FOOD SECURITY STATUS OF RURAL FARMING HOUSEHOLDS IN BENUE STATE, NIGERIA

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ABSTRACT

This study was carried out in Benue State, Nigeria. Simple and stratified random sampling techniques were employed in selecting a sample size of 360 rural respondent farming households. A structured questionnaire was administered to the respondents and data collected were subjected to descriptive statistics such as frequency counts, percentages and means, and inferential statistics such as food security index and logistic regression model. Results of data analysis revealed that 84.4% of the respondents with a mean age of 36 years were young and active in agricultural production. In addition, 84.2% of the respondent households were male-headed, 53.3% had an output of over 1500 kg with a mean of 1394.59kg, 36.9% had large household size with an average of 8 persons, 46.9% had low annual income with a mean value of ₦64, 043.54 (173.0910 USD), 40% had farm size of over 3.1 hectares with a mean of 2.18 hectares and 69% had at least primary education. The results of food security analysis showed that 50.3% of the rural farming households were food insecure. The logistic regression model results showed household size and household head education as significant variables at 5% probability level among ten variables. Eleven point eight (11.8) percent of the respondents identified poverty as the problem affecting food security among the rural farming households. The implications of the rural farming household food security status for policy and poverty reduction were that food security measures alone were likely to have a limited effect on the income, food and nutritional wellbeing of the rural farming households, without a food mediated poverty reduction policy. In view of this, the study recommends that, proactive policy in family planning, provision of at least basic literacy, skill training and empowerment, basic amenities and a government food security programme, with strategies to reduce poverty should be integrated as food security efforts of the government.

Key words: Food security, Farming households, Poverty reduction, Benue State, Nigeria

INTRODUCTION

In recent times, a major global focus has been on food security and poverty eradication. In the 1996 World Food Summit, the targets of the first Millennium Goal amongst others were to halve between 1990 and 2015, the proportion of people who suffered from extreme hunger and people whose income was less than US$1 a day. However, according to 2012 – 2014 study, the goal was not appreciably achieved. To improve upon the goal and others, "Transforming Our World: the 2030 Agenda for sustainable development" with its seventeen Sustainable Development Goals (SDGs) was adopted at the UN September 2015 Sustainable Development Summit in New York. During the summit, poverty, hunger and food insecurity were the key topics of discussion, producing the first SDG, which was to end poverty in all its forms everywhere, measured as people living on less than US$1.90 a day, and the second SDG, which was to end hunger, achieve food security and improved nutrition and promote sustainable agriculture[1].

Food insecurity is often rooted in poverty, a major obstacle and has a long term effect on the ability of families, communities and countries to develop and prosper. Today, more than 800 million people across the globe go to bed hungry every night, most of them small - holder farmers who depend on agriculture to make a living and feed their families. Despite a fast rise in urban slums over the last decade, nearly 75% of poor people in developing countries live in rural areas [2], consume a more starchy diet and are more likely to engage in extreme coping strategies (like going a whole day without food) to deal with food shortages [3].

The food and income poverty rate in Africa is high. While poverty rates have declined in all regions, progress has been uneven. Two regions, East Asia and Pacific (47 million extreme poor) and Europe and Central Asia (7 million) have reduced extreme poverty to below 3%, achieving the 2030 target. However, more than half of the extreme poor live in sub – Saharan Africa. In fact, the number of poor people in the region increased by 9 million, with 413 million people living on less than US$1.90 a day in 2015, more than all the other regions combined. If the trend continues, by 2030, nearly 9 out of 10 extreme poor will be in sub – Saharan Africa [4]. In Nigeria, the poverty index stood at 53.7% [5]. The country has been rated high in global poverty index [6]. Besides, most of the poor live in rural settlements where the percentage of poverty is 73.4% on per capita basis [7].

On several occasions, major Nigerian policy interventions aimed at increasing domestic food production, food availability and poverty reduction were initiated but could not fully meet targets. One of them was the National Food Security Programme (NSPFS). The NSPFS was a well-packaged project under community demand-driven approach to address rural poverty, provide food security and extend the frontiers of livelihood options of the rural poor [8]. If fully implemented, this food-mediated poverty reduction programme would have enhanced poverty reduction and food security in Nigeria at large and Benue State in particular. The State accounts for 32.7% of the poor and 63% of the extreme poor [9]. In 2012, about 36% of the population in the State was poor, the rural area being the most affected [7]. This portends a great danger to food security in the State.

