Discussion Paper on Household and Individual Food Insecurity

Valerie Tarasuk

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INTRODUCTION

Through the 1980s and 90s, food scarcity and food deprivation came to be recognized as problems among the poor in many affluent western nations. Variously referred to as hunger, food poverty, food insufficiency, and household food insecurity, the problem has been described by nutrition researchers in Canada, the United States, the United Kingdom, Australia, and New Zealand (1-11). In Canada, public awareness of the problem has largely come from the growing numbers of people seeking charitable food assistance. Although this was initially regarded as a short-term problem, linked to the economic recession of the early 1980s in Canada, demands for charitable food assistance did not diminish as the economy improved. Instead, the number of Canadians using food banks steadily grew through the 1980s and 90s (12). In the popular press and early scholarly literature, this phenomenon was labelled 'hunger', but it is now more commonly referred to as food insecurity.

Food security is a broad concept, encompassing issues related to the nature, quality, and security of the food supply as well as issues of food access. As described in Canada's Action Plan on Food Security, food security "exists when all people, at all times, have physical and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life" (13). Food insecurity can be considered at the level of the individual, household, community, region, or nation. In contrast, hunger, in the direct sense of the uneasy or painful sensation of not having enough to eat, is a uniquely individual experience, now recognized as a comparatively severe level or stage of the broader phenomenon of food insecurity.

Household food insecurity has come to be recognized as a public health problem in Canada (14-17), but also as a serious social problem (8). There have been calls for assessment and

monitoring activities to appraise the scope of the problem and evaluate interventions (13). A number of measurement activities have occurred at the local, regional and national levels, but there remains no coordinated plan for monitoring food insecurity nationally or provincially. In considering the inclusion of food insecurity in a national nutrition monitoring system, it is important to consider the broader goals of nutrition monitoring in Canada. What dimensions and what degrees of severity of food insecurity are most relevant to measure and monitor in Canada ultimately depends on the intended uses of the information.

This paper presents an examination of issues pertaining to the inclusion of direct and indirect indicators of food insecurity in a national nutrition monitoring system, focussing on individual- and household-level food insecurity that arises in the context of financial resource constraints. Here the term, food insecurity, will be used to denote the limited, inadequate, or insecure access of individuals and households to sufficient, safe, nutritious, personally acceptable food both in quality and quantity to meet their dietary requirements for a healthy and productive life. The focus on limited, inadequate or insecure access to food due to financial resource constraints reflects the recognition that, while financial resources are only one of a range of factors that operate to determine individuals' food consumption patterns, they are the primary barrier to food access among low income groups. This focus is consistent with the conceptualization of household and individual-level food insecurity from the full array of qualitative and quantitative research in this area, and with the focus of recent national monitoring and surveillance in the U.S. (18,19) and New Zealand (20).

This discussion paper is organized in four main sections. In Part 1, the meaning of food insecurity is elucidated through an examination of the range of conditions and experiences that comprise food insecurity at the level of households and individuals in the Canadian context. In Part 2, the value of including food insecurity as a part of a nutrition monitoring system is

discussed from the perspective of the relationship between food insecurity and health and nutrition and the social implications of food insecurity. In Part 3, various direct and indirect indicators of food insecurity are critically examined. Part 4 comprises a discussion of gaps in our current understanding of food insecurity and recommendations for future research to support the inclusion of direct or indirect indicators of food insecurity in a national surveillance framework.

PART 1: WHAT IS FOOD INSECURITY?

A broad range of research endeavours during the 1980s and early 1990s served to elaborate the concept of food insecurity in a U.S. or Canadian context, elucidating the complex, multidimensional nature of this phenomenon. This work was largely qualitative in nature and focussed primarily on low-income families. Of particular significance is the conceptual work by a group of researchers at Cornell University, based on interviews with low-income women in upstate New York who were asked "if they had ever gone hungry or had been close to going hungry" and then asked to describe the situation (21,22). From these data, quantitative, qualitative, psychological, and social or normative dimensions of food insecurity and their associated dietary manifestations were identified at the individual and household levels (21,23,24). The resultant conceptual framework is summarized in Table 1.

Table 1. Dimensions of food insecurity elucidated from qualitative research by Radimer (1990)[1]

	Individual level	***Household level***
Quantitative	Insufficient intake	Food depletion
Qualitative	Nutritional inadequacy	Unsuitable food
Psychological	Lack of choice, feelings of deprivation	Food anxiety
Social	Disrupted eating patterns	Food acquisition in socially unacceptable ways

[1]from Kendall et al.(24).

Although the four dimensions of food insecurity outlined in Table 1 were initially thought of as "core components" of the experience (21), and "essential components" of food security measurement (23), subsequent work revealed the need to carefully distinguish between core components or defining features of food insecurity and potential consequences or manifestations. Understanding of the core phenomenon of food insecurity has recently been extended through the application of quantitative research techniques. With the assessment of a wide range of conditions, behaviours, and experiences believed to be associated with the phenomenon, complex statistical procedures have been applied to define a unidimensional scale of severity in deprivation in the basic need for food that can be generalized across households (e.g., 19,25-27). Fuelled largely by the need to develop a valid scale for the measurement of household food insecurity in the U.S., this analytic work has been complemented by numerous studies to examine pertinent aspects of food insecurity measurement and interpretation. In addition, recognizing that much of the early qualitative research on food insecurity was conducted with domiciled families with children, qualitative research approaches have been employed to elucidate the experience of food insecurity among other vulnerable groups such as the elderly and the homeless (e.g., 28,29). As well, qualitative research has been undertaken to elaborate the social dimensions of food insecurity (e.g., 30-33).

The core concept of food insecurity can be understood most simply as deprivation in the basic need for food. Four key conceptual elements further define this phenomenon:

- Food insecurity is experienced at the household and individual levels in different ways. Individual-level experience relates to issues of food consumption and allocation and includes the physiological sensation of hunger, whereas food supply management and acquisition issues define the household situation (34).

- The experience of food insecurity is not static but dynamic in nature, defined by a temporal sequence of events and experiences that can be considered in terms of frequency, duration, and periodicity.

- The sequence of stages that define the experience reflect graded levels of severity, ranging from qualitative compromises in food selection and consumption to quantitative compromises in intake and the attendant physical sensation of hunger, as resources become increasingly depleted. As its most severe stage, food insecurity is experienced as absolute food deprivation (i.e., individuals not eating at all).

- Within households, individuals' experiences of food insecurity differ. In particular, adults appear to compromise their own intakes first in an effort to minimize the extent and nature of compromise experienced by children in the household. This suggests that food insecurity is a managed process in which the sequence of events and severity of experience for different household members is, to some extent, controlled and predictable (21,22,34).

The conceptual elements of food insecurity outlined above have emerged as cross-cutting themes in research conducted in Canada, the US, and Britain, suggesting that the core experience of food insecurity in developed nations is, in some ways, generic. Whereas the qualitative and quantitative dimensions of food insecurity identified by Radimer et al (21,22) and others appear to be integral parts of this phenomenon, the social and psychological dimensions of food insecurity outlined in Table 1 have not been as thoroughly or consistently characterized in food security research to date. The tremendous diversity of individuals' perceptions and experiences begs the question of whether any particular aspect of these dimensions is sufficiently common as to be considered an integral or defining feature of the experience of food insecurity. Further,

Hamelin et al (32) have suggested that the social and psychological dimensions of food insecurity might be more accurately understood as consequences of food insecurity.

What follows is an examination of key conceptual elements of the experience of food insecurity, as understood from recent research in Canada, the U.S., and Britain. This examination is organized around the four dimensions of food insecurity originally defined by the Cornell group (21-23), but draws upon a broader variety of research to illustrate and substantiate particular dimensions of the experience and highlight potential areas of ambiguity or debate. Selected quotes from participants in qualitative studies are included to provide the reader with a sense of the experiential nature of this phenomenon. Household and individual-level experiences of food insecurity are differentiated in the discussion of each dimension. Finally, the managed aspect of food insecurity and its temporal dimensions are examined, providing two different frameworks within which to consider the conditions, behaviours, and experiences that characterize food insecurity.

Food Quantity

Central to the concept of household or individual food insecurity is the notion of food scarcity or deprivation in the basic need for food. Food insecurity affects food quantity in terms of ***insufficient food intakes*** among individuals and ***insufficient or depleted food supply*** at the household level (21). At the individual level, this includes "going without food" and the resultant physical sensation of hunger (21). Clear gradations in the severity of quantitative compromises in food intake can be defined in terms of the extent and duration of the deprivation that individuals experience. Less severe deprivation is illustrated in comments such as *"for sure we are not starving to death, but we cannot eat so we can fill up"* and *"my children don't skip meals but they don't always eat to their fill"* quoted in a recent Quebec study (33). More severe deprivation is *"when I cannot get enough to eat, or nothing at all...when you can't sleep because*

your stomach hurts" (21). At the extreme, it may include going whole days without eating.

At the household level, the quantitative dimension of food insecurity relates to the perceived adequacy of the household food supply, expressed through concerns about running out of food and not having enough food to make a meal. This was captured in the work of Radimer et al (21) through statements like *"the food that I bought just didn't last..I didn't have anything to put anything together"* . The sentiments are echoed in comments from participants in a recent Quebec study like *"having enough to eat for the five of us is simply impossible"* and *"from the second week of each month there is so little food left in the fridge and in the cupboard that it is hard to make up a dish"* (33). Individuals' experiences of quantitative compromise in food intake are effectively 'nested' within the diminished or inadequate food supply of the household.

Food Quality

At the individual level, food quality concerns associated with food insecurity have been represented by intake patterns perceived to be ***nutritionally inadequate***, a situation captured in the research by Radimer et al (21) by statements like "*I wasn't eating the right stuff...my kids weren't eating a proper meal...I don't think their diet was very nutritious*". Among the elderly, qualitative compromises associated with food insecurity also appear to commonly include the inability to follow dietary practices recommended to them by health professionals as a means to manage specific health problems (e.g., low-sodium foods for hypertension, or fresh fruits and vegetables for diabetes) (29). Interestingly, although the broad definition of food security encompasses issues of food preference, this kind of qualitative compromise is not generally reflected in experiential accounts of food insecurity.

At the household level, food quality issues relate to the ***use of foods deemed unsuitable or of inferior quality***. This includes the consumption of unsafe foods and foods lacking in freshness

because these foods are all that is affordable or available at home or at local food banks (33). It also includes the consumption of a very limited variety or selection of foods because of financial resource constraints. Hamelin et al (33)described the ***monotony*** associated with food insecurity as a problem both of lack of variety in the foods consumed at a single meal and the lack of variety between meals, captured by remarks like *"the same stuff always comes back: noodles with soya sauce, shepherd's pie, pancakes"*.

The discussion of compromises in food quality associated with food insecurity is interesting in that this component, more than any other, overlaps almost entirely with what is known about food selection behaviours in the context of poverty. Intake patterns vary by income group, with low-income individuals in affluent western nations consuming diets that are - on average - qualitatively inferior to those of middle and upper-income groups (e.g., 35-50). (The data on nutrition inequities in Canada are limited, given the paucity of recent, population-based intake surveys in this country, but what evidence does exist certainly suggests that Canada is no exception to trends documented elsewhere.) Qualitative studies of the food practices of low-income families reveal the extent to which their food purchasing behaviours are shaped by their knowledge that the food they buy must last (34,38,51,52) and that they cannot afford to purchase food that might go to waste (53). This logic is exemplified by remarks like this one from a sole-support mother on welfare in Toronto: *"To go out and just buy a pizza - you look at one. Either that pizza or three or four loaves of bread, so you change your mind on the damn pizza"* (52).

Psychological Dimensions

At the individual level, food insecurity is linked to ***feelings of deprivation*** or ***lack of choice*** expressed as *"not according to your own will...that you have to miss or eat only a little because you don't have anything to eat"* (21). These kinds of feelings have been repeatedly documented

in qualitative studies of individuals' experiences of food insecurity (32,33,52,54), highlighting individuals' acute awareness of the extent to which their food intakes are compromised by severe financial resource constraints. Fitchen (38) has written about the ***preoccupation with food*** that comes with experiences of deprivation. In one particularly disturbing account of this phenomenon, she described young children in rural poverty-stricken families in the U.S. who *"when not actually eating or begging a parent for something to eat, ... would stand for whole minutes at a time just looking at whatever foods were still in the cupboard or refrigerator"* (38).

Household food insecurity is linked with an uncertainty or insecurity about the adequacy and sustainability of food supplies, labelled ***food anxiety*** and portrayed in comments like *"when you would get up in the morning, you would begin to worry if you were going to have enough food to make dinner, and if you did have enough food to get through today, what about tomorrow"* (21). Tightly interwoven with the notion of food anxiety is the ***preoccupation with access to enough food*** among food insecure households concerned about being able to maintain household food supplies and have enough food to eat (32 -34,38,52). This is exemplified by remarks such as *"when I see my cupboard becoming empty, I wonder how am I going to fill it again and I get panicky"* (33). Recent work by Hamelin et al (32,33) provides further elaboration of the psychological ***stress*** associated with household food insecurity. Examples include the loss of interest in food and cooking that accompanies such constrained circumstances and the fear of losing custody of one's child - presumably because of not being able to feed him or her properly.

Although psychological dimensions of food insecurity were initially framed as a core component of this phenomenon (21,34), the only psychological aspect identified as an integral part of the phenomenon in recent quantitative modelling is household-level food anxiety (19,26). To date, however, there has been limited research in this area. With further work, it may be possible to delineate other psychological aspects of food insecurity at the individual or household level that

also operate as integral or defining features of the phenomenon, at least within some specific population subgroups.

Social Dimensions

The food acquisition, selection, and consumption behaviours characteristic of food insecurity represent ***deviations from social and cultural norms*** (21,23). At the individual level, this deviation includes disruptions in the usual pattern of eating and may involve quantitative and/or qualitative departures from societal norms (e.g., not being able to eat three meals/day). At the household level, it includes disruptions in sociofamilial eating patterns, frictions around food in the home, and the inability to participate in meal-based cultural traditions and rituals (32,33,38). Depending on how this component is understood, it can have considerable overlap with the psychological aspects of food insecurity for individuals.

