sorta keep you in the ballpark.

It is clear that pricing and stocking decisions at grocery stores and supermarkets are strongly influenced or even controlled by decisions made in distant corporate offices. These decisions also help to determine the price and availability of food at variety stores. Corporate decisions can affect variety store prices through the distributors National Grocers and Lumsdens Brothers, which are owned by Loblaw's and Sobeys, respectively (see Figure 5.4). At least one variety store owner, V1, uses supermarket prices to set his own:

Obviously, we like to keep [the price] reasonable. And by reasonable, you like to sell [an item] for the price the higher priced supermarkets sell it for, when it's not on special. The product [is] usually priced like places like Barn. I know they offer really excellent services, and the place is really nice and clean, but they also charge a premium for whatever product and my price is usually comparable.

As both variety store interviewees discussed the importance of the prices of other variety stores in setting their own prices and the importance of price competition generally in a market economy, it appears that the stocking and pricing decisions made at corporate/franchise headquarters influence the price and availability of food in every store type discussed in this thesis. Given the structure of the industry, there is no reason to suspect that this pattern is unique to Hamilton.

Food price and availability. Store type influences the price and availability of food. That has been shown above and in other studies. This section will not belabor that point, but focus instead on two aspects of it: first, different store types within the supermarket category and how this influences differences in food cost between the two study areas, and, second, the question of produce availability in variety stores.

Types of supermarkets and food prices. This thesis uses a relatively simple classification system of four store types, only three of which are specific (see page 28). One of these categories is the supermarket. The two supermarket interviewees' descriptions of their stores indicated that the two are rather different. Using their descriptions, it is possible to describe two types of supermarkets, conventional and discount. Both sell a wide array of food and other items, but discount supermarkets stock a smaller number of items, usually including fewer brands; in addition, the conventional supermarkets are likely to offer other services, such as photo finishing, for customers. S1, a discount supermarket franchise owner, explains the discount strategy: "get the best price on everyday items versus conventional stores, which charge more. [We] stock 6,000 items. Fortinos or Loblaws [conventional supermarkets] stocks 15-20,000 items. We focus on things that turn over, quick sellers." The focus of the discount supermarket is on selling more of a smaller number of items. By focusing on the items that sell quickly, they are able to reduce cost and pass these savings to the cost-conscious customer.

This strategy contrasts with the conventional supermarket, which lures customers with special services and promises of quality, as described by S2, who identified the shoppers at his store as "Not the discount shopper. They go to No Frills or Food Basics." He continued: "Here, quality is the biggest issue. Quality and service [attract people]. People come here because "we pay more for our products; we go out of our way" to buy better products, "to buy the best." To prove his point, S2 used apples as an example of how the different supermarket types sell different goods. He did not consent to being tape recorded, so the extract below is from my notes, which follow his language as closely as possible.

S1: It's about standards and grades. Here compared to the discounters, that's the difference. Size and grade determines price. With apples, we buy your nice 88s or 85s. At Food Basics, they buy 110s, something like that. You buy an apple here, it is different than an apple there. Size determines quality.

JL: What are those numbers?

S1: Those are the sizes, how many you can fit in the box.

Leaving aside the question of whether larger apples really are better apples, the finding that all apples are not the same has important implications for surveys of the type carried out in this thesis as well as for the wide-ranging food-cost analyses cited in the review of inter-neighborhood price differences: if conventional and discount supermarkets systematically stock qualitatively different products and preferentially locate in neighborhoods of differing affluence, as is the case in this study, then the assumption that an apple sold in one supermarket or neighborhood is equivalent to another is not valid. Without assuming a direction to the differences, it is possible that the different grades of apples and other foods could vary in the amounts of nutrients they provide to consumers. It is also possible that this difference could structure exposure to pesticides or other contaminants that travel on the food.

That the two supermarket types are pursuing different business strategies seems clear. The Downtown is home to two discount supermarkets while the Westdale

supermarket and its nearest competition (in an adjacent neighborhood) are both conventional supermarkets. The different supermarket format between the two areas might explain the observed difference in the ONFB cost between the two areas (see Table 5.2). It should be noted that food availability, as measured by the ONFB, did not differ greatly between the Downtown and Westdale supermarkets, and, S1's comments about quality aside, the produce in the Downtown markets appeared to be of equal quality to that in Westdale. The difference in business plan can be seen clearly in light of the fact that the two interviewees do not see the other store type as direct competition. The discounter, S1, identified other discounters as his main competition, then stated, "Fortinos [a conventional supermarket chain in Hamilton] is [competition], but isn't. Different market." S2, employed by the conventional supermarket agreed, "You compare with local stores. But not Food Basics, No Frills. They're different."

Differences in store type obviously go beyond differences in supermarket types. Larger size allows economies of scale, and the supermarkets take advantage of this by buying direct from producers or by acting as their own distributors. "They [variety stores] can't buy a pallet like we do" (S2). Interviews with variety and grocery store owners revealed that they acquire the goods they sell from many different sources, including grocery wholesalers, bulk stores such as Costco and Cash and Carry, and even discount supermarkets. Because they purchase their inventory from intermediaries, the prices variety and grocery stores charge their customers tend to be higher; this is reflected in the results shown in Table 5.5. The economies of scale and vertical integration afforded the big chains are so great, in fact, that one variety store owner, V1, said he relies on discount supermarkets to stay in business:

Matter of fact, without taking advantage of specials that are held at the supermarket chain, it would be very tough to keep in business...say product such as Campbell's tomato soup, vegetable soups, ...we cannot get [them at the distributor] at the price that we can get it at the supermarket such as No Frills or Price Chopper. They regularly have specials on Campbells at [a] much lower price than is offered at wholesaler. I would say I have no option but to be able to go there and purchase so that I can pass it on to my customers at lower price. If I don't supply the lower price, at least I will be able to make bigger margin.

Having discussed the findings that relate to store type and food cost, I now turn to the question of the availability of produce at variety stores.

Produce availability and variety stores.

This study found that grocery stores and supermarkets in both study areas carry roughly the same number of produce items. This study also confirmed what many consider to be obvious: variety stores do not carry many vegetables and fruits. Variety stores in Hamilton, on average, carry 2.28 produce items; the most common are onions and potatoes; these are not the vegetables that are thought to provide the greatest health benefits. Given the distribution of store types in Hamilton, produce scarcity is of greatest concern to residents of the Downtown who do not have access to a car and live east of

Victoria Street and south of Cannon Street, as well as those Westdale residents who do not live near the cluster of food outlets on King Street West.

I asked the variety store owner/managers in my sample about the possibility of selling fruits and vegetables. They responded that they did not because 1) it is difficult for a variety store owner to purchase produce at a price that allows resale at a price attractive to consumers *and* garners a profit for the store, 2) the problem of spoilage, 3) space is at a premium in the smaller variety stores, and 4) consumers do not expect to purchase produce from a variety store.

V2, who manages a variety store in the Downtown, explained the problem: If we sell fruit and vegetables here, it [would] cost more and more money. How? Because we don't have enough space, first of all, and if we don't sell all of them, then they destroy [spoil], all cost will come to us, and, the big stores, as I know, they sell more fruit and vegetables on very low prices. That's why we can't compare with them. ...if you bring fresh vegetables for \$50, and sell only \$10, you take \$40 in loss. The other things here, they can stay for [many] days, vegetable and fruit [lasts] one or two days. That's why it is not good for us, because we have limited capital to spend in this business. And if we lose in vegetable and fruits, what will we do?

V1, who runs a variety store in the Downtown discussed the problem, also mentioning the problem of consumers' expectations:

The problem is vegetables and fruit must be maintained fresh. I have actually attempted [to sell produce] three different times, but I have failed each time. The number of people who come in are limited, and also I haven't had it [in the past], so they don't look for it, and of course, since I do not buy in large volume, it is hard to get it [produce] at decent price. So it is something I would like to carry, but I cannot....

If there was a demand, I would carry it. I have tried three separate times and it just doesn't work. Take a look at example of bananas. [The] problem [with] of bananas is that if it is not sold in three days—and there are 40 pounds in a box of bananas—what do I do with them? Banana bread. That's very tough. I have given bananas that gone dark to customers and they brought me banana bread.... So there is that problem, all the fruits and vegetables are perishable, and if [I] do not sell it by a certain time, basically, I am losing money.

In support of V1's claim that consumers do not expect to purchase produce at a variety store, only 2 of 100 face-to-face survey respondents mentioned buying produce at a variety store when asked what food items they purchased when shopping at variety stores (the results of the face-to-face survey are discussed in more detail below).

In the case of produce availability in variety stores, we see that the spoilage and consumer expectations interact with problems of profitability and space to make it difficult for variety store owners to sell these food items.

Summary for food outlet owner/manager interview. Interviews with food outlet owner/managers revealed that the determinants of food price and availability in Hamilton often originate outside the city. Supermarket prices and stocking patterns, and often those of grocery stores as well, are determined by franchise or corporate departments located outside of Hamilton who rely on diverse data sets to make their decisions. Because a few corporations dominate the industry, these decisions influence price and availability for the marketplace as a whole. Diversity within the supermarket category, in this study, served to locate two discount supermarkets in the less-affluent study area, providing at least some residents with access to cheaper food and a good selection of produce. Produce availability was limited in variety stores, and interview results suggest that this stems from a combination of problems with spoilage, space, and lack of demand.

The interview portion of this thesis also included public health workers. The results of their interviews are presented next.

Public health workers

Public health workers were interviewed to gain an understanding of the public health impacts of poor nutrition in Hamilton. As discussed in Chapter 4, only three public health workers agreed to participate; those who did all work primarily with children in downtown Hamilton. PH1 is a public health nurse, PH2 a public health dietician, and PH3 a school nutrition program coordinator.

After briefly discussing the public health issues linked to nutrition by the interview participants, this section will discuss what the public health workers identified as the causes of these problems. The agreement between the three was striking, perhaps as a result of working in similar parts of the city on similar projects.

Nutrition-related health problems. The first nutrition problem identified by all public health workers was undernutrition: PH1 related, “I think for sure we see hunger, we see hunger; I’m talking in the schools... They [the kids] are distracted by hunger.” PH2 echoed this sentiment, saying “There are a lot of kids coming to school without having had breakfast, there are kids that don’t even have lunch, they don’t have snacks with them.” PH3 said simply, “Not getting enough food.”

When asked about obesity, all three agreed that it was present in Hamilton children. PH2 characterized child obesity in Hamilton as a “very real, very growing trend.” PH3 described it as a “big, big problem.” She has worked as a lifeguard at community pools for 16 years and said that, in contrast to years past, children today are either “super thin” or “very big [and] very out of shape.” PH1, stated that 30 years ago,

“we didn’t see childhood obesity. There were kids who were clearly obese with metabolic problems, clinical problems... Today, the obesity is very striking, the amount of obesity, the severity of the obesity... [thirty years ago] I never saw that.”

This public health worker also linked nutritional inadequacy with dental problems in elementary school children, saying that the students, including junior kindergarteners, at a high-needs Downtown school have consistently had high incidences of cavities and gum disease over the last three decades.