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About 67.8% of the active population (mostly youth) in Benue State abandoned farming and farming related trading activities, and moved to Makurdi, the State Capital and neighboring States, most of them jobless and thereby deepening the food and income poverty rate in the State. The recurring clashes between Fulani herdsmen and farmers in some parts of Nigeria had been one of the major threats to food security in the country [10]. In Benue State, the food basket of the nation, Fulani herdsmen persistently engaged farmers in feuds that often resulted in serious casualties on both sides. This posed a serious threat to food security in the State.

The rural households are often affected by environmental factors such as limited water supply, contaminated surface water, inadequate sewage disposal and general sanitation, overcrowded and poor housing and unhygienic food preparation. Food consumption or utilization, a dimension of food security requires proper food preparation and hygiene practices, sound eating habits, a diverse diet which necessitates availability of all essential nutrients, and proper intra – household distribution of food [11]. The rural households are also at a particular disadvantage where infection is concerned because of their frequent limited access to health care and inability to pay for needed medication. Hence, sickness leads to decreased food intake, inefficient nutrient absorption, losses of body nutrient stores and increased nutritional requirements.

The broad objective of this study was to analyze food security status of rural farming households in Benue State and its implications for policy and poverty reduction. Specifically, the objectives were to examine the socio – economic characteristics of rural farming households that affected their food security, determine the food security status of the rural farming households, examine the determinants of food security and its implications on poverty reduction and investigate the problems militating against food security in the area.

MATERIALS AND METHODS

The study area
This study covers Benue State, which is located in the Middle Belt Region of Nigeria. It is located between longitudes $6^0 35'$E and 10^0E and between latitudes $6^0 30'$N and $8^0 10'$N. Benue State has a total land mass of 6,595 million hectares [12]. It is administratively and agriculturally divided into three Zones: A, B and C, with an estimated population of 5,741, 800 [12, 13] and 413,159 farm families/households [12]. The Tiv tribe dominates followed by Idoma, Igede and Etulo.

Agriculture is the major occupation of the people. The state is predominantly rural with an estimated 75% population engaged in rain-fed subsistence agriculture. Major crops grown are yam, cassava, sweet potato, rice, sorghum, maize, millet, benniseed and soyabean [14]. The state is named the Food Basket of Nigeria, hence, its choice as a study area.

Population and sampling procedure

The study population comprised all the rural farming households in Benue State, Nigeria. The number of rural farming households in the State was estimated to be 413,159 [12]. Due to the enormity of the population, a sample of 360 rural farming households was used for the study. Simple and proportionate stratified random sampling techniques were used for sample size selection. The state is divided into three agricultural zones: A, B and C. Two local Government Areas were randomly selected from each of the three zones, making a total of six Local Government Areas. Kwande and Katsina – Ala Local Government Areas from zone A, Gboko and Buruku Local Government Areas from zone B and Otukpo and Ogbadibo Local Government Areas from zone C. From each of the selected Local Government Areas, rural farming households were randomly selected on the basis of their population size using proportionate stratified random sampling technique with the formula: Sample size of the strata = Size of entire sample/Population size x Layer size (see Table 1). Finally, 360 rural farming households were randomly selected for the study.

Data collection and variable measurement

The data for this study were obtained from primary sources only. The three hundred and sixty rural farming households sampled were the primary sources from which data were collected. The primary data were obtained using a set of structured questionnaires which were distributed to the farming households chosen. The research instrument was designed to provide answers related to the specific objectives of the study and, consequently, response to research questions. Data collection covered household income and expenditure, demographic characteristics, food-mediated programmes, social, economic, farm-specific and health related factors of rural farming households and problems associated with their food security in the study area.

Household food security index was estimated based on household's daily calorie consumption. Quantity of food from own production (output) was measured in kilograms, household income was measured as the sum total of the earnings of the household in a year from both farm and off-farm sources in naira, farmer participation in a food-mediated poverty reduction programme was measured as dummy variable: household participation = 1, non-participation = 0, access to extension services was measured as dummy variable: access =1, non-access = 0, age of household head was measured in years, sex of household head was measured as dummy variable: male= 1, female = 0,household size was measured by counting the number of members per farming household, educational status of household head was measured as the number of years used for formal education of the household head in years, farm size was measured in hectares and household head's access to irrigation was measured as dummy variable: access = 1, non-access = 0.