At the household level, the social dimension of food insecurity is also manifested in behaviours to acquire food in ways that deviate from social norms. Sometimes referred to as coping strategies or resource augmentation strategies, these behaviours can include seeking food from charitable food assistance programs, family or friends, and food theft - sources considered outside the normal, socially acceptable routes of food acquisition (i.e., food purchasing). The notion of resource augmentation strategies also encompasses abnormal actions to acquire money for food, such as pawning or selling possessions, buying food on credit, delaying bill payments, etc (32,33,55). (Note: The term, resource augmentation strategy, is used in this document to avoid conveying the impression that the invocation of such strategies necessarily means households are coping and their food insecurity is being alleviated by these actions.)

Determining which behaviours lie outside social norms or are 'socially unacceptable' is clearly a matter of judgement, depending in part on one's social location. Furthermore, social norms are

constantly evolving; what appears to be socially unacceptable changes over time. While the normative aspect of this dimension of food insecurity might seem problematic from a measurement or monitoring perspective (e.g., 33), ***social exclusion*** appears to be an integral part of the experience of chronic food insecurity. As they work to satisfy their families' food needs on a limited budget, low-income women appear acutely aware of the extent to which their families' food consumption patterns mirror or deviate from social norms (32,38,52,53). Hamelin et al (33) also documented ***alienation*** in relation to household food insecurity, describing the profound feelings of ***powerlessness, guilt, and shame*** associated with this condition. Participants spoke of the need to conceal their lack of control over their food situations, as indicated by comments like "*we hide it; we don't know what others would think about us not having enough to eat"* (33). The concept of alienation described by Hamelin et al (33) is consistent with the discussions of food insecurity as social exclusion that are prominent in the U.K. literature (3,5,56).

Food Insecurity as a Managed Process

Although conceptually food insecurity can be examined as a composite of discrete components and levels, experientially it is a process. The experience comprises a distinct sequence of events; the nature and extent of compromise at each stage in this sequence is, to some extent, controlled. Further, the managed aspect of food insecurity means that individual members of a household experience different components of food insecurity at different times and to different degrees (21). Household food insecurity has thus come to be understood as ***a managed process*** (21,22,34).

In describing the experience of food insecurity among low-income women with children, Radimer et al (21) noted that anxiety about the adequacy of household food supplies occurred first, followed by compromises in the quality and then quantity of women's food intakes, perhaps

along with a more general deterioration in quality at the household level. Compromises in the quality and quantity of children's intakes did not occur until later, and it was Radimer's observation that children's eating patterns were rarely affected. Importantly, ***quantity was preserved at the expense of quality***, and ***children were protected*** from compromise. The differential restrictions of adults' and children's food intakes in the context of severely constrained resources have been described by a number of other authors as well (32-34,51,52,54,57-60). Adults appear quick to differentiate their own experiences of quantitative food deprivation from those of their children (e.g., *"I would eat more but I prefer to leave more to my child"* (33). More intensive, quantitative examinations of the differences between reported experiences of food deprivation among adults and children in food insecure households indicate that this 'protection' of children is tempered both by the ages of the children and the ratio of children to adults in the household (61). Older children and those in households with a higher children-adult ratio appear more likely than others to share the adult experience of deprivation.

In contrast to the descriptions of food insecurity among families with children, a qualitative study of food insecurity among the elderly revealed a somewhat different progression of events with increasing insecurity. Compromises in dietary quality were found to occur first, followed by food anxiety, socially unacceptable meals, the use of emergency food acquisition and other strategies to augment household food or financial resources, and finally, actual hunger (29). The authors suggested that the primacy of food quality concerns among the elderly might reflect their greater perceived need for high quality diets; many of those interviewed had health problems for which particular dietary practices had been recommended (29).

Related to the notion of food insecurity as a managed process is the understanding of graded levels of severity of food insecurity at the individual and household levels. At the individual level, qualitative compromises typically precede quantitative compromises, and absolute food

deprivation marks the most severe level of food insecurity. As noted earlier, the evidence is less consistent about the placement of food-related anxiety in this continuum of severity.

Strategies to obtain food or money for food in the context of severe resource constraints (e.g., the use of charitable food assistance programs, delayed bill payments, sending children to a friend's or relative's home for meals, selling or pawning possessions, etc) are recognized as belonging to the managed process of food insecurity, but their diversity and unpredictability have made their definitional usefulness questionable (21,27,62). Differences between households have been noted both in terms of the stage of severity at which a particular strategy is employed and whether or not the strategy is employed at all (22). This may in part relate to the differential access of individual households to particular strategies (e.g., the option to obtain help from family or friends or to obtain food assistance) (27 ,54), but must also relate to individuals' feelings about using particular strategies (29). (A fuller discussion of these strategies is presented in Part 3 where their usefulness as indirect indicators of household food insecurity is examined.)

It should be noted that the characterizations of food insecurity as a managed process described above have been developed from studies of domiciled, low-income families and individuals. The ordered sequence of events would appear to hinge on the cyclic flow of resources into the household such that food supplies are accumulated and then systematically depleted. It is unclear how generalizable this sequence of events is to those low-income households whose incomes flow through commissions, self-employment, or seasonal work; to homeless individuals and families; and to other groups whose existence is more "hand to mouth". Preliminary work with street youth in Toronto, for example, suggests that food-related anxiety does not necessarily precede or accompany qualitative or quantitative compromises in intake (63). Further, qualitative and quantitative compromises may be intertwined for individuals whose primary

access to food is through charitable food assistance programs that offer clients no choice about what they eat (28). While the emphasis of research to date on the situations of poor women with children and, more recently, the elderly undoubtedly reflects concerns about the particular vulnerability of these groups, insofar as the resultant conceptual framework forms the foundation for measurement and monitoring work at the population level, the narrowness of this focus is a limitation.

Temporality

Food insecurity is not a static condition. Underpinning the notion of food insecurity as a managed process is a clear temporal sequence of events and experiences. However, understanding the frequency, periodicity, and duration of specific experiences or stages of food insecurity is crucial to gauging the severity of food insecurity. As noted above, the pattern of food insecurity in a household is intimately linked to the pattern of financial resource constraints in the household. For example, a household may experience running out of food at the end of each month, if income flows into the household on a monthly basis and it is insufficient to meet expenditures. Alternatively, the experience of food deprivation may be episodic in nature, arising in the context of financial crises. Such crises could arise from the sudden loss of revenue associated with job loss or the suspension of welfare benefits, but might also occur in low-income households when expenses suddenly escalate. The following account illustrates this problem: *"our food situation was already tight when my teenager who had been temporarily placed in foster care came back [unexpectedly]; it was one more mouth to feed and increasing food stress"* (33). Finally, in the absence of financial resources, food insecurity may be constant, as in the case of homeless people and others living a "hand to mouth" existence.

In a 1986 World Bank publication that characterized food insecurity in both developed and developing countries, food insecurity was described as being either chronic or transitory, based

on whether there was continuously inadequate food access or a temporary decline in access, respectively (64). This distinction was also noted in an ethnographic study of the food problems of a small sample of low-income, single-parent families in Toronto; for these families periodic acute food shortages and deprivation appeared to occur against a backdrop of chronically limited food selection (52). A similar pattern of food insecurity appeared to characterize the experiences of most households in the recent study by Hamelin et al (33).

While the conceptualization of household food insecurity as a managed process is helpful in mapping out the probable sequence of events, understanding the frequency and duration of experiences (both at the household and individual levels) at each stage in this sequence is critical to determining the severity of the problem in terms of health or nutrition and understanding its psychological and social implications. Understanding the temporal patterns of food insecurity as it is experienced by Canadian households can also yield insight into the causes of this problem and help to elucidate appropriate interventions. As noted later, this aspect of food insecurity measurement is currently not well developed.

PART 2: WHY MONITOR FOOD INSECURITY IN CANADA?

The importance of monitoring household or individual-level food insecurity in Canada can be considered from two perspectives: i) food insecurity is a problem in its own right; and ii) it is a condition with deleterious consequences for the health and well-being of individuals and of society as a whole. This dichotomy was perhaps expressed most succinctly by Campbell (23) as a question of whether food insecurity should be considered "a nutritional outcome or predictor variable". As described in Part 1, household food insecurity is characterized by profound levels of deprivation that many would regard as unnecessary and unacceptable in an affluent society such as ours. As such, there is a strong argument for the need to monitor food insecurity as a problem in its own right. In this section, the value of monitoring food insecurity is explored more fully. The relationship of food insecurity to health, nutrition, and well-being, and the possible social consequences of food insecurity are examined to shed some light on the question of why household or individual-level food insecurity might be of interest as a risk factor for other undesirable outcomes. The broader question of what might be gained by including food insecurity in a national nutrition monitoring program is then discussed.

Nutritional Implications

Perhaps because of the perceived need to anchor self-reports of food insecurity in more 'objective', traditional measures of nutrition as a means to gain legitimacy for this area of health research (a need exemplified in a recent editorial in the American Journal of Public Health (65)), there have been a number of analyses of the relationship between measures of food insecurity and dietary intake. Several studies have documented significantly poorer intakes among individuals in households characterized by food insecurity than those in food secure settings (18,58,59,66,67). Further, dietary intakes of adult women at least appear to vary systematically with the severity of household food insecurity (68). In three of these studies (18,67,68),

multivariate modelling techniques have been applied to control for other social, cultural, and economic influences on dietary intake; results suggest that the observed differences in intake are specific to the state of household food insecurity. The strength and consistency of study findings indicate that the self-appraisal of food security or food sufficiency at a household level is reflective of actual intake and that it corresponds well to more conventional, nutritional assessments of dietary adequacy.

To date, there have been few studies linking food insecurity to biochemical or clinical measures of nutritional status. In a recent U.S. population-based survey of elderly, disabled women, a measure of food insufficiency[1] was examined in relation to three biochemical indicators of nutritional status: hemoglobin, serum albumin and total cholesterol (69). Women who reported food insufficiency were three times more likely than food-sufficient women to have iron deficiency anemia. Although the differences were not statistically significant, they also tended to have lower serum albumin and lower total cholesterol (measures that, in other studies, have been linked to increased risk of coronary heart disease and non-cardiovascular diseases respectively among older persons).

Despite the observed associations between suboptimal dietary intake or biochemical markers of nutritional status and household food insecurity, measures of household food insecurity are not necessarily indicative of or equivalent to other measures of income-related nutritional vulnerability. Rather, nutritional vulnerability, as ascertained through classic dietary, anthropometric or biochemical assessments, is a potential, but not a necessary consequence of food insecurity. The *expected* relationship between household food insecurity and individual-level indicators of nutritional status depends on the nature, severity, and duration of

[1]In this study, food insufficiency was assessed through a single question, "How often does it happen that you (and your husband) do not have enough money to afford the kind of food you should have?".

the insecurity experienced by the individual. The *observed* relationship also depends on how food insecurity is measured (i.e., the level of severity captured by the measurement instrument used) and how nutritional status or nutrient adequacy is assessed. Depending on how food insecurity is conceptualized and measured, this measure could potentially identify only a subset of those who exhibit income-related nutritional vulnerability as ascertained through dietary assessments.

The intrahousehold distribution of resources also affects the observed association between household measures of food insecurity and individuals' dietary intakes. Even when households are under no apparent economic constraints, foods and nutrients are not allocated in proportion to individual members' needs; some members are more privileged than others (70-73). Inequities in intrahousehold food distribution appear to increase in the context of food insecurity. Poor women typically report that they deprive themselves of food in order to leave more for their children during periods of severe food shortages (34,38,51,52,57,74). This behaviour is also suggested by studies reporting poorer quality dietary intakes among low-income women in comparison to their children (44,51,58). It is further indicated by the absence of significant differences in the energy or nutrient intakes of preschool children in food sufficient vs food insufficient households in the 1989-1991 CSFII, but the presence of significantly lower intakes of energy and five nutrients (protein, thiamin, calcium, phosphorus, and magnesium) among other household members in food insufficient vs food sufficient households (59,67). These findings suggest that women's intakes may be particularly sensitive to deteriorations in household food security, but raise questions about expected correlations between household food insecurity and children's dietary intakes. They also beg the question of how men's intakes are affected by household food insecurity if they reside in households that include women and children.

When food insecurity measures have been included in population nutrition surveys, the results have often been compared to intake data as a means to assess the validity of the measures. While these analyses have been important in advancing the field of food security measurement, a broader application of food security measures now seems warranted. When both food insecurity and dietary adequacy are measured in population-level dietary surveys, the food security data can be useful in interpreting the dietary measures. When suboptimal dietary intakes are recorded in the context of household food insecurity, it suggests that the intakes may have been influenced by financial resource constraints. (Note: Such associations do not provide evidence of causal links, only contextual associations.) While it might be assumed that a similar interpretation would be reached if the intake data were simply correlated with income or a measure of socioeconomic status, the subjective aspect of the food security assessment indicates that the individuals involved are cognizant of - and indeed actively engaged in dietary compromises because of their financial resource constraints. This is important because it sets the stage for a particular set of interventions to address identified nutritional problems. Without data on the role of financial resource constraints in shaping intake practices within households, nutrition planners might be more likely to presume that these practices are matters of personal choice requiring intervention at that level.

Implications for Physical Health

Although there has recently been considerable research into the relationship between household food insecurity and individuals' dietary intakes, research into the implications of food insecurity for health and well-being is in its infancy. Both conceptually and methodologically, this is a difficult area of research to pursue. By definition, food insecurity occurs in the context of financial resource constraints. The coexistence of household food insecurity with poverty, and the well-documented association between poverty and ill-health, make it difficult to identify health consequences other than dietary inadequacy that are specific to food insecurity. Thus

few definitive relationships are described here.

Insofar as food insecurity is associated with dietary compromises, it may affect the management of chronic diseases in which nutrition is implicated. One study of food insecurity among a sample of adult patients at a U.S. urban county hospital revealed associations between hypoglycemia and hunger and food insecurity among diabetic patients, suggesting that food insecurity may exacerbate the management of this condition (75). In this case, it seems plausible that the effect of food insecurity on health is mediated through its role on dietary intake.

