

Explaining the Gender Gap in Food Security in Côte d'Ivoire

N'Guessan Beugré Jonathan

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By

N'Guessan Beugré Jonathan
Economic Department,
University of Félix Houphouët Boigny, Côte d'Ivoire

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Abstract

This study sets out to determine the explanatory factors of food insecurity gap between female-headed households (FHs) and male-headed households (MHs) in Côte d'Ivoire. Using data from the Household Living Standards Survey in Côte d'Ivoire, which the National Institute of Statistics (INS) conducted in 2015, and the inequality decomposition method developed by Oaxaca and Blinder (1973), the study fractions the food insecurity gap between male and female household heads according to explainable characteristics on the one hand, and according to some other unexplained characteristics on the other. The results show that demographic variables such as household size, single and widow status, and a rural area of residence essentially explain the food insecurity gap between FHs and MHs in Côte d'Ivoire.

Key words: Food insecurity, Decomposition, Blinder Oaxaca, Female-headed households, Male-headed households.

1. Introduction

One of the main goals of the United Nations (UN) Sustainable Development Programme: The Sustainable Development Goals (SDGs) is to achieving gender parity by 2030. For this reason, a clearer understanding of gender at all levels, including responsibilities, resources, and gender constraints, is imperative to ensure that female-headed households in developing countries are generally taken into account in development policies.

Food security and its measurement remain a critical issue today (Olagunju et al, 2012; Akukwe, 2019; Welderufael, 2014; Yusuf et al, 2015; Dawit and Zeray, 2017; Ogundari, 2017). Indeed, given the food crisis that affected most individuals at that time, the focus was on food supply and food price stability (UN, 1975). Subsequently, the notion of food security has changed considerably by incorporating different concepts. In 1974, long-term food security was defined as the availability at all times of adequate global food security with a supply of basic foodstuffs to support a steady expansion of food supply and to compensate for fluctuations in production and prices (FAO, 1996). This was an attempt to integrate all aspects relevant to understanding the concept of this important issue. Later, in 1983, the concept of food security shifted to food access and was redefined as ensuring physical and economic access to food. Current trends in the transformation of the term food security continued until 1996 at the World Food Summit when the term food security was redefined as “when all people, at all times, have physical and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life” (FAO, 1996).

Thus, food security has been divided into four distinct dimensions, namely: availability, access, utilization, and stability (USAID, 1992). If a household is unable to reduce or mitigate the impact of a decline in these four dimensions, this makes it more vulnerable to food insecurity and, therefore, considered food insecure.

Although considerable attention has been paid to the study of food insecurity in developing countries, there are relatively fewer empirical studies in gender inequality literature within households in terms of food insecurity. Yet, reducing multiple inequalities is a prerequisite for achieving global and national food security goals (Lovendal and Knowles, 2005).

Although vulnerability to food insecurity is a general household problem, few studies have shown that the problem is more prevalent among female-headed households. For example, IRIN (2006) analysed the livelihood and food security status of vulnerable households and groups in Zimbabwe, Zambia, and Malawi. It was found

that female-headed households were more vulnerable to food insecurity than male-headed households. Rural women were poorer than men and had turned to agriculture and livestock with casual farm labour as their main source of income. Akinsanmi and Doppler (2005) found that female-headed households in southeast Nigeria were poorer and more vulnerable than their male counterparts. This was mainly caused by inequality in access to education, access to and control over productive resources. The study concluded that the living conditions of female-headed households could be improved if they were given full legal rights to resources that would make them eligible for loans and enable them to use productive resources efficiently. Similarly, Owotoki (2005) found that in the Kwara region of north-central Nigeria, female-headed households were more nurturing than male-headed households.

Thus, it has been generally observed that female-headed households (FHs) are more food insecure than male-headed households (MHs). FHs are more vulnerable to food insecurity because of the “triple burden”: (i) the female head, who is the main income provider, faces various disadvantages in the labour market and in many productive activities; (ii) she is also responsible for the maintenance of the household, including household chores and childcare, in addition to working outside the home, and thus; (iii) faces greater dependence on being the sole income provider (Fuwa, 2000). Duflo and Udry (2004) argue that the income of female heads of households is spent primarily on meeting family needs, such as food and health, while a significant portion of the income of male heads of households is spent on tobacco, alcohol, or other personal responsibilities other than food. Similarly, the costs of market participation between female and male household heads may also vary because of variations in their income flows (Quisumbing, 1995).

This paper departs from the existing literature by indexing factors specific to the situation of female household heads and emphasizing the pace and diversity of food consumption of these households.