Data analysis

Primary data collected from 360 respondents were analyzed using both descriptive and inferential statistics. The descriptive statistical tools such as frequency, percentage and mean were used to analyze socio-economic characteristics, food security status and

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problems militating against the food security of rural farming households while inferential statistics such as food security index and binary logistic model were used, respectively, to analyze food security status and food security determinants among the rural farming households in the study area.

The food security index determines the food security of each household based on the food security line using the recommended daily calorie required approach. A household whose daily per capita calorie intake is not up to 2100 -kcal will be regarded as a food insecure household.

The study used the food consumption recall method for a whole household and analysis of each type of food mentioned was carried out. A 7-day recall approach was used. The recommended daily per capita calorie intake of2100-kcal based on FAO criteria was the food security line [15]. The quantities of food consumed were converted to grams and the calorie content was estimated by using the Nutrient Composition table of commonly consumed food in Nigeria [16, 17] (in the food groups: cereals, roots and tubers; pulses and legumes; dairy products; meat, fish and eggs; oils and fats; fruits and vegetables). Per capita calorie intake was calculated by dividing estimated total household calorie intake by the household size. The household's daily per capita calorie intake was then estimated by dividing the household's per capita calorie intake by seven. Households whose daily per capita calorie was 2100-kcal or more were regarded as food secure, otherwise they were regarded as food insecure. This formula used to calculate per capita Kilocalorie intake is given as:

$$HFS_i = \frac{\text{Total Net Calorie Consumed by a Household daily}}{\text{Household size}} \quad \text{…………………….... (1)}$$

where,
HFS_i = Household Food Security of the ith household (i = 1, 2, 3…360)

Model specification
Based on the household food security status (Z_i), the logit model was used to estimate the factors that determine food security among the rural farming households and their implications on poverty reduction. The implicit form of the logit model is specified as:

$$Z_i = \beta o + \beta_1 x_{ik} + u_i \text{………………………………………………………………… (2)}$$

where:
Z_i = food security status of the household (dummy, 1=household is food-secure and 0, otherwise).
βo = constant
β_1 = coefficient
x_{ik} = set of explanatory variables (i=1,2,..k)
u_i = random error disturbance term.

The explicit form of the model is specified as:

$$Z_i = InPi \text{…………..…………………………………………………….….………… (3)}$$

$$1 - P_i$$

$$= \beta_o + \beta_1 x_1 + \beta_2 x_2 + \beta_3 x_3 + \beta_4 x_4 + \beta_5 x_5 + \beta_6 x_6 + \beta_7 x_7 + \beta_8 x_8 + \beta_9 x_9 + \beta_{10} x_{10} + u_i \ldots \ldots \ldots \ldots \ldots (4)$$

where:
Z_i = food security status (dummy variable, 1 = household is food secure, 0 = otherwise)
β_o = constant term
β_n = parameters to be estimated.
X_1 = quantity of food from own production (output) in kilograms.
X_2 = household income (₦) per year.
X_3 = participation in a food-mediated poverty reduction programme (1= participated, 0, otherwise).
X_4 = household head's access to extension services (1= access, 0, otherwise).
X_5 = age in years.
X_6 = sex (1 = male, 0, otherwise).
X_7 = household size in numbers.
X_8 = educational status (number of years of formal schooling).
X_9 = farm size in hectares.
X_{10} = access to irrigation (1 = access, 0, otherwise).
u_i = random disturbance term

The binary logistic model was chosen because it lends itself to a logically meaningful interpretation and accommodates a lot of variables. Also, besides its mathematical computational simplicity, an extremely flexible and easily used function, the research sought to identify key variables affecting a decision with a dichotomous outcome. Since the dependent variable was binary, the ordinary least square (OLS) technique was inappropriate to estimate the model. The maximum likelihood estimate (MLE) was, therefore, used. Household food security is largely a function of socio-economic characteristics of farmers. In this study, the farmer's food status was represented as 1 if the rural household was classified as food-secure and 0 otherwise.