Health problems associated with food insecurity have been alluded to in qualitative studies (32,33), and some associations between measures of food insecurity and indicators of poor health have been reported in the quantitative literature. Household food insufficiency and severity of household food insecurity have been associated with poor self-rated health among women with children (55,58). Consistent with these findings, in the 1994 National Longitudinal Survey of Children and Youth caregivers in families reporting child hunger were more likely to rate their health poorly and to report having at least one chronic health condition when compared to caregivers in families not reporting child hunger (76). In that study, the health of the children who experienced hunger was also reported to be worse than the health of children who did not experience hunger (76). This finding is similar to that in an earlier U.S. study in which the severity of household food insecurity among low-income families was directly related to the number of child health problems they reported (60). In the afore-mentioned U.S. study of elderly disabled women, food insufficiency was associated with poorer physical performance among white women, and with more medical conditions among minority women (69). Interestingly, financial variables were highly associated with the measure of food insufficiency in this study, but were not found to mediate the observed relationships between food insufficiency and health.

Social Implications

Food insecurity is not only a health or nutrition problem, but also a social problem. As outlined in the preceding discussion of the psychological and social components, food insecurity shapes and structures individuals' behaviours and feelings about themselves. Individuals' struggles to cope with food insecurity can give rise to a wide range of socially undesirable actions. A particularly extreme example of this is the documented link between hunger and criminal activity among street youth in Canada (77), and the reports of theft and poaching among food insecure families in Quebec (33). More commonplace strategies such as the seeking of assistance from food banks can also be regarded as socially undesirable and personally unacceptable, as indicated by the shame and humiliation many have reported in association with this action (32,33,78,79). Street youth also speak about the loss of dignity associated with having to panhandle or beg for money for food (80).

The social costs of food insecurity go beyond the indignities that can be associated with this experience. The preoccupation of individuals and families with getting enough food (32,38) takes attention away from other activities. The sizable, but largely invisible work of feeding one's family (81) is made even larger, more difficult, and more stressful when this work must occur in the context of financial resource constraints (32,53,82). Irrespective of the physical health consequences of a chronically compromised diet, the demands placed on individuals struggling to manage household food insecurity on an ongoing basis must compromise well-being and limit the ability to achieve a 'healthy and productive life'. Some indication of this is perhaps found in research from the U.S. Community Childhood Hunger Identification Project (CCHIP), in which a variety of behavioural, emotional, and academic problems were found to be more prevalent among children in food insecure vs food secure households (60,83,84). More recently, Klesges et al (69) have documented higher levels of psychological depression among elderly disabled women reporting food insufficiency compared to women reporting no such

problem.

Social exclusion may be a further social implication of food insecurity as those affected are forced to adopt food consumption patterns and food acquisition strategies that fall outside social norms (3,5,22,56). Both the array of strategies people report employing to acquire food or money for food when threatened with acute food shortages and the indications of compromised food intakes among those in households with severe food insecurity imply behaviours that depart from social norms. Qualitative interviews with those who have experienced food insecurity indicate that many are profoundly affected by this aspect of the experience (32,33,38,52,54). Social exclusion not only has deleterious consequences for those directly affected; its divisiveness affects our society more broadly, increasing inequalities and eroding social cohesion. Thus quite apart from its implications for individuals' physical health and nutrition, the social dimensions of food insecurity make it relevant to broader discussions of population health.

Monitoring Food Insecurity

While much remains to be understood about the nature and severity of food insecurity and the short- and long-term consequences of this phenomenon, the concept of food insecurity has now been clearly elucidated. The profound deprivation and social exclusion that underlie experiences of food insecurity suggest that this condition is a matter of public health concern worthy of monitoring in its own right. Food insecurity is also important to monitor as a risk condition for other health concerns. The dietary manifestations of chronic and severe food insecurity clearly pose threats to nutritional health and well-being. In addition, there is emerging evidence that food insecurity can have deleterious social and psychological consequences for those directly affect by this problem, although to date there has been less research in this area. Through the systematic monitoring of food insecurity, the incidence and prevalence of this condition can be

identified, and the characteristics of individuals and households who experience food insecurity can be defined. The relationship between household-level problems of food insecurity and changing social and economic conditions, policies, and intervention programs can be understood.

The fact that food insecurity denotes a dimension of nutritional vulnerability that is different from but complementary to traditional dietary assessments means that this problem must be monitored in its own right if we wish to understand it. The extent and severity of food insecurity cannot be readily inferred from other nutritional monitoring activities. Thus it has been argued that food insecurity should be considered an essential component of nutrition monitoring and surveillance activities because food security is an integral part of 'nutritional state' (defined as "the assimilation and utilization of nutrients by the body plus interactions of environmental factors such as those that affect food consumption and food security") (85). The measurement of household or individual-level food insecurity in tandem with other measures of nutritional vulnerability would importantly facilitate the identification of population subgroups whose nutritional health is potentially compromised because of financial resource constraints.

Also related to the question of including food insecurity as part of a national nutrition monitoring system are the moral, ethical and social dimensions of this problem in Canada. Quite apart from its relation to health and nutrition, food security is frequently framed as a moral imperative in a country as affluent as ours (8,16), and the existence of 'hunger' in our midst is seen as an indication of some collective failing. Related to this is the outpouring of public concern about local problems of food insecurity and continual controversy over what constitutes an effective response to these problems. For example, since their inception, there has been ongoing public debate over the appropriateness of food banks as a response to food insecurity in Canada. The proliferation and rapid entrenchment of these extra-governmental, community-based food charities has been repeatedly cited as a damning indictment of current directions in Canadian

social policy (8,86-88) and as evidence of the erosion of one of the most fundamental human rights - the right to food (8), yet they remain the primary response to food insecurity in Canada. Substantial community resources have been - and continue to be - deployed for charitable food distribution and other food security-related programs as local groups struggle to respond to perceived problems of 'hunger' and food insecurity in their midst. The ad hoc and local nature of most of these initiatives means they are difficult to enumerate, but the opportunity costs of this allocation of resources must be substantial.

With the recognition of household food insecurity as a persistent problem and one of public health significance (14-17), health departments and ministries have also become drawn into the development and delivery of responses to this problem. A wide range of food security programs have been initiated by public health departments or community service organizations across the country, but there remains much debate over the nature and magnitude of the problem and what constitutes effective intervention. It is also unclear how health professionals' responsibilities to address this problem should be circumscribed, and where the capacity lies for health and nutrition-oriented interventions to contribute (8,89-94). This confusion is perhaps most apparent in the current debates over children's feeding programs and their potential contribution to alleviating problems of child hunger related to household food insecurity (89,95,96), but can also be seen in the earlier literature on food banks in Canada. The systematic monitoring of food insecurity would importantly inform policy and programming in the area of food insecurity. As such, it would fill a significant void.

PART 3: MEASURING FOOD INSECURITY

In this section, direct and indirect indicators of household and individual-level food insecurity that might be relevant to the monitoring of food insecurity at a national, provincial or regional level are examined. The term, direct indicator, is used in reference to direct measures of household or individual-level food insecurity, while indirect indicator is used to refer to measures that are not of food insecurity but from which some level of vulnerability to food insecurity might reasonably be inferred.

1. DIRECT INDICATORS

The ideal direct measure of household food insecurity is one that captures the core behaviours and experiences that characterize household food insecurity in Canada and recognizes stages of severity. Further, the instrument should have known and acceptable levels of validity and reliability (including sensitivity to change) in the Canadian context and have a clear, empirically-grounded foundation for the interpretation of results. The relative importance of instrument sensitivity and specificity depends on the goals of the measurement activity. If the purpose of measurement is only to estimate prevalence, then the sensitivity (i.e., likelihood of correctly identifying those households with the problem) and specificity (i.e., likelihood of correctly identifying those who do not have the problem) of the instrument are unimportant as long as the proportion of false positives and false negatives identified are roughly equal so as to cancel each other out (97). Instrument sensitivity is very important, however, in identifying vulnerable population subgroups or at-risk households. (Specificity becomes particularly relevant when the instrument is used to evaluate interventions designed to move households out of food insecurity.) From the standpoint of application, the instrument should be relatively brief, easy to administer, translatable into both official languages (at minimum), and appropriate for use across the

diversity of households reflective of the Canadian population in terms of culture, household size and composition, education, etc.

Despite a broad understanding of quantitative, qualitative, psychological, and social or normative dimensions of food insecurity at the individual and household levels (23), measurement work has largely focussed on the qualitative and quantitative compromises in food intake that arise with declining household resources (19,97). The primacy given to measuring the quantitative aspect of food insecurity (i.e., food deprivation) reflects recognition of this as the most severe manifestation of food insecurity. As discussed in more detail later, the narrowness of this focus is particularly important to recognize in considering the application of current measurement tools for population monitoring. The interpretation of prevalence estimates of food insecurity must be couched in a clear understanding of what particular aspects of food insecurity have been assessed.

This discussion of direct indicators begins with a review of four instruments that have been developed and applied in the last two decades to measure food insecurity (or some components of it) in population samples in North America. General issues of questionnaire validity and reliability are then discussed, the experience of food insecurity measurement in Canada is briefly reviewed, and issues pertinent to the application of existing measurement tools in the Canadian context are examined.

The four direct measures of food insecurity (or particular aspects of it) employed in recent, major studies in North America and for which measurement properties have been documented are reviewed here[2]. These are, in chronological order of their development, the food sufficiency

[2] A brief food security measurement tool was developed for use in the 1997 New Zealand National Nutrition Survey. It is not included in this review because there is considerable overlap in content and format between this instrument and the American ones discussed here, and the

status question; the Community Childhood Hunger Identification Project (CCHIP) instrument; the Radimer/Cornell instrument; and the Food Security Core Module (FSCM). It should be noted that all of these instruments have been designed to be administered to the household head or person most responsible for food and food provision in the household, and to provide insight into household food insecurity. All four instruments have been developed and used extensively in the U.S., but all four have also found their way (in whole or in part) onto Canadian surveys and studies of food insecurity. Because the CCHIP and Radimer/Cornell instruments extended the understanding of food insecurity that could be gleaned from the Food Sufficiency Status question, and the FSCM is based on the conceptual and methodological development work of the earlier instruments, it does not make sense to consider the instruments as four options for food security measurement. Each has built upon the accomplishments of its predecessors, but each has only been able to go as far as the state of knowledge at the time of its development. The most recent instrument (i.e., the FSCM) is thus widely regarded as the best available instrument today (19,98,99), but as discussed here, it too has limitations and continues to be a focus of research.

Food Sufficiency Status Question

Perhaps the earliest (and still the simplest) attempt to measure food insecurity at a population level came from the assessment of food sufficiency status. Food sufficiency status was assessed as early as 1977-78 in the US Nationwide Food Consumption Survey (NFCS) and again in the 1987-88 NFCS and the 1985-86 and 1989-91 Continuing Survey of Food Intakes by Individuals (CSFII). An expanded set of five questions on food sufficiency was included on the Third National Health and Nutrition Examination Survey, 1988 through 1994 (NHANES III) (1,100). In its simplest form, food insufficiency is assessed with a single question which asks respondents

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New Zealand tool has not (yet) been used for scaling purposes.

to appraise the quantity (enough) and quality (kind wanted) of food eaten in their household (101). Food insufficiency is defined as "an inadequate amount of food intake due to a lack of money or resources" (100). It has been found to be associated with lower reported energy and nutrient intakes (1,18,58,67) and with income-based measures of poverty (1,58).

In more recent analyses of household food insufficiency (as assessed by the single question, classifying all those reporting sometimes or often not having enough to eat as food insufficient), it has been interpreted as a proxy for “food insecurity with hunger” as this has been defined in the FSCM (59). That is, food insufficiency is seen as a measure of fairly severe household food insecurity because it hinges on the admission of quantitative deprivation (vs less severe indications of food insecurity such as food-related anxiety or qualitative compromises in intake in relation to household financial resource constraints). A direct comparison of households' classifications based on two versions of the food sufficiency question with the FSCM, while revealing good overall correspondence between the two instruments, does not provide strong support for this inference. Differences in the classification of households across the two instruments may in part be a function of the absence of a time reference in the food sufficiency question and the different definitions of severity underpinning the two scales (the food sufficiency status question is focussed on the frequency of food shortages, whereas the FSCM measures food insecurity across a broader range of severity) (27).

Community Childhood Hunger Identification Project (CCHIP) and Radimer/Cornell Questionnaires

As the multidimensional nature of food insecurity was better understood, two more comprehensive measures of food insecurity were developed: the Community Childhood Hunger Identification Project (CCHIP) hunger index in the mid 1908s and the Radimer/Cornell instrument in the late 1980s and early 1990s (102). The CCHIP hunger index comprises eight

questions on qualitative and quantitative components of food insecurity at the household, adult and child levels (60,103). The Radimer instrument initially comprised 12 items, developed through factor and cluster analysis and reliability testing of a larger set of 30 items which had been developed from qualitative interviews with 32 women and then tested on a sample of 189 women (21,22). Slight modifications to the instrument were made in subsequent applications[3] (24). (For a comprehensive review of the evolution of this instrument over time see Hamelin (31).) Both the Radimer and CCHIP scales are additive, with determinations about 'hunger' based on the number of affirmative responses. The Radimer instrument has been applied to provide categorical determinations of household food insecurity, individual (adult) food insecurity, child hunger, and individual-level hunger for the adult respondent (21,24). The CCHIP instrument groups respondents into three categories: 'no hunger', 'at risk for hunger' and 'hungry' (60); this latter category is also sometimes labelled 'child(ren) hungry' because the classification requires an affirmative response to at least one question pertaining to compromises in children's intakes (83,84). However, it should be noted that while the labels suggest current and ongoing deprivation, households are classified based on reports of 'ever' having specific experiences over the last 12 months. Comparisons of the Radimer and CCHIP instruments have revealed good agreement in terms of their differentiation between food secure and food insecure households, suggesting that while the specific questions differ, the two instruments are tapping very similar phenomena (25,97).

U.S. Food Security Core Module

In 1992, USDA initiated work to develop a national measure of hunger and food insecurity, building on the developmental work of the CCHIP and Cornell groups (19,21-23,60). (A

[3]The various versions of this instrument are not differentiated in this document; all are considered under the general heading of “Radimer/Cornell” or simply “Radimer”. Readers are advised to consult the original sources that if they are interested in which particular version was used in a particular assessment of validity, etc.

detailed account of this development process can be found in Bickel et al (102).) The underlying conceptual framework for this work included an understanding of food insecurity as a "managed process" of decision making and behaviour in response to increasingly constrained household resources (19). To ensure that only behaviours arising in the context of financial resource constraints would be captured, every question includes a qualifier to this effect. The resultant instrument, described in detail below, marks a major advance over earlier instruments because it enables household food insecurity to be measured along a unidimensional, thoroughly calibrated scale of severity.

