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Does food insecurity impact subjective evaluation of well-being?

Evidence from a developing country

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Abstract: Understanding the relationship between food insecurity and subjective evaluation of well-being is critical in designing social welfare policies, especially in developing countries. Surprisingly, literature on the topic is scarce. This study adopted Van Praag's theoretical framework and used household survey data from Ghana to investigate the monetary income which households facing severe food insecurity require to reach a given level of verbal qualification of well-being. We found that households that are food insecure require a higher monetary income to reach the same level of verbal qualification of well-being than their counterparts who are food secure. Furthermore, per capita household income levels positively correlate with monetary income requirements, indicating a weak correlation between food security and per capita household income. Households that receive support from others require a lower level of income than either those who give support or those who neither give nor receive support.

Keywords: food security, well-being, equivalent scale
JEL classification: I31

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1 Introduction

While the percentage of undernourished people may have dropped globally, the absolute numbers are still high, and the rate of decrease falls short of international goals for reducing hunger, especially in the developing world (UN 2014). According to estimates made by the Food and Agriculture Organization (FAO), one in every nine individuals in the world has insufficient food for an active and healthy life, with the majority of these individuals being in developing countries (FAO et al. 2014). Lack of sufficient food correlates with poor health conditions, environmental degradation, inadequate trade and poor economic development. As a result, the extent to which a country/region manages to decrease the number of its hungry people reflects its economic and social progress (FAO et al. 2013).

Food security is defined by the FAO (1996) as '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'. Food security concerns nearly caused the breakdown of the overall Doha process in 2008 and also nearly derailed negotiations at the 2013 Bali Ministerial Conference, highlighting the relevance of the issue on the global development agenda (Diaz-Bonilla 2014). This is understandable, given that human nutrition is a fundamental need influencing health and well-being throughout the human lifespan in numerous ways (Hammond and Dubé 2012; Hoddinott and Yohannes 2002). The above notwithstanding, there is a lack of knowledge about how households' food insecurity situations influence their subjective measures of well-being. Specifically, there is a lack of knowledge about whether or not a household which faces severe food insecurity requires a relatively low amount of monetary support to reach a given level of verbal qualification of well-being, compared to a counterpart that is food secure. This critical question has not been addressed in the literature, and thus constitutes the core focus of this study.

According to the World Food Programme (WFP), approximately 1.2 million people (i.e. 5 per cent of the population) are food insecure, and 2.07 million are vulnerable to becoming food insecure (Biederlack and Rivers 2009). Although food insecurity, malnutrition and poverty have often been viewed as rural problems, rapid growth in urban centres, along with the accompanying shifts in social dynamics, require a discussion of these problems within the urban context as well (Levin et al. 1999). Although food is available globally, it is not necessarily accessible to each household. For example, in Ghana, 14 per cent of children under the age of five years are underweight, 28 per cent are stunted, and 9 per cent are classified as wasted (GSS et al. 2009). Considering that food security is an important element in multifactorial systems analysis of health and well-being, investigating its interaction with subjective individual well-being is essential (Jaron and Galal 2009).

The concepts 'food security' and 'well-being/welfare' are complex and evolving (Anderson et al. 2014; Carletto et al. 2013). Income has been used extensively as a measure of well-being (Meyer and Sullivan 2003) and, when considering food security, estimates of absolute incomes could provide some estimates of household food security. However, this can only be justified if income share of food is equal across households – a strong assumption indeed, since needs and costs of other goods and services assessed by each household could differ significantly (Meyer and Sullivan 2003). It is however obvious that devising a fitting tool or measure to investigate the relationship between household food insecurity and an individual's subjective well-being will contribute meaningfully to the food security/well-being discourse and, most importantly, guide intervention appropriately.

It has been long debated by economists that income may not be a sole indicator of welfare/well-being, since a lot of the amenities considered for social or individual good may not be monetarily quantifiable (Sen 1987, 1993; Zhong 2009). Also, scientists generally believe that it is impossible to make interpersonal comparisons of utility, which capture welfare, attributes, experiences and observable choices of an individual (List 2003). Nevertheless, there is growing consensus that, for the purposes of social policy, interpersonal comparability is necessary (Wolbring et al. 2013). Thus, there is a need to ask questions in the context of a more 'universally' familiar and measurable concept, such as income, while retaining the integrity of the subjectivity of the concept of welfare/well-being.

