Determinants of Household Food Insecurity in Kinshasa, the Democratic Republic of Congo

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Résumé

Contexte : Plusieurs études à travers le monde ont identifié des caractéristiques socio-économiques et démographiques des ménages comme déterminants de l'insécurité alimentaire. En République Démocratique du Congo, les données et la compréhension de l'insécurité alimentaire au niveau des ménages en milieu urbain demeurent insuffisantes. La plupart de précédentes études conduites sur la sécurité alimentaire ont été plus descriptives qu'analytiques. Cette étude avait pour but d'accroitre la compréhension générale de l'insécurité alimentaire au niveau des ménages. **Objectif :** Identifier les déterminants socio-économiques et démographiques de l'insécurité alimentaire des ménages. **Méthodes :** Un total de 1591 ménages provenant de deux zones de santé sélectionnées dans la ville de Kinshasa ont été interviewés en 2001 et 2004 en utilisant un échantillonnage probabiliste à plusieurs degrés. Une mesure à 16 questions a été développée sur base d'une échelle sommative pour évaluer l'état de sécurité alimentaire des ménages. Un ménage avec un score entre 0 et 7 était considéré en sécurité alimentaire et celui avec un score entre 8 et 16, en insécurité alimentaire. La régression logistique binaire a été utilisée pour identifier les déterminants de l'insécurité alimentaire du ménage. **Résultats :** Les ménages dont les chefs n'avaient aucune instruction ou avaient fait l'école primaire, et ceux dont les chefs avaient fait l'école secondaire, avaient respectivement deux fois (OR_{adj}, 1,79; IC95%, 1,21-2,64 et OR_{adj}, 1,67; IC95%, 1,26-2,21) plus de risque d'être en insécurité alimentaire que les ménages dont les chefs avaient un niveau universitaire ou d'institut supérieur. Les ménages dont la principale source de revenu était les petits métiers avaient plus de risque (OR_{adj}, 1,43; IC95%, 1,10-1,88) d'être en insécurité alimentaire que les ménages où la principale source de revenu était le salaire. **Conclusion:** L'éducation et la principale source de revenu étaient les déterminants les plus importants de l'état de sécurité alimentaire des ménages. D'où la nécessité de la promotion de l'instruction post-primaire, de la création des emplois et de la régularité du paiement des salaires.

Mots-clés: Insécurité alimentaire, Ménages, Déterminants, Kinshasa/RDC.

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Summary

Background: Several studies around the world have identified household-level socio-economic and demographic characteristics as predictors of food insecurity. In the Democratic Republic of Congo, data and understanding on household food insecurity in urban area remained insufficient. Most of the previous studies on food security conducted in the country were more descriptive than analytical. This study aimed to increase the general understanding of food insecurity at the household level. **Objective:** To identify the socioeconomic and demographic determinants of household food insecurity. **Methods:** A total of 1591 households from two selected health zones of Kinshasa were surveyed in 2001 and 2004 using a multiple stage-cluster design. A 16-question measure was developed using a summative scale to capture the food security status. A household with a score from 0 to 7 was considered as food-secure and that with a score from 8 to 16, as food-insecure. A binary logistic regression was run to identify determinants of food insecurity. **Results:** Households whose chief had none/primary level of education and those with secondary level were respectively 2 times (OR_{adj}, 1.79; 95% CI, 1.21-2.64 and OR_{adj}, 1.67; 95% CI, 1.26-2.21) more likely to be food-insecure than households whose chief went to college/university. Households whose main source of incomes was the little crafts/jobs were more likely (OR_{adj}, 1.43; 95% CI, 1.10-1.88) to be food-insecure than those with salary as main source of incomes. **Conclusion:** Schooling and main source of income were the strongest determinants of household food security status. Post primary education should be promoted, employment created, and salaries regularly paid.

Key words: Household Food Insecurity, Determinants, Kinshasa/DRC.

Introduction

From 1996 to 2002, the Democratic Republic of Congo (DRC) experienced numerous outbreaks of war. Kinshasa, the capital of DRC, was greatly impacted by theses outbreaks. It was isolated from its main sources of local food supply, and the population was impoverished, with more than 50% living on less than one U.S. dollar per day (1). The result of these impacts was a sharp deterioration in the life quality of the population.

Among children less than five years old, acute malnutrition rate increased from 5% to 14%, while that of chronic malnutrition rose from 20% to 38% (2, 3). In 2003, the Sun City Accord was signed, formally ending the protracted war in DRC which permitted other provinces to start sending their provision of foodstuffs. Yet, the household food situation did not seem to improve.