The study on gender gaps in household food insecurity in Côte d’Ivoire is important for several reasons. It is useful for understanding gender differences in food security among household heads and determining whether they deserve special policy attention. Also, to design programmes to address food insecurity, policy makers need to identify the factors that lead to food insecurity. If there are gender differences in food insecurity, gender policies can also address food insecurity. In addition, food aid or nutrition-focused programmes provide only temporary solutions to food insecurity. If limited employment and educational opportunities make women more likely to experience food insecurity, policies targeting employment and education for women and girls can have long-term consequences for food insecurity. Finally, this analysis informs decisions about targeting appropriate food aid programmes.

The main objective of this analysis is to explain the food insecurity gap between male-headed households (MHs) and female-headed households (FHs) in Côte d’Ivoire. Specifically, the objective is to assess the food consumption gap between MHs and FHs in Côte d’Ivoire and to identify the determinants of this food consumption gap in Côte d’Ivoire.

Our analysis is structured in five parts. The first part presents the food context of Côte d'Ivoire; the second and third parts present, respectively, the theoretical framework and the empirical review of our study; the fourth part reviews the methodological approach used; and the fifth part presents and discusses the results obtained while the sixth part provides the conclusion and policy implications.

The analytical framework that motivates our investigation of the subject is that of Côte d'Ivoire, which depicts a relatively worrying situation in certain regions of the country. Food consumption in Côte d'Ivoire is mainly based on cereals (63% on average).

According to the 2016-2020 NAIP², the national undernourishment rate over the 2014-2016 period averaged 13.3%. Food insecurity affected 12.8% of the population in 2015, 4.0% of whom were severely food insecure, particularly in the rural areas of the north, northeast, and west (National Institute of Statistics, 2015). The diet of food-insecure households in the South, North, North-West, and West regions is mainly composed of cereals, tubers, leaves and vegetables, and oil. In Côte d'Ivoire, 20.5% of the population in 2014 did not meet the minimum level of caloric intake, and diet remains undiversified across all age groups. The average caloric intake per capita is 2,534 Kcal/person/day against 2,806 Kcal/person/day as recommended by the WHO².

In addition, Côte d'Ivoire ranks 43rd in the African Development Bank's 2015 Equality Index, ranking out of 52 African countries and 155th out of 159 countries in 2015³ with a Gender Inequality Index (GII) of 0.672. These statistics show that gender inequalities persist in the country, and the level of women's empowerment remains low despite the high-level political commitment to women's advancement. The 2015 Household Living Standards Survey highlights the fact that the proportion of poor women is higher than that of men (47.4% of poor women compared to 45.5% of poor men). In terms of education, 63% of women in Côte d'Ivoire are illiterate compared to 49% of men (National Institute of Statistics, and ICF International, 2012). Only 14% of girls have access to secondary education compared to 30% of boys. At the primary school level, nine girls are enrolled for every ten boys, and 34.1% of girls drop out of school prematurely compared to 28.4% of boys⁴.

Women make up 52.4% of labour market participation, much more in the informal sector. In the formal sector, they represent a small proportion of employees in both the public (28% against 72% of men in 2013) and private sectors (19.25% against 80.75% of men in 2013). As for representation at the level of decision-making bodies, women occupy 9.2% of the seats in Parliament and constituted 20.0% of members in the government in January 2017. In the agricultural sector, women constitute nearly 67% of the agricultural workforce and are massively present in subsistence farming, where they provide 60-80% of production on small individual family farms (World Bank, 2018). As producers of perishable foodstuff, particularly vegetables, women are the main victims in terms of being isolated from production areas and the lack of conservation and processing infrastructure. Their difficult access to land due to customary rights recognized by the land law confines them to less fertile and less irrigated land, resulting in low production and low income. In 2016, the productivity

gap between them and men was 34% for food crops and 17% for export crops. In 2017, only 8% of these women farmers held a land title or a sale certificate compared to 22% of men. In addition, they remain subject to discriminatory social practices that can lead to food insecurity.

Given the above, in Côte d'Ivoire, as in many other developing countries, women have less access than men to assets or means of production (fertile land, equipment), to agricultural services (training, technology, and inputs), and sources of financing (own income and credit). These constraints are also expressed in terms of mobility, time constraints, the arduousness of the work, low levels of education, and a lower level of involvement in decision-making processes, and a lower capacity to act due to the central role of men in decision-making. These social constraints impact negatively on the availability of food and increase women's vulnerability. In addition, the high incidence of poverty among women in Côte d'Ivoire due to their difficult access to sources of income and the man's decision-making dominance limits their choices and compromises their food security.