The impact of food security on an individual's well-being or welfare may be modulated not only by his or her income, but also by other available resources, as well as the extent to which he or she is 'entitled' to make use of those resources (Damas and Israt 2004). In the same vein, resource scarcity induced by factors such as climate change, while perhaps resulting in specific adaptive and resource-conserving measures, influences an individual's perceived well-being (Kijazi and Kant 2011). It is thus imperative to consider measuring interpersonal capability of well-being to better address distributional issues of intra- and inter-socioeconomic equity during exposure to climate-induced stressors like food insecurity, among others.

Taking cues from some existing works (Van Praag and Kapteyn 1973; Van Praag 1968; Van Praag and Ferrer-i-Carbonell 2007), we have employed a novel approach to investigate factors influencing an individual's verbal qualification of well-being when he/she is faced with varying degrees of food insecurity, which could emanate from climate-sensitive conditions, using data on three urban poor communities in Ghana. In addition, we have investigated the change in monetary income necessary to equalize welfare across households that are food secure and those that are not.

The results of our study reveal that those who are food insecure, compared to their food-secure counterparts, require higher monetary subsidy/support to reach the same level of verbal qualification of well-being. On the other hand, per capita household income levels positively correlate with the required support. It follows that the correlation between food security and per capita income is weak. Furthermore, households that receive financial support from others require lower monetary support, compared to those who do give support and those who neither give nor receive financial support.

The remainder of the paper is organized as follows: the next section (Section 2) describes the theoretical model employed for the study, which is based on Van Praag (1968). This is followed by a section on data sources and description. Section 4 presents the data analysis and the last section (Section 5) presents the concluding remarks.

2 The theoretical framework

2.1 Welfare parameters: want parameter, welfare sensitivity, and welfare position

The study adopts an individual welfare evaluation framework proposed by Van Praag (1968), which is based on cardinal utility analysis. The basic assumption of this approach is that, based on an individual's own situation, he/she is able to evaluate income ranges that he/she considers 'excellent', 'good', 'sufficient', 'inadequate', and so on (Van Praag and Kapteyn 1973; Van Praag 1968; Van Praag

and Ferrer-i-Carbonell 2007). These individual evaluations are termed *verbal qualifiers*. A typical example of an income evaluation questionnaire (IEQ) is as follows:

Taking into account your own situation with respect to the characteristics of your family and job, you would call your net-income in Ghana new cedi (including gifts from family and friends and tips) per year

i. 'More than what you need' if it were above …
ii. 'Just what you need' if it were between … and …
iii. 'Barely what you need' if it were between … and …
iv. 'Less than what you need' if it were between … and …
v. 'Much less than what you need' if it were less than …

The respondent is supposed to complete the IEQ's blank spaces. Now, suppose a typical respondent provided the following values to the preceding verbal qualifiers, respectively: (i) 7200; (ii) 4800 and 7200; (iii) 3600 and 4800; (iv) 2000 and 3600; and (v) 2000. Let the 'inserted' income levels at the left-hand column of the income evaluation question be defined as $z_{ik} = \{7200, 4800, 3600, 2000\}$; where $k = 1, 2, 3, 4$, and $i = 1, 2, ..., n$ is individual identifier. The following parameters can then be computed from the verbal qualifiers:

$$\mu_i = \frac{1}{4}\sum_{k=1}^{4} ln(z_{ik}) \tag{1}$$

$$\sigma_i^2 = \frac{1}{4-1}\sum_{k=1}^{4}\left(\ln(z_k) - \mu_i\right)^2 \tag{2}$$

$$\Lambda_i = \frac{\ln(z_{ik}) - \mu_i}{\sigma_i} \tag{3}$$

The parameters μ_i, σ_i^2, and Λ_i are known as 'want parameter', 'welfare sensitivity parameter' and 'welfare position parameter', respectively. The 'want parameter', if expressed in an exponential form (i.e. e^{μ_i}), is called the 'natural unit'. The natural unit corresponds to a median value of welfare evaluation, which also implies that an individual's income level is halfway between the worst and the best situation. Conversely, a high (low) e^{μ_i} implies the individual requires a relatively high (low) level of income to attain the median welfare evaluation (i.e. 0.5 or 50 per cent). Thus, for any two individuals (A and B), B is more satisfied with his/her monetary income than his/her counterpart A, if B has lower e^{μ_i}. Table 1 illustrates how these parameters are computed.