RESULTS AND DISCUSSION

Socio-economic characteristics of respondent rural farming households
The results of household socio-economic characteristics are presented in Table 2. The results showed that about 55.0% of the rural farming household heads fell within the age range of 31-50 years and the mean age of the respondents is 36 years. This implies that most of the respondents are in their active, working and productive age and as such have a great potential for increasing agricultural productivity and production and, hence, for improving household food security, livelihoods and poverty reduction in the study area. This finding is in line with the findings of Akinsulu *et al.* [18] who reported that as the farmers grow older, their level of production decreases; this could be that as they advance in age, their energy level diminishes.

Majority of the rural farming households were male-headed (84.4%). This indicates that most of the respondents were in a better position to supply more labour to do farm work and would influence decision-making by providing the resources needed to acquire food

to meet the food need of the family. This is consistent with the finding that male-headed households are expected to have better food security status than their female-headed counterparts because male-headed households are in a better position to supply more labour to do farm work [19]. The mean household farm output was 1394.59 kilograms. Specifically, 53.3%of the rural farming households had a farm output of over 1500 kilograms. This implies a substantial food output and availability, with a positive impact on the household income and food security. However, most of the foods produced were lost to wastage in the study area. This is in line with the finding that annually, approximately, 49% of perishable farm products are lost to wastage, due to lack of proper markets, storage, and processors, and 26-33% of non-perishables, especially grains are lost during harvest, storage and transportation processes [3]. This means that the food security status of Benue State would be threatened if not addressed urgently.

The result showed that 36.9%ofthe rural farming households had 6-10 household members with a mean of 8 persons. This implies availability of labour for farm production. The large household size also indicates that the households would suffer food insecurity if most of the members were dependants. This result agrees with the findings that a large family size exhibits a negative relationship with household food security as it creates more pressure on food security and increases household expenditure [20].

The results also revealed that majority (69%) of the respondents had at least primary education. This implies that the rural household heads were largely literate. This, therefore, stood them in a good stead to acquire more production information and managerial capacity, and livelihood strategies, enhance food security and reduce poverty. This agrees with the report that the educational status of a household head is positively and directly related to the household food security [18].

The average annual income was found to be ₦ 64043.54 (173.091USD). Most of the rural farming household heads (46.9%) had annual income of not more than ₦50,000 (135.135USD). This implies that most of the respondents had low income and household welfare. The ability to secure entitlement to food, inputs and other items through purchase was impeded. Thus, food insecurity is not just inadequate production of food commodities, it is also caused by low household income and poverty. This is in line with the findings that food insecurity is caused by poverty [2].

Most (40%) of the rural farming households had farm sizes of 3.1 hectares and above with an average farm size of 2.18 hectares. This implies that they are small-scale farmers with a subsistence practice and objective of positively influencing household food security. This corroborates the view that, under subsistence agriculture, holding size is expected to play a significant role in influencing farm household's food security [19].

Food security status of respondent households in the study area

The level of calorie intake and the resulting food security status of the respondent households are presented in Table 3. The results showed that 49.7%of the rural farming households acquired 2100 kilocalories and above per capita per day and were, therefore, classified as food secure while most of the rural farming households (50.3%) were unable to meet the recommended calorie intake of 2100 kilocalorie per capita per day per

adult equivalent and, therefore, classified as food insecure. This implies that the study area is food insecure. This food insecurity situation could be due to the high perishability of farm produce during harvest, sale of farm produce at low prices during the harvesting season, high concentration of poverty and destruction of farms by cattle. The food problem is not that of food production only, but also a question of storage, marketing and distribution arrangement as well as unequal food access by members of the society. This is also in line with the finding that, annually 49% of perishable farm products (oranges, mangoes, cashew, tomatoes, among others) go to waste due to lack of proper markets, storage, and processors. Another 26-33% of non-perishables, especially grains are lost during harvest, storage and transportation processes [3]. This means that the food security status of Benue would be threatened if not addressed urgently.

Analysis of food security determinants in the study area

The results of the logistic regression analysis for the determinants of food security status of rural farming households in the study are presented in Table 4. The analysis of the survey data revealed that two out of the ten variables fitted in the model were significant in explaining the variation in the food security status of households in the study area. These variables are educational status of the household head, and household size. They have significant influence on the log likelihood of being food secure.

