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Income Risk and Welfare Status of Rural Households in Nigeria

Ekiti State as a Test Case

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Abstract

This paper examines the impact of income risk on the level of well-being of rural households in Nigeria. While income risk is defined as the risks associated with variability in income well-being is defined in terms of the level of utility reached by a given individual. This level is a function of goods and services that the individual consumes. The study is based on primary data collected from a sample of 285 households in Ekiti State, Nigeria. Analysis of the data revealed that household heads' age, years of formal education, household size, size of land cultivated and total expenditure (on food and non-food items) are major determinants of income risks among households in the study area. Also, going by the indices of various social indicators of well-being considered, it was revealed that income risk impacts negatively on the well-being of households in the study area.

Keywords: income risk, welfare status, social indicators, Ekiti State, rural households

JEL classification: I31

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1 Introduction

Rural households in Nigeria, like in most developing economies across the globe, face one kind of risk situation or another, leading to fluctuations in their income. They are impoverished and vulnerable to negative changes in environmental, socio-cultural, political and economic conditions because of their entanglement in the vicious cycle of poverty and they are often the worst hit by the scourge of food insecurity (FOS 1999a). These rural households constitute the greater share of agricultural labour force (FOS 1999b; ECA 2001) but earn low incomes because of poor marketing facilities, poor storage and preservation techniques, bad road network, poor health facilities, unfavourable government policies and lack of technological know-how. Worse still, the rural poor are risk averse, as they are continually sceptical of losing the limited resources that they have at their disposal and thus tend to concentrate on low risk-low return activities (Collier and Gunning 1999). The consequence is further impoverishment, or at least increased inequality.

Risk is the possibility of an uncertain event (shock) that can erode an individual's well-being. Therefore, income risk is the risk associated with variability in income and this directly or indirectly influences the consumption/savings pattern of rural households. Such income risk includes weather uncertainty, price changes, epidemics or sickness, government policies, loss of job etc (Townsend 1994; Lustig 2001). Income risk and its attendant consequences are a major problem facing rural households in Nigeria because of the prevalence of factors frequently leading to income variability. The rural households are invariably the most vulnerable to income risk also because of the peculiar characteristics inherent in their primary means of livelihood and major income source (agriculture).

1.1 Motivation/Rationale

Recognizing that rural households constitute the majority of agricultural labour force in Nigeria, a study on income risk and its implications on the well-being of the rural households is timely and relevant. While literature is replete with several works on poverty (Omonona 2001), food security (Olayemi 1996), inequality (Aigbokhan 2000), few studies have been done on the risk associated with income in Nigeria, and Ekiti State in particular. Static poverty measures neglect several important aspects of households' welfare (Ligon and Schechter 2002) and economists have long used measures of poverty to summarize the level of well-being of the less fortunate households in a population. At the same time, they have recognized that a household's sense of well-being depends not just on its average income or expenditures, but also on the risk it faces. This is particularly true for households with fewer resources. In other words, the bulk of the studies on poverty have been from the static perspective but the focus here is on the dynamic approach to poverty measurement.

2 Theoretical framework and literature review

2.1 The concept of income risk and welfare

Substantial changes in household economic conditions have been associated with significant fluctuations of income variability (Ro 1978). Households interpret

differences between recent income and future income as transitory income and income variability (income risk) is a measure of the pattern and extent of transitory income (Canh 1974). Households respond to risk differently and income risk is caused by a variety of factors. Specifically, there are two types of risk: common risk and individual risk. Common risks are aggregate, economy-wide, covariate risks that affect all members of a community or region. Individual or idiosyncratic risks affect only a particular individual in the community. In practice, within well-defined rural communities, few risks are purely common or idiosyncratic. Studies have shown that most of the shocks experienced by households include both individual and common risk features and that the idiosyncratic part of income risk is relatively large. Morduch (2002) concluded that idiosyncratic risk (inclusive of measurement error) accounts for 75-96 per cent of the total variance in income within villages. Deaton (1997) also found that common components explain very little of the variations in household income for particular villages in Côte d'lvoire in 1985-86. Other characteristics of income risk include the frequency and intensity of shocks and the persistence of their impact (Morduch 1999). Relatively small but frequent shocks such as transient illness are easier to deal with than large infrequent negative health shocks, such as disability or chronic illness. In short, identifying the nature of the shocks will help us to identify the possibilities for dealing with its consequences.

Welfare (a state of well-being), on the other hand, is defined in terms of the level of utility reached by a given individual. This level is a function of goods and services that he or she consumes. This is the 'welfarist' approach to well-being, as greater importance is attached to the individual's perception of what is considered useful to him or her. The 'non-welfarist' approach defines well-being independent of individual's perception of it. It does this by relying on what planners deem desirable for individuals from a social point of view, and selective indicators are used to distinguish certain goods considered socially useful. In particular, planners generally favour adequate food, improved access to education, health care, housing, clean water, etc. (Ravallion 1992). Whether or not a household is poor is widely recognized as an important, albeit crude, indicator of the well-being of the household. This is reflected in the central role that the concept of poverty plays in analysis of social protection policy. According to Okorie (1982), the central objective of rural development involves raising incomes and outputs as well as existing assets in order to improve the welfare of rural people in totality. Thus, its overall objective is to ensure a rural growth process which yields pareto-sum benefits (Olayide 1975).