Food security is a broad and complex concept, simplified by focusing on three key dimensions: food availability, food access, and food utilization (4). Each dimension is comprised of many factors. This study focused on the food access dimension. Several studies worldwide have identified household-level socio-economic and demographic characteristics as predictors of food insecurity (5-11). In DRC, data and understanding on household food security remained insufficient. Most of the past studies on food security conducted in the country were more descriptive than analytical (3, 12).

This study aimed to increase the general understanding of food insecurity at the household level. The objective was to determine the households' food-insecure based on household socio-economic and demographic characteristics.

Material and methods

Study design

This paper is based on two cross-sectional studies collected at two different time periods: the first survey during the war period in 2001 when Kinshasa was cut off from provinces and food suppliers, and the second survey in 2004 during the peace period (After the signed Sun City Accord). Two health zones of Kinshasa, named Kisenso and Masina, were the selected sites because previous studies on malnutrition, realized throughout randomly selected health zones of the capital city, have shown high prevalence in those two health zones. The overall, the sample size for the study was estimated at 1600 households. The sampling method of statistical units was a multiple stage-cluster design. The same study design and methodology were applied for the two time periods. Permissions to carry out the two studies were obtained from Congolese administration and health authorities of Kisenso and Masina communities and health zones. Within the household, only one eligible individual was interviewed: mainly the householder spouse, if not available the householder, its child or any relative aged at least 18. All participants gave their informed verbal consent before each interview. The same participants were not surveyed twice, but it was different random selection of eligible individuals during the two surveys.

Measurements and statistical analysis

To measure the outcome "household food insecurity", we developed a 16-question measure of household food security status. We created a summative scale using specific questions in the survey questionnaire. Each answer was recoded either zero or one. The item responses were summed to compute the score ranging between 0 and 16 points, with 0 corresponding to the most food-secure households and 16 to the households most severely affected by food insecurity. Based on the frequency of the score distribution, the median score was used as the cutoff point: a household with a score from 0 to 7 was considered as food-secure and that with a score from 8 to 16 as food-insecure.

We run a binary logistic regression model to select the best determinants of household

food insecurity. We used EPI INFO version 6.4b (WHO & CDC) to enter and clean the data, and SPSS (Statistical Package for Social Sciences) version 16.0 (SPSS Inc, CHICAGO, IL, USA) to analyze the data. The p-value, less than 0.05, was regarded as the statistical threshold of significance.

Results

Table 1 summarizes the characteristics of the sample. The final total sample size was 1591 households (Response Rate of 99.4%). The respondent's mean age was 39 ± 13 years, 68% of them were females. In 45.8% (n = 728), the respondent was the householder spouse who is normally responsible for cooking. The majority of household heads were natives of Bas-Congo and Bandundu provinces, the nearest provinces of Kinshasa. Seventy five percent (n = 1186) of householders were married in monogamy. Regarding the food security status, 62.2% (n = 990) of households were food-insecure.

Table 1. Frequency distribution of some characteristics of the sample

Characteristics of the sample	n = 1591	Percent
Respondent age, mean (SD), years	38.63 (13.308)	
Respondent sex, female	1082	68.0
Respondent relation with the householder		
- Himself (chief)	465	29.2
- Spouse	728	45.8
- Child or relative	398	25.0
Householder marital status		
- Single	49	3.1
- Married in monogamy	1186	74.5
- Married in polygamy	52	3.3
- Divorced/widowed/separated	203	12.8
- Free union	101	6.3
Householder native province*		
- Bas Congo	726	46.4
- Bandundu	489	31.1
- Equateur	93	6.0
- Kasai Occidental	30	1.9
- Kasai Oriental	188	12.0
- Katanga	7	0.4
- Kinshasa	11	0.7
- Maniema	3	0.2
- Nord Kivu	4	0.3
- Province Orientale	9	0.6
- Sud Kivu	3	0.2
Household food security status		
- Households' food-secure	601	37.8
- Households' food-insecure	990	62.2