Educational status of household head

This variable coefficient was found to be positive and significant at 5% level. This conforms to a priori expectation implying that households with educated heads are more likely to be food secure than those with uneducated household heads. Keeping other factors constant, a unit increase in a year of schooling of the household head improves the likelihood of the households being food secure by a factor of 1.060 (or 6%). This result also agrees with the findings that educational status of the household head is positively related to household food security. An educated household head is more sensitive to adopt technology to maximize the output he/she generates from activities which contribute directly to household food security [18].

Household size

This variable had negative coefficient that is significant at 5% level. This result is consistent with a priori expectation, implying that as the household size gets larger, the probability of food security decreases. In other words, large – size households are more likely to be food insecure than small – size households. As the number of people in a household increases, the food requirement increases, especially when most of the members are dependants. If all other things are held constant, the odds ratio in favour of being food secure ($\exp^{\beta}$), shows that an increase in the size of family by one person decreases food security by a factor of 0.937 unit (or 6.3%).

Problems of food security in the study area
Results of the problems affecting the food security of rural farming households in the study area are presented in Table 5. The most common problem affecting the rural farming households is poverty, indicated by 11.8% of the respondents. The result is in line with the findings that, the cause of food insecurity is poverty [2].

Implications for policy and poverty reduction
The overall results of this study as presented above have serious implications for policy and poverty reduction. They revealed what should be the policy direction. They showed that household food security decreases with increasing household size, and increases with household education, and that, majority of the rural farming households are food insecure. Household size and education, which had significant effect on the food security of the people also have implication on poverty reduction. Few of the household heads had tertiary education and majority had primary or no formal education. Also, the farm families had large household sizes. This implies a decrease in food and an increase in income poverty. Poverty had affected the social, financial, food and nutritional well-being of the rural farming households in the area. Therefore, to ensure a sustainable food security and a considerable poverty reduction among the rural farming households, there must be an all-embracing policy framework addressing food insecurity, diseases, poor sanitation, poor and unsafe water sources, inadequate education, high population or poor family planning, poor access to markets and poor entrepreneurship skills for business establishment and poor farmer economic empowerment with a specific focus on poverty reduction, if not eradication. A food security programme to address the food situation among rural farming households would also address poverty, and must be well coordinated and consistent to ensure its maximum delivery.

Therefore, with regard to its thrust, the food mediated policy framework includes poverty reduction strategies and project activities designed to improve implicitly or explicitly household food security and the nutritional status of individuals in the rural farming households through improving food availability sources, adequate formal education, increasing income – earning opportunities in farm and non – farm employment, reducing production and marketing risks, improving small holder farmers' access to agricultural inputs, water sources, irrigation, improved health care and sanitation, and population or family planning and child care issues. It will be an enabling, consistent policy, sectoral (rural) and institutional environment for household food security and nutrition programmes that will considerably reduce poverty and ensure sustainable household food security.

CONCLUSION

The result of this study revealed the socio-economic characteristics of the rural farming households as they affected their food security. Most of the households had high output from own production. This should have a significant impact on their food security and income. Most of the households were headed by men. Majority of the household heads were less than 51 years of age. This was expected to possibly allow the young farmers cultivate large farm sizes. Most of the household sizes were large with an average of 8 members, which constituted a reasonable farm labour. The study, however, showed that

increased household size decreased food security in the area. Majority of the household heads were literate having at least primary education. This literacy level among the households had impacts on their food and nutrition security and poverty reduction, since household head's education was found to be one of the significant determinants of food security in the area. However, the household income was low in the study area. Majority of the household respondents had annual income of not more than ₦50, 000 (135.135 USD).

The study also showed that most of the respondent households were food insecure and that the rural farming households were poor. Poverty reduction should increase a household food security and otherwise.

Several factors militated against food security in the study area. Prominent among them was poverty. This calls for serious and well-coordinated multi-faceted food mediated poverty reduction strategy to curb this menace.

Based on the findings of the study, the following recommendations were made for policy implications:

1. The growing rural household population should be controlled through family planning, health extension service, awareness raising and provision of adult education.

2. A food security programme should include at the initial point of articulation and project design, strategies to reduce poverty and should be well co-ordinated and its consistency ensured for maximum delivery.