However, the term vulnerability has also come to be widely used alongside poverty in discussions of poverty alleviation and social protection strategies since the risks that households face are an important aspect of their well-being. Holtmann and Jorgensen (2000) defined vulnerability within the framework of poverty eradication, as the ex ante risk that a household will, if currently non-poor, fall below the poverty line, or if currently poor, will remain in poverty. Poverty is said to exist when an individual or group of individuals fail to attain a level of well-being, usually material well-being which is deemed to constitute a reasonable minimum by the standard of that society. This means that poverty is an ex post measure of a household's well-being (or lack thereof). It is today defined as a state of long-term deprivation of well-being, a situation considered inadequate for a decent life. Vulnerability to risk is defined by the degree to which the growth rate of household consumption covaries with the growth rate of household income. This definition explicitly acknowledges that households may adopt a variety of risk management strategies and instruments, to protect themselves from risk.

Households, for example, may use their savings (Paxson 1993), take a loan from the formal financial sector to carry them through the difficult times (Udry 1994), sell assets (Deaton 1992), or send their children to work instead of school in order to supplement income (Jacoby and Skoufias 1997). These actions enable households to spread the effects of income shocks through time. Kochar (1995), in a study at the International Crop Research Institute for Semi-Arid Tropics (ICRISAT) on villages in South India reports that crop-income shocks and lack of access to credit link income uncertainty to poverty and that the households most vulnerable to shocks are those with few male members.

Based on the foregoing, and the considering the significance of income in rural households' decisionmaking, an analysis of the risk associated with income and its consequences on the state of well-being of rural households in the study area is very important.

3 Methodology

3.1 The study area

This research work was conducted in Ekiti State, Nigeria. Ekiti State is one of the six states constituting the southwestern region of Nigeria, and is home to one of the major ethnic groups (i.e., the Yorubas). Although some parts of the region are fairly urbanized, the greater majority of the population still lives in rural areas. Ekiti State was carved out of the former Ondo State on 1st October 1996. Situated within the tropics, it is located between longitudes $4^0 45' to 5^0 45'$ east of Greenwich meridian and latitudes $7^0 15' to 8^0 5'$ north of the equator. It lies south of Kwara and Kogi States as well as east of Osun State. It is bounded in the east and in the south by Ondo State. Ekiti State has 16 local government areas. According to the 1991 national census, the state has a population of about 1,647,800 and a land area totalling 5,435 sq km. The state is mainly an upland zone, 250 metres above sea level. Ekiti State has a generally undulating land surface with a characteristic landscape that consists of old plains broken by steep-sided outcrops, and dome rocks appearing singularly or in groups or ridges. Temperatures range between 21-28^0 Celcius with high humidity. Tropical forest exists in the south while Guinea savannah covers the northern peripheries. The study area is chosen particularly because it ranks high (within top five) among the poor states in Nigeria and because it is predominantly agricultural, the primary occupation of the rural dwellers in the state.

3.2 Sources and types of data

The study used primary data collected with the aid of well-structured questionnaire. Open discussions, interviews and physical observation were also employed to complement the data for accuracy and reliability. Key information gathered includes the following:

Socioeconomic/demographic data: Data under this category include age of household head, gender, marital status, years of formal education, type of occupation, household type, household size, total household income (from farm and off-farm and income

received as gifts from relatives, friends), membership of any association (e.g., cooperative societies).

Household consumption data: Data were collected on expenditure on food and non-food items (health, education, transportation, water, furniture, household, recreation, books, wears, newspapers and magazines) and such non-commodity expenditures as transportation, communications, repairs and other household utilities.

Other relevant information gathered includes the various income sources and the various risk situations associated with income.

3.3 Sampling technique

A multi-stage random sampling technique is employed. The first phase involves division of the study area into zones as delineated by agricultural development projects in the state. The state is divided into two zones, with each zone having eight local government areas. The selection of five local government areas from which the sample is taken under each zone forms the second stage. The third stage was the selection of towns/villages/communities on the basis of the population size to make the analysis representative. In all, ten local government areas were surveyed. The number of questionnaires administered in each of the local governments was based on the population of the residents. Households in the chosen communities/towns or villages were randomly selected and interviewed. A total of 300 questionnaires were administered out of which 285 are used for analysis; the remaining 15 were rejected on the basis of incorrectness or lack of detailed information.

3.4 Methods of data analysis

Basically, two statistical tools are employed in this study: logistic and feasible generalized least squares (FGLS) models.

3.4.1 The logistic model

The logistic model is used in estimating the probability of events based on dependent dichotomous variables (Gujarati 1995). A dichotomous dependent variable can assume only two values (either zero or one). The model is generally expressed as:

$$L_i = \ln(\frac{R_i}{1-R_i}) = \beta_1 + \beta_2 X_i + \varepsilon_i \quad (1)$$

Where:

L_i = log of odd ratios

R_i = 1 if a household reports experience of income risk and zero if otherwise.

The adapted form of the model that was estimated takes the form:

$$L_i = \ln(\frac{R_x}{1-R_x}) = \alpha_o + \beta_1 X_1 + \beta_2 X_i + ... + \beta_n X_n + \varepsilon_i \quad (2)$$

Where:

$L_i = \ln(\frac{1}{0}) =$ if a household reports experience of any risk associated with income

$L_i = \ln(\frac{0}{1}) =$ if a household does not report experience of any risk associated with income

$X_1 - - - - X_n$ = Vector of explanatory variables

ε_i = Error term

$\beta_1 - - - - \beta_n$ = The parameter coefficients.

3.4.2 Feasible generalized least squares (FGLS)

In determining the extent to which income risk impacts on the welfare status (proxies as consumption expenditure on food and non-food items), it is assumed that the stochastic process generating the consumption of a household *h* is given by:

$$\ln c_h = X_h \beta + \varepsilon_h \quad (3)$$

Where, $c_h =$ per capita consumption expenditure,

X_h = a bundle of observable household characteristics (including assets and other risk management instruments)

$\beta =$ a vector of parameters and

$\varepsilon_h =$ a mean-zero disturbance term that captures idiosyncratic factors (shocks or risk associated with income that contributes to different per capita consumption levels for households that are otherwise observationally equivalent)

The second assumption is that the variance of the error term ε_h is given by:

$$\sigma^2_{e,h} = Z_h \theta \quad (4)$$

This means that from Equation (4) the variance of the regression depends on the household characteristics.