Causes of inadequate diets. Inadequate income was by far the most frequently cited explanation given by public health workers to explain poor nutrition. This theme was mentioned repeatedly and without specific questioning on my part. Interestingly, however, insufficient incomes were linked specifically with undernutrition, not with overweight or obesity. The situation described in instances of undernutrition was often one of food insecurity. PH2 and PH3 discussed the issues in the most detail:

PH2: A lot of it [hunger problems] may be related to financial issues...Ontario Works incomes [social assistance payments] haven't changed since '95...housing costs eat up the predominant amount of income and...food is the first thing to go out of the budget.

PH3: Just lack of funds. Some people just don't even have the money, enough money to access [food]—it's OK if you have a grocery store, but if your check doesn't come in, or you lose your job...Money is probably the biggest [cause]. Even working people; not just Ontario Works. It's about people struggling to make ends meet...Job doesn't pay you enough, not enough money for rent.

When discussing causes of obesity, the public health workers were more likely to discuss overeating, especially of high-fat, high-sugar prepared foods, and low activity levels than insufficient income or food access.

PH1: So we have the combination of nutrition—food choice and the quality of what they're eating—and the no exercise, all cumulative, and we just see a tremendous, tremendous amount of obesity.

PH2: I think the biggest piece is really more the physical activity side of it. Kids are not very active, a lot of time spent sitting, either in front of the television screen or a [video game], not a lot of play out there. Some times it's for safety reasons as well. People driving their kids to school because they don't think the walk is safe. [Kids are] very inactive for a huge variety of reasons, but then, as well, all the marketing piece I talked about, the less healthy food choices and lack of time on people's part to do basic food preparation, so the convenience foods tend to be higher-fat, higher-calorie choices.

PH3: It's interesting to see what kids bring [to school] for lunch. A lot of junk, like a lot of parents will send prepped stuff, like Dunkaroos or those Lunchables...Kid's don't walk.

Lack of access to food outlets and problems with transport were also identified as contributing to suboptimal diets:

PH1: When talking about food access, one issue is really transportation... [In a specific part of the Downtown area], you see [children's] wagons full of food, you see bikes with different systems of boxes or whatever bringing food home. This is a neighborhood of bungee buggies [wheeled carts used to transport groceries and laundry]: if you go to the local donut shop in the morning, you don't see the cars all lined up by the donut shop, what you see is all the bungee buggies with boxes in them...and that is their transportation.

PH2: Another problem in the downtown area [as a whole, not this study's Downtown area] is, we have an area where...we have the fewest grocery stores and [worst] access to grocery stores.

PH3: A lot of grocery stores are closing in Hamilton. There used to be a Barn [supermarket] downtown; it's no longer there. The Farmers Market is in decline...To get the food, if you don't have the transportation, taking it [food] on the bus is a pain, and not everybody can take it on the bus [for physical reasons].

Lack of nutrition education, along with making poor nutrition choices was identified as a factor as well:

PH2: Well, the lack of education piece about nutrition, because if parents ...I don't know that they realize, some of them, the impact the choices they're sending in kids' lunches.

PH1 agreed with this, but then also pointed out that lots of nutrition information is available these days:

We have wonderful articles about nutrition in [Hamilton's local newspaper] the *Spectator*...nutrition is in every magazine—there's recipes, there's nutrition information, there's nutrition and exercise, linking it together, how to shop more efficiently. There's probably more of that information out there than there's ever been. And look how we're eating.

She pointed out, however, that newspaper and magazine articles are not accessible by all members of society, especially recent immigrants and others who may not be skilled in the English language. The other two public health workers made similar statements about the various nutrition education programs, suggesting that the programs were not always successful in reaching those who are most in need.

Improving diet quality

I asked both food outlet owner/managers and public health workers about what sorts of policies or programs could be put in place to improve the nutritional adequacy of people's diets.

All three public health workers listed a national school-lunch program modeled on the system in place in the US; two of the three suggested raising the minimum wage; and two suggested using either group-buying schemes or revenues from a tax on unhealthy foods such as chips and soda pop to make healthy food choices more affordable than less healthy ones.

Reaction was quite different from the food outlet owner/managers. Only three of seven thought that obesity or undernutrition were problems nationally or in Hamilton; two of these were noncommittal while the third saw these as very important. The three who responded were the Downtown (discount) supermarket franchisee (S1), the grocery store manager (G1), and the Downtown variety store owner (V1). Their responses to the question about how to improve public nutrition were: more nutrition education (G1); raising incomes ("To solve? More income"—S1); and to do both (V1).

In the last decade, many have suggested using taxes on soft drinks and "junk" food to reduce the consumption of these foods and to fund various programs aimed at increasing public health and nutrition (Battle and Brownell 1997); controversy continues to surround this suggestion (Brownell and Horgen 2004). I asked public health workers and food outlet owner/managers if, from their perspective, such a strategy seemed likely to work. Public health workers were pessimistic:

PH2: I don't honestly think it would work because increasing the cost of cigarettes, other than maybe youth, it hasn't really been able to deter people that don't want to give up smoking...I don't really want to say if it would work or not; I doubt it.

PH3: I think people would still continue buying it [pop/junk food].

PH2 went on to suggest that the taxes would be more effective if the revenue was used to counter commercials marketing unhealthy food choices.

Those food outlet owner/managers who answered the question expressed similar doubts. Referring to why she didn't think such a strategy would work, G1 said, "Tax alcohol, cigarettes, people still buy...Triple the price and they still buy them." S2 thought there was very little to be done at the point of sale, in general, to change eating habits, saying a food outlet "has minimal impact on how people eat" and describing the role of food outlets as that of a "servant. They ask, we supply."

Summary for improving diet quality. The interview results show that both food outlet owner/managers and public health workers see poor nutrition stemming from both insufficient incomes and lack of nutrition knowledge. Both groups also seem to believe that taxes on unhealthy food choices will do little to staunch consumer demand for these foods.

Summary for Interviews

Interview results revealed that the Hamilton food distribution system is dominated by the franchises and subsidiaries of a small number of corporations. In the areas included in this study, however, lower-priced supermarkets are located in areas where these lower costs are most needed. Efforts to improve the availability of produce in variety stores appear to face many obstacles. Interviews with public health workers suggested that insufficient diet quality is negatively impacting health in Hamilton's downtown; they suggested that insufficient incomes and nutrition education were largely to blame for these problems. Food outlet owner/managers appeared to agree with this assertion; both groups were pessimistic that a proposed tax on unhealthy foods meant to curb their consumption would work.

This chapter has thus far focused on measuring the cost and availability of food in the two study areas and gathering the opinions of those who work in these areas. The topic now shifts to the results of the face-to-face survey designed to measure how the residents of the two study areas navigate Hamilton's foodscape in light of food cost and availability and other factors

Consumer Survey

Representativeness of Survey

Before presenting the results of the face-to-face survey, I discuss the representativeness of the survey sample by comparing it to 2001 census data (Statistics Canada 2001) for those variables that the two data sets have in common. Table 5.7 presents those variables for Westdale (WD) and the Downtown (DT); as with Table 3.1, a range of figures for each area is presented rather than an average.

Table 5.7: Assessing the representativeness of the survey sample using census data.

	Westdale Survey (n = 50)	Westdale Census	Downtown Survey (n = 50)	Downtown Census
sex (% female)	64	51	66	50
mean # children	0.46	1-1.2	0.72	0.8-1.5
median income (\$1000s)	40-50	60-95	10-20	23-38
mode age range	18-24	25-34	25-34	25-34

Women are overrepresented in the survey sample, perhaps because they may be more likely to perform shopping duties. Comparing average numbers of children per family, we see that households in the interview sample average fewer children than is typical for the study areas. Median income among sample respondents is lower than census figures. Reviewing the methods used in the face-to-face survey portion of the project does not provide any obvious reasons why the sample respondents have fewer children and lower incomes than would be expected based on census figures; perhaps it is a result of small sample size or patterns of consumer behavior of which I am unaware. In

the case of the Westdale sample, lower income and number of children is likely related to the number of university students in the survey sample.

Figures 5.5 and 5.6 compare the age distributions between survey and census samples for Westdale and the Downtown. Members of age class 1, aged 18 to 24 years, are overrepresented in the Westdale sample; possible reasons for this are discussed in Chapter 4, on page 33. Ignoring this age class, however, the age distributions appear to match fairly well. In the Downtown sample, the age distribution is close to what would be expected. This pattern can also be seen in Table 5.7 (above): the mode age range in the Downtown survey is the same as that for the Downtown 2001 census, while the mode age range for the Westdale survey data is younger than in the 2001 census sample.