A broad array of questions related to food insecurity were included in the April 1995 Current Population Survey (CPS), and through nonlinear modelling, a core set of food insecurity and hunger items were identified that could be scaled along a single dimension. The scale was refined through Rasch modelling. The resultant 18-item scale, now called the Food Security Core Module (FSCM) or simply the U.S. Food Security Scale, essentially measures qualitative and quantitative compromises in food intake with declining household resources, recognizing differences in adults' and children's experiences of resource constraint. (A copy of the instrument is included in Appendix A.) Severity is based on the level of reported food deprivation among adults and, in households with children present, food deprivation among children. The scale is designed to yield a single score (from 0 to 10) denoting severity of household food insecurity over the past twelve months along a continuous, Rasch-based scale. The instrument also has the capacity to obtain a 30-day measure of food insecurity although the questions are insufficient to permit differentiation of 'food secure' from food insecure with no hunger evident' over this time period.

A four-level categorical variable can be derived from the FSCM, classifying household food security status as 'food secure', 'food insecure with no hunger evident', 'food insecure with

moderate hunger', and 'food insecure with severe hunger' (Table 2). The actual classification of households into these categories is based on the number of affirmative responses. The cut-points used to classify households and the conceptual definitions applied to the resultant classifications are grounded in extensive conceptual work and consistent with the Rasch-based scaling of items in terms of severity. Nonetheless, the cut-point are in some sense arbitrary, and it is important to recognize this in considering their application. While the availability of a categorical variable is particularly useful in summarizing scale results, there is some question about where exactly the cut-points should be drawn and how the resultant categories should be labelled (discussed more fully later). It would appear likely that with further research, alternative categorical measures will be proposed and additional sub-scales developed.

Table 2. Conceptual definitions of levels of household food insecurity identifiable from the 12-month Food Security Core Module.

Food secure	Households show no or minimal evidence of food insecurity.
Food insecure without hunger	Food insecurity is evident in households' concerns and adjustments to household food management, including reductions in diet quality, but with no or limited reductions in quantity of food intake.
Food insecure with moderate hunger	Food intake for adults in the household is reduced to an extent that implies that adults are experiencing hunger due to lack of resources.
Food insecure with severe hunger	Households with children reduce the children's food intakes to an extent that implies that children experience hunger as a result of inadequate household resources. Adults in households with or without children experience extensive reductions in food intake (e.g., going whole days without food).

from Hamilton et al (26).

In developing this measurement scale, the term, hunger, has been used to denote "the uneasy or painful sensation caused by lack of food", recognized as a possible but not necessary consequence of food insecurity (19). However, because the categorical measure of individual households is based on the total number of affirmative responses, not the pattern of responses to individual questions, a household can be classed as food insecure with severe or moderate hunger without having reported 'hunger' at the level of adults or children. In the context of these classifications, hunger refers to a relatively severe manifestation of the broader condition of food insufficiency experienced relative to need. The facet of the FSCM has drawn into question the face validity of the categorical measure (25).

In the US, the 18-item FSCM has been found to take, on average, two minutes to administer. Most households are 'food secure', and because of the skip patterns built into the questionnaire, for food secure respondents the instrument only takes a few seconds to complete. For households that are 'food insecure with hunger', the questionnaire can take as long as four minutes. A comprehensive guide is available to instruct potential users as to the administration and scoring of the FSCM, further expediting the implementation of this tool (104).

This questionnaire, with minor modifications, has been included in subsequent years of the CPS, and the USDA has released yearly national food security prevalence estimates for 1995 to 1998. The instrument has also been administered in several other research contexts both at the national and state or regional level, and it will be included in the forthcoming integrated NHANES/CSFII. There is even some suggestion that in the present context of fiscal restraint and decentralization, local or state-level surveys of food insecurity could supplant more costly dietary intake assessments (18). Use of the instrument here would permit U.S.-Canadian

comparisons of prevalence of household food insecurity, if these were of interest.

In response to demands for an even shorter instrument for population-level assessment, a 6-item subset of questions was developed from the 18-item FSCM (105). In a general sample of the U.S. population, this subset appears to be able to correctly classify households into three categories of food security: 'food secure', 'food insecure with no hunger evident', and 'food insecure with hunger evident'. The limited number of items does not allow for differentiation between households that are food insecure with moderate vs severe hunger. Further, the 6-item subset cannot provide a continuous scale measurement for severity of food insecurity. As well, the authors note that the concordance between classifications based on the 6- and 18-item questionnaires would be poorer in samples with higher prevalence of food insecurity because the short form's sensitivity is lower than its specificity. Thus the two instruments are not interchangeable.

Limitations of the FSCM

The operational definition of food insecurity embodied by the 18-item questionnaire is considerably narrower than the definitions of food insecurity commonly presented (85). This needs to be borne in mind when interpreting prevalence estimates based on the FSCM. The psychological and social dimensions of food insecurity elucidated in qualitative studies of this phenomenon are not well captured in the FSCM or its predecessors. As noted earlier though, these dimensions may be more accurately thought of as consequences rather than essential components of food security measurement. Only one question in the FSCM relates to anxiety about household food supplies (the least severe item on the scale). The normative aspects of food insecurity are captured only insofar as respondents appraise their own consumption patterns relative to their perceptions of adequate and acceptable food consumption (e.g., eating less than they felt they should; not being able to afford balanced meals) and eating patterns (e.g., cutting

or skipping meals). No attempt is made to garner data on the respondent's 'baseline' in this regard, however. Insofar as those in chronically deprived circumstances become inured to income-related compromises in food selection and eating patterns, they may not identify these behaviours as abnormal or problematic on a questionnaire.

The FSCM also fails to capture disruptions in normal, socially-acceptable food acquisition practices and the adoption of more highly stigmatized and potentially risky behaviours to garner food (e.g., dumpster diving, theft, charitable food assistance, etc). A number of questions about resource augmentation strategies were included in the 53-item questionnaire initially administered on the US CPS in 1995. However, statistical analyses of responses to these items indicated that they did not relate in a systematic, predictable manner to other indicators of the severity of household food insecurity (27), an observation consistent with earlier work by Radimer et al (21). Further, the omission of this dimension of food insecurity was determined to have only a small impact on prevalence estimates of household food insecurity (27).

Rather than regarding the FSCM's emphasis on quantitative food deprivation as a limitation, it could be seen as a particular strength of this instrument. Quantitative deprivation is probably the most unambiguous aspect of food insecurity and thus the one that can be measured most precisely. Further, because such deprivation is necessarily embedded in a larger context of qualitative compromises in food intake, even if individuals' experiences of actual food deprivation are short-lived, they are likely to be nutritionally vulnerable. This assertion is supported by the observed associations between household food insecurity and more limited food consumption patterns and lower intakes of energy and several nutrients (18,24,68,97,101).

Interpretation of the determination of household food *security* (vs food insecurity) derived from the FSCM is perhaps clouded by the fact that this instrument (like the CCHIP and Radimer

instruments) does not include questions to confirm food security (106). Households are categorized as food secure if they have less than three affirmative responses to items assessing food insecurity. This begs the question of whether all those classed as food secure are really that. The FSCM's emphasis on quantitative compromises in intake may mean that households in which *only* dietary quality is compromised will be less likely to be identified as food insecure. How many households fall into this category is difficult to ascertain from existing data. Three questions on the FSCM address food quality but two of these focus specifically on children's intakes, representing a more severe manifestation of food insecurity than compromises at the more general, household level. In a recent survey in Hawaii, Derrickson et al (25) reported that 2.1% of those classed as food secure on the FSCM reported that their families were unable to afford balanced meals. The finding suggests that an expansion of the operational definition of household food insecurity to include reported qualitative compromises (coupled perhaps with more questions to explore this behaviour) would result in an increased prevalence estimate. However, analyses of dietary intake data in relation to socioeconomic status suggest that qualitative compromises are an integral part of the food consumption patterns of those on limited budgets, begging the question of what level of compromise is specific to household food insecurity. Whether all households whose food purchases are constrained by budget limitations should be considered food insecure depends on how one understands the meaning of this term, but the question perhaps highlights the ambiguity associated with this particular component of food insecurity.

Recent work by Derrickson et al (25) has raised additional questions about the appropriateness of the categorical measure currently applied to the FSCM in U.S. surveys (shown in Table 2). Comparisons of FSCM food security classifications with measures adapted from the Radimer and CCHIP instruments and a third tool (the Face Valid Food Security Measure, developed by Derrickson) revealed a lower prevalence of household food insecurity with the FSCM than the

other three measures (15% vs 22% of the sample). The discrepancy arises because a minimum of three affirmative responses is required to classify a household as food insecure on the FSCM whereas the other instruments require only one affirmative response to make the same classification. However, Derrickson et al (25) found significant differences in other indicators of food insecurity (e.g., resource augmentation behaviours) between households with one affirmative response to the FSCM vs those with no affirmative response, suggesting that the FSCM classification procedures may be overly stringent. While the study highlights the need for further research into the categorical measures derived from the FSCM, it important to recognize that this criticism focuses on the cut-points proposed by Hamilton et al (26,27) for the construction of a categorical variable from the scale. It is not a challenge to the scale itself.

One final feature of the FSCM that perhaps deserves note is that it does not include sufficient questions to capture details on the duration and frequency of food deprivation or compromised intake associated with food insecurity. Frequency is assessed in very broad categories and no attempt is made to identify the number of consecutive days, for example, when the respondent went without eating or ate only small amounts of food. Such data would be required to pursue a more elaborate analysis of the potential physiologic or pyschosocial ramifications of food insecurity at an individual level, but the relevance of this is probably greatest in a research context, not in nutrition monitoring.

Assessing the Validity of Food Security Measurement Tools

Because of the complex, multidimensional nature of food insecurity and the strong subjective element to this construct, it is difficult to identify a simple ‘gold standard’ against which food insecurity scales can be validated. Instead, validity needs to be examined from a variety of perspectives. The overarching question of instrument or scale validity is what level of

confidence can be placed on inferences made about people based on their scores from a particular scale (107). What follows is an overview of current research on different aspects of food security measurement that, taken together, provide some insight into the validity of these tools. Because there is substantial overlap between the FSCM, Radimer, and CCHIP scales and comparisons across scales suggest comparable levels of validity (25), this review is organized according to method of validation or type of validity being assessed, rather than the individual scale.

One criterion of validity proposed by Frongillo (98) is that the construction of the food security measures is well grounded in an understanding of the phenomenon. In conventional terms, this can be understood as an issue of content validity. The questions used in the Radimer and CCHIP scales, and now in the FSCM are grounded in qualitative research with those directly affected by household and individual-level experiences of food insecurity (though the samples were primarily with low-income women with children). As such, the experiential dimensions and, in some cases, the actual language used have been drawn from the accounts of those who are food insecure. Content validity is also implied by the fact that the performance of these instruments is consistent with the understanding of food insecurity that has arisen from qualitative research (108,98). Specifically, factor analysis of questionnaire responses confirms the conceptual components of food insecurity as these have been theorized from qualitative research (21,24,26,60,103). The item response pattern (i.e., the sequence of affirmative responses among modal households) is consistent with the understanding of food insecurity as a managed process (19,26,98). Further, cognitive testing indicates that the questions are comprehensible and meaningful to respondents (60,98,108), suggesting good face validity.

Criterion validity refers to the correlation of a scale with some other measure of the phenomenon, but as noted earlier, such assessments are complicated by the lack of a clear ‘gold

standard' and by the somewhat arbitrary nature of the cut-points used to define food insecurity vs food security. In two studies, the concordance of scale measures has been compared to determinations of food insecurity based on qualitative interviews. Hamelin (30,31) found good agreement between the classification of individuals as food secure vs food insecure based on their descriptions of their situations in focus groups and individual interviews vs their classifications based on their responses to the Radimer/Cornell instrument. Comparisons of five quantitative measures of food insecurity with assessments of individuals' food insecurity status based on in-depth, semi-structured interviews with 24 elderly also revealed good agreement, with the Radimer and CCHIP measures exhibiting greater sensitivity than the food sufficiency question (29).

In a study of 193 women living with children in a rural county in New York state, food security classifications based on the Radimer and CCHIP measures and a version of the food sufficiency question (used on NHANES III) were compared with a criterion measure of food insecurity derived from independent assessments of the households based on an evaluation of household demographic characteristics, use of food programs, sources and expenditures on food and other items, income, household food inventories, and 24-hour dietary intake recall data on the women (97). When compared to the criterion measure, the Radimer and CCHIP instruments showed good specificity (correctly classifying 63-71% of the 'truly food secure') and excellent sensitivity (correctly classifying 84-89% of the 'truly food insecure'), and the instruments yielded similar prevalence estimates. Further, there was good overall agreement between the CCHIP and Radimer instruments. The NHANES III question fared considerably more poorly, however, substantially underestimating the prevalence of food insecurity and displaying very poor sensitivity (though excellent specificity).

Construct validation addresses the question of whether observed relationships between the scale

and other variables are as one would hypothesize, assuming the scale is a valid measure of the underlying phenomenon or construct of interest (107). Thus comparisons between the understanding of household food security status as determined by the food sufficient question, Radimer, CCHIP or FSCM scales with other measures or markers of household food security provide evidence of construct validity for these scales. Derrickson et al (25) reported comparable levels of construct validity when they compared the three scales with three behavioural variables understood to vary with food security status. Across all of the scales, they found that as food insecurity worsened, there was increased utilization of resource augmentation strategies, a decrease in vegetable intake, and an increased use of an inexpensive noodle product (previously identified as a marker of hardship among Hawaiian households).

Kendall et al (24) compared household demographic characteristics, household food inventory scores, and reported frequency of fruit and vegetable consumption) with food security classifications based on the Radimer/Cornell instrument among the previously-described sample of 193 women with children. As food security status worsened, a significant and progressive increase in the proportion of households reporting low income, education and employment; an increase in the proportion participating in food assistance programs; and a significant decline in household food availability and fruit and vegetable consumption were observed (24). In this study, two 24-hour dietary intake recalls were also collected from each woman, but very few significant differences in intake were observed by food security status, perhaps because of the small sample and limited number of days of intake data collected (66).