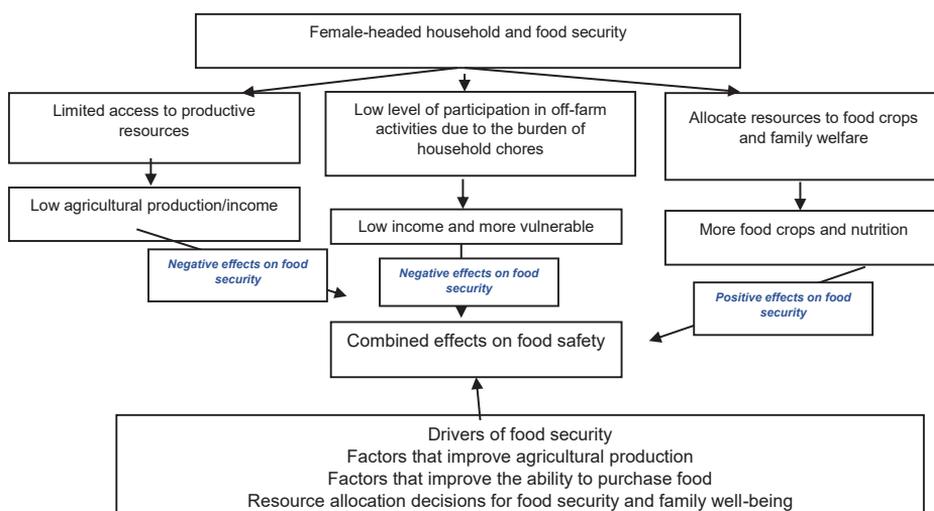
In 2012, the country opted for implementation of the NDP (2012-2015) integrating the National Nutrition Policy (NNP) and the Five-Year Strategic Nutrition Plan (QNSP) aimed at improving the country's food security. To carry out its nutrition policy, Côte d'Ivoire has defined, after the post-election crisis of 2011, sectoral policies including the National Agricultural Investment Programme (NAIP) and the National Social Protection Strategy and the National School Feeding Policy. The government has also initiated the process of formalizing the Ivorian Food Safety Agency. In addition, the State has reaffirmed its commitment by creating, through decree No. 2014-433 of 16th July 2014, the National Council for Nutrition (CNN), thus providing a multi-sectoral coordination platform for effective management and efficient programming of nutritional interventions. Côte d'Ivoire has ratified major international instruments recognizing women and men as equal in rights and duties and prohibiting all forms of discrimination against women. At the national level, the new Constitution adopted in October 2016 and promulgated in December 2016 ensures parity between women and men in its legislation. In addition, the government has adopted a National Policy on Equal Opportunities, Equity, and Gender to take into account the gender dimension in development policies, plans, and programmes with a view to ensuring a human, balanced and sustainable development.

2. Theoretical framework

The problem of food insecurity is considered acute in most developing countries. It is associated not only with economic factors, but also and especially with social and cultural values, and gender.

Our conceptual framework focuses primarily on gender and attempts to describe how it is associated with household food insecurity. Review of existing literature shows that there are three key issues related to food insecurity: (i) access to factors that improve agricultural production; (ii) access to factors that improve household income, such as ability to purchase food; and (iii) the decision to allocate some resources for family food security (e.g., investing more in food crops rather than cash crops) and welfare. Studies have shown that, compared to male-headed households (MHs), female-headed households (FHs) are less food secure primarily because various factor or their endowments are lower than those of men (Kassie et al, 2014; 2015). However, it cannot be generalized to all cases and requires an empirical approach. Thus, building on previous work by Doss (2018), Fuwa (2000), and Kassie et al (2014), Kassie et al (2015), Kieran et al (2015), Quisumbing et al (2001), and Quisumbing and Maluccio (2003), we define our conceptual framework.

Figure 1: Conceptual framework



3. Empirical review

This section discusses empirical work on the determinants of household food security and how the gender correlates with food security.

Determinants of household food security

The main dimensions of food security, now understood to include sufficient food availability, adequate food access, appropriate food utilization, and stability, are influenced by several factors at the household level. One of the main factors that determines a household's ability to acquire adequate food is its ability to produce or purchase food (Maxwell, 1996). In addition, the ability of the household to use available resources efficiently also remains a prominent factor in household food security. In turn, resources should be used sufficiently for productive ends. Other attributes are the nature and extent of the household's endowment of these resources, production processes, income from production, and the level and methods of consumption.