Thus, Z_h is the matrix X_h augmented with vectors that quantify the occurrence of shocks θ was estimated using a three-step FGLS, a method suggested by Amemiya

(1977), Chaudhuri (2000), Chaudhuri *et al.* (2002), Alayande (2002) and Hoddinott and Quisumbing (2003a and 2003b).

The first step involves estimation of Equation (3) using ordinary least squares (OLS) procedure.

The estimated residuals from Equation (3) are then used to estimate Equation (5) by OLS:

$$\hat{e}^2_{OLS,h} = X_h\theta + \eta_h \tag{5}$$

The prediction from Equation (5) is then used to transform the equation as shown below:

$$\frac{\hat{e}^2_{OLS,h}}{X_h\hat{\theta}_{OLS}} = \left(\frac{X_h}{X_h\hat{\theta}_{OLS}}\right)\theta + \frac{\eta_h}{X_h\hat{\theta}_{OLS}} \tag{6}$$

The transformed Equation (6) is estimated using OLS to obtain an asymptotically efficient FGLS estimate, $\hat{\theta}_{FGLS}$.

The asymptotically efficient estimate $X_h\hat{\theta}_{FGLS}$ gives a consistent estimate of $\sigma^2_{e,h}$, the variance of the idiosyncratic component of household consumption.

The estimate $\hat{\sigma}_{e,h} - \sqrt{X_h\hat{\theta}}_{FGLS}$ is used to transform Equation (3) as shown below:

$$\frac{\ln c_h}{\hat{\sigma}_{e,h}} = (\frac{X_h}{\hat{\sigma}_{e,h}})\beta + \frac{e_h}{\hat{\sigma}_{e,h}} \tag{7}$$

In sum, an OLS estimation of Equation (3) yields a consistent and asymptotically efficient estimate of β. The standard error of the estimated coefficient, $\hat{\beta}_{FGLS}$, can be obtained by dividing the reported standard error by the standard error of the regression.

Using the $\hat{\beta}$ and $\hat{\theta}$ thus obtained, it is possible to directly estimate expected log consumption as:

$$\hat{\mathrm{E}}[\ln c_h / X_h] = X_h\hat{\beta} \tag{8}$$

And the variance of log consumption as:

$$\hat{V}[\ln c_h / X_h] = \hat{\sigma}^2_{e,h} = X_h\hat{\theta} \tag{9}$$

for each household *h*.

Further, by assuming that consumption is log-normally distributed we can use the estimates to form an estimate of the probability that a household with characteristics, X_h, will be poor, i.e. to estimate the household's vulnerability level. Thus letting $\Phi(.)$ denote the cumulative density of the standard normal, the estimated probability will be given by:

$$\hat{V}_h = \hat{\mathrm{P}}(\ln c_h < \ln z / X_h) = \Phi \frac{\ln z - X_h \hat{\beta}}{\sqrt{X_h \hat{\theta}}} \tag{10}$$

where z is the consumption poverty line.

4 Data description, results and interpretation

4.1 Socioeconomic characteristics of respondents in the study area

A number of socioeconomic characteristics of households in the study area are considered. These include age, gender, marital status, household size, years of formal education, major occupation, secondary occupation, farming experience, size of land cultivated, residency type, family type, membership of association, etc. These socioeconomic characteristics are expected to be associated with the income shock experienced by the households.

Analysis of the data reveals that mean age of the sampled household heads is 54 years. Table 1 shows that the range is 25 to 85 years. This distribution shows that the bulk of the respondents are old and perhaps fragile from the arduous farming activity, the major income source of the households; hence the increased food insecurity in the study area. As shown in Table 1, in the study area the mean household size is 9, while the household size is fairly large. This is an indication of low income per head, thus an increase in their experience of income risk is reported. The smallest household has one member while the largest has 23. Table 2 shows that 85.3 per cent of the households are male-headed, while 14.7 per cent are female-headed. Thus there are more male-headed households than female-headed households in the study area. The breakdown in Table 2 indicates that there are more married household heads than single, widowed or divorced household heads (88.1 per cent of the household heads are married, 4.9 per cent single, and the remaining 7.0 per cent are either widowed or divorced).

However, households' distribution by years of formal education reveals that 71.6 per cent of the household heads are educated to the tertiary level while about 14.1 per cent have primary and secondary education. Only 14.4 per cent of the household heads have

Table 1
Summary statistics of socioeconomic characteristics

Variable	Obs	Mean	Std dev.	Min	Max
Age	285	53.97895	11.3937	25	85
Hsize	285	9.140351	4.956283	1	23
Edus	285	17.75789	8.781441	0	28
Famexp	285	23.75439	13.98551	0	60
Lndsz	285	2.877333	2 .501505	0	15