3. The government should diversify the economy by investing high in agriculture so as to boost the production capacity of the rural farmers leading to high productivity and sustainable household food security.

4. The government should consider and incorporate as policy options, at least basic literacy of the rural farming households, provision of other basic needs such as good, affordable and accessible health care, safe drinking water, sanitation, good and healthy housing, and should train, empower and encourage the people for small- and medium – scale enterprises for sustainable and healthy livelihood.

Table 1: Sample size selection plan

Zone	LGA	Sample frame (stratum)	Number of people in sample	Sample size
A	Kwande	12,272	12272*360/157899	28
	Katsina–Ala	27,939	27939*360/157899	64
B	Gboko	32,528	32528*360/157899	74
	Buruku	39,016	39016*360/157899	89
C	Otukpo	31,176	31176*360/157899	71
	Ogbadibo	14,968	14,968*360/157899	34
	Total	157,899		360

Source: Village Listing Survey [12, 13]

Table 2: Distribution of respondents by their socio-economic characteristics

Variables	Frequency	Percentage	Mean
Age (years)			
≤ 30	106	29.4	
31-50	196	55.0	36
≥ 51	56	15.6	
Sex			
Male	303	84.2	
Female	57	15.8	NA
Output (kg)			
< 500	22	6.1	
500 – 1000	44	12.2	
1001 – 1500	102	28.3	1394.59
> 1500	192	53.3	
Household size (Numbers)			
≤ 5	125	34.7	
6 – 10	133	36.9	
11 – 15	54	15.0	8.35
>15	48	13.3	
Educational status			
Informal	111	30.8	
Primary	101	28.1	
Secondary	77	21.4	NA
Tertiary	71	19.7	
Annual income (₦)			
≤50,000 ($135.135)	169	46.9	
51,000 – 100, 000	101	28.1	64043.54($173.0910)
> 100, 000 ($270.270)	90	25.0	
Farm size (Ha)			
≤ 1	120	33.3	
1.1 -3	96	26.7	2.18
≥ 3.1	144	40.0	

NA = Not Applicable   NGN370.000 = 1 USD as at March 27, 2020

Table 3: Distribution of respondents by their food security status

Food security status	Calorie consumption per day per adult equivalent	Proportion of households	Percentage
Food secure	Equal to or Above 2100	155	43.1
Food insecure	Below 2100	205	56.9

NB:Recommended per capita daily intake is 2100 - kcal.

Table 4: Logit regression estimates for determinants of food security status of households in the study area

Variables	Estimated Coefficients (β)	S. E.	Wald Statistics	Sig (P>/Z/)	Odds Ratio EXP (β)
Constant	-0.0581	0.511	1.291	0.256	0.559
X_1. Quantity of Food from own production	0.000	0.000	0.384	0.535	1.000
X_2. Household income	0.000	0.000	0.022	0.881	1.000
X_3. Particip. in a food - mediated poverty reduction prog.	0.279	0.324	0.742	0.389	1.322
X_4. Access to Extension Services	-0.168	0.246	0.465	0.495	0.845
X_5. Age	0.005	0.009	0.317	0.573	1.005
X_6. Sex	0.133	0.310	0.184	0.668	1.143
X_7. Household Size	-0.065	0.020	10.221	0.001**	0.937
X_8. Educational status	0.058	0.022	7.213	0.007**	1.060
X_9. Farm size	0.001	0.015	0.006	0.936	1.001
X_{10}. Access to irrigation	0.061	0.308	0.040	0.842	1.063

Nagelkerke $R^2 = 0.076$ -2 Log likelihood $= 469.386$ Chi – square $(X^2) = 21.024$

Cox and Snell $R^2 = 0.057$ HosmerandLemeshow $X^2 = 6.541$

**Significant at 5%

Table 5: **Distribution of respondents by problems affecting their food security in the study area**

Problems	Frequency*	Percentage
Poverty	173	11.8
Policy inconsistency	102	7.0
Corruption	127	8.7
Lack of input supply	137	9.3
Poor extension services	139	9.5
Lack of irrigation	125	8.5
Lack of credit	136	9.3
Lack of storage	145	9.9
Lack of mechanization	130	8.9
Government's low investment in agriculture	156	10.6
Communal conflict	97	6.6

*Multiple Responses

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