According to anthropometric measures, individuals define "adequate" consumption from their perspective, as opposed to an external definition of adequate consumption. How households perceive adequate food provision and their dietary needs may vary with socioeconomic status (Headey and Ecker, 2013). As an illustrative guide, wealthy households may be accustomed to a different diet than poor households. In addition, men and women may have different perceptions of what they perceive to be adequate food provision, resulting in differences in how men and women respond to food insecurity issues (Croson and Gneezy, 2009).

Some empirical studies show that food insecurity in a household is related to the professional status of adult household members, household size, irrigated agriculture, income level, and its stability (Maharjan and Joshi, 2011). Coates et al (2006), in a comparative study on the experience of food insecurity across several crops, find a common denominator or "core" of household food insecurity. In all but a few of the cultures sampled, concerns about the inadequacy of the amount of food consumed, the inadequacy of the quality of food consumed, and uncertainty and worry about food availability and accessibility to food consumed are underlying factors regarding food insecurity.

In a qualitative study on the determinants of household food insecurity in rural and urban districts of Southwestern State, Nigeria, Akanbiemu et al (2016b) show that non-food expenditures determine the amount of money available to purchase food. Therefore, non-food expenditures such as rent, school fees, and medical expenses were listed as determinants of household food insecurity.

Other studies have addressed the socioeconomic determinants of household food insecurity. Indeed, households whose household heads have little or no formal education are more likely to be food insecure than families whose household heads have higher levels of education (Akanbiemu et al, 2016b) and are also more likely to be malnourished. In addition, mothers with higher levels of education have, on average, more information about nutrition and health compared to mothers with lower levels of education. With nutrition and health knowledge, mothers can control nutritious foods for their children (Variyam et al, 1999; Kabubo-Mariara et al, 2009). In contrast, David (2013) found that education level was not a crucial determinant of food security even among rural low-income families. Thus, education is essential for food security because it correlates with income, and also because it has a positive impact on how household resources are managed.

Empirical evidence reveals that age also has a significant and positive relationship with household food security levels (Iram and Butt, 2006; Arene and Anyaeji, 2010; Sharaunga et al, 2016; Ebeh and Agama, 2018). Mother's age, for example, is important in measuring household food security because age is associated with experience. Older mothers may have a better understanding of food quality and nutritional needs of the family compared to younger mothers. In contrast, Titus and Detokunbo (2007) and Ahmed and Abah (2014), in their research in Nigeria, found an inverse relationship between the age of household head and food security. They reveal that as the age of the household head increases, the possibility of household food security decreases. On similar topics, Sekhampu (2013) and Muhoyi et al (2014) revealed that age was not significant in determining the level of household food security.

Regarding household size, many empirical works have pointed out that it negatively influences the level of household food security (Asefach and Nigatu, 2007; Aido et al, 2013; Muhoyi et al, 2014). This negative association may be caused by an increase in the number of dependency ratios in the household. It means that households with many children and elderly groups may lack adequate labour, which will ultimately result in over-reliance on limited resources of the household to provide adequate food. If there is a change in the number of members, household decision-makers will reallocate the available resources to the new household members (Charmarbagwala, 2004). However, other studies have also proven that household size is not significant for household food security levels (Arene and Anyaeji, 2010; Ebeh and Agama, 2018).

In addition to this work, Rustiani (1996) also notes that an individual woman has a dual role. The first role is the domestic role in the household, namely as a homemaker and the second has a public role, which is usually in the labour market. Levin et al (1999) added that the role of women in the household is to improve food security because a woman who chooses to work tends to use much of her income to purchase

food and basic needs for children and family members. Most research concludes that household expenditures have a significant and positive relationship with increasing household food security (Makinde, 2000; Omotesho et al, 2008; Kungu, 2014; Ebeh and Agama, 2018).

Gender and household food security

While there is evidence that food security at the household level is low in developing countries (Ngema, Sibanda and Musemwa, 2018), female-headed households experience even higher levels of food insecurity (Lutomia et al, 2019).

Many studies have sought to determine the influence of the gender of the household head on food security status of the household. Male-headed households were found to be more food secure than female-headed households (Joshi and Joshi, 2017; Akadiri, Nwaka and Jenkins, 2018; Kassie, Ndiritu and Stage, 2014; Maharjan and Joshi, 2011; Larson, Castellanos and Jensen, 2019). To the contrary, in a study by Mallick and Rafi (2010) in Bangladesh, no significant difference was found between the food security of male-headed households and female-headed households. The authors suggest that this lack of evidence may be attributable to lack of socio-cultural restrictions among indigenous ethnic groups in that country, allowing women more freedom to participate in the labour market.