Dietary intake data have also been compared to measures of food sufficiency as a means to appraise the construct validity of these measures. Significantly lower intakes of energy and a number of nutrients have been documented among adult women (58,67) and the elderly (67) in food insufficient vs food sufficient households, but differences in intakes of preschool children

in food insufficient vs sufficient households have not been consistently observed (58,67). Importantly, the analyses by Rose and Oliveira (67) controlled for the potentially confounding effects of several social, cultural, and economic factors known also to influence diet. Aggregate measures of energy and nutrient intakes at the household level (expressed as mean 'nutrient adequacy ratios') were also found to differ by food sufficiency status, even when other influences on food selection were taken into account (18).

In the initial development of the FSCM, external construct validation was accomplished by examining the relationship between household food security status and weekly food expenditure per household member, household income and income relative to the federal poverty line, and food sufficiency status (27). In a subsequent study, severity of 30-day household food insecurity as measured by the FSCM was found to be associated with women's energy, protein, carbohydrate, vitamin A, folate, iron, magnesium, and zinc intakes over this same period (68). The associations persisted even when other sociodemographic and behavioural influences on intake were considered (68), suggesting that the effects are specific to the food security status of the household.

In appraising the construct validity of food security measurement tools from studies such as those described above, it is difficult to define standards for the interpretation of results. For example, what level of agreement between a food security measure and income measure should be observed before the measure can be considered valid? Given the complexity of the relationship between food insecurity and income-based measures of poverty (discussed in more detail in the following section) (59), it is difficult to interpret observed associations or to discount food security measures when such associations are not observed. Similarly, the extent to which household food insecurity is apparent in the food intake behaviours of individual household members depends on the nature of the dietary data collection and analysis, the

intrahousehold food distribution practices, and the severity of the food insecurity. As noted elsewhere, the nature and extent of dietary compromise differs between children and adults, and Fitchen's work would suggest that it may very well also differ among children and among adults in household (38). The observed associations between dietary intake data and food security measures reported here as indications of instrument validity (e.g., 18,24, 58,67,68) are essentially observed differences in group mean intakes (i.e., on average, individuals in food insecure households - however defined - reported lower intakes of 'x' than those in food secure households). At the level of individuals, intakes vary markedly from day to day; low reported intake on one or two 24-hour recalls is not necessarily indicative of food insecurity. Thus while group comparisons revealing systematically lower dietary intakes among individuals in food insecure vs food secure households are consistent with our understanding of the dietary manifestations of food insecurity, such findings should not be interpreted as definitive evidence of the validity of food security measures at the level of individual households.

Assessing Instrument Reliability and Sensitivity to Change Over Time

The question of instrument reliability is fundamentally a question of the amount of systematic and random error inherent in the measurement (107). In the field of food security measurement, reliability has been most commonly examined through measures of internal consistency, based on the performance of instruments observed in a single sitting. Reliability of the FSCM was assessed from the single administration of that instrument in 1995 Current Population Survey (CPS) by means of a number of different statistical indices (27). One of these statistics, Cronbach's alpha, has also been computed for the Radimer and CCHIP instruments. Cronbach's alpha has typically been found to exceed 0.85 on these scales, suggesting good internal consistency (21,24,60,98,103). Two potentially important sources of variance in the measurement of household food insecurity not identified through measures of internal

consistency are day to day variation in individuals' responses to the instrument (intra-observer reliability) and variations in the assessment of household food security depending on which member of the household responds (inter-observer reliability). A related question is how sensitive food security scales like the FSCM are to changes in household circumstances.

It is difficult to assess the reliability of food security measures using conventional test-retest designs because food insecurity is not a static condition or trait but rather a complex temporal sequence of events and experiences. Further, within this sequence, each experience or stage of food insecurity at the household or individual level can be thought of as having its own temporal dimensions. How sensitive the particular aspects of food insecurity being captured in current measures are to changes in household resources is an important question for monitoring purposes and for the use of these instruments in any kind of program or policy evaluation. It is not a question that appears to have been well examined to date.

In one recent study, the CCHIP instrument was administered to a sample of 96 parents at two time points, four months apart (84). Seventy households (73%) were classified into identical categories across the two time periods, but interpretation of the comparison is complicated by the low prevalence of hunger (the most severe of three classifications derived from this instrument) in the sample (11% at time 1 and 4% at time 2) and the fact that a school breakfast program was introduced during the four month period. More carefully designed studies are needed to address the question of instrument sensitivity to change.

Food security measurement scales are ideally administered to the person most responsible for food procurement and food management in the household (104), but in practice, this is often not feasible - particularly when a measure of household food insecurity is included in a survey conducted with a representative sample of the general population (i.e., spanning the normal

variation in age and gender in the population). This raises the question of the extent to which the assessment of household food insecurity varies depending on which member of the household responds to the questionnaire. In conventional terms, this is as a question of inter-observer or inter-rater reliability, with each household member being an observer or rater of the household situation. As noted earlier, there is some evidence to suggest that individual household members' direct experiences of food insecurity differ from one another (at least in terms of adults vs children), but much less is known about how the assessment of household food insecurity is affected by which household member makes the assessment. In one study, the assessment of child hunger derived from parents' responses was compared to the assessments of their school-aged children, using a five-item subset of the CCHIP (84). Agreement between the two sets of respondents appeared good but inferences from the comparison are limited by the fact that only 10% of the sample were classed as hungry based on parents' responses; the number drops to 8% for children's assessments (84). Because most households in the general population can be expected to be food secure, studies designed to assess issues of inter- and intra-observer reliability are probably best conducted with samples drawn from population subgroups known to have high incidence of food insecurity.

Individual vs Household Measures

The instruments discussed here provide measures of food insecurity at the household level. The Radimer, CCHIP and FSCM achieve this through a combination of questions about the household food supply and quantitative and qualitative compromises in the intakes of adults and children in the household. The resultant determination of food security status must be treated as a household-level variable, like measures of household income or food expenditure. This feature of food security measurement stands in sharp contrast to other nutrition-related variables which are measured and interpreted at the level of the individual.

Individuals who are members of food insecure households are clearly vulnerable to personal experiences of food insecurity, and their levels of vulnerability must increase with the increasing severity of household food insecurity. However, the nature and severity of food insecurity experiences by individual household members are likely to differ somewhat depending on the allocation of resources within the household and upon individual members' access to additional resources outside the household. While existing research would suggest that children are likely to experience less severe deprivation than their mothers (21,22,32,38,52,57,59,60,67), much remains to be understood about the interrelationship between individual and household food insecurity.

We currently lack measurement scales to assess food insecurity among individuals. Although questions about individuals' experiences of food deprivation (e.g., going hungry, missing meals, not eating for entire days, worrying about getting enough food) can and have been administered to individuals (e.g., 63), the questions have typically been used as 'red flags' (99). None of the instruments discussed here are designed to specifically measure an individual's experience of food insecurity, although under some applications (e.g., the administration of food security measures to people who live alone) the questions yield individual-level measures. Work has been undertaken with the FSCM to extract a measure of food insecurity among children by considering the number of affirmative responses to items pertaining specifically to children (61). The development of individual-level measures from the FSCM is also reported to be underway (104). However, it should be recognized that one particular strength of this instrument is that the assessment of household food security status is based on multiple questions. Some of this strength may be lost when inferences are made from subsets of the instrument.

It is important to clarify that the absence of good individual-level measures of food insecurity cannot be offset by the use of other individual-level measures of suboptimal dietary intake or

disrupted meal patterns. While potentially related to food security status (66), these measures are not specific to food insecurity. To illustrate this problem, consider the highly innovative method developed by McIntyre (109) to assess breakfast-skipping and inadequate breakfast-eating among young schoolchildren. At first glance, the tool might be seen as a measure of child hunger. However, the fact that these behaviours can arise under conditions other than household financial resource constraints makes the measurement tool unsuitable for use in assessments of food insecurity unless it is complemented by other direct measures of this phenomenon.

The Measurement of Food Insecurity in Canada

Both the CCHIP and Radimer instruments (or subsets of questions from these instruments) have been widely used in Canada in research projects (31,57,63,68), various community-based surveys (e.g., (110-113), some provincial nutrition surveys, and Canada Prenatal Nutrition Program evaluations. In many cases, a few questions have been included in a survey in what has been described as a "red flag" approach to measurement (99). Recent examples of this nationally include the three food security questions included in Cycle 1.1 of the Canadian Community Health Survey and the two questions on child hunger included in the National Longitudinal Survey of Children and Youth (76).

In “red flag” approaches, frequency distributions of responses to individual items are typically generated to provide some indication of vulnerability in the sample. In surveys with multiple items, the generation of overall prevalence estimates is more difficult because of the absence of a clear analytic framework for scaling or grouping responses. As illustrated by the analysis of data from the NLSCY (76), such ‘red flag’ approaches can provide important information about the problem of food insecurity. However, the limited number of items and the absence of a clear

analytic framework for the analysis of multiple items means that these approaches to measurement do not yield meaningful data on the full range of severity of food insecurity; nor do they facilitate comparisons of results across surveys. As such, the "red flag" approach has a number of distinct disadvantages over the use of a systematically-derived set of scaled indicator questions such as the FSCM.

One large-scale, national food security measurement initiative deserves note. A Food Insecurity Supplement, developed by staff at Human Resources Development Canada (HRDC), was included in the 1998-99 National Population Health Survey. The underlying conceptual framework and rationale for individual questions are outlined in a document developed by HRDC (114). The questions were drawn from a variety of sources including the Radimer/Cornell and CCHIP instruments, but do not appear to be a systematically-derived set of scaled indicators (though perhaps de novo scale development work is planned). In many cases, items appear to have been adapted to incorporate subtly different understandings of the underlying constructs and/or to assess both frequency (how often ---- happened over the last 12 months?) and periodicity (did ----- mostly happen at the end of the month?). At the household level, the questions included cover food anxiety, compromised food quality, and quantitative compromises in intake (‘eating less than you think you should’ and ‘going hungry’). At the individual level, the focus is exclusively on child hunger, with five items spanning a broad spectrum of severity from worrying about not being able to feed one’s children, to reporting that one’s children have missed meals or lost weight. In addition, the supplement contains several questions about household expenditures, behaviours to ‘stretch’ one’s money for food, perceived barriers to shopping, and use of charitable food assistance and targeted feeding programs. One brief summary of data from the supplement is available (The Daily, Health Statistics Division, Statistics Canada, Ottawa, July 21, 2000).

The emphasis on manifestations of food insecurity at the level of children in the HRDC instrument may limit the utility of this instrument for food security assessment. Both qualitative and quantitative studies of household food insecurity indicate that reductions in children's food intakes occur only when household food supplies are severely depleted (21,22,26,32,38,52,59,60). Women in particular, repeatedly report depriving themselves of food in order to spare their children (21,22,52,57). Thus reports of extreme food deprivation or food insecurity-related weight loss among children are likely to be very rare events. Further, these events are likely to be subject to under-reporting given the social stigma associated with being unable to feed one's children and the potentially devastating consequences of admitting this to 'outsiders' (i.e., we are all legally obligated to report children at risk to child welfare authorities).

Other Considerations in the Use of Direct Measures of Food Insecurity

Selection of Survey Vehicle

Currently available instruments like the FSCM are sufficiently brief as to have low respondent burden. Thus direct measurement can be accomplished by simply including the instrument on a larger, population survey. The most appropriate survey vehicle depends on the survey design and the range of other variables being measured. Although food insecurity is a "nutrition variable", its measurement need not be restricted to nutrition surveys. Other survey vehicles could afford important opportunities to gain insight into the problem of food insecurity in Canada and enable ongoing monitoring of this problem.

Ideally, one would want to install a direct measure of food insecurity on a survey that is administered at regular intervals to a representative sample of the population. There may be some seasonal variation in household food security and even though an instrument like the

FSCM assesses food insecurity over the past 12 months, it is likely that responses will be influenced by recent experiences (Nord, unpublished). Seasonal variation should be therefore taken into account in the survey design.

It can be assumed that all population surveys will include measures of sociodemographic variables, thus facilitating the identification of sociodemographic correlates of food insecurity. However, surveys will provide different opportunities for the examination of predictors and descriptors of the individuals and households who experience food insecurity. Some of these considerations are examined below.

- ***Household-level surveys:*** Because the currently available instruments are best employed to assess food insecurity at the household level, there may be particular advantages to considering their inclusion in a household-level survey like the Statistics Canada Survey of Household Spending. This would enable comparison of household food security status with expenditure patterns on food and other goods and services and permit a broader analysis of the experience of household food insecurity in the context of financial resource constraints and competing financial demands. A comparison of the food purchasing patterns of food secure vs food insecure households, for example, would yield insight into food selection patterns in the context of resource constraints.

- ***Dietary surveys:*** The measurement of household food security status in conjunction with individual-level measures of dietary intake will provide important contextual information within which to interpret indices of dietary quality or nutrient adequacy. It will also provide an opportunity to further examine the relationship between household food security and individuals' dietary intakes. (For excellent examples of these sorts of analyses with U.S. population survey data, see papers by Rose & Oliveira (18,67) and

Cristofar & Basiotis (58).)

- ***Health surveys:*** Because household food insecurity is a marker of disadvantage and deprivation and a risk factor for poor nutritional health and well-being, it is perhaps useful to include measurement of this variable in surveys of the broader determinants of health. As noted in Part 1 of this document, there is currently limited research on the relationship between food security status and specific health outcome variables.

- ***Longitudinal vs cross-sectional surveys:*** Considerable understanding of the sociodemographic correlates of household food insecurity and of the sensitivity of this phenomenon to macro-level changes in social and economic conditions can be gleaned from the measurement of food insecurity on repeated cross-sectional surveys. The inclusion of a direct measure of food insecurity on a longitudinal survey affords different opportunities for analysis, assuming that the food security instrument is administered to the same respondents repeatedly. Repeated measures of food security within households would provide some insight into the sensitivity of this variable to change over time. Further, the examination of within-household changes in food security status in relation to other variables (e.g., changes in employment status, changes in household size and composition, etc) would permit identification of the factors that influence household food security, but such analyses could be seriously limited by sample size constraints in a general population survey, depending on the proportion of the sample that a) report food insecurity and b) exhibit changes in food security status over time.

  The value of including a food security measure in a prospective (cohort) study is less clear. Because of the potential for household food insecurity to change over time and the currently limited understanding about individuals' actual experiences of food insecurity

within the context of household food insecurity, further research is needed to support the interpretation of analyses in which a 'baseline' measure of household food security status over a 12-month period is linked to health outcomes measured several years hence.