Figure 5.5: Westdale age structure: survey versus 2001 census

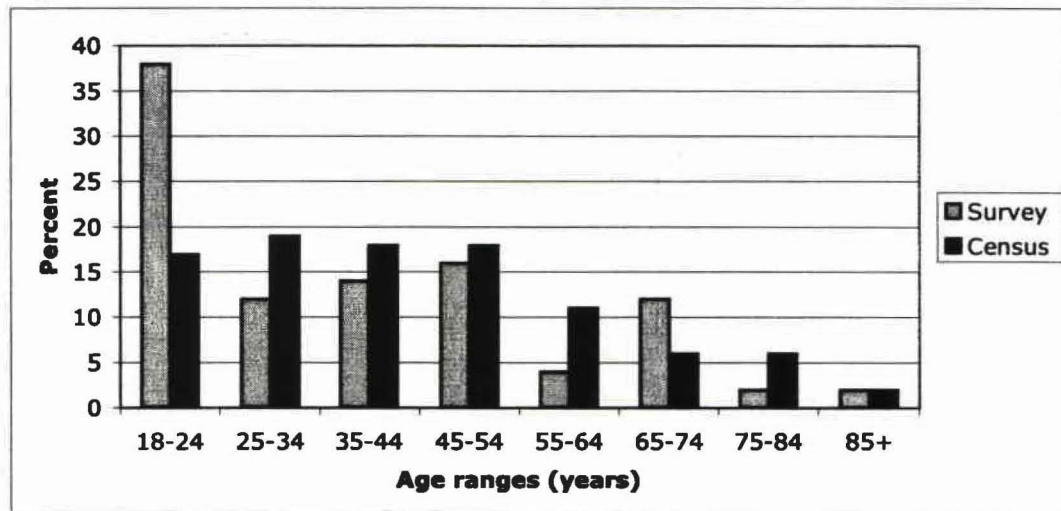


Figure 5.6: Downtown age structure: survey versus 2001 census

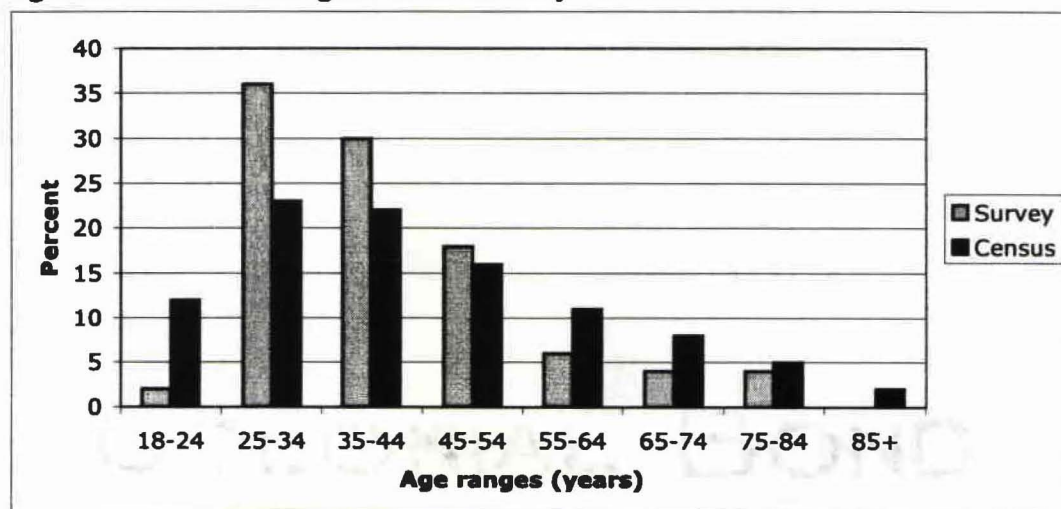
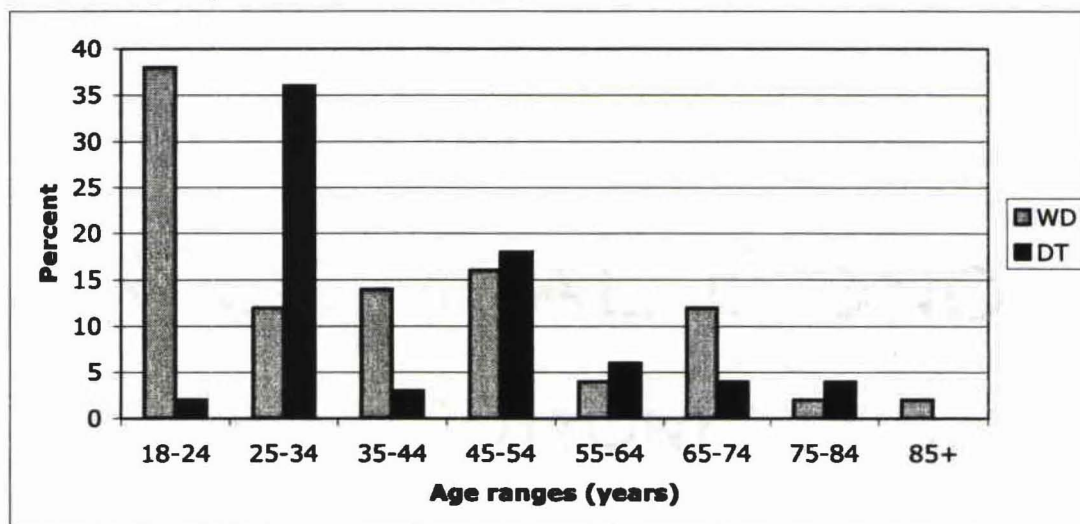


Figure 5.7: Percent of respondents in each age range in face-to-face survey sample. WD = Westdale, DT = Downtown.



Results

To partially correct for the large number of Westdale respondents in between 18 and 24 years of age, survey results are presented for both the full sample and after excluding respondents between the ages of 18 and 24.

Entire sample results. Selected results of the entire consumer survey are presented in Table 5.8. For both areas, nearly two-thirds of respondents were women. Because age data was collected in ranges, an average age cannot be computed. The median age range in Westdale was 2.5, corresponding roughly to ages 30-40; the mode range for Westdale was 1, corresponding to a range of 18-24 years. For Downtown, the median age range was 3, corresponding to 35-44 years; the mode age range was 2, corresponding to 25-34 years. Figure 5.7 compares the age structure of the two samples in more detail.

Statistically significant differences (Mann-Whitney U Test) were found between the two areas in mean number of weekly shopping trips per week ($p = 0.011$), mean number of weekly variety store trips per week ($p = 0.001$), mean number of food outlets used ($p = 0.015$), average income range ($p < 0.000$) and the three measures of transport (see Table 5.8 for p -values). These results suggest that Westdale respondents shop less often than Downtown respondents. Differences in frequency of shopping at variety stores seems to account for most of this difference, though it is also apparent that Downtown residents shop at slightly more types of food outlets. Westdale respondents are more likely to have access to a car and correspondingly less likely to walk or use a wheeled grocery cart when shopping. Additionally, having a car means that larger amounts of groceries can be purchased per trip allowing one to shop less often. These differences are likely related to the observed difference in income.

Table 5.8: Selected results of face-to-face survey, by study area.

Variable	Westdale (n = 50)	Downtown (n = 50)	p-value
sex (% female)	64	66	0.382
% with children at home	28	42	0.142
mode age range (yrs/%)	18-24 (38%)	25-34 (36%)	--
# weekly shopping trips	2.2	2.9	0.011
# weekly supermarket trips	1.7	1.6	0.867
# weekly variety store trips	0.4	1.0	0.002
number food outlets used	1.56	1.82	0.015
% buy all or most foods at supermarkets	86	94	0.182
% with access to a car	60	26	0.0006
# nights eat at home	5	5	0.297
% walk to shopping	22	42	0.032
distance to shopping (km)	2.01	1.37	0.871
% use wheeled grocery cart	6	22	0.044
household income class (\$1000/yr)	4 (30 to 40)	2 (10 to 20)	0.001
mode household income class (\$1000s/%)	above \$60 (32%)	10 to 20 (42%)	--
median household income class (\$1000s/yr)	5 (40 to 50)	2 (10 to 20)	--

Table entries in bold face are significant at $p < 0.05$. Values are means unless stated otherwise.

Mann-Whitney U Test for mean differences.

Chi-square test ($df = 1$) for frequency differences, Yate's correction applied as appropriate.

It is possible that the socioeconomic differences between the two areas, which were discussed in Chapter 3 and are apparent in Table 5.8, might contribute to the area differences. To attempt to account for this and investigate the influence of income on shopping behavior, I divided the sample into two groups based on income, using the 2001 Low-income cut off (LICO), which is \$29,653 for a family of four (Statistics Canada 2001) as a guide. This figure is close to the upper limit of income class 3, \$30,000. I therefore divided my sample at that point. As information on family status is not available in the survey data, this is not meant to suggest that those respondents in income class 3 or below are below the LICO; the goal is merely to divide the sample to investigate income-level differences and how they compare to area-level differences.

Dividing the sample in this way yields two groups, termed here high- and low-income. Investigation of the composition of these categories shows, however, that the former is dominated by Westdale residents, while the latter is dominated by Downtown residents. This is even more striking when the youngest age class is excluded (see Table 5.9). Given this, analysis in this vein is not pursued further, as it would be only very slightly different from area comparisons. This is unsurprising, given that the areas were chosen precisely because they contrast socioeconomically.

Table 5.9: Income classification and neighborhood.

	Westdale	Downtown	Westdale (excluding youngest age class)	Downtown (excluding youngest age class)
	N	N	N	N
High Income	30	8	26	7
Low Income	20	42	5	42

Results excluding age class 1. As discussed in this chapter and in Chapter 4, respondents aged 18-24 years are overrepresented in the Westdale sample, perhaps because of this area's proximity to McMaster University. The incomes and shopping habits of students in particular and young people generally can be quite different from other, older residents. In an attempt to compare non-student residents of both neighborhoods, I repeated the above analyses excluding respondents in aged 18-24 years.

Table 5.10 compares survey results between Westdale and the Downtown after removing 18 to 24 year-olds; total sample size is now 80: 31 in Westdale and 49 in the Downtown. The significant differences of note relate to number of weekly shopping trips to variety stores and supermarkets and measures of transport. These differences, as well as the income difference, are in the same direction as those found in Table 5.8. The difference in age class shown in Table 5.10 is an artifact of excluding the youngest class from the sample; this had a much greater effect on the Westdale sample.

Table 5.10: Results of face-to-face survey, by study area, excluding age class 1.

Variable	Westdale (n = 31)	Downtown (n = 49)	p-value
sex (% female)	74	67	0.515
% with children at home	45	41	0.701
mode age range (yrs)	4 (45-54)	2 (25-34)	---
# weekly shopping trips	2.4	2.9	0.203
# weekly supermarket trips	2.1	1.6	0.050
# weekly variety store trips	0.24	0.88	0.002
number food outlets used	1.6	1.8	0.051
% buy all or most foods at supermarkets	90	94	0.556
% with access to a car	81	27	<0.000
# nights eat at home	5.3	5.5	0.647
% walk to shopping	13	43	0.010
distance to shopping (km)	2.10	1.37	0.820
% use wheeled grocery cart	10	22	0.245
household income class (\$1000/yr)	5	2	<0.000

Table entries in bold face are significant at $p < 0.05$. Values are means unless stated otherwise. Mann-Whitney U Test for mean differences.

Chi-square test (df = 1) for frequency differences, Yate's correction applied as appropriate.

Reviewing the results, several trends are apparent. First, Downtown residents shop more often in variety stores. This is true with or without the youngest age class. Table 5.11 shows responses to the survey question asking what foods were purchased at

variety stores. It is clear that Downtown residents purchase a wider variety of items at variety stores than do Westdale residents (Table 5.11). It should be recalled at this point that equal numbers of surveys (50) were completed in each area.

Table 5.11: Items reported purchased in variety stores, by area and number of mentions.

Westdale Items	Times Mentioned	Downtown Items	Times Mentioned
Milk	19	Bread	20
Snacks/Junk	6	Milk	18
Bread	4	Snacks/Junk	9
Cereal	2	Eggs	8
Sugar	1	Juice	5
"Frozen stuff"	1	Soda pop	5
Sandwiches	1	Lunch meat	3
Samosas	1	Cheese	2
Eggs	1	Produce	2
Yogurt	1	Soup	2
Soda pop	1	"Cans"	1
		Gum	1
		Mayonnaise	1
		Spaghetti sauce	1

Note: Lists generated from the 50 respondents in each study area.

Frequency of shopping in supermarkets varies in the opposite direction from variety store results: Westdale residents shop more often in supermarkets than do Downtown residents when the youngest age class is excluded.

A second trend apparent in the survey results was that Westdale residents had better access to cars with which to do their food shopping. Downtown residents reported walking to do their shopping and using wheeled grocery carts much more often than did their higher-income counterparts. Transport differences, could explain, in part, the different shopping habits discussed above, especially in the Downtown, which has only two supermarkets.

Multiple regression analyses. This thesis investigates links between income, area of residence, and shopping behavior. To that end, I performed multiple linear regression analyses to investigate whether the simple socioeconomic and area variables collected in this survey are able to account for differences in mean number of weekly shopping trips to variety stores and supermarkets. These variables were chosen for two reasons. First, consumers who shop at variety stores face higher prices and reduced selection of vegetables and fruits, compared to those who shop at supermarkets. Second, differences in mean weekly number of variety store and supermarket shopping trips were statistically significantly different between Westdale and the Downtown, as well as between income classes.

Regression analyses were performed with and without 18-24 year-olds. The independent variables are age class, number of children in the home, access to a car, income class, and area of residence. The results in Table 5.12 show that neither analysis succeeded in accounting for a large amount of the variability in weekly shopping habits.