Next, an individual with a high 'welfare sensitivity parameter' (i.e. σ) evaluates a broad income range below and above the median value. Thus, if an individual has a large σ, then he/she is sensitive to income change over a broad range of income levels. From Appendix Table A1, for example, individuals A and B have welfare sensitivity values of 0.29 and 0.82, respectively, implying that B's

income is more sensitive over a broader range of income levels than A. If an individual has a σ value equal to 0, he/she is completely unsatisfied with any rise in income below μ . The value of the welfare position parameter (Λ_i) indicates an individual's own evaluation of his/her current welfare position, as based on his/ her μ and σ given his/her current income evaluated on a cardinal scale.

Furthermore, following Van Praag (1968) and Van Herwaarden et al. (1977), let the utility function also known as 'individual welfare function of income' defined over a closed set (i.e. $u(z_{ik}) \in [0,1]$) be normally distributed, i.e.

$$u(z_{ik}) = N\left(\frac{\ln(z_{ik}) - \mu_i}{\sigma_i}; 0,1\right) \tag{4}$$

Van Praag (1968) has shown that informational value obtained from the verbal qualifiers is maximized if the following relationship holds:

$$u(z_k) = \frac{k}{3+1} \tag{5}$$

2.2 Welfare effect of food insecurity, social capital and climate factors

In order to verify the welfare impact on food insecurity, social capital and climate factors, the following equations are estimated:

$$\mu_i = \alpha_0 + \alpha_1 \ln y_i + \alpha_2 Ed_i + \alpha_3 FS_i + \alpha_4 SC_i + \alpha_5 CM_i + \varepsilon_i \tag{6}$$

$$\sigma_i = \beta_0 + \beta_1 \ln y_i + \beta_2 Ed_i + \beta_3 FS_i + \beta_4 SC_i + \beta_5 CM_i + \mu_i \tag{7}$$

Following Frijters and Van Praag (1998), let the term $(\ln(y_i) - \mu_i)$ constitute an 'ordinal welfare index' of individual or household i. Furthermore, define $j(=FS, SC, CM)$ as an indicator for the three variables of interest and let a reference situation be denoted by subscript zero (e.g. $(\ln(y_{i0}) - \mu_{i0})$) so that the counterfactual situation is represented by the subscript j. An individual or household is indifferent between his/her/its reference and actual situations if the following condition holds:

$$\ln(y_{i0}) - \mu_{i0} = \ln(y_{ij}) - \mu_{ij} \Rightarrow \ln\left(\frac{y_{ij}}{y_{i0}}\right) = \mu_{ij} - \mu_{i0} \tag{8}$$

Using Equation (6) in (8), we obtain the following:

$$\ln\left(\frac{y_{ij}}{y_{i0}}\right)=\frac{\alpha_2}{1-\alpha_1}\left(Ed_{ij}-Ed_{i0}\right)+\frac{\alpha_3}{1-\alpha_1}\left(FS_{ij}-FS_{i0}\right)+\frac{\alpha_4}{1-\alpha_1}\left(SC_{ij}-SC_{i0}\right)+\frac{\alpha_5}{1-\alpha_1}\left(CM_{ij}-CM_{i0}\right) \quad (9)$$

From Equation (9), which is termed 'equivalent scale', the change in income necessary to compensate an individual or household for a welfare loss/gain due to a change in his/her/its food security situation, or change in climatic condition or social capital endowment, all else being equal, can be computed (e.g. $\Delta\ln\left(\frac{y_{ij}}{y_{i0}}\right)=\frac{\alpha_5}{1-\alpha_1}\Delta\left(CM_{ij}-CM_{i0}\right)$).