The correlation between gender and food security is not so simple for two reasons. First, unequal access to productive resources and information may reduce agricultural production among FHs, and thus increase their likelihood of being less food secure than MHs. Second, female-headed households are more likely to allocate more family resources to food crops rather than cash crops (De Brauw, 2015; Kennedy and Peters, 1992), and a greater share of women's contribution to household income is spent on food (Duflo and Udry, 2004).

It is so because women are constrained by gender inequalities that manifest themselves in barriers such as limited access to productive resources (land, credit, fertilizer, livestock and improved seeds, and contact with extension services; Debela and Workneh, 2017). Again, they are more vulnerable to shocks due to the effects of environmental changes such as climate change and/or other rapid changes (Meybeck et al, 2018). Conversely, when access to some productive resources improves, agricultural productivity increases, poverty levels decrease, and nutrition improves, thus an improvement in food security status (Ashagidigbi, Afolabi and Adeoye, 2017). Farzana et al (2017) and Owunka, IHEMEZIE and OLUMBA (2018) identified that the adoption of livelihood strategies is a significant way to achieve the above improvement.

Using survey data on 32 Ivorian men, Falb et al (2014) attempted to describe, through a study, men's experiences in a women's empowerment programme that shed light on men's perceptions of gender norms, poverty, and armed conflict. The interviews were conducted as part of an intervention that combined gender dialogue groups for both women and their male partners with village-based women's savings

and loans programmes alone to reduce domestic violence against women. They conclude that in the context of armed conflict, traditional gender and economic stressors experienced by men challenged gender role fulfillment and threatened men's sense of masculinity. Men who participated in gender dialogue groups discussed their acceptance of programming and its implementation. The authors noted improvements in their relationship with their female partners. In addition, these men discussed financial planning with their partners. Bina (2011) examines the nature of the current food crises, the projected effect of climate change on food in developing countries, the vulnerabilities created by regional concentrations of food production, imports, and exports, and the crucial role of women as home food producers, consumers and managers. It concludes that it is possible to close the productivity gaps between male and female farmers by helping women farmers overcome the production constraints they face. It could significantly increase agricultural growth and production, given the large proportion of women in the overall agricultural labour force in the developing world.

Mukasa and Salami (2016) examine the importance of women's empowerment in ensuring gender equality. They attempt to show the potential benefits that African countries could achieve if they worked to achieve better gender equality outcomes in their agricultural sectors. They found that gender productivity gaps in Nigeria, Tanzania, and Uganda were 18.6%, 27.4%, and 30.6%, respectively. They estimate that reducing the gender productivity gap will result in output gains of 2.8% in Nigeria, 8.1% in Tanzania, and 10.3% in Uganda. These production gains would subsequently increase monthly consumption per adult equivalent by 2.9%, 1.4% and 10.7% in Nigeria, Tanzania, and Uganda, respectively, and would help about 1.2%, 4.9% and 13.0% of households with women land managers out of poverty in Nigeria, Tanzania, and Uganda, respectively.

Drawing on qualitative data from Côte d'Ivoire, Elizabeth (2015) examines how income allocation and intra-household dynamics affect income allocation and household resilience during the less productive season. The author finds that the fact that women and men incomes are separate and intended for different purposes within the household, and the fact that men's income is often allocated to individual expenditures, creates particular problems for households during the dry season. She concludes that empowering women within the household is critical to improving intra-household resource allocation for household resilience. However, households headed by women in the "*de jure*" locality of the study are more food insecure than male-headed households, and female-headed households in the "*de facto*" locality.

Using a large international sample of individual data and the first global experiential measure of food insecurity, Broussard (2019) shows that women are more likely to be food insecure than men. The magnitude of the gender gap in food insecurity varies across regions and by the severity of food insecurity. In the developed countries of the European Union, women are 4.7 percentage points more likely than men to experience some form of food insecurity. In poor countries in South Asia and Sub-Saharan Africa, women are two percentage points more likely than men to experience severe food

insecurity. Using a modification of the Blinder-Oaxaca decomposition technique, Broussard (2019) finds that gender differences in household income, educational attainment, and social networks explain the majority of the gender gap in food insecurity. However, in some regions, namely South Asia and Australia/New Zealand, gender differences in observable characteristics do not account for gender differences in food insecurity. This analysis, therefore, suggests that policies to address gender inequality in employment opportunities and educational attainment may also have an impact on food insecurity.