Table 5.12: Regression statistics, weekly variety store and supermarket shopping trips

Analysis	R ²	Adjusted R ²
Variety store trips, all respondents	0.151	0.106
Variety store trips, excluding 18-24 yrs	0.199	0.145
Supermarket trips, all respondents	0.219	0.178
Supermarket trips, excluding 18-24 yrs	0.167	0.111

Independent variables: age class, number of children, access to a car, income class, area of residence.
For all regressions, df = 5.

In the regression analysis for number of weekly variety store shopping trips (all respondents), age class and area of residence were significantly correlated with weekly number of variety store trips; when 18 to 24 year-olds were excluded from the sample, only area remained significantly correlated (See Table 5.13, which presents only those variables for which significant results were detected). For the weekly supermarket trips regression with all respondents, age and number of children were significantly correlated with the dependent variable; no variables were significantly correlated when excluding 18 to 24 year-olds, though number of children borders on significance at $p = 0.069$.

Table 5.13: Regression statistics: significantly correlated independent variables

Analysis	Variable	Standardized Regression Coefficient	p-values
Variety store trips, all	age	-0.321	0.004
	area (WD=1, DT=2)	0.354	0.003
Variety store trips no 18-24	area (WD=1, DT=2)	0.420	0.009
Supermarket trips, all	age	0.269	0.011
	# of children	0.272	0.006
Supermarket trips no18-24	--	--	--

These results suggest that area of residence contributes to variation in the number of weekly variety store shopping trips while age and number of children may be more important in determining the number of weekly supermarket shopping trips. Given the low R² values for the analyses, these results should be interpreted with caution. However, they are consistent with the survey results discussed above.

Conclusion

The results show that food outlets are more closely clustered in Westdale than in the Downtown, where variety stores are by far the most common outlet type. Differences in food cost are more apparent between stores of the same type than between study areas. Comparing the cost of foods available at most variety stores shows little difference between variety stores and grocery stores, while supermarkets are over 20% cheaper than both. A greater diversity of food items in general and produce items in particular is available in grocery stores and supermarkets than in variety stores. Downtown variety stores tend to stock more produce than their Westdale counterparts, though this difference was not significant.

Interview results reveal a food distribution system dominated by a few large corporations; the decisions of these corporations influence food cost and availability in

both neighborhoods. Different business strategies, or perhaps other factors, have resulted in the presence of discount supermarkets in the Downtown area, which improves food access for residents living near these stores. Residents of both neighborhoods who do not live near supermarkets or grocery stores are unlikely to find produce in variety stores, as problems of space, spoilage, and consumer expectations make it hard for variety stores to sell produce. Public health workers identified several types of nutrition problems, especially in the Downtown area; they felt many of these were linked with shortages of income and nutrition education.

The consumer survey showed that Downtown residents are less affluent, shop more often in variety stores, and use a car to shop less frequently to shop than do Westdale residents. This could mean that though food is not necessarily more expensive in the Downtown, a significant number of residents may have trouble accessing a healthy range of foods at reasonable prices, especially fresh produce. This situation does not bode well for their chances of obtaining a nutritionally appropriate diet.

The potential effects of the differences and similarities between the two study areas identified here are discussed in the following chapter.

Chapter 6: Discussion

This chapter discusses the results of this study, which were presented in Chapter 5, in light of the literature reviewed in Chapter 2. Rather than being organized by research method, as was the case for the Methods and Results chapters, this chapter is organized into sections based on key research themes. The results of the various research methods, as they touch on each theme, are discussed as appropriate.

The themes discussed in this chapter are: 1) food cost and availability, 2) produce availability, 3) food acquisition behavior, 4) public health impacts of the food distribution system, and 5) social and economic strategies to improve public nutrition.

Food Cost and Availability

Do the Poor Pay More for Food?

This study found that food prices do not vary inversely with neighborhood affluence in Hamilton, Ontario. The same conclusion was reached in the section of the literature review (Chapter 2) on the topic of variation in food prices with respect to neighborhood affluence.

Four studies cited in the literature review concluded that food prices in poor neighborhoods were greater than in non-poor neighborhoods (Finke et al. 1997, Kunreuther 1973, Sooman et al. 1993, Travers 1996). Only two reported statistical tests (Finke et al. 1997, Kunreuther 1973); the others reported no statistical tests and included food prices from only 19 stores between them. The findings of Finke et al. (1997) appear to be related to higher food prices paid by low-income urban Blacks: this group paid higher prices than any group of Whites, as well as high-income urban Blacks. Hayes (2001), in an analysis that generally found prices to be lower in poor neighborhoods, found the opposite to be true in Black neighborhoods. Notably, in Finke et al.'s (1997) study, urban Whites, be they high or low income, did not pay significantly different prices for food. This leaves Kunreuther's (1973) study finding prices were higher in poor neighborhoods, and this study compared large stores with smaller stores in poor areas; this may have influenced the study's findings.

Contrasting with this, 10 studies found no relationship between area affluence and food cost (Alcaly and Klevorick 1973, Ambrose 1979, Chung and Meyers 1999, Cummins and Macintyre 2002b, Frankel and Gould 2001, Groom 1966, Horton and Campbell 1990, Marcus 1969, McDonald and Nelson 1991, Travers et al. 1997) and two found that the food is less expensive in poor neighborhoods (Hayes 2000, Mooney 1990); only one of these did not report statistical tests (Mooney 1990). The balance of the literature, therefore, suggests that food prices are *not* systematically higher in low-income neighborhoods.

Curtis and McClellan (1995) suggested that interest in whether food prices were greater in poor areas stemmed from Caplovitz's (1967) findings that the poor paid more for durable goods in New York City. It appears that in addition to this interest, there was the conviction that the durable goods findings applied to food as well. Indeed, many studies (e.g. Diez-Roux et al. 1999) continue to cite studies such as Hollington and Newby (1995), Mooney (1990), and Sooman et al. (1993) that did not report statistical

tests, thereby lending further, misguided heft to the assertion that food is more expensive in poor neighborhoods. These studies were carried out by public health groups who are actively engaged in working for the poor or disadvantaged, which may or may not play a role in shaping the conclusions they reach. A study not cited in the literature review because of concerns about its quality, Bell and Burlin (1993), shows this bias clearly, as the title states “Many of the poor still pay more for food” as if this had been clearly demonstrated in the past. Chung and Meyers (1999:292) state, “The poor appear to pay only slightly more [for a list of food not grouped in a market basket] in the Twin Cities [Minneapolis-St. Paul, MN] market, and *this finding was not statistically significant*” (my italics). They also found that market baskets costed at stores located in poor locations were not significantly more expensive than baskets costed at stores in nonpoor locations. Thus, the two cost measures they employed fail to show that residents of poor neighborhoods face higher food prices. Yet they conclude, against the results of their statistical tests, that “the poor do indeed pay more in the Twin Cities grocery market” (Chung and Meyers 1999: 293), largely because they found non-chain stores, which were more expensive, to be more common in poor areas. This may relate to the fact that the Minneapolis Urban League provided support for the study (Chung and Meyers 1999:276).

Cummins and Macintyre (2002a: 438) report similar circumstances surrounding the “fact” that food deserts exist in British cities. In their opinion, “the burden of proof, or demand for evidence, may vary according to a policy’s perceived fit with the prevailing collective world views about issues of popular topical interest.” In my opinion, a similar situation surrounds some of studies of the cost of food in neighborhoods of differing affluence. This is not to say that the question has been definitively answered; the opposite is in fact true for Canada (Power 2004), and many more studies are necessary at the local and national level to truly understand the variation in food cost across neighborhoods. However, I believe it fair to say, given the current state of the literature, food cost does not vary with neighborhood affluence.

Food Cost and Availability in Hamilton, Ontario

The general results of the food cost and availability study are in line with the majority of previous work from the US, UK, and Canada. Food cost differences varied significantly with store type: food was cheapest at supermarkets and more expensive in grocery stores and variety stores. Looking at grocery stores and variety stores, food cost did not appear to vary between the two study areas when making comparisons within store type; variation within each area exceeded that between areas.

Food cost variation in the supermarket category was more complex because of heterogeneity within the supermarket category. ONFB totals at the two Downtown supermarkets were very similar to one another; the average Downtown cost was 20% cheaper than the cost at the Westdale supermarket. Interview results (see pages 43-54) suggest that this is due to the different business strategies pursued by the supermarkets in question: the Downtown supermarkets pursue a discount strategy focused on selling high-turnover items, while the conventional Westdale supermarket focuses on services and higher-quality items.

The socioeconomic differences between the two study areas (see Chapter 3) likely explain why the discount supermarkets are located in the Downtown. First, consumers with less disposable income will be less likely to use the higher-priced services available in the conventional supermarket, making the Downtown area more attractive to discount supermarkets than to conventional ones. A second factor is the greater (by a factor of four) population density in the Downtown area. Shaffer (2002) reports food-industry analyses showing that areas with higher population density and lower per capita income have more spending power *per acre* than more dispersed areas with higher per capita incomes; stores in such areas often have higher per-square-foot profit margins. As discount supermarkets focus on selling large amounts of a smaller group of items and their profits rely more on sales volume, a densely populated area like the Downtown is more desirable than an affluent area like Westdale. The presence of low-cost supermarkets in the Downtown may also help less-affluent families stretch their food budgets further.

The finding that food cost does not vary greatly between areas for the smaller store types and that Downtown supermarkets are cheaper than the Westdale supermarket should not be taken as evidence that Downtown residents can easily purchase low-cost food. Because of differences in population density, fewer supermarkets per person are available in the Downtown than in Westdale (0.08/1000 vs. 0.14/1000; see Table 5.1, p 37). Inspection of the maps (Figures 5.1 and 5.2, pages 38 and 39) shows that few residents of the Downtown live near a supermarket, though the two Downtown supermarkets are on major streets served by public transport and one is relatively centrally located. Additionally, most Downtown residents do not have access to a car—only 26% of surveyed residents had such access—meaning they must either walk or use public transport when traveling to shop for food. Car access is much higher in Westdale, according to the survey results. These results are consistent with previous studies. Studies by Morland et al. (2002) and Shaffer (2002) found fewer supermarkets were available per person in poor areas in American cities. Turrell et al. (1996 in Morland et al. 2001) and Morland et al. (2001) also found that car ownership declined with area affluence.

In contrast to the dearth of supermarkets in the Downtown, 64% of Downtown food outlets are variety stores; grocery stores make up a further 9%. Because most Downtown residents do not have access to a car with which to do their food shopping, they either walk or take public transport, which may lead to shopping closer to home. In other words, they are more likely to shop at grocery and variety stores, which are more expensive than the supermarkets and carry fewer food items. Table 6.1 compares the cost of food across store types, using supermarkets as the standard; grocery and variety stores are between 29 to 46% more expensive than supermarkets. These results suggest that the relative lack of mobility among Downtown residents could lead to them paying higher prices for food. Finke et al. (1997) suggested that lack of mobility among low-income urban Black consumers contributed to this group paying higher food prices than high- and low-income urban Whites and high-income urban Blacks.