3 Data description

The study was conducted in Accra, the administrative and commercial capital of Ghana. The city occupies an approximate area of 114 km^2 with a total population of approximately 2 million (GSS 2012). Three communities (James Town, Ussher Town, and Agbogbloshie) were surveyed. These communities are commercially vibrant but densely populated, with poor social amenities typifying an urban poor settlement. In addition, the communities are waterlogged and experience seasonal flooding. This results in occasional losses of property, thus worsening household food insecurity situations (Codjoe et al. 2013). Also, the communities lack proper drainage systems, and studies have found a high incidence of climate-related diseases such as malaria, diarrhoea, cholera, and typhoid among the residents.

The study was approved by the Institutional Review Board of Noguchi Memorial Institute for Medical Research at the University of Ghana, Legon. Data was collected between October and November 2013. Detailed questionnaires to study respondents were administered via face-to-face interviews. The questionnaires were written in English, and the fieldworkers administered them in the local language. The study localities were divided into enumeration areas which served as clusters. The choice of households from these clusters was based on systematic random sampling, which was achieved by randomly selecting the first respondent in the list of members of the cluster, followed by the selection of every next nth. Eligible members interviewed in households were household heads. Administered questionnaires covered sections ranging from socio-demographic and economic questions, climate events such as flooding, the household food security situation, and capitals (i.e. social, physical, financial and human capital). In addition, a section was devoted to eliciting responses for the household's welfare function.

A key variable, 'food security', is based on recall. Thus, respondents were asked to recall the household food situation over a time period of one month prior to the interview date. Specifically, household heads were asked to indicate whether there were day(s) in the 30 days prior to interviewing when he/she or any member of the household did not have enough nutritious food to eat.[1] Households with no affirmative responses were considered food secure. Households that indicated they did not

[1] From the World Food Summit in 1996 household food security can be defined as when all persons in a household, at all times, have physical and economic access to sufficient safe and nutritious food to meet their dietary needs and food preferences for a healthy and active life (FAO 1996).

have enough food to eat from one to ten days were considered to be moderately food insecure, while those who did not have enough food for more than ten days were considered severely food insecure.

Next, the climatic variable of interest in this study is extreme precipitation as represented by the occurrence of floods in the study communities. Due to the topology of the study regions and various exposure levels to extreme climate events, the frequency of the households' flooding experiences varies both across and within communities. Households were categorized as either (1) having experienced no flooding over the rainy season, or (2) having experienced flooding more than once during the rainy season.

Furthermore, considering the fact that the well-being of households has been linked to the existence of support systems, household heads were asked if their household had received or given – or both received and given – any financial or in-kind support from family (children, siblings or parents), relatives (other kin) or friends outside the household over the last 12 months. Thus, four categories of social support systems were identified: (1) households that neither received nor gave any form of support; (2) those that received support; (3) those that gave support; and 4) those that received and gave support.

4 Data analysis

4.1 Descriptive statistics and regression analysis

Table 1 contains the descriptive statistics of the variables used for the empirical analysis. In total, 789 households were interviewed. First, the average annual household income of the respondents is GHS4900, with a very high standard deviation of 33,306, revealing high levels of income inequality within the communities.[2] Second, the mean value of the computed 'want parameter' is 8.05, with a relatively low standard deviation of 1.08, implying that the computed values are clustered around the mean, in spite of the high income inequality. Third, the welfare sensitivity parameter has a mean and standard deviation of 1.05 and 1.3, respectively. Fourth, the food security variable reveals that about 30 per cent of households are food insecure, with 5 per cent classified as being highly food insecure. Furthermore, approximately 40 per cent of households receive financial support from friends and relatives in times of need, while 29 per cent give out support to others. Finally, about 45 per cent of the respondents have experienced flooding at least once a year.

[2] At the time of data collection, the exchange rate was US$1=GHS2.29.

Table 1: Descriptive statistics of variables used in the empirical model

	Mean	SD
Welfare indicators		
Want parameter (μ)	8.05	1.08
Welfare sensitivity (σ)	1.05	1.31
Household food security		
High food insecurity (=1, 0 otherwise)	0.05	0.23
Low food insecurity (=1, 0 otherwise)	0.22	0.42
Food secured (=1, 0 otherwise)	0.72	0.45
Social capital		
Receives no support (=1, 0 otherwise)	0.41	0.49
Receives support (=1, 0 otherwise)	0.14	0.38
Gives support (=1, 0 otherwise)	0.29	0.45
Receives and gives (=1, 0 otherwise)	0.16	0.36
Climate variability		
No flooding	0.89	0.31
Flooding once in a year	0.38	0.19
Flooding ≥ 2 in a year	0.07	0.25
Location		
Agbogbloshie	0.16	0.36
James Town	0.16	0.44
Ussher Town	0.56	0.45
Formal education (yrs)	7.84	4.43
Income (Ghana Cedi)	4900.23	33305.93

Source: Data extracted from RIPS EDULINK Survey 2013.