Sampling

Given that household food insecurity arises in the context of financial resource constraints and the risk of severe food insecurity is heightened as resources become increasingly limited, accurate estimates of prevalence can only be derived from population-based samples that are representative of the most disadvantaged members of our society. Because representativeness is a function of the sampling design and survey response rates, both issues need to be considered when contemplating the inclusion of food security measures on a population survey and when interpreting survey results. Non-response bias may arise, for example, in surveys administered by telephone or in samples defined on the basis of housing units because these samples will necessarily exclude homeless individuals and those too poor to afford telephones. Further, many national samples exclude First Nations people who live on reserves and members of the Canadian Armed Forces; both groups may include households at risk of food insecurity. Procedures can be undertaken to compensate for such potential sources of bias in the design and/or analysis of surveys, but this only happens if those responsible are cognizant of the issues.

When contemplating the inclusion of food security measures in population surveys, it is also necessary to consider the expected number of low-income participants in the survey sample. If this number is very small, the confidence intervals around any estimate of food insecurity will be wide, and it may be impossible to obtain stable estimates of the different levels of severity that are measured by the FSCM. Such problems may be overcome by oversampling very low-income households if additional resources are available. Alternatively, the inclusion of food security measures in some surveys may simply be inadvisable because of sample size

constraints.

Screening

While there are many arguments for including questions about food insecurity on a population-based survey in Canada, most members of the general population are likely to be food secure. (Prevalence estimates derived from administration of the FSCM in population surveys in the U.S. have ranged from 10-12%.) If the FSCM were administered to each and every participant in the NPHS or CCHS, for example, it is likely that most people would not respond affirmatively to any question on the instrument. To reduce questionnaire administration time under these circumstances, two levels of screening can be built into the FSCM so that people who respond negatively to questions about less severe conditions of food insecurity are not asked about more severe conditions (104). (See Appendix A for example of this.) Thus the questionnaire takes only seconds to administer to people who are food secure. Still, it is possible that the administration of the FSCM could be made even more efficient by including another screening question (or questions) at the outset, to reduce the number of people who are asked any questions about food insecurity. Various options for screening are explored in this section, followed by a cautionary note about the potential pitfalls of screening at the initial stages of direct measurement.

Because of the well-documented association between food insecurity and low income, one option is to administer the FSCM only to those survey participants with incomes below a certain threshold. In the 1995 CPS in the U.S., for example, the food security supplement was administered to those households with incomes at or below 185% of the federal poverty level in the previous 12 months. Households with higher incomes were included in the supplement only if they answered affirmatively to one of three additional questions related to household food sufficiency (26). An analogous set of screening questions could be devised in Canada,

considering household income levels in relation to the Statistics Canada Low Income Cut-Offs (LICOs) or some multiple of these income levels.

Currently there is very little Canadian data available upon which to base decisions regarding the income levels above which households stand absolutely no risk of food insecurity. Thus, if using an income cut-point to screen out potential respondents, it would be strongly advisable to error on the side of caution and set the thresholds well above the LICOs, at least in the first administration of the FSCM. As a further safeguard, the food sufficiency status question or some other set of food security-related questions could be administered to households above the income threshold, and any households indicating concerns about food insecurity could be included in the FSCM sample. (This approach mirrors that employed in the U.S. 1995 survey (27).)

Although food security-related questions were used as screeners in the HRDC Food Insecurity Supplement (114), the use of such questions alone to screen for potentially food insecure households is generally not advisable. As illustrated in comparisons of the food insufficiency question with more detailed assessments of household food insecurity, this question has reasonably good specificity but poor sensitivity (27, 97). Thus a number of food insecure households would likely be screened out with this approach. Using food sufficiency or food security questions in combination with an income screen (i.e., to screen for potentially vulnerable household from among those with incomes above a certain threshold) is less problematic because the probability of finding food insecure households among those with higher incomes is small to begin with. Thus the screening bias introduced by the low sensitivity of something like the food insufficiency question in this context is likely to be minimal.

It is emphasized that the practice of screening - regardless of the screening questions selected -

always entails some risk that food insecure households will be excluded by the screen and the prevalence of food insecurity will be systematically underestimated. Thus in the initial stages of direct measurement, when there is poor understanding of the precise relationship between household food insecurity and potential screening variables, it is inadvisable to include screening questions. When food security measurement is being undertaken for monitoring purposes, the comparability of prevalence estimates is affected by any changes in the approach to screening over time. It may be possible to employ analytic techniques to improve the comparability of data across survey administrations in such instances (e.g., 115), but the potential interpretational problems introduced by changes in screening methods speak strongly to the need for careful thought about the methods employed initially.

The Sensitive Nature of Food Insecurity

In a society as affluent as ours, there is a social stigma associated with hunger and food insecurity. To be unable to feed oneself and one's children can be a profoundly embarrassing and humiliating condition. The sensitivity of this issue has implications both for the administration of direct measures of food security in population surveys and for the interpretation of responses.

Interviewers may require special training to deal with the administration of food security questions. In particular, they need to be instructed as to how to respond when survey respondents reveal extensive levels of food deprivation in their households. Depending on the depth of deprivation encountered and the skill and training of the interviewers, interviewer debriefing sessions may be required to aid interviewers in dealing with the experiences of receiving such disturbing information.

Care also needs to be taken to ensure that the conditions under which food security questions are

administered work to encourage rather than discourage full disclosure of food insecurity. As in the collection of other kinds of sensitive personal information, issues of privacy, confidentiality, anonymity, and respect are important to consider in the design of surveys that will include food security measures.

The stigma and shame associated with experiences of severe food insecurity is commonly believed to lead to underreporting of these experiences by some respondents (27). This is a particular concern with respect to questions about hunger and food deprivation among children. However, in the absence of good, independent measures of food insecurity, it has been difficult to determine the magnitude of this potential source of response bias on survey instruments (27). The impact of underreporting extreme deprivation on the determination of household food security status on the FSCM is perhaps offset to some degree by the design of that instrument's classification system (Table 2). Households are classified according to the number of affirmative responses, but they need not have answered every single question on the FSCM affirmatively to be classed as food insecure with severe hunger. Thus households with children can be classed as such without necessarily having responded affirmatively to questions about serious food deprivation among children (e.g., children not eating of a whole day because there was not enough money for food). In the interpretation of this classification, the admission of serious, repeated reductions in the food intakes of adults in the household is considered sufficient to indicate reductions in children's intakes as well. (With the development of a child-specific sub-scale from the FSCM (61), it may be possible to further refine the categorical measure to better address this issue.)

Translation and Cultural Adaptation

All of the food security measurement instruments described here have been developed in English, with English-speaking participants. Use of food security measures for population-based

surveys in Canada requires their translation into languages other than English. (The Radimer instrument has been successfully translated into French and used in Quebec (30,31), but a French translation of the FSCM is currently unavailable.) Extensive research is currently underway to identify appropriate translations of the FSCM for various Spanish-speaking subgroups in the U.S., and while perhaps not directly applicable to Canada, the research highlights the importance of capturing the nuances and underlying meanings in particular questions - not merely conducting literal translations (Harrison, Stormer and Herman, unpublished).

Although the FSCM and many of the questions that comprise it have already been used in Canadian samples and the instrument has been used with a wide variety of population groups elsewhere, cognitive testing of the instrument is advisable prior to its use on population surveys in Canada. There may be some need to adapt specific parts of the FSCM to accommodate the particular language and cultural variations in the Canadian population. For example, in a recent survey of First Nations people in Alberta, interviewers identified potential problems with questions on the FSCM that asked respondents about the frequency with which particular circumstances were "true" for their household; it was suggested that this wording might be interpreted as a challenge to the participant's veracity (Judith Lawn, personal communication, Jan 24, 2001). The response categories were subsequently amended to simply assess frequency. The instance highlights the need for pilot testing with particular cultural subgroups to ensure that the questions are acceptable.

One other feature of the FSCM which has sometimes raised concern is the use of the phrase 'balanced meals' to ascertain qualitative compromises in adults' and children's' intakes (106). Precisely how this phrase is interpreted by individual respondents is questionable, but the two questions which include the phrase have been demonstrated to be effective parts of the measurement scale (27). In the First Nations survey described above, 'balanced' was changed to

'healthy'. Whether this substitution alters anything more than the face validity of the instrument is unclear. Cognitive testing is required to clarify the need for and impact of altering such phrases in the questionnaire.

Food Security Measurement in Canadian Context

Although this discussion has focussed very narrowly on issues related to the direct measurement of food security, it is important to note that the use - and thus the usefulness - of data on household food insecurity hinges on their relevance to Canadian concerns and their interpretability within the Canadian context. Four issues are noted here for future consideration.

- In considering the inclusion of food security in a national nutrition monitoring system, it is important to establish what dimensions and what degrees of severity of food insecurity are most relevant to measure and monitor here. While the FSCM undeniably represents the 'state of the art' in food security measurement presently, this instrument has been developed to capture the particular aspects of food insecurity that are most relevant to programs and policies in the U.S. Specifically, this scale captures levels of severity associated with quantitative food deprivation - a condition that may be considered the most severe manifestation of food insecurity. Monitoring such extreme deprivation can be seen as a moral imperative because, in a country as affluent as ours or the U.S., this hardship seems unconscionable. This level of measurement also has particular relevance in the U.S. context, where government is directly involved in the funding and administration of domestic food assistance programs (e.g., food stamps, school feeding programs, WIC). Thus it is not uncommon for prevalence estimates of food insecurity to be linked to questions about the adequacy of current nutrition assistance programs (e.g., 69). In Canada, social policy responses to problems of poverty and inequality have historically taken a very different route, focussing on income support programs rather

than direct food assistance (88). Poverty has traditionally been of concern here in a relative sense as well as in the absolute sense of deprivation to basic needs.

Depending on the broader goals of nutrition monitoring in Canada and depending on the nature and magnitude of food insecurity experienced by people in this country, it may be desirable to consider developing additional indicators to permit the measurement of less severe levels of food insecurity and explore specific qualitative and social or psychosocial dimensions of food insecurity. The development of measures to quantify the frequency and duration of particular experiences of food insecurity would also be helpful in gauging chronicity and thus providing a better basis for examinations of the short- and long-term consequences of this phenomenon.

In contemplating the expansion of a direct measure of food insecurity to include a broader array of behaviours, perceptions, and experiences associated with this phenomenon, it is important to bear in mind the purpose of the measurement activity. If the goal of measurement is to estimate prevalence, then the addition of items is only useful if this will yield a more accurate estimate of the prevalence of levels of severity or particular manifestations of household food insecurity deemed important to monitor. As noted earlier, measurement of resource augmentation strategies (tapping into the notion of socially unacceptable food acquisition strategies in the context of severely depleted food supplies) was considered in the development of the FSCM but the addition of these items made only a trivial difference in the estimation of prevalence. While an instrument that more fully captured the multidimensional nature of food insecurity would undeniably gain face or content validity, it might net no improvement in the estimation of prevalence.

- One advantage of using the FSCM is that it has been - and continues to be - the product of extensive research in the U.S. Thus our understanding of how this scale works will only grow in the coming years. Still, questions remain regarding such issues as the scale's sensitivity to change, the most appropriate determination of categorical measures from this scale, and the extent to which scale scores can be expected to vary depending on which household member responds. Depending on the particular applications of the FSCM, it might be advisable to initiate research to address these specific issues.

- When food security measures are included on population surveys, it is imperative that additional measures and analyses be undertaken to elucidate the sociodemographic and behavioural correlates of household food insecurity in Canada and delineate regional variations. Such data are critical to the interpretation of measurements. Although food insecurity can be expected to relate to poverty, more descriptive data on vulnerable subgroups is needed to understand the ways in which various federal, provincial and municipal policies and programs operate to influence the prevalence and severity of household food insecurity among specific subgroups. Such knowledge would importantly inform future policy and program initiatives and provide guidance for subsequent monitoring and surveillance activities.

- Although the interpretation of food security measures can, to some extent, be guided by the existing literature, it must be recognized that this area of research is in its infancy. Furthermore, very little of the existing research has been conducted in Canada, and the transferability of findings from U.S. and U.K. studies to the Canadian context is limited by our significant sociopolitical, geographic, and cultural differences. In particular, additional research is required to delineate the causes and important consequences of food insecurity in Canada.

2. INDIRECT INDICATORS

The resources required to obtain direct measures of the prevalence and severity of food insecurity in the population are substantial, and the measures are intrusive. Thus it is important to carefully consider what can be learned about the prevalence of food insecurity from indirect measures of this phenomenon that are more readily available, either because they are routinely collected as a part of other monitoring and evaluation processes or because it would be relatively simple to obtain data on these measures. In this section, the possible or probable relationship between food insecurity and three classes of indirect indicators is examined: indicators of financial resource constraints that could be reasoned to predispose households to food insecurity or the risk of it; indicators of resource augmentation strategies that suggest food insecurity (e.g., food bank usage); and indications of programmatic activities at the community level that could be interpreted to suggest the presence of local problems of food insecurity.

By definition, indirect indicators of food insecurity lack the specificity and sensitivity to individual or household-level food insecurity that can be obtained from direct measures. The value of indirect indicators hinges on our understanding of their relation to more direct measures. When systematic comparisons of indirect and direct indicators are possible, probabilistic statements about their relationships can be derived, furnishing an important foundation for the interpretation and application of indirect indicators in monitoring and surveillance activities. Given the paucity of such research currently, the following examination of indicators is largely speculative. Where possible, however, avenues for future research are highlighted.

Indicators of Resource Constraint

Because household food insecurity is, by definition, related to financial resource constraints, indicators of such constraints may be useful indicators of food insecurity. Three different kinds

of indicators of resource constraint are examined here. Each is (or can be) routinely measured and tracked and as such, may be an economical way to track vulnerability.

Income-Based Measures of Poverty

Income is perhaps the simplest measure of household resources, and not surprisingly, direct measures of food insecurity have been found to be strongly associated with income-based measures of poverty (1,6,24,30,58,69,116-118). In U.S. population surveys using the FSCM, both the prevalence and the severity of food insecurity increase as household incomes decrease (19). However, there is not a simple linear relationship or one-to-one correspondence between poverty-level incomes and measures of hunger or food insecurity (59). Although the relative proportion of food insecure to food secure households increases as income levels fall, even within low-income groups, there is typically a mix of food insecure and food secure households (1,26). Thus poverty-level incomes are neither specific nor sensitive indicators of food insecurity (59). The measures fail in part because food insecurity is not a static condition (59), but rather one that - among low-income households at least - is very sensitive to the ebb and flow of household resources. Within low-income household, the immediate availability of food or money for food is a function not only of the household income, but also household size and composition, shelter costs, debts, savings, assets, existing food supplies, material support from social networks, and a host of other resources and expenses. It must also be a function of food prices and the associated costs of getting food. Measures of household income do not include all of these variables; thus they provide only a crude indication of the available resources for food within a household at any point in time.