Table 6.1: Relative cost of food by food-outlet type, relative to supermarket

Food list based on	Supermarket	Grocery Store	Variety Store
Variety Store	1	1.32	1.29
Grocery Store/Supermarket	1	1.46	--

For both comparisons, the supermarket price was assigned a value of 1. Grocery and variety store values, which are higher, were calculated by dividing the cost of food at the grocery or variety store by the cost at the supermarket.

Supermarkets influence more than the cost of food. The presence of a supermarket has been shown to have positive effects on diet: Morland et al. (2002) found that supermarket presence increased the percentage of people meeting dietary recommendations and caused an increase in fruit and vegetable consumption; Wrigley et al. (2002b) found that when a supermarket was built in an impoverished area, reported consumption of fruits and vegetables increased.

Affordable food is not necessarily readily available in Westdale. As the map results show (See Figure 5.1, page 38), food outlets in Westdale are tightly clustered. This is likely not as large a problem for Westdale residents, as over 80% of survey respondents, excluding those aged 18 to 24, reported using a car to do their food shopping. Further, an internet grocery delivery service recently started operating in Westdale; the high incomes enjoyed by many residents suggests that more than a few will be able to use this service¹. It should be noted that food availability, as measured by the ONFB, did not differ greatly between the Downtown and Westdale supermarkets.

In sum, the distribution of food outlets in both study areas leaves many residents without a nearby store that sells a large number of food items. The public health effect of this is likely greater in the Downtown area, where incomes and car access are lower. In particular, the relative lack of supermarket access combined with low car access may contribute to Downtown residents paying more for a more uniform diet. This has not gone unnoticed in the area. Ehrlich et al. (2001) conducted interviews with 17 individuals from the Downtown area. They noted that many interviewees expressed a need for more and better food outlets; one interviewee said, “There’s only No Frills otherwise no other really affordable grocery outlet, as a result residents buy overpriced nutritionally deficient food from the corner stores” (Ehrlich et al. 2001: 52). Corner stores—variety stores, to use the terminology of this study—were found to stock very few produce items. The pattern of produce availability in the two study areas is discussed in the next section.

Produce Availability

Numerous studies found associations between the consumption of fresh produce, especially vegetables, and improved health outcomes (see Chapter 2). For this reason, produce availability was a topic of special interest in this project. Supermarkets carried the greatest number of produce items, followed by grocery stores and variety stores. Variety stores, which make up 64% of Downtown food outlets, averaged 2.28 produce items (all stores); Downtown variety stores averaged 2.49 produce items. Though this

¹ One Downtown grocery store offers grocery delivery, for a small fee. The service is primarily used by seniors in a home outside the boundaries of the Downtown area.

figure is slightly higher, it still represents low produce availability. Combined with low levels of car and supermarket access, this makes fresh produce very hard to come by for the majority of Downtown residents. Interviews with a variety store owner and variety store manager suggested that produce provision in variety stores is unlikely to increase, as economies of scale, problems with lack of space, consumer expectations, and price competition with other food outlets all work against variety stores selling fresh produce.

A greater number of Westdale outlets—approximately one in five stores—can be expected to carry a variety of produce. This is because variety stores are not as common in Westdale as they are in the Downtown. And, as discussed above, most Westdale residents will be able to access this produce using a car or through a grocery delivery service. Westdale variety stores averaged less than one produce item per store; this difference between Westdale and the Downtown was not statistically significant and may relate to the clustered distribution of Westdale food outlets: most variety stores are very close to either the grocery store or supermarket. This may reduce to nil the already small market niche for a variety store owner who wishes to sell produce.

Interviews with the two supermarket representatives produced an interesting finding with respect to the produce sold in the different supermarkets. S1, a manager at the Westdale (conventional) supermarket, claimed that the produce sold in his store was of higher quality. In the context of the interview, it was clear that by higher quality, he meant that the produce was larger:

S1: It's about standards and grades. Here compared to the discounters, that's the difference. Size and grade determines price. With apples, we buy your nice 88s or 85s. At Food Basics, they buy 110s, something like that. You buy an apple here, it is different than an apple there. Size determines quality.

JL: What are those numbers?

S1: Those are the sizes, how many you can fit in the box.

S1's claim of higher quality is highly relevant to this research. This study and those reviewed in the section on food cost and neighborhood affluence assumed that an apple—or other item—sold in one store or neighborhood was equivalent to an apple sold in another store or neighborhood. This assumption is fundamental: meaningful cost comparisons can only be made if the items being compared are of very similar or equal quality; otherwise, different items are being compared. To avoid this problem, many of the large-scale studies reviewed earlier (e.g. Finke et al. 1997) compared the prices of only those foods for which they felt had minimal variation in quality or compared the cost of a single brand (e.g. Jimmy Dean sausage) to avoid measurement errors associated with perceived or actual differences in quality.

Given that "quality" is extremely difficult to quantify, it will be nearly impossible to remove uncertainty associated with quality variation from analyses of variation in the price of food. Of the food-cost studies reviewed as part of this research, only one reported on quality variation across neighborhoods. In their study of food price and availability, Sooman et al. (1993) ranked available produce on an arbitrary scale of 1 to 5, with 5 being the highest quality. Average quality scores were higher in the more affluent study

area; the authors did not report statistical tests and the sample size was small (9 stores). I did not rank produce items according to perceived quality in this study. However, marked differences in quality or freshness of produce between the study areas were not apparent.

Another issue raised by S1's comment is that differences in food supply could lead to structured differences in exposure to pesticides or other food contaminants. Another way in which quality variation could affect health is through freshness. Differences in the freshness of produce could have important effects on the nutritional benefit derived from the food. Assessing produce freshness was not part of this study's design; however, the produce in the Downtown supermarkets was not noticeably less fresh than Westdale produce.

As with food cost and availability, the produce availability results suggest that while neither study area enjoys ideal provision, lower income and car access in the Downtown makes purchasing produce a more difficult proposition. This could have potentially large impacts on public health, as vegetables and fruit have been shown to confer significant benefits in disease reduction when consumed in adequate quantities. The problem of low car and supermarket access is more pressing in the Downtown and could lead to the consumption of uniform diets low in fruits and vegetables for many area residents; this could be expected to have serious public health effects. This is especially true in light of this study's finding that Downtown residents shop more often in variety stores than Westdale residents. Differences in food acquisition behavior are discussed in the next section.

Food Acquisition Behavior: Supermarket and Variety Store Shopping

The face-to-face survey showed that residents of the two study areas had broadly similar shopping habits. An average consumer in either neighborhood would patronize slightly over 1.5 food outlets, buy most of all foods at a supermarket, make approximately 2.5 food shopping trips per week, and eat at home slightly more than 5 nights a week.

There were some important, statistically significant differences, however. The first type was discussed above: Westdale residents are much more likely to have access to a car with which to do their food shopping; conversely, they are less likely to walk to their main shopping location or use a grocery cart.

The second type of difference identified related to where people shopped. Downtown residents shopped more often in variety stores than did Westdale residents; Westdale residents shopped more often in supermarkets than did Downtown residents (see Tables 5.8 and 5.10, pages 57 and 58). Not only that, but Downtown residents purchased a greater diversity of food items when shopping in variety stores (see Table 5.6, page 43).

The difference in shopping habits makes sense in light of the transport difference. Without a car, transporting the greater number of food items available at a grocery store is more difficult. Lack of a car can influence shopping behavior at a supermarket, making it more difficult to transport the larger, more economical packages available at supermarkets.

Shopping at variety or grocery stores could lead to poor diet quality in several ways. First, shopping in variety stores could result in insufficient food quantity, as food

costs more—about 25% more, in this study—in variety stores. Second, as variety stores sell very few produce items, an insufficient intake of fruit and vegetables is likely if these food outlets are regularly patronized. Third, variety stores sell large amounts of unhealthy food items such as soda pop, chips, candy, and so on. Regularly shopping in food outlets of this type could result in regularly buying and eating these unhealthy foods. This can be seen from the findings of this study, the literature reviewed in Chapter 2, and in the above quote from a Downtown resident.

The relevance of food cost and availability to biological anthropology rests on how these affect human health. Therefore, measures of public health for the two study areas are discussed below to assess whether the pattern of food cost and availability discussed above matches the distribution of health problems in Hamilton.

Public Health Impacts of the Food Distribution System

This study has documented how the distribution of food outlets in Hamilton can, in conjunction with low incomes, lead to the consumption of suboptimal diets. The abundance of Downtown variety stores coupled with low car access favors shopping close to home; shopping close to home often means shopping in grocery stores and variety stores which have higher food prices and stock fewer produce items and fewer foods. In light of these findings, it is not surprising that Downtown residents shop more often in variety stores and less often in supermarkets than Westdale residents. Given these findings, the links between diet and health discussed in Chapter 2, and the lower levels of education and income in the Downtown, we would expect public health problems to be worse in this area.

Interviews with the public health workers show that malnutrition, in the form of undernutrition as well as obesity, is present in Hamilton in general and the Downtown in particular. PH1 reported that a consistently high incidence of cavities and gum disease, even among very young children, at a Downtown school, indicates nutritional adequacy is a problem. PH1 has worked in the area for several decades and reports that her observations of children attending before-school breakfast programs are consistent with suboptimal diets. At least two breakfast programs were active in the area in 2001 (Ehrlich et al. 2001). Interviews conducted for this project and by Ehrlich et al. (2001) found that attendance at the breakfast program varied throughout the month, suggesting episodic food shortages in some families. Such problems are not in evidence in Westdale. Unfortunately, quantitative data to support these assertions is not available.

Further evidence for poor nutrition in the Downtown area comes from anthropometric surveys of schoolchildren. Moffat et al. (submitted) found that children attending schools within the Downtown area were more likely to be overweight or obese, compared to the 2000 CDC standard growth sample (chi-square test, $p < 0.000$), while students attending school in Westdale were not (see Figure 6.1). Investigations into possible dietary or activity-based reasons for these anthropometric results are ongoing.

In a survey of residents in several Hamilton neighborhoods undertaken as part of the Deconstructing Determinants of Health at the Local Level Project, Downtown respondents were more likely to rate their health as fair or poor and less likely to rate

their health as good than were residents of the city as a whole (Keller-Olaman et al. no date)².

Data comparing morbidity and mortality between Westdale and the Downtown are not available. The City of Hamilton has access to databases containing mortality and hospital-admission data by postal codes, but the areas under study in this thesis are not large enough for valid statistics to be generated (personal communication, City of Hamilton Public Health and Community Services Department 2004). Given the affluent nature of Westdale, it is unlikely that the health of residents here is worse than the city average. On the whole, however, the paucity of morbidity and mortality data comparing Westdale and the Downtown does not allow clear assessment of whether public nutrition is influencing public health in the two neighborhoods. Such an assessment would require using demographic standardization techniques to account for the different age structures of the two populations (Streiner and Norman 1996).

This thesis has documented that the pattern of food cost and availability in Hamilton could lead to suboptimal nutrition, especially among less-affluent residents of the Downtown. Anthropometric studies of children's growth, measures of mortality and morbidity, and the testimony of public health workers provide evidence of the expected negative public health effects. It should be noted, however, that this is an ecological association and causal relationships between these conditions, or others, and poor nutrition has not been demonstrated.