The regression results of the 'want parameter', 'welfare sensitivity' and income equations are presented in Tables 2, 3 and 4, respectively. The F-statistic shows that the 'want parameter' regression line is a good fit at 1 per cent significance level ($P<0.000$). Regarding the explanatory variables, it has been found that household monetary income, food insecurity, flooding, social support, and years of formal education explain verbal qualification of welfare position. The sign of the coefficient of monetary income is positive, meaning a household that is relatively well off, all else being equal, requires a higher level of income to reach the same level of a subjective welfare evaluation as its counterpart that has a lower monetary income. The coefficient of the income variable is significant at the 1 per cent level, with a corresponding elasticity of 0.02. The positive sign associated with this variable is consistent with the findings in the literature, confirming that current levels of monetary income heighten people's aspirations (Brickman and Campbell 1971; Frijters and Van Praag 1998).

The coefficient of the dummy variables for 'low food insecurity' and 'food security' are found to be statistically significant at 5 per cent and 1 per cent levels, respectively. The reference category of these two variables is 'high food insecurity'. The sign of the coefficients indicates that, all other things being

equal, a household classified as being highly food insecure has the highest aspiration (i.e. want parameter) on the average, compared to its counterpart which is categorized as low food insecure or food secure. Conversely, being food secure corresponds to the lowest want parameter on the average. This finding is both logical and intuitive. Indeed, there are no limits to aspirations, and a household that is food insecure may have more needs than its counterparts that are food secure. As a result, the household that is food insecure may require a relatively higher income to reach the same level of verbal qualification of well-being as its more secure counterparts. This finding has implications for public policy.

Households that experience flooding more than once within each year have a lower want parameter relative to their counterparts who experience it at most once within a year. Thus, households that experience frequent flooding require lower monetary income to reach the same level of well-being compared to their counterparts that experience it at most once a year. This result, though surprising, is not unexpected, since the households that experience flooding frequently are not necessarily those who are food insecure.

Table 2: The effect of household food insecurity, experience of flooding and selected socioeconomic characteristics on the welfare function-natural unit

	Natural unit, μ			
	Coefficient		Robust Std. error	Elasticity
Low food insecurity (=1, 0 otherwise)	-0.560	**	(0.221)	-0.016
Food secure (=1, 0 otherwise)	-0.700	***	(0.208)	-0.063
Household experience flooding ≥2 times/year (=1, 0 otherwise)	-0.226		(0.168)	
Receives social support (=1, 0 otherwise)	-0.525	**	(0.165)	-0.010
Gives social support (=1, 0 otherwise)	0.061		(0.108)	
Household size	0.033	**	(0.015)	0.019
Formal education (yrs)	0.028	**	(0.011)	0.027
Ln (Income)	0.178	**	(0.057)	0.022
Constant	6.875		(0.126)	
N	467			
R^2=0.10 ; F =5.43***				

Notes: ***, **, * indicate significance at the 1%, 5%, and 10% levels, respectively.

Source: Data extracted from RIPS EDULINK Survey 2013.

Furthermore, 'years of education' is positively correlated with the want parameter. The implication is that educated households are generally better exposed to opportunities and wealth, and hence require higher monetary income to reach a given level of verbal qualification of welfare. The corresponding elasticity coefficient is 0.03.