Despite the fact that income-based measures of poverty are insensitive and nonspecific measures of household food insecurity, at a population level low income is undeniably the single greatest risk factor for household food insecurity. Furthermore, the distribution of incomes is routinely

monitored at the national, provincial, and regional levels. As such, the use of income or poverty measures as indirect indicators of the problem merits further exploration. Insofar as vulnerability to food insecurity increases with decreasing income, the proportion of Canadians living in poverty - however this is defined - must provide some indication of vulnerability to food insecurity.

There has long been debate over the appropriate definition and measurement of poverty in Canada, but this debate is not particularly germane to the question at hand. The Statistics Canada Low-Income Cut-Offs (LICOs), often referred to as the 'poverty line', define low income in relation to average household expenditure patterns; LICOs are dollar values below which households spend 56.2%[4] or more of their gross income on the basic necessities of food, shelter, and clothing (119). The LICOs vary across seven categories of household size and five community sizes (based on the population). Others have proposed 'market basket' approaches, defining poverty in terms of income levels that are insufficient to purchase a predefined 'basket' of goods and services deemed necessary for some basic standard of living. The Basic Needs Line proposed by Sarlo (120) defines a level of income required for subsistence in Canada. More recently, Human Resources Development Canada has undertaken the development of a Market Basket Measure of poverty, intended to represent the level of income required for a Canadian household to achieve a "creditable" standard of living (121). The concept of a market basket measure of income adequacy also underpins a number of community projects in which the cost of a nutritious food basket has been compared to estimates of income and other expenditures.

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[4]This percentage represents the '1986 base', the base used for the poverty comparisons published by the National Council of Welfare. Statistics Canada has also published Low-Income Cut-offs employing a '1992 base', defining low income in terms of expenditure levels on necessities equal to or in excess of 54.7% of gross income.

The relationship between various poverty measures and household food insecurity is quite simple: the lower the income threshold used to define poverty, the greater the vulnerability to food insecurity for those with incomes below it. We currently lack the data to develop a more precise interpretive framework for income-based indicators of food insecurity in Canada, but this void could easily be filled with some additional analyses of currently-available national survey data (e.g., the NPHS or CCHS). An examination of the relationship between a direct, population-level measure of food insecurity and household income would enable estimation of the risk of food insecurity associated with particular income levels. Additional analytic work could be undertaken to determine if the sensitivity of an income-based measure of poverty to household food security status could be improved by taking into consideration factors such as shelter costs that are known to affect the available income for food.

Income Source as an Indication of Poverty

Some income support programs in Canada provide only minimal levels of income to recipients and thus may be good indicators of financial hardship. The largest and perhaps best documented of these is social assistance (welfare). Not only are welfare incomes typically set at levels well below the LICOs (122), but households are often required to divest themselves of savings and other assets prior to being deemed eligible for assistance. Because welfare programs are administered by the provinces and territories, the depth of poverty associated with welfare (i.e, the extent to which welfare benefit levels fall below the LICOs) varies across jurisdictions. It also varies within jurisdictions, across categories of eligibility defined in terms of family size and employability (distinguished in its simplest terms as 'employables' vs 'disabled'). In 1998, for example, individuals classed as 'single employables' had welfare incomes ranging from 9% (in Newfoundland) to 41% (in Ontario) of the 'poverty line' (122). Welfare incomes for a single parent with one child ranged from 50% (in Alberta) to 69% (in Newfoundland) of the 'poverty line'.

Given the depth of poverty associated with a reliance on welfare, it might be considered an indicator of vulnerability to food insecurity at the individual or household level. This inference is strongly supported by a recent analysis of data from the 1994 National Longitudinal Survey of Children in Youth (NLSCY) in which families who reported child hunger were 13 times more likely to report income from social assistance or welfare than those who did not report child hunger (76). Welfare recipients' vulnerability to food insecurity is also indicated by the fact that they comprise the vast majority of food bank users (79,123-125). Obviously not everyone on welfare is food insecure, but these findings suggest that being on welfare is associated with a heightened risk of food insecurity, probably because of the depth of poverty it signifies.

The proportion of the population in a community or province on welfare is an imperfect indicator of vulnerability to food insecurity in the population overall because this measure misses those households living in comparable (or more severe) levels of poverty but who do not receive welfare. Welfare program statistics would thus systematically underestimate vulnerability associated with low income. While this might seem like a serious limitation, the extent of this bias can be readily estimated from population-level data on income and income sources. Further, the risk of food insecurity associated with being on welfare can be quantified (as it was in the NLSCY analysis (76) from population-based surveys where both variables are measured. Given that welfare rates are routinely tracked and that secondary analysis work can be undertaken to provide an interpretive framework for this indicator, it merits serious consideration as an indirect indicator to be included in nutrition monitoring and surveillance activities at the provincial level and possibly at the national level.

Indicators of Extreme Financial Hardship

In addition to income-related measures of resource constraints, there a number of indicators of extreme financial hardship that might be useful indicators of food insecurity in some contexts.

Examples include homelessness, evictions, arrears, and the termination of household utilities because of unpaid bills. Basically, any externally observable behaviour or condition that indicates extreme poverty of financial crisis is a potential indicator of food insecurity because under such circumstances food security must be seriously jeopardized. The intertwining of food insecurity with financial hardship is exemplified in a quote from one participant in a recent Quebec study: "*Our phone bill increased from $20 to $30 this month. Either we pay $15 or $20 only, or we ask to disconnect the phone. We have no choice; we already owe more than $100 on our electrical bill. We must eat."* (33).

Many conditions of extreme financial hardship are routinely monitored at the local level, although the quality of the monitoring could be expected to vary across jurisdictions. Furthermore, financial hardship related to food insecurity may manifest itself differently in different jurisdictions, depending on the relative affordability of essential goods and services for low-income households (e.g., housing costs and utility rates vary considerably across regions) and the programs in place locally to assist households who fall behind in rent or utility payments (e.g., emergency cheques, "rent banks", etc.). With further development work, markers of extreme financial hardship could be the basis of a sentinel indicator system, applied community-wide to identify potentially at-risk households. As well, some conditions might be useful to include on population-based surveys as indicators of vulnerability to severe food insecurity.

Indicators of Resource Augmentation Strategies (E.g., Food Bank Usage)

The extent of food insecurity may also be inferred from records of resource augmentation strategies believed to be associated with food insecurity. The best example of this in Canada is food bank usage, but as noted below, many of the limitations associated with this indicator could equally well apply to other food security-related program utilization statistics.

Food Bank Utilization Statistics

In the absence of direct survey data, the number of Canadians using food banks has long been cited as the primary indication of food insecurity in this country (86). Usage is routinely monitored by many food banks across the country. Periodically, these numbers are compiled at the provincial and national levels. In 1989, the Canadian Association of Food Banks (CAFB) released its first estimates of food bank usage nationally in the form of a 'HungerCount' (126). Since 1997, the release of national and provincial statistics on food bank usage by the CAFB has become an annual event, and the CAFB has undertaken examinations of time trends (125). Although the statistics continue to be presented as 'HungerCounts', the CAFB acknowledges that they are likely conservative estimates of the number of Canadians using food banks, and underestimates of the number of Canadians who experience food insecurity (125). Because of the widespread use of food bank numbers as measures of household-level hunger or food insecurity, a detailed examination of the limitations of this indicator is presented here.

The compilation of statistics by food banks is complicated by the fact that these are voluntary, community-based organizations, typically operating with limited funds or none at all. Not all food banks participate in the surveys (although the CAFB estimated that the participation rate in their 2000 survey was 88.9%), and the quality of data from individual food banks is variable. Further, depending on the sophistication of individual agencies' tracking systems, it may be difficult for food bank workers to accurately determine the number of different people who use the agency (vs the number served over the course of a month or year) and the size and composition of households who ultimately receive the food. Thus the 'HungerCounts' represent only crude estimates of the number of Canadians using food banks over any defined period.

While the counting of households using food banks may be less than perfect, there is now considerable research to suggest that people who use food banks are food insecure. When the

FSCM was administered to a sample of 153 women in families using food banks in Toronto, 94% reported some degree of food insecurity over the past 12 months (79). Further, 57% reported food insecurity with moderate or severe hunger over the previous 30 days, a period that by design included at least one visit to a food bank (79). These findings are consistent with the results of food bank surveys in which clients' experiences of hunger have been assessed (125). The inference that food bank users are food insecure is also supported by the results of a recent study of a random sample of 490 food bank users in Montreal (123,127). Although no direct measures of food insecurity were included in this study, participants reported very low incomes and food expenditure levels that were substantially lower than the minimum food costs estimated for an adequate diet in that area (123). Further, 27% of those surveyed reported that they did not have sufficient food on hand for one more day when they went to the food bank for assistance (123). These data suggest that food bank usage may be a fairly sensitive indicator of food insecurity at the level of individual households.

Despite their apparent sensitivity, food bank statistics are a poor indicator of the prevalence of food insecurity in Canada because not all individuals who experience food insecurity use food banks. Food insecure households have been found to use a myriad of strategies in the face of actual or impending food shortages (21,22,32,52,76). Though sometimes portrayed as the strategy of last resort, seeking charitable food assistance is a potential but not inevitable consequence of household food insecurity. This may in part be attributed to the social stigma associated with using food charity in the context of an affluent society such as ours. Many food bank users report feeling shame and embarrassment, particularly on first coming to food banks (32,78,79). How many others are kept away because of these feelings is unknown. In addition, some food insecure households may not seek help from food banks because they are unable to access the agencies (perhaps because there is no food bank nearby and they lack the funds necessary for transportation, or because they are physically unable to access the facilities). In

their recent survey of food bank users in Montreal, Starkey et al.(127) noted that the homeless and other low-income groups who are less mobile (e.g., single parents with large families, the frail elderly) were under-represented. Still others who are food insecure may be discouraged from using food banks by the limited quantity and poor quality of food assistance they may receive from this system (128). Food bank operators have long reported that demands for food assistance exceed the available supply of donated foodstuffs. In their struggles to balance supply and demand, many food banks have had to recently implement further restrictions on the amount of food they give and the frequency of use permitted (125). A few food banks have reported having to turn people away because of a lack of food (125).

In sum, while food bank usage is indicative of food insecurity at the level of the individual user, food bank usage statistics are a poor indicator of food insecurity because not all food insecure households are counted in these numbers. Further, the proportion of food insecure households in Canada who make use of food banks is unknown. Only 31% of the 206 households reporting child hunger in the 1994 National Longitudinal Survey of Children and Youth reported using food banks as a way to cope with the lack of food (76). In a study of 52 economically disadvantaged households in southern Ontario, 65% reported some indication of food insecurity (based on a modified version of the Radimer questionnaire), but only 21% had used a food bank in the past three months and food bank usage was not found to be associated with food security status (57). While limited in scope, these results suggest that the prevalence of food insecurity could be seriously underestimated by food bank usage statistics.

A more precise estimate of the proportion of food insecure households using food banks (i.e., one derived from a population survey that included contemporaneous measures of household food insecurity and food bank use) would facilitate more accurate interpretation of the CAFB 'HungerCounts' and other local and regional reports of food bank usage. This would be an

important advance, but food bank statistics would still be limited by the issues of incomplete and inaccurate recording of usage by some agencies. Further, given the imbalance of supply and demand in this system, the artificial truncation of usage statistics during the periods of highest demand remains a concern if individual food banks are forced to close early or turn people away because they have run out of food to distribute.

Utilization Statistics for Other Food-Security Related Programs

Although food bank usage is most commonly cited as an indirect indicator of food insecurity in Canada, utilization or participation statistics from other programs that have been initiated at least in part to address perceived problems of food insecurity are also likely to be very poor indicators of the problem. The use of children's feeding programs, for example, would be a poor indicator of food insecurity because it is unclear what proportion of participants in these programs are from food insecure households (89,95,96) and what proportion of children from food insecure households participate in the programs. Similar uncertainties would apply to the interpretation of participation data from other community-based food security initiatives.

Indicators of Programmatic Activity Related to Food

One final set of indirect indicators of food insecurity that merits discussion is the presence of food security-related programs. In some of the early writing on food security in Canada, the presence of food banks was cited as evidence of the problem. Increases in the number of food banks in Canada have also been cited as indications of a growing problem (125). It is conceivable that some might wish to use the presence of other community-based food security initiatives (e.g., community kitchens, community gardens, targeted feeding programs, etc.) as indirect indicators of food insecurity. As illustrated in the following discussion of food bank numbers, the ad hoc, community-based nature of such programs makes their mere existence a

very poor indicator of the local prevalence of food insecurity.

There can be little doubt that the very public presence of food banks has rendered the problem of household food insecurity more visible in Canada, importantly drawing public attention to this issue. However, the proliferation of food banks is a function of many things, only one of which must be the household food insecurity that appears to underpin demands for charitable food assistance at the local level. Most food banks receive no funding from government or the United Way (125). They survive through volunteer labour and charitable food donations, but cannot exist without a considerable amount of both. Furthermore, the exact number of food banks in any one region is in part a function of the organizational structure of charitable food relief operations in that area. In some regions, efforts are more centralized; in others, food assistance is provided by a number of small, local agencies. This variation would be reflected in simple counts of the number of food banks in one area vs another, but it is likely completely unrelated to the local or regional prevalence of food insecurity. The idiosyncratic nature of community responses to perceived problems of household food insecurity makes the simple counting of these initiatives a very poor indicator of the problem.

PART 4: RECOMMENDATIONS FOR FURTHER WORK

From the foregoing examination of conceptual and methodological issues related to the measurement of food insecurity in Canada, a number of knowledge gaps have been identified. What follows is a brief discussion of some gaps that, in the opinion of the author, would be important to address if food insecurity were to be included in a national nutrition monitoring and surveillance system.