Table 2
Households' distribution by socioeconomic variables

Variable		Frequency	%	Valid %	Cumulative %
Gend	1	243	85.3	85.3	85.3
	0	42	14.7	14.7	100.0
Mstat	1	251	88.1	88.1	88.1
	2	14	4.9	4.9	93.0
	3	3	1.1	1.1	94.0
	4	17	6.0	6.0	100.0
Edus	1	41	14.4	14.4	14.4
	2	25	8.8	8.8	23.2
	3	15	5.3	5.3	28.4
	4	60	21.1	21.1	49.5
	5	72	25.3	25.3	74.7
	6	72	25.3	25.3	100.0
Asomem	1	204	71.6	71.6	99.6
	0	81	28.4	28.4	100.0
Shoexp	1	148	51.9	51.9	51.9
	0	137	48.1	48.1	100.0
Restyp	1	210	73.7	73.7	73.7
	2	75	26.3	26.3	100.0
Poccu	1	150	52.6	52.6	52.6
	2	26	9.1	9.1	61.8
	3	59	20.7	20.7	82.5
	4	12	4.2	4.2	86.7
	5	38	13.3	13.3	100.0
Soccu	1	135	47.4	47.4	47.4
	2	22	7.7	7.7	55.1
	3	0.7	0.7	0.7	55.8
	4	35	12.3	12.3	68.1
	5	91	31.9	31.9	100.0

no formal education. This shows that the greater share of the sampled households is educated and this in part explains high potential job opportunities for the respondents. In the same vein, about 71.6 per cent of the households belong to one association or another other while only 28.1 per cent do not belong to any association. Belonging to an association may guarantee an opportunity to share income-related risks among members. The result shows that about 73.7 per cent of the households are natives while only about 26.3 per cent (74 households) are either non-natives or migrants. Thus, the study area has more natives than non-natives. Table 1 shows that the household heads have an average farming experience of 24 years. The minimum and maximum years of farming experience are three and 55 years, respectively. With regard to occupation, about 52.6 per cent of the sampled households have farming as their primary occupation while 20.7 per cent are civil servants. Breakdown of other trades include 13.3 per cent artisans, 9.1 per cent traders while only 4.2 per cent have private salaried job as their primary occupation.

On the other hand, 47.4 per cent of the sampled households indicate farming as their secondary occupation while 12.3 per cent engage in private salaried job as their secondary occupation. The distribution generally reveals the relative importance of

farming in the study area. The greater majority of the respondents engage in farming either full-time or part-time to supplement their income. The breakdown by size of farmland (Table 1) shows that average cultivated area is about 3 hectares, with the minimum being 0.1 hectare and maximum 10 hectares. This indicates that the greater majority of the farmers cultivate less than 5 hectares, thus operating at subsistence level. Overall, the analysis of households reporting experiences of income risk shows that more than half (148, or 51.9 per cent) of the surveyed families faced some form of risk associated with income, whereas only about 48.1 per cent (137 households) report no experience of income risk. Thus, in the study area, there are more households with experience of income risk than those without similar experiences.

3.2 Logistic estimates of reported experience of income risk (SHOEXP)

The logistic estimates show that the coefficient of age is negative and significant at one per cent. This means that the higher the age of the household heads, the lower the (log) odds of the household heads reporting experience of any risk associated with income. In other words, as an individual ages, there seems to be a better understanding of how best to manage or mitigate the impact of income risk. The significance of this variable shows that age is one of the correlates of the households that report experiences of income risk in the study area. The coefficient of gender is positive, implying that male-headed households report experience of higher income risk than female-headed households. This is because males are more often assumed to be the breadwinner and expected to be more willing to take higher risks than their female counterparts. Meanwhile, the non-significance of this variable indicates that gender is not likely to be a correlate of households reporting incidence of income risk. However, the sign of the coefficient of years of formal education is negative and significant at 5 per cent. This is an indication that the higher the years of education obtained by household heads, the lower the (log) odds of the household heads reporting experiences of income-related risks. Since the coefficient is very significant, it means that this variable is a very important correlate of households' reporting experience of risk associated with income.

As expected, the coefficient of the household size is positive but insignificant, implying that the smaller the size of households, the smaller the (log) odds of households reporting experience of income risk. Thus small-sized households are less prone to income risk than the large-sized ones. The coefficient of the size of land cultivated is positive and highly significant, indicating that the smaller the sizes of the land cultivated, the lower the (log) odds of the households reporting experience of income risk, i.e. households with large farmland holdings report higher experiences of income risk than those with small landholdings. The reason for this could be attributed to households being unable to manage big farms due to lack of technology or modern implements and having increased loss in farm output. Also, the significance of the coefficient of this variable indicates that size of land cultivated is a correlate of households' reporting experience of risk in the study area. However, the coefficient of landholding is negative, indicating that households with land report experience of lower income risk than households without land. Similarly, Rose (1999) found that in rural India, landless households were more at risk. The coefficient of farming experience was negative, implying that the higher the years of farming, the lower the (log) odds of the households reporting experience of income risk. Thus, households with more farming experience are better equipped at coping with or managing income risk.

The positive sign of the coefficient of primary occupation indicates that households whose main occupation is farming report indicates of higher income risk than those engaged in other occupations. This could be attributed to the uncertainties inherent in agriculture and because farming is very prone to environmental influence. Also, the positive sign of the coefficient of membership of association implies that households that report experience of income risk in the study area are those belonging to one association or the other. In other words, households belonging to an association might be a strategy for mutual support whenever faced with any income-related risks. This is consistent with the findings by Fafchamps (1997). The coefficient of household items (a measure of asset) was negative implying that the lower the value of household items the higher the (log) odds of the households reporting experience of income risk. In other words, asset-poor households report higher experience of income risk than asset- rich households. This is consistent with the findings of Deaton (1997). In Table 3