The pattern of public health issues is consistent with the pattern of food cost and availability. As many other factors operating at various levels influence health and this study covers only two areas of a large city, the claim that the food environment in Hamilton is the sole cause of area-based health disparities is *not* made here. However, the findings of this study do suggest that Hamilton's "foodscape" could be a contributing factor to these disparities. If further study in Hamilton and elsewhere shows this to be the case, the question of how to deal with this situation arises. Economic strategies to improve public nutrition are discussed in the next section.

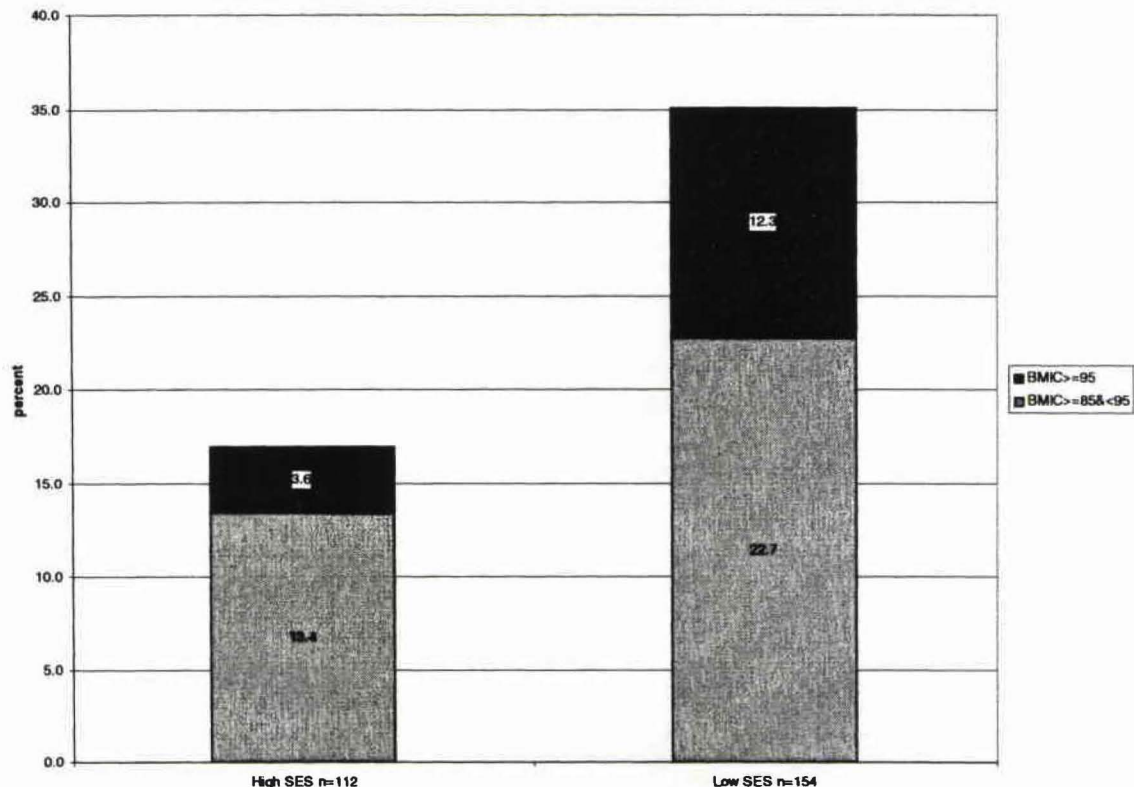
Social and Economic Strategies to Improve Public Nutrition

In industrialized nations such as Canada, overweight and obesity are the most common results of improper nutrition. These conditions contribute greatly to healthcare costs. Birmingham et al. (1999) estimated that obesity directly contributed \$1.8 billion dollars to health care costs in Canada in 1997; they felt that this was a conservative estimate. The \$1.8 billion represents 2.4% of total Canadian health care expenses, a proportion that is similar to those in New Zealand, Australia, and France and lower than estimates from the Netherlands (4%) and United States (5.5%) (Birmingham et al. 1999 and references therein). Another US estimate found that approximately 7% of health care expenditures in the US can be attributed to obesity (Brownell and Horgen 2004); the costs of obesity in the US may now equal or exceed those related to smoking (Sturm 2002, Sturm and Wells 2001). Considering that other diseases, notably some cancers, can

² In this case, "city" refers to the "old city" of Hamilton, before the municipalities of Hamilton, Stoney Creek, Flamborough, Glanbrook, Ancaster, and Dundas amalgamated on January 1, 2001.

be linked with dietary intakes, the costs, in terms of quality of life as well as dollars, of improper nutrition can be very high. It is therefore worthwhile to consider various strategies to improve healthy eating.

Figure 6.1: Prevalence of overweight (BMIC ≥ 85 & < 95) and obesity (BMIC < 95) in elementary students from one Westdale and two Downtown schools (Moffat et al. submitted).



As many factors, including social, cultural, and political-economic ones, influence food choice behavior, no single solution is likely to effect great change. As this thesis is concerned primarily with how food prices influences food choice, this discussion focuses on economic strategies to improve public nutrition. Many strategies to improve public nutrition have been suggested (see Nestle and Jacobson 2000). As purchasing healthy food is a greater problem for the less affluent, the discussion here focuses on adjusting food prices (including taxing unhealthy food items) and raising the minimum wage. A second reason for discussing these strategies in particular is that these were the most commonly cited by public health workers interviewed as part of this study. The importance of improving access to healthy food is discussed as well.

Adjusting Food Prices

To adjust food prices in favor of healthy eating, nutritious foods need to be made more affordable and less healthy foods need to be made more expensive. Brownell and Horgen (2004) argue that taxes on snack foods should be used to generate revenues which can be used to subsidize healthy foods. Nestle and Jacobson (2000), gathering suggestions from the literature to fund these programs, proposed three taxes, each of which, if enacted in the US, would generate approximately \$ 1 billion (US) annually: 2/3 of a cent tax on 12-ounce soft drinks, 5% on new televisions and video equipment, and a 1-cent tax on each gallon of gasoline sold. They argue that the taxes are small enough that worries about their regressive nature are unfounded. Whether such proposals would enjoy public support in Canada, where taxation levels are generally higher than the US, is debatable. Also debatable is their assertion that the regressive nature of these taxes does not merit much concern.

There is evidence to suggest that the tax-and-subsidize approach would work. With respect to reducing the cost of healthy foods, French et al. (1997, 2001) found that reducing the prices of fruits and vegetables in school and worksite vending machines resulted in significant sales increases for these foods without lowering average profits for the machines. Horgen and Brownell (2002) found that lowering menu prices of healthy food items increased sales. With respect to taxes on unhealthy foods, taxes ranging from 5 to 10% were enacted in the US states of California, Maryland, and Maine and in the District of Columbia for short periods of time over the last 15 years; sales figures from Maryland and California suggested that these taxes succeeded in reducing sales of snack foods and generating revenue (Brownell and Horgen 2004). Undertaking a national tax-and-subsidize program meant to increase the cost of unhealthy foods and decrease the cost of healthy foods would be a complex endeavor, including at a minimum contentious decisions about which foods to tax, which foods to subsidize, the proper amount of taxation or subsidy, how to manage the process, and how to gain public acceptance (Brownell and Horgen 2004). This does not mean, however, that it could not or should not be done, as the brief discussion here suggests that such a program could help to improve public nutrition.

Raising the Minimum Wage

A second suggestion made by the public health workers and some food outlet owner/managers interviewed in this study was to raise the minimum wage (or public assistance benefits) to allow the less-affluent to better afford healthy foods.

Debate exists on the question of whether raising the minimum wage is the best instrument with which to increase incomes among the poor. Conventional economic wisdom holds that raising the minimum wage leads to job losses (“disemployment”) in the short and long term, as employers cut back on the number of jobs (Card and Krueger 2000, Sarlo 2000); this effect may be stronger for teenagers than it is for adults (Sarlo 2000 and references therein). Card and Krueger (1994, 2000) have challenged this view based on study of an increase in the minimum wage in New Jersey in the absence of a wage change in nearby Pennsylvania, but others have challenged this work (Card and

Krueger 2000). Goldberg and Green (2000) also suggested that minimum wages do not lead to disemployment; this was disputed by Sarlo (2000).

There is also debate about whether raising the minimum wage will serve primarily to increase incomes among the working poor. Sarlo (2000:4) argues that because raising the minimum wage leads to disemployment, it serves to “redistribute income from some low-income households (who are left unemployed as a result of the change) to other low-income households (who retain their jobs at the higher wage).” Neumark and Wascher (2002) analyzed employment and earning statistics collected in the US between 1986 and 1995, finding that increases in the minimum wage help some poor families escape poverty while causing others to fall into poverty (because of disemployment effects). They found a greater number of families fell into poverty than left it, though the difference was not significant; they also found that raising the minimum wage tends to increase the incomes of poor families that remain below the poverty line. Agreeing with Sarlo (2000), Neumark and Wascher (2001) conclude that rather than fighting poverty, minimum wages tend to redistribute income among low-income families.

Approximately 4% of the Canadian workforce—547,000 people—earned the minimum wage in 2003; two-thirds of these were women (Statistics Canada 2004b). In addition to women, young people, students, and part-time workers are likely to earn the minimum wage; 5% of all minimum wage workers are heads of families and nearly all of these people have a child under 18 to support (Statistics Canada 2004b). Another factor to consider is that many minimum wage workers do not belong to low-income families. Shannon and Beach (1995 in Sarlo 2000) reported that 31% of minimum wage workers belong to families with incomes greater than \$50,000 while only 28% belonged to families with incomes below \$20,000. Goldberg and Green (1999) analyzed results of the Survey of Labour Income and Dynamics (SLID), finding that 55% of minimum wage workers live with their parents: 36% are teenagers and 19% are young adults between the ages of 19 and 24. The SLID data also show that 13% of minimum wage earners are in families below the 5th percentile in income; 34% of minimum wage workers are in families below the 25th percentile in income (Goldberg and Green 1999). From these numbers we can see that while raising the minimum wage would benefit low-income families, it would also benefit many others. Miller 1995 (in Sarlo 2000) has argued that more complex solutions would raise the incomes of low-wage workers without disrupting the labor market and other sectors of the economy; these include programs such as the Earned Income Tax Credit in the US, the Self-Sufficiency Project with which Canada is experimenting (Crossley 2004, personal communication), Quebec’s subsidy program (Herring 2004, personal communication), a program of wage subsidies, and cash grants. Such strategies would be more desirable than an across the board increase in the minimum wage as they would more efficiently direct funds to those in greatest need and avoid potential disemployment effects.

This brief discussion of economic strategies to improve public nutrition was based on the premise that no single solution will end public nutrition problems. The two strategies discussed here were a tax and subsidy program meant to increase the consumption of healthy food choices while decreasing the consumption of unhealthy foods. While implementing such a program would be complex, available evidence

suggests that it could help to improve public nutrition. The second strategy, raising the minimum wage, is more problematic. Economic strategies tailored specifically to raise incomes among the working poor might achieve the desired result of providing secure access to a range of healthy foods at less cost and less risk of unintended consequences.