Table 3: The effect of household food insecurity, experience of flooding and selected socioeconomic characteristics on the welfare function-welfare sensitivity

	Welfare sensitivity, σ			
	Coefficient		Robust Std. error	Elasticity
Low food insecurity (=1, 0 otherwise)	-0.067		(0.280)	
Food secured (=1, 0 otherwise)	0.165		(0.277)	
Household experience flooding ≥1 time / year	0.286		(0.235)	
Receives social support (=1, 0 otherwise)	-0.577	***	(0.156)	-0.078
Gives social support (=1, 0 otherwise)	-0.353	**	(0.124)	-0.100
Household size	-0.005		(0.017)	
Formal education (yrs)	0.001		(0.014)	
Ln (Income)	-0.167	**	(0.070)	-1.241
Ussher Town (=1, 0 otherwise)	0.532	***	(0.162)	0.142
James Town (=1, 0 otherwise)	0.481	***	(0.129)	0.255
Constant	2.000		(0.537)	-0.143
N	467			
R^2=0.06; F =3.63**				

Notes: ***, **, * indicate significance at the 1%, 5%, and 10% levels, respectively.

Source: Data extracted from RIPS EDULINK Survey 2013.

As noted earlier, Table 3 contains the regression results of the welfare sensitivity. The F-statistic indicates the line is a good fit at the 5 per cent significance level. The dummy variable for households that receive financial support, and for those who give support to others are significant at 1 per cent and 5 per cent, respectively. First, the signs of the coefficients of the two variables show that both variables lower welfare sensitivity by 0.4 and 0.6, respectively, relative to those who neither receive nor give social support, implying their income is less sensitive over a broader range of income levels. Second, the more educated a household is, all else being equal, the broader its evaluation of income around the median value. Furthermore, income levels are negatively related to welfare sensitivity, with a corresponding elasticity coefficient of 0.2. Thus, households that are economically well off had a smaller range of evaluation of income around the median value.

The income of the respondents was regressed on a number of variables, including food security, to determine which of the variables explain it. The regression results are reported in Table 4. The F-statistic shows that the line is a good fit, and the R-square value indicates that about 5 per cent of the variability of the income is explained by the regressors. The two variables with significant coefficients are the dummy for food security and years of education. Households that are food secure have higher incomes than their counterparts who are food insecure. Moreover, households that have more years of education are relatively well off.

Table 4: The effect of household food security status, climate variability, and selected socioeconomic characteristics on income

	Ln (Income) Coefficient		Robust Std. error
Low food insecurity (=1, 0 otherwise)	0.184		0.179
Food secured (=1, 0 otherwise)	0.348	**	0.189
Household experience flooding ≥1 time / year	0.167		0.138
Receives social support (=1, 0 otherwise)	-0.136		0.142
Gives social support (=1, 0 otherwise)	-0.038		0.097
Formal education (yrs)	0.035	***	0.017
Constant	7.210		0.199
R2=0.052; F= 4.51***			

Notes: ***, **, * indicate significance at the 1%, 5%, and 10% levels, respectively.

Source: Data extracted from RIPS EDULINK Survey 2013.

4.2 Welfare loss/gain due to food insecurity

The equation derived from the equivalent scale is employed to determine the income change needed to bring:

a) Severely food insecure households to the same level of verbal welfare qualification as their counterparts who are moderately food insecure and food secure; and
b) Households receiving no social support to the same level of verbal welfare qualification as their counterparts that receive social support.

A mean income change of 2103.60 is required for households that are severely and moderately food insecure to attain the same level of verbal qualification of welfare. The corresponding figure for a household that is food secured compared to one that is highly food insecure is 2901.64. It therefore follows that the mean income differential between the moderately food insecure households and food secure household is GHS789. Furthermore, compared to those who do not receive social support, a household that receives support requires an additional amount of GHS3049 to attain the same level of verbal qualification of welfare.

Table 5: Change in income required to reach a level of verbal welfare qualification

	Change in income
Household food security[a]	(GSS & Macro)
Severely food insecure	2901.64
Moderately food insecure	789.06
Social capital[b]	
Receive social support	3048.86

Notes: [a]Severely food insecure households serve as reference. [b]Household with no social support serves as reference. At the time of data collection, the exchange rate was US$1=GHS2.29.

Source: Data extracted from RIPS EDULINK Survey 2013.

5 Conclusion

With one in every nine households in the world having insufficient food for an active and healthy life, food insecurity remains a global problem. This study has addressed a critical question of whether households that are food insecure require lower or higher amounts of income in order to reach a given level of verbal qualification of welfare, compared with their counterparts who are food secure. We have found that, among the urban poor community dwellers in Ghana, households that are food insecure require more money than their counterparts who are food secure to reach a given level of subjective well-being. However, a very weak correlation is found between food security and per capita household income, which is intriguing. This finding suggests the notion that food is always ranked first on a household's scale of preference is not universally tenable. Social policies directed at reducing hunger should therefore examine welfare implications of transfers and subsidies.