Table 3
Logistic estimates of SHOEXP

	Model I	Model II	Model III	Model IV	Model V	Model VI
Age^2	-0.0004*	-0.0004*	-0.0004*	-0.0004**	-0.0004***	-0.0004**
	(-1.76)	(-1.89)	(-1.74)	(-2.52)	(-2.61)	(-2.53)
Hsize	0.0652	0.0692	0.0688	0.0634	0.0608	0.0603
	(1.47)	(1.57)	(1.57)	(1.54)	(1.47)	(1.47)
Edus	-0.0455**	-0.0457**	-0.0460**	-0.0420**	-0.0476**	-0.0421**
	(-2.28)	(-2.30)	(-2.32)	(-2.22)	(-2.27)	(-2.22)
Lndsz	0.2822***	0.2796***	0.2975***	0.2992***	0.2954***	0.2993***
	(3.31)	(3.32)	(3.56)	(3.97)	(3.93)	(3.97)
Lnttexp	0.6346***	0.6455***	0.6688***	0.6656***	0.6445***	0.7124**
	(2.78)	(2.84)	(3.10)	(3.07)	(2.93)	(3.42)
Ownland	-0.6850	-0.6656	-0.6256	-0.7953***	-0.7924***	-0.7978
	(-1.38)	(-1.34)	(-1.27)	(-1.71)	(-1.71)	(-1.71)
Hitem	2.53E-07	2.60E-07	-0.0602	-0.0759	-0.0728	-0.0747
	(0.48)	(0.48)	(-0.85)	(-1.08)	(-1.05)	(-1.06)
Offam	-0.0622	-0.0637	0.3694	1.96E-07	1.17E-06	
	(-0.88)	(-0.89)	(1.10)	(0.54)	(0.65)	
Asomem	0.3756	0.3843	0.3785		0.3796	
	(1.11)	(1.14)	(1.13)		(1.13)	
Famexp	-0.0189	-0.0183	-0.1366			
	(-0.84)	(-0.82)	(-1.11)			
Poccu	-0.1388	-0.1342				
	(1.12)	(1.09)				
Restyp	-0.3036	-0.2937				
	(-0.89)	(-0.86)				
Gend	0.1002					
	(0.21)					
Mstat	-0.1328					
	(-0.59)					
Cons	-5.1264	-5.3595	-6.0831	-6.2982	-5.9730	-6.8032
	(-1.95)	(-2.16)	(-2.58)	(-2.67)	(-2.47)	(-2.98)

Notes: *** Coefficients significant at 1 %
** Coefficients significant at 5%
* Coefficients significant at 10%
No. of observations: 285
t-values are in parenthesis
Best logistic estimate is Model V

the logistic estimate indicated by Model V is chosen as the best, because it has the highest likelihood ratio and the Chi square statistic obtained reveals that inclusion of more explanatory variables has no significant effect on the regressand (the reported experience of income risk in the study area—SHOEXP).

3.3 Causes and classification of risks in the study area

In the study area, five categories of risk faced by the households are identified, and the categorization is done on the basis of their degree of correlation (i.e., whether the risk is idiosyncratic/regional/aggregate). Furthermore, the risks are classified based on their levels (i.e., low or high) vis-à-vis some socioeconomic attributes of the households. The causes of income risk faced by rural households in the study area include fertilizer shock, ill health, rainfall shock, fire outbreak, pests and diseases, theft and pilfering, non-payment of salary due to strike and civil unrest, price fluctuation, rise in transportation cost, labour shortages, drought, infant mortality, and non-availability of credit. As shown in Table 4, it is evident that economic risk is the major risk facing households in the study area, as indicated by the fact that the bulk of the risks are economic in nature. The classification of risk based on socioeconomic characteristics indicates that young, male-headed, large-sized, uneducated and migrant households, respectively, experience higher income risk than old, female-headed, small-sized, educated and indigenous households. On the other hand, those engaged in farming for their primary income source are more prone to experience income risk than those engaged in other occupation. Furthermore, the bulk of the income risk in the study is idiosyncratic (individual) in nature. This confirms the results from the studies by Morduch (2002), Deaton (1997) and Townsend (1995) in India, Côte d'Ivoire and Thailand, respectively.

Table 4
Classification of risk based on their degree of correlation

Type of risk	Causes of risks	Degree of correlation
Economic	Labour shortage, fertilizer shock, price fluctuation, rise in transportation cost, non-availability of credit	Regional/ individual
Environmental	Pests and diseases, fire outbreak, theft and pilfering	Regional/individual
Natural	Rainfall shock, drought	Regional/aggregate
Health	Ill health, infant mortality	Individual
Social	Non-payment of salary	Regional/individual

3.4 Social indicators of well-being in the study area

A number of social indicators of well-being are considered to examine the welfare status of households and they are highlighted next:

Housing type: Based on the results of the analysis (Table 5), about half (44.9 per cent) of the households surveyed live in a room-with-parlour, 29.1 per cent in a flat, 14. 4 per cent in a single room, while the rest live in either a hut or other type of dwelling. This is

indicative of the low level of well-being in the study area because it means that, on average, 9 people live in a room-with-parlour. Such households are confronted with the risk of overcrowding.

Housing materials: The results (Table 6) reveal that about two-third (60 per cent) of the surveyed households live in houses made of mud bricks and zinc roof while only about 30.9 per cent lives in zinc-roofed houses made of baked bricks. The rest live either in dwellings made of mud with thatched roofs or bamboo huts with thatched roofs. This breakdown highlights the low level of well-being in the study area. The fact that most of the houses are not plastered also reflects the low level of living standard.

Toilet facility: Table 7 shows that 118 households, or 41.4 per cent, make use of pit toilet while only 14.7 per cent have a water closet. The greater share (42.8 per cent) of the households uses either the surrounding bushes or bare ground. This is an indication of the low level of well-being of the households and the unhygienic environment in which these people live.

Source of drinking water: Table 8 shows that more than half (50.5 per cent) of households in the study area rely on dug wells for their drinking water. Only about 22.1 per cent of the surveyed households have access to tap water. The rest depend either on streams or other sources. Thus, households in the study area are exposed to the risks of contacting water borne diseases.