Improving Food Access

It is also important to consider food access. Morland et al. (2002) found that residents of neighborhoods with easy supermarket access reported increased the consumption of fruits and vegetables compared to residents without such access. Wrigley et al. (2002b) performed dietary surveys before and after the construction of a large supermarket in a poor section Seacroft, Leeds, UK. They found, on average, a very small but statistically significant increase in mean servings of fruits and vegetables, from 2.88 to 2.92 servings per day. Further analysis showed, however, that the increase in fruit and vegetable consumption occurred among those who had the poorest diets before the store was constructed. Among these individuals, average fruit and vegetable consumption more than doubled and fruit/fruit juice consumption increased more than fivefold. Wrigley et al. (2002b) also found that those with the worst diets in the first portion of the study were the most likely to switch to the new store for purchasing fruits and vegetables. This finding is especially encouraging—not only do supermarkets seem to allow people to acquire better diets, but the effect may be concentrated among those whose diets are most in need of improvement.

These two studies, along with this thesis, suggest that supermarket access may be important in improving public nutrition. It is true that grocery stores often stock a wide range of produce items. In this study, however, prices were much greater at grocery stores than at supermarkets, suggesting that grocery stores might not be as helpful in improving public nutrition. Policy makers might therefore wish to consider tax or other incentives to maintain and increase the presence of supermarkets in less affluent areas. As Shaffer (2002) reported that supermarkets stores in low-income areas are often highly profitable, these incentives may not need to be very large or extremely long lasting in order to be effective.

Other programs to improve access to produce in low-income areas could be pursued. These could include organizing group-purchasing cooperatives, encouraging farmers markets to be open longer hours, or other programs such as Toronto's Good Food Box, that make fresh produce more available to low-income urban residents. In cities such as Hamilton, partnerships with nearby farms are an option. In the US, some low-income groups receive vouchers allowing them to purchase fruits and vegetables at farmers markets (Just and Weninger 1997).

Summary

The results discussed in this chapter suggest that the pattern of food cost and availability in the Downtown area and this area's lower affluence make it harder to purchase an optimal diet. Of particular note was the widespread distribution of variety stores, which stock relatively few produce items. As Downtown residents often lack car

access or the funds to hire a taxi to do their shopping, it is unsurprising that they shop more often and buy more foods in these food outlets than do their Westdale counterparts.

What little data is available on morbidity and mortality for the two areas suggests that public nutrition may be playing a role in the relatively higher morbidity in the Downtown. This claim should be interpreted with great caution, given the nature of the data and the small size of this study. Economic strategies meant to partially ameliorate the gap in food access were discussed as well.

This study's conclusions are presented in the next chapter, along with suggestions for future research.

Chapter 7: Conclusions

The goals of this study were to: 1) describe the pattern of food availability and cost in Hamilton, Ontario; 2) investigate the determinants of food cost; 3) investigate how these patterns of food cost and availability influence the food acquisition decisions of consumers in the two study neighborhoods; and 4) investigate the public health impacts of poor diet quality and malnutrition. Conclusions relating to these goals are addressed in turn, after which other goals of the study are discussed. This chapter concludes with suggestions for future studies of the urban foodscape.

Specific Goals of the Study

1. This study is one of very few describing the pattern of food cost and availability in a Canadian city. Food cost and availability varied more within than between the two study areas in Hamilton, Ontario. In particular, the availability of fresh produce was found to be problematic. This finding applies to both areas. Lack of automotive transport and lower incomes exacerbated the problem in the Downtown area, where supermarket access was worse than in Westdale.

2. It was discovered that food cost was mostly determined by decisions made outside of Hamilton by a relatively small number of business enterprises. Local demand and input are unlikely to play a large role in food cost and availability. It should be noted, however, that this might differ at specialty stores, which were not an area of focus for this research. Consistent with other research, store type was found to influence food cost and availability: supermarkets offer better prices and selection than grocery stores, which offer better prices and selection than variety stores.

3. Another of this study's goals was to investigate differences in individual behavior. The main difference in shopping behavior discovered between the two areas was that Downtown residents shopped more often at variety stores and relied on these outlets for a greater number of food items. This difference in behavior may relate to the abundance of variety stores and paucity of supermarkets in the Downtown, along with the prevailing socioeconomic conditions in the area. In Westdale, greater affluence and car access apparently allows residents to solve problems of food outlet distribution. Investigating individual-level differences in addition to those at the area level is one of the contributions of this study.

4. It was difficult to link the pattern of food cost and availability evident in the two areas with measured differences in public health. This stemmed in large part from difficulty accessing appropriate public health data. Hospital admission and mortality data are available by postal code, but the areas under study in this thesis were not large enough for valid statistics to be released (personal communication, City of Hamilton Public Health and Community Services Department 2004). Improved food consumption and public health data for the two study areas would be highly desirable and would enhance the relevance of the study for policy makers and public health workers. Comparing these populations would require using standardization techniques (Norman and Streiner 1996) that would separate effects stemming from the differing age structures

(and other compositional differences) from those potentially related to diet or other factors.

In sum, this study has shown that food cost and availability can and should be considered as one of the “local conditions” (Goodman and Leatherman 1998) to which human biologies are exposed. While food retail prices and availability, especially as measured here, only once throughout the year and not taking into account the influence of sales or household composition, are only two factors affecting how people acquire the food in their diet, they can play a role in shaping human health. As the global trend toward urbanization continues, the complicated relationships between local conditions, including those relating to food, socioeconomic variation, and public nutrition will become increasingly important, as will the role of multinational corporations and the influence of globalization.

As articulated in Goodman and Leatherman (1998), biocultural theory focuses more on materialist influences on behavior than social/cultural ones. This shortcoming is brought to the fore in a study investigating determinants of diet. Economic conditions are of course important, but future studies of socioeconomic variation in diet should draw upon the work of social theorists to help explain observed differences in diet or shopping behavior (see, e.g. Power 2004). The inclusion of these perspectives would also be of benefit to biocultural theory more broadly.

Other Study Goals

One aim of the study was to attempt to discern which aspects of the food distribution system derived from living in an urban environment and which derived from living in a less-affluent urban environment. Both areas exhibited food outlet distributions that were less than ideal. Supermarket access, in particular, was identified as a larger problem in the Downtown area; unequal access to transport was also identified as a potential factor linked to living in a less-affluent portion of the city. On the positive side, two discount supermarkets were located in the Downtown, providing low-cost grocery supplies to those who were able to access the stores.

Two economic strategies to promote healthier diets—supplementing incomes among the less affluent and making the prices of healthy foods more attractive—were discussed. While these strategies, if implemented, may be able to improve public nutrition, other characteristics of these areas’ foodscape could also be changed to improve access to foods consistent with healthy diets. Improving the availability and consumption of produce would seem to be of special import, as would improving access to food outlets selling a wide range of healthy foods at affordable prices.

Suggestions for Future Research

Power (2004) identifies four areas in which our understanding of social determinants of healthy eating are lacking. One of these is reliable data on variation in the cost of healthy diets in Canada. This thesis research therefore plays a small part in filling this gap. Future research into variation in food cost in Canadian cities should include studies of many store types across large areas, if not the entirety of, the cities in question.

These studies should follow the example of Donkin et al. (2000) and include foods that are purchased and consumed by all residents of the city in question.

This research has shown that the pattern of food cost and availability in two parts of Hamilton can plausibly be linked with public health disparities. It should be noted that this is an ecological association; causation has not been demonstrated. The reliability and specificity of the findings of future studies of this type could be improved in several ways, some of which are discussed below.

1. A larger study assessing food cost and availability throughout an entire city would allow the identification of variation in these parameters and the assessment of whether this variation is significantly linked with health disparities and socioeconomic/demographic variation.
 - a. Area designations should be made based on observed demographic and/or health indicators, rather than on mail-delivery areas, as is common. Lugginaah et al. (2001) provide a good example of this. This will help ensure that the units of analysis are as relevant as possible. While it may be more difficult to acquire census data for areas designated in such a manner, the availability of census data at levels below the census tract could help to offset this difficulty in some cases.
 - b. The analysis of food price and availability should include foods that are consumed by most of a city's population and not include foods that are unlikely to be consumed by various segments of the city's population. Donkin et al. (2000) constructed four market baskets that took into account not only nutrition recommendations and variation in dietary preferences. A research project combining both a national or regional standard (such as the ONFB) and locally influenced baskets such as those used in Donkin et al. (2000) would achieve maximum relevance to local populations as well as to policy makers.
2. A representative, individual-level study of food acquisition, preparation, and consumption habits; health status; and demographic and socioeconomic indices would document not only how individuals make constrained choices in the context of prevailing area and individual circumstances, but how these actions interact with area-level differences in health and food access (if these exist) identified in point 1.
 - a. Efforts should be made to include in this sample residents who may not be fluent or comfortable in the two official languages of Canada.
 - b. Specifically attention should be paid to addressing the question of access to transport and distance from a food outlet selling a wide array of food items, including produce, at accessible prices.

Such a study would document at individual and area levels variation in food cost and availability, socioeconomic status, and health outcomes. The analysis of these findings would allow the design of public policy which would help to improve public nutrition in Hamilton. This would obviously be an expensive and complex undertaking. However, given the high and increasing costs of poor nutrition, savings in economic and other terms could be significant.

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Appendices

Appendix 1: Produce Survey Items

Oranges
Tomatoes
Apples
Bananas
Grapes
Pears
Raisins
Potatoes
Broccoli
Cabbage
Carrots
Celery
Cucumber
Iceberg Lettuce
Romaine Lettuce
Onions
Green Peppers
Turnips/Rutabagas

Appendix 2: Face-to-face survey guide

Date _____ Time _____ Location _____ Sex: Male Female
 1. Is your age: 18-24 25-34 35-44 45-54 55-64 65-74 75-84 85+

2. Do you have any children living with you? Y N

3. (IF YES)How old are they?

The first questions will be about how you get food.

4. On average, how many times do you shop for any type of food in a week?

5. How many of those times do you usually shop in a supermarket?

6. (IF ONE OR MORE)What types of food do you usually buy there?

7. How many times in a normal week do you shop for food in a variety store?

8. (IF ANY)What types of food do you usually buy there?

9. Are there other places where you often get food?

10. (IF YES)What types of food do you usually get there?

11. Do you use a car to do your food shopping? Y N Other

12. IF OTHER: What do you use?

13. Do you take a wheeled cart with you?

Now I'd like to ask a few questions about where you eat your meals.

14. How often in a normal week do you cook dinner at home?

15. How often in a normal week do you eat food cooked outside your home?

16. What type of food do you eat when you eat outside the home?

Now I'd like to ask some questions about the food you keep and eat at home, if I may.

17. Do you keep a vegetable garden at home? Y N

18. Do you do preserve any fruits and vegetables for later use? If yes, how much?

19. What language or languages do you speak at home?

20. Part of my project looks at how far people travel to do their shopping. Would you tell me the street intersection nearest your home?

21. And where do you do most of your shopping? (Answer from above?)

Now, if you don't mind, I'd like to ask you about your income.