Female-headed households are also more vulnerable to the non-income aspects of poverty. Female-headed households, which are “overburdened with activities” employ other household members, including school children who participate in income-generating activities. This is reflected in the low level of children schooling in female-headed households (Buvinic and Rao, 1997). McLanahan (1985) also finds that once income is factored in, children in female-headed households have a lower rate of socioeconomic income than children in male-headed households. If female-headed households use all available resources, including existing human capital, to survive, they cannot invest in future human capital formation, making it more likely that poverty will be passed on to the next generation. Within female-headed households, there is also heterogeneity. For example, Dreze and Srinivasan (1997) find evidence that widow-headed households are more disadvantaged than other types of female-headed households.

There are also counter examples showing that female-headed households are no less food insecure than male-headed households. Quisumbing, Haddad, and Pena (2001) using a household survey dataset from 10 developing countries did not find a significantly higher incidence of poverty among female-headed households in two-thirds of the countries except Bangladesh, where female-headed households are consistently poorer among the poorest households in the population. For example, Dreze and Srinivasan (1997), in the context of rural India, find no evidence of a higher incidence of poverty among female-headed households in terms of standard poverty indexes based on per capita household expenditures.

4. Methodology

Data source

This study uses data from the household living standards survey in Côte d'Ivoire. The survey was conducted by the National Institute of Statistics (INS) and sampled 12,899 households in 2015. A multi-stage stratified random sampling method was applied to select the sample households. The survey covers all regions of the country and, therefore, is nationally representative.

Food security indicator

This analysis uses the food consumption score as a variable to capture the food situation of household heads.

Some studies have used objective measures of food security, while others have applied subjective measures. Deaton (2010) argues for broader use of individual subjectivity. For example, Kassie et al (2014, 2015), and Mallick and Rafi (2010) used subjective food security measures in Kenya, Malawi, and Bangladesh, respectively. The present study used the subjective measure of food security, which considers family diets: the food consumption score:

$$FCS = \sum_{i=1}^n a_i x_i \quad (1)$$

With FCS the food consumption score; n the total number of selected food categories; a_i the weight of each food category; and x_i the number of days each food category was consumed by the household in the last seven days. In addition, the thresholds defined for Côte d'Ivoire are as follows: score ≤ 21 , poor food consumption; 21.5 to 35 borderline food consumption and score ≥ 35.5 acceptable food consumption. Thus, households with a score less than or equal to 21 will be considered food insecure, and those with a score greater than or equal to 21.5 are food secure. Overall, the FCS ranges from 0 to 112.

Empirical method: Blinder-Oaxaca decomposition

This analysis uses the Oaxaca (1973) decomposition method. The method explains the average difference in the interest variable between two distinct groups, in this case between male-headed households (MHs) and female-headed households (FHs). This difference is decomposed into a part related to differences in initial characteristics between the two groups and another part associated with differences in the returns to these characteristics (the implicit assumption here is that the parameters associated with the characteristics may be different for the two groups). This study intends to explain the differences in food consumption depending on the food consumption scores of MHs or FHs.

Let Y our variable of interest be the food consumption score. We have two groups: Group A [male-headed households (MH)] and group B [female-headed households (FH)]. We assume that Y is explained by a vector of determinants X .

$$R = E(Y_A) - E(Y_B) \quad (2)$$

With $E(Y)$, the mathematical expectation of the variable of interest. Since the variable of interest is a function of other variables, it can be estimated using the following regression model:

$$Y_\rho = X'_\rho \beta_\rho + \varepsilon_\rho, \quad E(\varepsilon_\rho) = 0 \quad \text{where } \rho \in (A, B) \quad (3)$$

Where X represents the vector containing the endogenous variables and the constant, β containing the parameters to be estimated and the intercepts and, ε error term, the difference in the mean of the food consumption score of the two groups considered being given by :

$$R = E(Y_A) - E(Y_B) = E(X'_A) \beta_A - E(X'_B) \beta_B \quad (4)$$

Car $E(Y_\rho) = E(X'_\rho \beta_\rho + \varepsilon_\rho) = E(X'_\rho \beta_\rho) + E(\varepsilon_\rho) = E(X'_\rho) \beta_\rho$ where $E(\beta_\rho) = \beta_\rho$ by assumption.