Table 5
Households' well-being indicator by housing type (HTYP)

		Frequency	%	Valid %	Cumulative %
Valid	1	41	14.4	14.4	14.4
	2	128	44.9	44.9	59.3
	3	83	29.1	29.1	88.4
	4	11	3.9	3.9	92.3
	5	22	7.7	7.7	100.0
Total		285	100.0	100.0	

Table 6
Households' well-being indicator by housing type (HMAT)

		Frequency	%	Valid %	Cumulative %
Valid	0	2	0.7	0.7	0.7
	1	88	30.9	30.9	31.6
	2	171	60.0	60.0	91.6
	3	4	1.4	1.4	93.0
	4	6	2.1	2.1	95.1
	5	14	4.9	4.9	100.0
Total		285	100.0	100.0	

Table 7
Households' well-being indicator by toilet facility (TLTFAC)

		Frequency	%	Valid %	Cumulative %
Valid	0	1	0.4	0.4	0.4
	1	42	14.7	14.7	15.1
	2	118	41.4	41.4	56.5
	3	2	0.7	0.7	57.2
	4	122	42.8	42.8	100.0
Total		285	100.0	100.0	

Table 8
Households' well-being indicator by source of drinking water (WATSOS)

		Frequency	%	Valid %	Cumulative %
Valid	0	3	1.1	1.1	1.1
	1	63	22.1	22.1	23.2
	1, 3	10	3.5	3.5	26.7
	1, 4	1	0.4	0.4	27.0
	2	21	7.4	7.4	34.4
	2, 3	1	0.4	0.4	34.7
	3	144	50.5	50.5	85.3
	3, 4	5	1.8	1.8	87.0
	3, 5	6	2.1	2.1	89.1
	4	15	5.3	5.3	94.4
	4, 5	1	0.4	0.4	94.7
	5	15	5.3	5.3	100.0
Total		285	100.0	100.0	

Table 9
Households' well-being indicator by health facility (HLTFAC)

		Frequency	%	Valid %	Cumulative %
Valid	0.5	1	0.4	0.4	0.4
	1	151	53.0	53.0	53.3
	2	104	36.5	36.5	89.8
	2, 3	2	0.7	0.7	90.5
	3	27	9.5	9.5	100.0
Total		285	100.0	100.0	

Table 10
Households distribution based on lighting source (LITSOS)

		Frequency	%	Valid %	Cumulative %
Valid	1	23	8.1	8.1	8.1
	1,2	8	2.8	2.8	10.9
	2	243	85.3	85.3	96.1
	2, 4	2	0.7	0.7	96.8
	3	8	2.8	2.8	99.6
	4	1	0.4	0.4	100.0
Total		285	100.0	100.0	

Health facility: As shown in Table 9, more than half (53.0 per cent) of the surveyed households have access to health facilities, either a clinic or hospital. Also, about 36.5 per cent of these households make use of dispensaries, while only 9.5 per cent rely on herbs to cure their illness.

Lighting source: The study reveals that 85.3 per cent of the households use kerosene lanterns as their major source of lighting (Table 10). The next is electricity (used in 23 households, representing 8.1 per cent). In the same vein, more than two-third (66.7 per cent) of households rely entirely on firewood for their source of cooking fuel. The second common cooking material is kerosene stoves, used by 24.2 per cent of households, whereas only about 2.8 per cent use a gas cooker/electricity for cooking. This distribution is also a reflection of the low level of well-being of households in the study area.

4 Explaining the impact of income risk on households' well-being (FGLS results)

The method (feasible generalized least squares—FGLS) is employed to determine how income risks impact on the welfare status of households in the study area. Recognizing that one of the basic assumptions of OLS is that the error term must have a mean zero and constant variance and once this constant variance assumption is violated, there is bound to be heteroscedasticity. The relaxation of the constant variance assumption (Chaudhuri 2000) is considered a method of determining how the variance of the error term (i.e. now a measure of income risk) impacts on the well-being (proxies by expenditure on food and non-food items). On subjecting the data to analysis, the first stage of the FGLS reveals that 40.5 per cent of the variation in total consumption expenditure (a measure of well-being) is explained by age, marital status, years of formal education, household size, residency type, size of land cultivated, loan, and household items. The rest (59.5 per cent) can be attributed to the disturbance term. Other socioeconomic variables included as part of the regressors are gender, family type, and association membership. Age and marital status are very significant at 5 per cent level while household size, land size cultivated, years of formal education, loan and

Table 11
OLS estimates of LNTTEXP (1st step)

	Model A	Model B	Model C	Mode D
Age^2	-0.0001**	-0.0001**	-0.0001**	-0.0001**
	(-2.45)	(-2.46)	(-2.48)	(-2.49)
Gend	-0.0027			
	(-0.02)			
Mstat	-0.1149*	-0.1155**	-0.1095*	-0.1127**
	(-1.75)	(-1.98)	(-1.92)	(-1.98)
Edus	0.0183***	0.0183***	0.0183***	0.0184***
	(3.26)	(3.27)	(3.27)	(3.30)
Hsize	0.0608***	0.0608***	0.0610***	0.0584***
	(4.76)	(4.77)	(4.80)	(4.77)
Famtyp	-0.0319	-0.0319	-0.0318	
	(-0.76)	(-0.76)	(-0.76)	
Restyp	1.82E-01*	0.1825*	0.1893*	0.1911*
	(1.77)	(1.78)	(1.86)	(1.88)
Asomem	0.0079	0.0079		
	(0.49)	(0.49)		
Lndsz	0.0552***	5.52E-02***	0.0549***	5.44E-02***
	(2.74)	(2.79)	(2.77)	(2.76)
Loan	2.25E-06***	2.25E-06***	2.25E-06***	2.27E-06***
	(5.08)	(5.10)	(5.11)	(5.17)
Hitem	1.18E-07***	1.18E-07***	1.18E-07***	1.18E-07***
	(3.31)	(3.34)	(3.34)	(3.34)
Cons	1.07E+01	10.74429	10.72589	10.71171
	(40.7)	(45.96)	(46.55)	(46.67)

Notes: No. of observations = 285 *** Coefficients significant at 1 %

R^2 = 40.53 % ** Coefficients significant at 5 %

$\bar{R}^2$ = 38.62 % * Coefficients significant at 10 %

t-values are in parenthesis Best estimate is model C

household items are very significant at 1 per cent levels. The low R^2 value is not very uncommon because of measurement error (due to unobserved and omitted variables) associated with the use of cross-sectional data in consumption studies. However, this measurement error indirectly accounts for the importance of the disturbance term, a variable capturing idiosyncratic factors (inclusive of risk associated with income). All the variables included in the analysis (except gender, family type and membership of association) have some influence on the well-being of the households. For instance, age has a negative influence on the consumption expenditure of households in the study area (Table 11, model C).