22. In the last year, was your approximate total family income:

under 10k 10-20k 20-30k 30-40k 40-50k 50-60k 60K+

THANK YOU VERY MUCH FOR YOUR TIME AND PATIENCE.

Appendix 3: Food outlet owner/managers interview guide

Name _____ Store # _____ Date _____

1. How long have you owned/managed this store?
2. How would you describe your store?
3. Do you have a 'target market' or group of people you try to attract the most?
4. On an average day, how many people shop in your store?
5. Can you describe your typical customer or types of customers?
6. Do you have a system of tracking where your customers live? Y N
 - a. What patterns have you found?
 - b. Do you have a general sense of where they live?
7. What do you think makes people choose to shop in your store?
8. What five items, food or nonfood, do your customers the most buy the most of?
 - a. What five foods?

Items:

Foods:

9. How do you decide what items to sell in your store? Is it based on what people ask for, what items have the most mark up, a combination of things?
 10. Where do you get the items you sell?
 11. **Follow this up based on answer...**
 12. What about setting prices? Are these fixed by the distributors or do you set the prices?
 13. What factors influence the price of an item? What are the most important ones?
 14. What types items do you make the most profit on?
 15. The types of items do you make the least profit on?
 16. Are there items you would like to sell but are unable to?
 17. (Variety store owners) Do you think it would be possible to sell more fresh fruit and vegetables? Why or why not?
 18. How do (supermarkets/**variety stores**) affect your business?
 19. As the manager/owner of this store, what is your biggest problem or problems?
 20. Is there anything else you would like to tell me on this topic?
- Now I'd like to ask you a few questions about nutrition in this neighborhood/city.**
21. Do you think that people in this neighborhood eat good diets?
 22. What do you think are the most important nutritional problems in this neighborhood?
 23. What factors do you think are most important in causing these problems?
 24. What do you think can be done to solve these problems?
 25. Recently, there has been much talk of an "obesity epidemic." Do you see that being a problem in this neighbourhood?
 26. What about undernutrition? Do you see that being a problem in your neighbourhood?
 27. If you could do 1 to 3 things to improve people's diets, what would you do?
 28. If you could improve one aspect of nutrition in this neighborhood, what would it be?
 29. Is there anything else you would like to tell me before I go?

Appendix 4: Public health worker interview guide

Name _____ School/Agency _____ Date _____

1. How long have you been working in this neighborhood?
2. Could you describe your duties for me? (School/neighborhood?)
3. What are the most important nutritional concerns for children in this school/neighbourhood?
4. What factors do you think are most important in causing these problems?
5. What do you think can be done to solve these problems—at policy levels, at volunteer levels, etc.?
6. Do you think the public—Hamilton, Ontario—is willing to shoulder these costs?
7. Do you think volunteerism/community efforts alone can significantly improve the situation?
8. Many in government or the media are fond of education programs as a way to improve public nutrition and health. What are your thoughts on this?
9. Another suggestion has been to tax non-nutritious foods, like chips and soda pop or fast food, with the proceeds going to lower the cost of fruits and vegetables. What are your thoughts on this proposal?
10. If, as some argue, access to fresh produce and other healthy foods is a big problem, how do you think access could best be improved?
11. Recently, much has been made of an “obesity epidemic.” Do you see that being a problem in this school/neighbourhood?
12. What about undernutrition? Do you see that being a problem in your school or neighbourhood?
13. If you could do, or cause to happen, 1 to 3 things to improve children’s diets, what would you do?
14. Is there anything else you think I should know about the health of the children in this school/neighbourhood?

Appendix 5: ONFB (Health Canada 1998) items in supermarket comparison.

Items with line through were not included. Items with dotted underline were not available at all stores and replacement values were calculated.

<u>Milk Products</u>	<u>Citrus Fruits and Tomatoes</u>
2% milk	oranges
yogurt, fruit, 2% butter fat	<u>apple juice, canned</u>
cheddar cheese	orange juice, frozen, concentrate
processed cheese slices	tomatoes
mozzarella cheese	whole tomatoes, canned
vanilla ice cream	tomato juice
<u>Eggs</u>	<u>Other Fruit</u>
grade A large	apples
	bananas
<u>Meat, Poultry, Fish</u>	grapes
round steak	pears
boneless stewing beef	<u>raisins, seedless</u>
ground beef, medium	fruit cocktail, canned in juice
pork chops, loin	
chicken legs	<u>Vegetables</u>
wieners, beef & pork	potatoes, fresh
<u>slice ham, 11% fat</u>	French fries, frozen
frozen fish fillets	broccoli
pink salmon, canned	cabbage
tuna, canned, in water	carrots
	celery
<u>Meat Alternatives</u>	cucumber
baked beans, tomato sauce, canned	lettuce, iceberg
<u>white beans, dry</u>	lettuce, Romaine
peanut butter	onions
	green peppers
<u>Grain Products</u>	<u>turnips (rutabaga)</u>
bread, enriched, white	mixed vegetables, frozen
bread, whole wheat	kernel corn, canned
hot dog/hamburger rolls	green peas, canned
flour, all purpose	
flour, whole wheat	<u>Fats and Oils</u>
spaghetti/macaroni	Margarine, tub
<u>rice, long-grained, white, parboiled</u>	Butter
macaroni/cheese dinner	Canola oil
oatmeal, regular/quick-cooking	Dressing, mayonnaise, < 35% oil
corn flakes	
Shreddies™	<u>Sugar and Sweets</u>
soda crackers	sugar, white
<u>social teas</u>	strawberry jam

Appendix 6: ONFB (Health Canada 1998) items in grocery store comparison.

Items with line through were not included. Items with dotted underline were not available at all stores and replacement values were calculated.

Milk Products

2% milk
yogurt, fruit, 2% butter fat
cheddar cheese
~~processed cheese slices~~
mozzarella cheese
~~vanilla ice cream~~

Eggs

grade A large

Meat, Poultry, Fish

~~round steak~~
~~boneless stewing beef~~
~~ground beef, medium~~
~~pork chops, loin~~
~~chicken legs~~
~~wieners, beef & pork~~
~~sliced ham, 11% fat~~
~~frozen fish fillets~~
pink salmon, canned
~~tuna, canned, in water~~

Meat Alternatives

baked beans, tomato sauce, canned
~~white beans, dry~~
peanut butter

Grain Products

bread, enriched, white
bread, whole wheat
hot dog/hamburger rolls
flour, all purpose
~~flour, whole wheat~~
spaghetti/macaroni
~~rice, long-grained, white, parboiled~~
macaroni/cheese dinner
~~oatmeal, regular/quick-cooking~~
corn flakes
Shreddies™
soda crackers
~~social teas~~

Citrus Fruits and Tomatoes

oranges
apple juice, canned
orange juice, frozen, concentrate
tomatoes
whole tomatoes, canned
tomato juice

Other Fruit

apples
bananas
grapes
pears
~~raisins, seedless~~
fruit cocktail, canned in juice

Vegetables

potatoes, fresh
~~French fries, frozen~~
~~broccoli~~
~~cabbage~~
carrots
~~celery~~
cucumber
lettuce, iceberg
lettuce, Romaine
onions
green peppers
~~turnips (rutabaga)~~
~~mixed vegetables, frozen~~
kernel corn, canned
green peas, canned

Fats and Oils

Margarine, tub
Butter
~~Canola oil~~
Dressing, mayonnaise, < 35% oil

Sugar and Sweets

sugar, white
strawberry jam

Appendix 7: ONFB (Health Canada 1998) items in variety store comparison.

Items with line through were not included. Items with dotted underline were not available at all stores and replacement values were calculated.

<u>Milk Products</u>	<u>Citrus Fruits and Tomatoes</u>
2% milk	oranges
yogurt, fruit, 2% butter fat	apple juice, canned
cheddar cheese	orange juice, frozen, concentrate
processed cheese slices	tomatoes
mozzarella cheese	whole tomatoes, canned
vanilla ice cream	tomato juice
 <u>Eggs</u>	 <u>Other Fruit</u>
grade A large	apples
	bananas
 <u>Meat, Poultry, Fish</u>	grapes
round steak	pears
boneless stewing beef	raisins, seedless
ground beef, medium	fruit cocktail, canned in juice
pork chops, loin	
chicken legs	 <u>Vegetables</u>
wieners, beef & pork	potatoes, fresh
sliced ham, 11% fat	French fries, frozen
frozen fish fillets	broccoli
pink salmon, canned	cabbage
tuna, canned, in water	carrots
	celery
 <u>Meat Alternatives</u>	cucumber
baked beans, tomato sauce, canned	lettuce, iceberg
white beans, dry	lettuce, Romaine
peanut butter	onions
	green peppers
 <u>Grain Products</u>	turnips (rutabaga)
bread, enriched, white	mixed vegetables, frozen
bread, whole wheat	kernel corn, canned
hot dog/hamburger rolls	green peas, canned
flour, all purpose	
flour, whole wheat	 <u>Fats and Oils</u>
spaghetti/macaroni	Margarine, tub
rice, long grained, white, parboiled	Butter
macaroni/cheese dinner	Canola oil
oatmeal, regular/quick cooking	Dressing, mayonnaise, <35% oil
corn flakes	
Shreddies™	 <u>Sugar and Sweets</u>
soda crackers	sugar, white
social teas	strawberry jam

Appendix 8: ONFB (Health Canada 1998) items in supermarket-grocery comparison.

Items with line through were not included. Items with dotted underline were not available at all stores and replacement values were calculated.

Milk Products

2% milk
yogurt, fruit, 2% butter fat
cheddar cheese
~~processed cheese slices~~
mozzarella cheese
vanilla ice cream

Eggs

grade A large

Meat, Poultry, Fish

~~round steak~~
~~boneless stewing beef~~
~~ground beef, medium~~
~~pork chops, loin~~
~~chicken legs~~
~~wieners, beef & pork~~
~~sliced ham, 11% fat~~
~~frozen fish fillets~~
pink salmon, canned
~~tuna, canned, in water~~

Meat Alternatives

baked beans, tomato sauce, canned
~~white beans, dry~~
peanut butter

Grain Products

bread, enriched, white
bread, whole wheat
hot dog/hamburger rolls
flour, all purpose
~~flour, whole wheat~~
spaghetti/macaroni
~~rice, long-grained, white, parboiled~~
macaroni/cheese dinner
~~oatmeal, regular/quick-cooking~~
corn flakes
Shreddies™
soda crackers
social teas

Citrus Fruits and Tomatoes

oranges
~~apple juice, canned~~
orange juice, frozen, concentrate
tomatoes
whole tomatoes, canned
tomato juice

Other Fruit

apples
bananas
grapes
pears
~~raisins, seedless~~
fruit cocktail, canned in juice

Vegetables

potatoes, fresh
~~French fries, frozen~~
~~broccoli~~
~~cabbage~~
carrots
~~eelery~~
cucumber
lettuce, iceberg
lettuce, Romaine
onions
green peppers
~~turnips (rutabaga)~~
~~mixed vegetables, frozen~~
kernel corn, canned
green peas, canned

Fats and Oils

Margarine, tub
Butter
~~Canola oil~~
Dressing, mayonnaise, < 35% oil

Sugar and Sweets

sugar, white
strawberry jam