* There were 28 missing data
SD = Standard Deviation

Table 2 presents the associations between determinants and household food insecurity. The proportion of female-headed households, and that of single-parents were the same for both households' food-secure and those food-insecure. There was no statistically significant difference ($p>0.05$) between the average size of households'

food-secure (7.98 ± 3.65) and that of households' food-insecure (8.11 ± 3.77). Looking at the educational level of the householder, the proportion of those who had either a primary or a secondary level of education was higher among households' food-insecure while the proportion of those who went to college or university was higher among households' food-secure ($p < 0.001$). Concerning their occupation, the proportions of intellectuals and traders were higher among households' food-secure while those of craftsmen and without occupation were higher among households' food-insecure ($p < 0.001$). The same picture was obtained among the householder spouses. Regarding the main source of incomes, and the financial contribution to incomes, the proportions of households with little crafts/jobs and financial aid as main sources of incomes were higher among those food-insecure and the proportions of households with salary and trade as main sources of incomes were higher among those food-secure ($p < 0.001$). The proportion of households in which both parents and any adult contributed was higher among those food-secure, while that of households in which only the chief contributed was higher among those food-insecure ($p = 0.036$). The proportions of households with only one person and those with two persons contributing to incomes were higher among households' food-insecure, while the proportion of households with at least three persons contributing was higher among those food-secure ($p = 0.019$). Looking at the homeownership status, the proportions of owners and renters were higher among households' food-secure, while that of households lived in family/friend houses was higher among those food-insecure ($p = 0.03$).

Table 2. Associations between determinants and household food insecurity (n=1591)

Determinants	Outcome n (%)		Total n (%)	Chi Square Test
	Household food-secure	Household food-insecure		
Gender of the household head				0.001
- Male	526 (87.5)	866 (87.5)	1392 (87.5)	
- Female	75 (12.5)	124 (12.5)	199 (12.5)	
Composition of the household				0.066
- Double-parent	504 (83.9)	835 (84.3)	1339 (84.2)	
- Single-parent	97 (16.1)	155 (15.7)	252 (15.8)	
Size of the household				0.467
- 1 to 4 persons	88 (14.6)	138 (13.9)	26 (14.2)	
- 5 to 8 persons	297 (49.4)	480 (48.5)	777 (48.8)	
- 9 persons or more	216 (35.9)	372 (37.6)	588 (37.0)	
Educational level of the household head				45.874**
- None or primary school	100 (16.6)	251 (25.4)	351 (22.1)	
- Secondary school	314 (52.2)	567 (57.3)	881 (55.4)	
- College/University	187 (31.1)	172 (17.4)	359 (22.6)	
Occupation of the household head (n = 1575)				17.910**
- None	181 (30.4)	376 (38.4)	557 (35.4)	
- Craftsmen	131 (22.0)	240 (24.5)	371 (23.6)	
- Traders	52 (8.7)	64 (6.5)	116 (7.4)	
- Intellectuals	232 (38.9)	299 (30.5)	531 (33.7)	
Occupation of the householder spouse (n = 1339)				24.872**
- None	283 (56.2)	539 (64.6)	822 (61.4)	
- Craftswomen	144 (28.6)	233 (27.9)	377 (28.2)	
- Traders	42 (8.3)	25 (3.0)	67 (5.0)	
- Intellectuals	35 (6.9)	38 (4.6)	73 (5.5)	
Main source of income of the household				34.547**
- Salary	303 (50.4)	425 (42.9)	728 (45.8)	
- Trade	103 (17.1)	109 (11.0)	212 (13.3)	
- Little crafts/jobs	159 (26.5)	395 (39.9)	554 (34.8)	
- Financial aid	36 (6.0)	61 (6.2)	97 (6.1)	
Members of the household contributing financially to incomes				8.534*
- Only the chief	246 (40.9)	433 (43.7)	679 (42.7)	
- Both parents	217 (36.1)	370 (37.4)	587 (36.9)	
- Chief and any adult	95 (15.8)	148 (14.9)	243 (15.3)	
- Both parents & any adult	43 (7.2)	39 (3.9)	82 (5.2)	
Number of persons contributing financially to household incomes				7.893*
- Only 1 person	246 (40.9)	433 (43.7)	679 (42.7)	
- 2 persons	283 (47.1)	480 (48.5)	763 (48.0)	
- 3 persons or more	72 (12.0)	77 (7.8)	149 (9.4)	
Homeownership status				7.024*
- Owner	362 (60.2)	583 (58.9)	945 (59.4)	
- Renter	196 (32.6)	297 (30.0)	493 (31.0)	
- Family/friend houses	43 (7.2)	110 (11.1)	153 (9.6)	

* $p<0.05$ ** $p<0.001$

Table 3 shows the determinants associated with household food insecurity in the univariate associations (unadjusted odds ratio, $OR_{unadj.}$) and binary logistic regression model (adjusted odds ratio, $OR_{adj.}$). At the univariate level, the determinants found to be statistically associated with households' food insecurity were the following: educational level of the

household head (no schooling/primary level, and secondary level), householder occupation (none, and craftsmen), householder wife occupation (none), main source of incomes (little crafts/jobs), household members contributing financially to incomes (both parents and any adult), number of persons in the household contributing financially to incomes (only one member, and two members), and homeownership status (living in family/ friend house). All the determinants were positively associated with the outcome, except "household members contributing financially to incomes" which was negatively associated with the outcome.