The second stage (Table 12, model C) of this method involves regressing the squared residuals generated from the first stage of the FGLS against these socioeconomic variables. The results at this stage indicate that the error term is normally distributed and that years of formal education and size of land cultivated are very significant at 10 per cent levels. Thus, they are very important in explaining the impact of income risk on the well-being of households. The last stage of this analysis is the OLS transformation of the initial equation in stage one. The results of the analysis generally reveal that income risk impacts negatively on the welfare of households in the study area, going by the significance of the associated variables in the model fitted.

Table 12
OLS estimates of the squared residual errors (2nd step)

	Model A	Model B	Model C	Model D
Age^2	-0.00007 (-1.30)	-7E-05 (-1.31)	-7E-05 (-1.31)	-7.3E-05 (-1.31)
Gend	0.2321 (1.56)	0.2329 (1.58)	0.2331 (1.58)	0.2299 (1.56)
Mstat	-0.0367 (-0.51)	-0.0370 (-0.52)	-0.0373 (-0.52)	-0.0425 (-0.60)
Edus	-0.0113* (-1.83)	-0.0113* (-1.83)	-0.0113* (-1.83)	-0.0112* (-1.83)
Hsize	0.0088 (0.63)	0.0088 (0.63)	0.0086 (0.64)	0.0084 (0.63)
Famtyp	-0.0022 (-0.05)	-0.0022 (-0.05)		
Restyp	-0.0851 (-0.75)	-0.0843 (-0.75)	-0.0842 (-0.75)	-0.0906 (-0.82)
Asomem	-0.0076 (-0.43)	-0.0077 (-0.43)	-0.0077 (-0.43)	
Lndsz	0.0407* (1.84)	0.0407* (1.85)	0.0407* (1.85)	0.040983* (1.87)
Loan	3.87E-07 (0.80)	3.93E-07 (0.83)	3.95E-07 (0.84.)	3.93E-07 (0.84)
Hitem	1.93E-09 (0.05)			
Cons	0.5120 (1.74)	0.5108 (1.75)	0.5096 (1.75)	0.5303 (1.85)

No. of observations = 285 * Coefficient significant at 10%
t-values are in parentheses Best estimate is Model C.

5 Summary, conclusion and policy recommendations

5.1 Summary and conclusion

This study has focussed on analysing the impact of income risk on the well-being of rural households in Ekiti State, Nigeria. The findings reveal that male headed-households are more prone to income risk than female-headed households. Also, young people are more susceptible to income risk than old/aged people in the study area, i.e. the key members of the risk group are young and able-bodied youths. Households without/with little education are more susceptible to income risk than highly educated households and large-sized households report more incidents of income risk than the small-sized households. Again, households relying on agriculture/farming for their primary income source are more prone to income risk than households engaged in other occupations such as trading or government salaried job. This is a reflection of the peculiar characteristics of farming as a profession. In the same vein, households belonging to an association are better able to cope/manage/share income risk than those not belonging to any association. Landless/asset-poor households are more prone to experience income risk than asset-rich/those having land in the study area. However, the larger the size of land cultivated, the greater the experience of income risk. Married household heads report less experiences of income risk than single, divorced or widowed household heads. Indigenous/native households in the study area are less prone to experience income risk than non-native, indigenous or migrant households.

Generally, it is very clear that income risk impacts negatively on the well-being of the sampled households because all the social indicators of well-being considered point in the same direction; i.e., that there is a general low level of well-being. In sum, the above findings highlight the prevalence of downside income risk in Ekiti State and the overall effect of this is enormous on the well-being of the inhabitants.

5.2 Policy implication and recommendations

The implication of our findings is that the key at risk group constitutes the young, agile, and able-bodied youths who are supposed to be productive members, contributing to the development of the study area. In other words, valuable human capital is being wasted and made redundant because of the lack of gainful employment opportunities. The study recommends that investment in human capital be intensified. The importance of education in increasing the likelihood of getting a better paid job is paramount. Also, it needs to be recognized that land is an asset which could be used to manage income risk; therefore, land reform policies in the study area need to be revisited and improved upon.

5.3 Areas of further research

Because of the paucity of longitudinal data, it was impossible to look at income risk over a certain timeframe. This would have given a better picture of how the well-being of these households has been affected over the years. Thus, studies need to conducted in this vein, in order to provide a lasting remedy to the income variability and its effects on consumption smoothening in the study area. Again, acknowledging that formal social protection/coping strategies cannot, given the cost implication, be targeted to individual

households, it is equally important to focus research on regional analyses so as to provide information on programmes and policies that suit each zone or region of the country better.

References

Aigbokhan, B. E. (2000). 'Poverty, Growth and Inequality in Nigeria: A Case Study'. AERC Research Paper 102. Nairobi: African Economic Research Consortium.

Alayande, B. (2002). 'Vulnerability Assessment: Some Evidence from Nigeria'. A commissioned study prepared for the Nordic Consulting Group. Denmark. Mimeo.