1. An appraisal of the levels of severity and the dimensions of food insecurity most relevant to monitor in relation to policies and programs in Canada

Conceptually, food insecurity is not a simple binary variable, but an array of behaviours and perceptions. The potential consequences of food insecurity are wide ranging and multidimensional. In undertaking monitoring activities, it is important to consider what dimensions and what degrees of severity of food insecurity are most relevant to the Canadian context. As noted in Part 3, the FSCM has been developed to capture the particular aspects of food insecurity deemed relevant to programs and policies in the U.S. Specifically, this scale captures levels of severity associated with quantitative food deprivation - a condition that may be considered the most severe manifestation of food insecurity. Monitoring such extreme deprivation can be seen as a moral imperative because, in a country as affluent as ours or the U.S., this hardship seems unconscionable. However, it should be recognized that this level of food insecurity is likely to be much less common in our country than less severe manifestations. The experience of absolute food deprivation ('not eating for a whole day'), for example, is a biologically unsustainable event, and there are charitable assistance programs to provide some relief to those in such dire circumstances (though how effective they are in fulfilling this mission is admittedly an open question). Less severe manifestations of household food insecurity, such

as chronic compromises in dietary quality, are likely to be more prevalent and may have more serious implications for health and well-being over the long term than periodic episodes of absolute deprivation. Similarly, it could be argued that the broader social implications of chronic food insecurity related to social exclusion and alienation are relevant to population health irrespective of whether they are associated with measures of quantitative food deprivation.

Prior to the inclusion of food insecurity as part of a nutrition monitoring system in Canada, it is imperative that the broader goals of this monitoring be established. These goals will dictate the needs for measurement. They will also lay a foundation for the identification of other sociodemographic and behavioural factors that must be measured in concert with food insecurity in order to identify vulnerable subgroups.

2. Research to further develop direct measures of food insecurity relevant to nutrition monitoring goals in Canada.

Although an extensive body of research on food security measurement now exists, there may be a need for some additional research to tailor existing measures and develop new measures to meet the specific priorities identified for direct measurement in this country. In particular, research may be required to i) confirm the suitability of the FSCM for use here and establish what categorical measures of household food security drawn from this scale will be most relevant for monitoring purposes; and ii) develop additional direct measures of food insecurity at the household or individual level to extend the understanding that can be gleaned from the FSCM. To maximize the contribution of these initiatives, it is imperative that any new research be grounded in a thorough understanding of the present literature and that new undertakings clearly build upon existing work.

Food insecurity is not a static condition or trait but rather a complex temporal sequence of events and experiences. Further, within this sequence, each experience or stage of food insecurity at the household or individual level can be thought of as having its own temporal dimensions. How sensitive the particular aspects of food insecurity being captured in current measures are to changes in household resources is an important question for monitoring purposes and for the use of these instruments in any kind of program or policy evaluation. It is not a question that appears to have been well examined to date. Existing measures also do not permit estimation of the chronicity of various levels of severity of food insecurity, yet this aspect of food insecurity is clearly relevant to understanding causes and consequences and identifying effective program and policy responses. Again, depending on the goals of monitoring food insecurity in Canada, it might be important to undertake development work to incorporate measures of temporality into existing measures of household food insecurity

It may also be important to consider the development of additional indicators to measure qualitative and social dimensions of food insecurity. As discussed in Part 3, the addition of such indicators might improve the face validity of a national food security measure. However, from a monitoring perspective, the critical question to answer is whether the addition of these items affects the estimate of prevalence in any meaningful way.

Although considerable advances have been made in the measurement of household food insecurity over the past decade, we still lack a good measure of food insecurity at the individual level. Enough is known about the differential nature of individuals' food experiences within households to know that household-level measures cannot be simplistically extrapolated to individual members. Yet further research is needed to characterize the experiences of individual members in households defined by varying levels of food insecurity. Importantly, this research must not simply differentiate between the experiences of women and children, but more fully

elucidate age- and gender-related differences.

3. Research to facilitate the comparison of new, more comprehensive measures of food insecurity to other direct indicators that have been included on previous population surveys.

Monitoring food insecurity in Canada implies comparisons of indicators over time. To maximize the potential insights to be gained from this initiative, it would be useful to develop methods to enable the systematic comparison of results from the administration of newer, more comprehensive food security scales such as the FSCM with earlier, "red flag" approaches to food security measurement among population samples. For example, three questions on food security were included in Cycle 1 of the CCHS. A 'bridging study' comparing these questions with the FSCM would provide an empirical framework within which to interpret the CCHS data and enable comparison of Cycle 1 results with any subsequent cycles that include a more comprehensive measure. Similarly, empirical work to elucidate the relationship between questions included in the NPHS, NLSCY, and selected provincial nutrition surveys and a more comprehensive food security scale would facilitate fuller interpretation of these data. While this may seem like a tall order, it should be noted that many of the food security questions that have appeared on these surveys are very similar, if not identical to items on the FSCM. Further, provincial groups may be willing to absorb some of the costs of this work because it will enable them to make better use of existing data and perhaps examine trends over time.

4. Research to provide an empirically-based framework within which to interpret key indirect indicators of household food insecurity.

The development of the FSCM means that we now have a direct indicator of household food insecurity with known measurement properties that is suitable for inclusion in population surveys. Ongoing national surveys such as the NPHS, CCHS, and Survey of Household Spending could provide vehicles for the direct measurement of household food insecurity in Canada. Even if this measurement work occurs, however, there are likely always to be situations in which indirect indicators of food insecurity are needed (e.g., at the regional and community levels where national survey samples may be insufficient to provide good estimates). Thus it would be important to conduct sufficient analytic work to provide an interpretive framework for at least three major indirect indicators of food insecurity: income-based measures of poverty, welfare rates, and food bank usage. A valuable foundation for the interpretation of these indicators could be gained now through the focussed analysis of existing population-level survey data.

Additional analyses of currently-available data from population surveys that have included extensive sociodemographic measures as well as some indicators of household or individual-level food insecurity (e.g., the NPHS and CCHS) would enable estimation of the risk of food insecurity associated with particular income levels or sources of income. Statistical modelling could also be undertaken to determine the extent to which the sensitivity of selected indirect indicators could be improved by taking into account other factors that affect the availability of money for food (e.g., shelter costs, household composition, regional variations in cost of living, etc). Given the particular salience of indirect indicators at the local and regional levels, it is important that the insights gleaned from such secondary analysis be communicated publicly so that they may inform local practice.

5. Research to provide a empirical foundation upon which to interpret measures of household food insecurity in Canada.

Despite the tremendous advances in food security research over the last decade, much remains to be understood about the short- and long-term consequences of food insecurity as it arises and is experienced at the individual and household level in Canada. Research is also needed to better understand the causes of food insecurity in this country and to elucidate the relationships between household-level problems of food insecurity and changing social and economic conditions, social policies, and intervention programs. A broad range of research into the causes and consequences of varying levels of severity and chronicity of food insecurity among Canadian households would importantly inform the interpretation of monitoring efforts.

SUMMARY

While much remains to be understood about the nature and severity of food insecurity and the short- and long-term consequences of this phenomenon, the concept of food insecurity has now been clearly elucidated. It can be understood most simply as deprivation in the basic need for food. Although a wide range of conditions, behaviours, and experiences are associated with this phenomenon, graded levels of severity have been defined that appear generalizable across groups. Less severe food insecurity is characterized by qualitative compromises in food selection and consumption and possibly anxiety related to food sufficiency. As resources become increasingly depleted, food insecurity is characterized by quantitative compromises in food intake and the attendant physical sensation of hunger. At its most severe stage, food insecurity is experienced as absolute food deprivation (i.e., not eating at all). Across this continuum of severity, food insecurity also has defined psychological and social manifestations, several of which appear related to the concept of social exclusion.

The measurement of food insecurity in affluent, western nations has been the focus of considerable research recently. There now exists a strong foundation of work upon which to design a system to monitor food insecurity in Canada. In particular, there have been marked advances in the development of direct indicators to measure household food insecurity at a population level. The Food Security Core Module, recently developed for use in monitoring food insecurity and hunger in the U.S., provides a brief, well-designed, and thoroughly calibrated measure of severity that may be suitable for use on Canadian population surveys with minimal additional work. Indirect indicators of food insecurity are also available, although their usefulness in nutrition monitoring would be greatly enhanced with some additional research to develop an empirically-based framework within which these indicators could be interpreted.

The profound deprivation that underlies experiences of food insecurity suggests that this condition is a matter of public health concern and a social problem worthy of monitoring in its own right. Food insecurity is also important to monitor as a risk condition for other health concerns. The dietary manifestations of chronic and severe food insecurity clearly pose threats to nutritional health and well-being. In addition, there is emerging evidence that food insecurity can have deleterious social and psychological consequences for those directly affect by this problem, although to date there has been less research in this area.

Through the systematic monitoring of food insecurity, the incidence and prevalence of this condition can be identified, and the characteristics of individuals and households who experience food insecurity can be defined. Furthermore, through such monitoring the relationship between household-level problems of food insecurity and changing social and economic conditions, policies, and intervention programs can be understood. As such, monitoring food insecurity would lay a valuable foundation for the development of policies and programs to address this problem.

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Appendix A. The U.S. Food Security Core Module Questionnaire

What follows is the FSCM as presented in Appendix A of the Guide to Measuring Household Food Security (104). The instrument is presented as a three-stage design with two internal screeners, although the inclusion of these screening questions is optional. Detailed descriptions of the method of coding responses and scaling respondents, and the procedures for handling missing responses are presented in the guide.

Questionnaire transition into module--administer to all households:

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

General food sufficiency question/screener: Questions 1, 1a, 1b (OPTIONAL: These questions are NOT used in calculating the food-security/hunger scale.)

Question 1 may be used as a screener: (a) in conjunction with income as a *preliminary* screen to reduce respondent burden for *higher income households only;* and/or (b) in conjunction with the 1st-stage internal screen to make that screen "more open"--i.e., provide another route through it.

1. [IF ONE PERSON IN HOUSEHOLD, USE "I" IN PARENTHETICALS, OTHERWISE, USE "WE."]

Which of these statements best describes the food eaten in your household in the last 12 months: --enough of the kinds of food (I/we) want to eat; --enough, but not always the kinds of food (I/we) want; --sometimes not enough to eat; or, --often not enough to eat?

[1] Enough of the kinds of food we want to eat [SKIP 1a and 1b]

[2] Enough but not always the kinds of food we want [SKIP 1a; ask 1b]

[3] Sometimes not enough to eat [Ask 1a; SKIP 1b]

[4] Often not enough [Ask 1a; SKIP 1b]

[ ] DK or Refused (SKIP 1a and 1b)

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

YES NO DK

[ ] [ ] [ ] Not enough money for food

[ ] [ ] [ ] Not enough time for shopping or cooking

[ ] [ ] [ ] Too hard to get to the store

[ ] [ ] [ ] On a diet

[ ] [ ] [ ] No working stove available

[ ] [ ] [ ] Not able to cook or eat because of health problems

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

YES NO DK

[ ] [ ] [ ] Not enough money for food

[ ] [ ] [ ] Kinds of food (I/we) want not available

[ ] [ ] [ ] Not enough time for shopping or cooking

[ ] [ ] [ ] Too hard to get to the store

[ ] [ ] [ ] On a special diet

BEGIN FOOD-SECURITY CORE MODULE (i.e., SCALE ITEMS)

Stage 1: Questions 2-6 --ask all households:

[IF SINGLE ADULT IN HOUSEHOLD, USE "I," "MY," AND “YOU” IN PARENTHETICALS; OTHERWISE, USE "WE," "OUR," AND "YOUR HOUSEHOLD;" IF UNKNOWN OR AMBIGUOUS, USE PLURAL FORMS.]

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

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

[ ] Often true

[ ] Sometimes true

[ ] Never true

[ ] DK or Refused

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

[ ] Often true

[ ] Sometimes true

[ ] Never true

[ ] DK or Refused

4. “(I/we) couldn’t afford to eat balanced meals.” Was that often, sometimes, or never true for

(you/your household) in the last 12 months?

[ ] Often true

[ ] Sometimes true

[ ] Never true

[ ] DK or Refused

[IF CHILDREN UNDER 18 IN HOUSEHOLD, ASK Q5 - 6;

OTHERWISE SKIP TO 1st-Level Screen.]

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

[ ] Often true

[ ] Sometimes true

[ ] Never true

[ ] DK or Refused

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

[ ] Often true

[ ] Sometimes true

[ ] Never true

[ ] DK or Refused

1st-level Screen (screener for Stage 2): If AFFIRMATIVE RESPONSE to ANY ONE of Questions 2-6 (i.e., "often true" or "sometimes true") OR response [3] or [4] to

Question 1 (if administered), then continue to Stage 2; otherwise, skip to end.

Stage 2: Questions 7-11 --ask households passing the 1 st -level Screen: (estimated 40% of hh's < 185% Poverty; 5.5% of hh's > 185% Poverty; 19% of all households).

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

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

[ ] Often true

[ ] Sometimes true

[ ] Never true

[ ] DK or R

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

[ ] Yes

[ ] No (SKIP 8a)

[ ] DK or R (SKIP 8a)

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

[ ] Almost every month

[ ] Some months but not every month

[ ] Only 1 or 2 months

[ ] DK or R

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

[ ] Yes

[ ] No

[ ] DK or R

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

[ ] Yes

[ ] No

[ ] DK or R

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

[ ] Yes

[ ] No

[ ] DK or R

2 nd -level Screen (screener for Stage 3): If AFFIRMATIVE RESPONSE to ANY ONE of Questions 7 through 11, then continue to Stage 3; otherwise, skip to end.

Stage 3: Questions 12-16 --ask households passing the 2 nd -level Screen: (estimated 7-8% of hh's < 185% Poverty; 1-1.5% of hh's > 185% Poverty; 3-4% of all hh's).

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

[ ] Yes

[ ] No (SKIP 12a)

[ ] DK or R (SKIP 12a)

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

[ ] Almost every month

[ ] Some months but not every month

[ ] Only 1 or 2 months

[ ] DK or R

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

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

[ ] Yes

[ ] No

[ ] DK or R

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

[ ] Yes

[ ] No (SKIP 14a)

[ ] DK or R (SKIP 14a)

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

[ ] Almost every month

[ ] Some months but not every month

[ ] Only 1 or 2 months

[ ] DK or R

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

[ ] Yes

[ ] No

[ ] DK or R

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

[ ] Yes

[ ] No

[ ] DK or R

END OF FOOD-SECURITY/HUNGER CORE MODULE