At the multivariate level, the determinants which remained significantly associated with the outcome were: educational level of the household head, and main source of household incomes. Compared to households whose householder had a college or university degree, households whose chief had none or primary level of education and those with secondary level were respectively 2 times (OR_{adj}, 1.79; 95% CI, 1.21-2.64 and OR_{adj}, 1.67; 95% CI, 1.26-2.21) more likely to be food-insecure. Households whose main source of incomes was the little crafts/jobs were more likely (OR_{adj}, 1.43; 95% CI, 1.10-1.88) to be food-insecure than those with salary as main source of incomes.

Table 3. Determinants associated with household food Insecurity (n = 1591)[1]

Determinants	Unadjusted Odds Ratio (95% CI)	Adjusted Odds Ratio (95% CI)
Time period †		
- 2001 (war period)	4.11 (3.28 – 5.15) ***	3.59 (2.80 – 4.61) ***
Educational level of household head ††		
- None or primary school	2.73 (2.00 – 3.72) ***	1.79 (1.21 – 2.64) **
- Secondary school	1.96 (1.53 – 2.52) ***	1.67 (1.26 – 2.21) ***
Occupation of the household head †††		
- None	1.61 (1.26 – 2.06) ***	1.09 (0.71 – 1.66)
- Craftsmen	1.42 (1.08 – 1.87) *	0.93 (0.65 – 1.34)
- Traders	0.96 (0.64 – 1.43)	0.90 (0.46 – 1.75)
Occupation of the householder spouse †††		
- None	1.75 (1.08 – 2.84) *	1.48 (0.84 – 2.61)
- Craftswomen	1.49 (0.90 – 2.47)	1.25 (0.71 – 2.19)
- Traders	0.55 (0.28 – 1.08)	0.88 (0.43 – 1.83)
Main source of household incomes ††††		
- Financial aid	1.21 (0.78 – 1.87)	1.02 (0.56 – 1.85)
- Little crafts/jobs	1.77 (1.40 – 2.42) ***	1.43 (1.10 – 1.88) *
- Trade	0.75 (0.56 – 1.03)	0.75 (0.51 – 1.10)
Members of the household who contribute financially to household incomes †††††		
- Both parents	0.97 (0.77 – 1.22)	1.03 (0.43 – 2.50)
- Chief & any adult (not wife)	0.89 (0.66 – 1.20)	0.67 (0.33 – 1.36)
- Both parents & any adult	0.52 (0.33 – 0.82) **	0.72 (0.41 – 1.25)
Number of persons contributing financially to household incomes ††††††		
- One person	1.65 (1.15 – 2.35) **	1.45 (0.93 – 2.26)
- Two persons	1.57 (1.11 – 2.59) *	1.17 (0.52 – 2.67)
Homeownership status †††††††		
- Living in family/friend house	1.59 (1.10 – 2.31) *	1.12 (0.72 – 1.74)
- Renter	0.94 (0.75 – 1.18)	1.03 (0.79 – 1.35)

* p<0.05 ** p<0.01 *** p<0.001
[1] Two hundred fifty-nine records with missing data were excluded from multivariate logistic regression analyses.
† 2004 (peace period) is the baseline,
†† College/University is the baseline,
††† Intellectuals is the baseline,
†††† Salary is the baseline,
††††† Only the chief is the baseline,
†††††† At least three persons is the baseline,
††††††† Owner is the baseline