Amemiya, T. (1977). 'The Maximum Likelihood Estimator and the Non-linear Three-stage Least Square Estimators in General Non-linear Simultaneous Equation Models'. *Econometrica*, 45: 955-68.

Canh, T. Q. (1974). 'Income Instability and Consumption Behaviour: A Study of Taiwanese Farm Households 1964-1970'. Columbus: Ohio State University. Ph.D. dissertation.

Chaudhuri, S. (2000). 'Empirical Methods for Assessing Vulnerability to Poverty'. New York: Dept. of Economics, Columbia University. Mimeo.

Chaudhuri, S., J. Jalan, and A. Suryahadi (2002). 'Assessing Household Vulnerability to Poverty from Cross-Sectional Data: A Methodology Estimate from Indonesia'. New York: Dept. of Economics, Columbia University. Mimeo.

Collier, P., and J. W. Gunning (1999). 'Explaining African Economic Performance'. *Journal of Economic Literature*, 37 (1): 64-111.

Deaton, A. (1992). *Understanding Consumption*. Oxford: Clarendon Press.

Deaton, A. (1997). *The Analysis of Household Surveys: Microeconomic Approach.* Baltimore: Johns Hopkins University Press.

ECA (Economic Commission for Africa) (2001). 'Transforming Economies: Africa's Overview'. Addis Ababa: ECA.

Eswaran, M., and A. Kotwal (1989). 'Credit as Insurance in Agrarian Economies'. *Journal of Development Economics*, 31 (1): 37-53.

Federal Office of Statistics (FOS) (1999a). 'Poverty Profile for Nigeria, 1980-1996'. Lagos: Federal Office of Statistics.

Federal Office of Statistics (FOS) (1999b). 'Poverty and Agricultural Sector in Nigeria'. Abuja: Federal Office of Statistics.

Gujarati, D. N. (1995). *Basic Econometrics*, 3rd edition. Singapore: McGraw-Hill Book Company.

Hoddinott, J., and A. Quisumbing (2003a). 'Methods for Microeconometric Risk and Vulnerability Assessments: A Review with Empirical Examples'. Washington, DC: IFPRI. Manuscript.

Hoddinott, J., and A. Quisumbing (2003b). 'Data Sources for Microeconometric Risk and Vulnerability Assessments'. Washington, DC: IFPRI. Manuscript.

Holzmann, R., and S. Jorgensen (2000). 'Social Risk Management: A new Conceptual Framework for Social Protection'. Discussion Paper No. 0006. Washington, DC: World Bank.

Jacoby, H., and E. Skoufias (1997). 'Risk, Financial Markets, and Human Capital in Developing Countries'. *Review of Economic Studies*, 64 (3): 311-35.

Kochar, A. (1995). 'Explaining Household Vulnerability to Idiosyncratic Income Shocks, AEA Papers and Proceedings'. *American Economic Review*, 85 (2): 159-63.

Ligon, E., and L. Schechter (2002). 'Measuring Vulnerability: The Director's Cut'. WIDER Discussion Paper DP 2002/86. Helsinki: UNU-WIDER.

Lustig, N. (ed.) (2001). *Shielding the Poor, Social Protection in the Developing World*. Washington, DC: Brookings Institution Press.

Morduch, J. (1999). 'Between the State and the Market: Can Informal Insurance Patch the Safety Net?'. *World Bank Research Observer*, 14 (2): 187-207.

Morduch, J. (2002). 'Consumption Smoothing across Space: Tests for Village-Level Responses to Risk'. WIDER Discussion Paper DP 2002/55. Helsinki: UNU-WIDER.

Okorie, A. (1982). 'An Impact and Performance Evaluation of Funtua and Gusau ADPs, Nigeria'. Ibadan: Dept. of Agricultural Economics, University of Ibadan. Ph.D. Thesis.

Olayemi, J. K. (1996.) 'Food Security in Nigeria'. Ibadan: Development Policy Centre. Mimeo.

Olayide, S. O. (1975). 'Stimulating integrated Rural Development through Research' Rural Development Paper No. 18. Ibadan: Dept. of Agricultural Economics, University of Ibadan.

Omonona, B. T. (2001). 'Poverty and its Correlates among Farming Households in Kogi State'. Ibadan: Dept. of Agricultural Economics, University of Ibadan. Ph.D. Thesis.

Paxson, C. (1993). 'Consumption and Income Seasonality in Thailand'. *Journal of Political Economy*, 101 (1): 39-72.

Ravallion, M. (1992). 'Poverty Comparisons: A guide to Concepts and Methods'. LSMS Working Paper 88. Washington, DC: World Bank.

Ro, Y. K. (1978). 'Income Instability and Consumption Savings Behaviour among South Korean Farm Households 1962-1976'. Ohio State University. Mimeo.

Rose, E. (1999). 'Consumption Smoothing and Excess Female Mortality in Rural India'. *Review of Economics and Statistics*, 81 (1): 41-9.

Townsend, R. M. (1994). 'Risk and Insurance in Village India'. *Econometrica*, 62 (3): 539-91.

Townsend, R. M. (1995). 'Consumption Insurance: An Evaluation of Risk-Bearing Systems in Low-Income Economies'. *Journal of Economic Perspectives*, 9 (3): 83-102.

Udry, C. (1994). 'Credit Markets in Northern Nigeria: Credit as Insurance in a Rural Economy'. *World Bank Economic Review*, 4 (3): 251-71.

Von Braun, J., and R. Pandya-Lorch (1991). 'Income Sources of the Malnourished People in Rural Areas: Micro Level Information and Policy Implications'. IFPRI Working Paper No 5 on Commercialization of Agriculture and Nutrition. Washington, DC: IFPRI.