Thus, to identify the contribution of the groups in the expected value gap, the previous gap equation can be rewritten as follows:

$$R = \{E(X'_A) - E(X'_B)\}' \beta_B + E(X'_B) (\beta_A - \beta_B) + \{E(X'_A) - E(X'_B)\}' (\beta_A - \beta_B) \quad (5)$$

Note also that the decomposition is subdivided into three components as follows:

$$R = E + H + K \quad (6)$$

The first component is the portion of the difference that is due to the difference between the groups regarding endowment effects:

$$E = \{E(X_A) - E(Y_B)\}' \beta_B \quad (7)$$

The second component measures the part of the difference due to the difference between the coefficient values and the intercept (the coefficient effect):

$$H = E(X_B)'(\beta_A - \beta_B) \quad (8)$$

The last component shows the differences attributable to the interaction between the terms because the difference in endowments and coefficients exists simultaneously between the two groups.

$$K = \{E(X_A) - E(Y_B)\}'(\beta_A - \beta_B) \quad (9)$$

As we can easily see in the previous decomposition, the different components are weighted by the coefficients of group B. The first two components can be interpreted as follows. The endowment effect measures the expected change in average food consumption of group B (FHs) if group B had the expected level of group A (MHs). Similarly, coefficient measures the expected effect of the change in average food consumption in group B if group B had the same level as group A. Of course, this decomposition can also be done with the weights of the coefficients of group A.

5. Empirical results and discussion

This section of our analysis presents, following the empirical method, results obtained from the estimations by the Blinder-Oaxaca method. We first present the descriptive statistics of the variables in our analysis, then results drawn from the Blinder-Oaxaca decomposition.

Descriptive statistics

Our analysis highlights that there is a mean difference between FHs (8.34) and MHs (7.89) in terms of food status. This result is similar to the findings of Mallick and Rafi (2010) in the context of Bangladesh. Indeed, legal measures and provisions aimed at eliminating gender inequalities between men and women in Côte d'Ivoire are increasingly important, as illustrated by the new Ivorian law on equality between men and women within the married couple. These legal provisions increasingly give women the same opportunities to access productive resources as men. In addition, the improvement in women's level of schooling gives women more resources to meet their food needs and take total care of their families. In addition, these differences are observed in their socio-economic and demographic characteristics.

On average, female household heads are less educated (primary, secondary, and tertiary) than male household heads. The results highlight that male household heads have a relatively higher level of education than female households' heads. The results also show that statistically significant differences exist between MHs and FHs in terms of material possessions. Indeed, compared to male household heads, female household heads have more housing assets. However, they are older and have fewer hours of work per week in their main activities, fewer formal jobs, fewer permanent jobs, fewer salaried jobs, and therefore less social protection. We also added age to the square of the household head to capture the effect of changing age on the explanatory variable. This socioeconomic instability hinders the ability of FHs to cover their food needs necessary for healthy family life. In addition, they derive fewer financial resources from primary jobs than is the case with MHs. We also find that, compared to MHs, FHs are less likely to participate in secondary activities.

Such differences in education, job quality, hours of work, earnings from primary and secondary activities, and in wealth between MHs and FHs underpins the reduced ability of FHs to invest consistently in their household food security. It should also be noted that the difference is more pronounced among the FHs because of their status as "single" and/or "widowed" women. Indeed, widowed or single women are more

challenged with regard to feeding and caring for their families. It is more serious when they are less educated, when they do not own arable land to cultivate or have no formal, well-paid work. The family, cultural and social burdens they face in the event of the loss of their spouse also alter their psychological capacity and increases their vulnerability to food insecurity.

Table 1: Characteristics of male-headed and female-headed households (national)

Description of variables	MH		FH		t.test
	Mean	Std.Dev	Mean	Std.Dev	
Food consumption score	7.89	15.19	8.34	0.31	1.31
Age of head of household	40.32	14.05	44.21	16.13	12.13***
Age² of head of household	1823.61	1328.21	2215.53	1566.13	12.83***
Size of household	3.80	2.67	3.23	2.18	9.87***
Youth	0.702	0.004	0.566	0.009	13.15***
Degree	1,210	0.026	0.936	0.046	5.877***
Employment status (unemployment)	1.489	0.004	1.598	0.009	9.955***
Permanent employment	0.922	0.003	0.889	0.008	4.083***
Place of residence	1.571	0.004	1.470	0.009	9.218***
Formal employment	0.083	0.003	0.006	0.009	2.12**
Ln_food expenses	12.986	0.808	12.894	0.016	5.060***
Duration of contract	4.544	0.021	4.513	0.060	0.479
Secondary employment	1.957	0.02	1.766	0.004	1.712*
Ln_household expenses	13.732	0.006	13.622	0.013	7.014***
Home ownership	1.415	0.004	1.540	0.009	11.424***
Ln primary remuneration	11.70	0.019	10.43	0.049	25.44***
Single	0,193	0.003	0.246	0.008	5.944***
Widow(er)	0.014	0.001	0.315	0.004	58.26***
Total number of observations	10 366		2 533		