Furthermore, as expected, larger households require more money, and households with higher levels of formal education also require larger amounts of money to reach a given level of subjective well-being. The implications are that social support programmes that seek to improve well-being must vary across households according to some important attributes.

Finally, social networks are generally critical in providing support in times of need to people in developing countries. We found that those who depend on others for financial assistance require more support (i.e. they need more money to reach a given level of verbal qualification of welfare). This is not surprising since those who seek such supports are people who are obviously in need.

Notwithstanding the limited scope of the study (a cross-sectional study covering urban poor communities in Ghana), its findings nevertheless provide a starting point for further research on welfare implications of social support for society's economically disadvantaged segments.

References

Anderson, G., T. W. Leo, and P. Anand (2014). 'Dealing with Increasing Dimensionality in Wellbeing and Poverty Measurement, Some Problems and Solutions'. Mimeo. University of Toronto Economics Department.

Biederlack, L., and J. Rivers (2009). 'Comprehensive Food Security and Vulnerability Analysis (CFSVA)'. Ghana: United Nations World Food Programme.

Brickman, P., and D. Campbell (1971). 'Hedonic Relativism and Planning the Good Society'. In M. H. Apley (ed.), *Adaptation-level Theory: A Symposium*. New York: Academic Press.

Carletto, C., A. Zezza, and R. Banerjee (2013). 'Towards Better Measurement of Household Food Security: Harmonizing Indicators and the Role of Household Surveys'. *Global Food Security*, 2: 30-40.

Codjoe, S.N.A., G. Owusu, and V. Burkett (2013). 'Perception, Experience, and Indigenous Knowledge of Climate Change and Variability: The Case of Accra, a Sub-Saharan African City'. *Regional Environmental Change*, 14: 369-83.

Damas, P., and R. Israt (2004). *Vulnerability and Poverty: What are the Causes and How they are Related?* Bonn: Universität Bonn, ZEF Bonn.

Diaz-Bonilla, E. (2014). 'On Food Security Stocks, Peace Clauses, and Permanent Solutions after Bali'. Working Paper, June 2014. Washington DC: International Food Policy Research Institute.

FAO (1996). 'Rome Declaration World Food Security and World Food Summit Plan of Action'. World Food Summit 1996. Rome: FAO.

FAO, IFAP, WFP (2013). 'The State of Food Insecurity in the World: The Multiple Dimensions of Food Security'. Rome: FAO.

FAO, IFAD and WFP (2014). 'The State of Food Insecurity in the World 2014. Strengthening the Enabling Environment for Food Security and Nutrition'. Rome: FAO.

Frijters, P., and B. M. Van Praag (1998). 'The Effects of Climate on Welfare and Well-being in Russia'. *Climatic Change*, 39(1): 61-81.

Ghana Statistical Service (GSS), Ghana Health Service (GHS), and ICF Macro (2009). 'Ghana Demographic and Health Survey 2008'. Accra, Ghana: Ghana Statistical Service, Ghana Health Service and ICF Macro.

Ghana Statistical Service (GSS) (2012). 'Ghana Statistical Service. 2010 Population and Housing Census: Summary Report of Final Results'. Available at: http://www.statsghana.gov.gh/docfiles/2010phc/Census2010_Summary_report_of_final_results.pdf. (Last accessed 16 February 2015).

Hammond, R.A., and L. Dubé (2012). 'A Systems Science Perspective and Transdisciplinary Models for Food and Nutrition Security'. *Proceedings of the National Academy of Sciences*, 109: 12356-63.

Hoddinott, J., and Y. Yohannes (2002). 'Dietary Diversity as a Food Security Indicator'. Food and Nutrition Technical Assistance Project. Washington, DC: Academy for Educational Development.

Jaron, D., and O. Galal (2009). 'Food Security and Population Health and Wellbeing'. *Asia Pacific Journal of Clinical Nutrition*, 18: 684.