CI = Confidence Interval

Discussion

Although it is difficult to compare across studies, because of different measures used, the results of this study indicates correlations of household socio-economic and demographic characteristics with household food insecurity. The low level of education, and the unemployment or the fact of being a craftsman, was associated with household food insecurity. This was consistent with the results of existing literature (5, 6, 11, 13-17). Our study did not find that renting a home versus owning it increased the risk of household food insecurity (5, 6, 14, 15). However the survey found a positive association between households living in family or friend houses and household food insecurity. This could be explained by the fact that they lack money to neither rent a house nor possess their own house. However, householder gender was not associated with household food insecurity. Yet, studies have shown that female-headed households faced a high risk of being food-insecure (9, 13, 16, 17). In this study, there were no statistical differences between the proportion of female-headed in households food-secure and that of those in households food-insecure. Since the economic crisis of years 90, which has paralyzed the formal sector of employment in DRC, at Kinshasa and particularly in poor communes like Masina and Kisenso where the surveys took place, many males do not work or do little jobs that do not permit them to meet their family needs. Females, with small commercial activities, gardening, and small livestock rearing, hold their families: feeding households, sending children to school, and dressing them, though the household head remains the male. Although other studies (5, 6, 16) obtained an association between household composition and household food insecurity, the present study reported no statistical differences between the proportion of single-parents in households food-secure and that of those in households food-insecure. The same explanation on female-headed households could be considered here because the majority of single parents headed households are females. Unlike some studies (6, 11, 14) found that as the household size increased, the probability of being food-insecure also increased; this study did not find an association between household size and household food insecurity. Our result was consistent with a study in Rwanda (16) which also found that larger households did not tend to be food-insecure compared to households with small size. In DRC, families are characterized by large household size, 7 to 8 members in average, regardless their household socio-economic and demogra-phic characteristics (3, 18, 19). This could be also the case in Rwandan families were similar results were found.

Other household characteristics, which are not usually taken in consideration in other surveys on food security as risk factors, were examined in our study as determinants of household food insecurity. Compared to salary, we found that the little crafts/jobs as household main source of income were related to household food insecurity. Although the salaries are not enormous, if they are given regularly, people can get organized to feed their families. But the little crafts/jobs are not regular sources of money, and it is difficult for the householders to take care of their families. They are usually in a financial insecurity. However, we found almost the

same proportion of households whose main source of income was financial aid among those food-secure and those food-insecure. This could be explained by the fact that if a family received regularly a certain amount of money from a relative, it can get organized with that money and will be financially secure.

Although in multivariate analysis, this determinant did not remain significant, we found in univariate analysis that when both parents and any adult in the household contributed financially to income, this protected the household against food insecurity. One could suppose that all adults in the household looked for money to contribute to household income. That could explain why we also found the number of persons in the household contributing to income associated with the food security status. The proportion of households with at least three members contributing was higher among households food-secure than those food-insecure. And we found in this study that if only one person in the household contributed financially, that household felt in food insecurity even if it is the chief of the family. When the contribution came from two persons, the risk to fall in situation of food insecurity was always present. The contribution of other members of the household was necessary to protect family against food insecurity. We also have to be awarded that people living in Masina and Kisenso during those periods were among populations with low socioeconomic status. So the more people contribute financially in the family, better is the food security status of the household. Maybe this would not be the case if we had different socio-economic status (middle and high classes). Only the revenue of the householder could be enough.

The study had some limitations. Since the data have been collected five years ago, the situation might have changed since then. However, results of the Demographic and Health Survey (DHS) conducted in DRC in 2007 revealed that the nutritional status of children less than five years old remained the same: in Kinshasa, the acute malnutrition rate is 11.2% and that of chronic malnutrition is 32.2% (20). Hence, the situation may not have changed much. Secondly, no measure of food security can be accepted as the international "gold standard" and the agreed best approach for measurement uses several proxy and outcome indicators in combination to measure each dimension of food security (21). Hence, the selected questions to capture food security permitted to define and measure our outcome variable, and inferences could be made from that. However, missing of some questions to measure the outcome may have introduced some biases. Thirdly, the retrospective responses could lead to information bias, specifically recall bias concerning food consumption. However, the risk was very low as the asked questions referred to recall period of 24 hours for food consumption or one week for food habits. Fourthly, the temporal sequence between outcome and determinants could not be established, since the analyses were based on a cross-sectional study. Due to the geographic limitation of the study, the results cannot be generalized to the entire country.

Conclusion

This research conducted in Kisenso and Masina, two health zones of Kinshasa the Capital of the DRC, has provided a better and in-dept general understanding of food

insecurity at the household level. The study looked at the association between household socio-economic and demographic characteristics and food insecurity. Schooling and main source of household income were the strongest determinants of household food security status. Post primary education should be promoted, employment created and salaries regularly paid.

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