Kijazi, M.H., and S. Kant (2011). 'Evaluation of Welfare Functions of Environmental Amenities: A Case of Forest Biomass Fuels in Mount Kilimanjaro, Tanzania'. *Ecological Economics*, 72: 129-39.

Levin, C.E., M. T. Ruel, S. S. Morris, D.G. Maxwell, M. Armar-Klemesu, and C. Ahiadeke (1999). 'Working Women in an Urban Setting: Traders, Vendors and Food Security in Accra'. *World Development*, 27: 1977-91.

List, C. (2003). 'Are Interpersonal Comparisons of Utility Indeterminate?'. *Erkenntnis,* 58: 229-60.

Meyer, Bruce D., and James X. Sullivan (2003). 'Measuring the Well-Being of the Poor Using Income and Consumption'. *Journal of Human Resources*, 2003, v38 (Supplement): 1180-1220.

Sen, A. (1987). 'The Standard of Living'. In G. Hawthorn (ed.), *The Standard of Living*. Cambridge: Cambridge University Press.

Sen, A. (1993). *Capability and Well-Being. The Quality of Life*. Oxford: Oxford University Press.

United Nations (UN) (2014). 'The Millennium Development Goals Report 2014'. New York: United Nations.

Van Herwaarden, F., A. Kapteyn, and B. M. S. Van Praag (1977). 'Twelve Thousand Individual Welfare Functions: A Comparison of Six Samples in Belgium and the Netherlands'. *European Economic Review*, 9(3), 283-300.

Van Praag, B. M. (1968). *Individual Welfare Functions and Consumer Behavior: A Theory of Rational Irrationality* (Vol. 57). North-Holland Pub. Co.

Van Praag, B. M., and A. Ferrer-i-Carbonell (2007). *Happiness Quantified: A Satisfaction Calculus Approach*. Oxford: Oxford University Press.

Van Praag, B. M. S., and A. Kapteyn (1973). 'Further Evidence on the Individual Welfare Function of Income: An Empirical Investigation in the Netherlands'. *European Economic Review*, 4: 33-62.

Wolbring, T., M. Keuschnigg, and E. Negele (2013) 'Needs, Comparisons and Adaptation: The Importance of Relative Income for Life Satisfaction'. *European Sociological Review*, 29(1): 86-104.

Zhong, H. (2009). 'A Multivariate Analysis of the Distribution of Individual's Welfare in China: What is the Role of Health?'. *Journal of Health Economics*, 28: 1062-70.

Appendix

Appendix Table A1: Evaluation of welfare function of two study respondents

Income Evaluation Question (IEQ): Q: Taking into account your own situation with respect to the characteristics of your family and job, you would call your net income in Ghanaian new cedi (including gifts from family and friends, and tips) per year	Answers for respondent A			Answers for respondent B		
More than what you needed if it were above	7200			5000		
Just what you needed if it were between	4800	and	7200	1500	and	5000
Barely what you needed if were between	3600	and	4800	1000	and	1500
Less than what you needed if it were between	2000	and	3600	600	and	1000
Much less than what you needed if it were less than	2000			600		
Actual current income	4800			6000		

Calculation of individual welfare function: Based on answers by respondents A and B above	A				B			
	z_1	z_2	z_3	z_4	z_1	z_2	z_3	z_4
Income levels $z_{ji}\left(k=4\right);\ j=1,...,k;\ i=A,B$	2000	3600	4800	7200	600	1000	1500	5000
$Ln\left(z_{ji}\right)$	7.60	8.19	8.48	8.88	6.40	6.90	7.31	8.52
$\sum_{j=1}^{k} Ln(z_{ji})$				33.04				29.13
Natural Unit $\hat{\mu}=\frac{1}{k}\sum_{j=1}^{k} Ln\left(z_{j,i}\right)=\left(\frac{33.05}{4}\right)$				8.26				7.28
Welfare sensitivity $\hat{\sigma}^2=\frac{1}{k-1}\sum_{j=1}^{k}\left(Ln\left(z_{j,i}\right)-\hat{\mu}_i\right)^2$				0.26				0.82
Welfare position $\Lambda=\left(Ln(z)-\mu\right)\sigma^{-1}$				0.35				1.57

Source: RIPS EDULINK wave 3 survey data. The exchange rate is GHS 2.19 = US$1.00 at time of data collection.