Source: Author Note. *, **, ***** correspond to the significance level of 10%, 5% and 1%, respectively

Breakdown of food consumption gaps between MHs and FHs

Tables 2 and 3 of our analysis present the results of the Blinder-Oaxaca decomposition of the food consumption gap between male and female-headed households in Côte d'Ivoire. A negative sign of the estimated coefficient implies an advantage in favour of MHs, while a positive sign indicates an advantage in favour of FHs. The results denote a food consumption score differential between MHs and FHs of 94.8% in favour of MHs.

Table 2: Synthesis Blinder-Oaxaca estimate

Blinder-Oaxaca decomposition Group 1: FH = 0 Female-Headed Household (FH)
 Number of obs = 1 872 Group 2: MH = 1 Male Headed Household (MH)

Food Consumption	Coef.	Std. Err.	z	P>z	[95% Conf.	Interval]
FH	10.271***	1.364	7.53	0.000	7.597199	12.94634
MH	11.219***	0.419	26.72	0.000	10.39672	12.04287
Difference	-0.948	1.427	-0.66	0.507	-3.746377	1.850323
Endowments	4.310***	0.996	4.32	0.000	2.356366	6.263854
Coefficients	-3.212**	1.560	-2.06	0.040	-6.27013	-0.1542887
Interaction	-2.045	1.267	-1.61	0.106	-4.529933	0.4380789

Table 3: Detailed Blinder-Oaxaca estimate

Variable	Endowments			Coefficients			Interaction		
	Coef.	Std. Err.	P>z	Coef.	Std. Err.	P>z	Coef.	Std. Err.	P>z
Age	-1.439	2.125	0.498	29.304	34.426	0.395	3.859	6.571	0.557
Household size	1.003**	0.467	0.032	-4.738**	2.239	0.034	0.496	0.328	0.130
Young	0.655	1.079	0.544	57.122	81.383	0.483	-1.472	2.979	0.621
Age ²	0.871	1.163	0.454	-14.683	13.896	0.291	-2.534	3.704	0.494
Degree	0.080	0.075	0.284	-1.694	1.060	0.110	-0.220	0.227	0.332
Employment status (unemployment)	0.070	0.060	0.246	3.529	3.400	0.299	0.156	0.180	0.385
Permanent employment	-0.000	0.006	0.908	-0.474	4.001	0.906	-0.002	0.027	0.915
Place of residence	0.181*	0.102	0.077	0.722	4.613	0.876	0.046	0.295	0.876
Formal employment	0.070	0.069	0.310	-0.994	0.936	0.288	-0.201	0.218	0.357
Ln_Food expenses	0.113	0.118	0.336	3.646	30.126	0.904	0.016	0.137	0.904
Duration of contract	-0.010	0.023	0.650	-3.464	6.545	0.597	0.033	0.083	0.686
Secondary employment	-0.016	0.056	0.769	3.778	13.208	0.775	0.007	0.037	0.837
Household expenditure	-0.115	0.105	0.271	20.913	46.722	0.654	0.140	0.325	0.665
Home ownership	0.038	0.060	0.522	-4.012	5.314	0.450	-0.186	0.258	0.471
Ln primary pay	0.017	0.088	0.840	9.934	9.351	0.288	-0.317	0.318	0.320
Single	2.538***	0.595	0.000	-2.365	1.475	0.109	-1.518	0.998	0.129
Widow(er)	0.568**	0.566	0.016	-0.020	0.029	0.484	-0.599	0.831	0.471

Source: Author

The standard application of the Blinder-Oaxaca technique is to divide the food consumption gap between MH and FH into a portion that can be explained by differences in the determinants of food consumption score and a portion that cannot be explained by these factors.

The decomposition results show the predictions or mean values by group and their difference in the first panel. In our sample, the mean food consumption score is 10.27 for FH and 11.21 for MH, resulting in a food consumption score difference of 0.948, or 94.8% but not significant in favour of MH. In the second panel of the decomposition, the food consumption score gap is divided into three parts. The first part reflects the average increase in food consumption levels of the FHs if they had the same characteristics as the MHs. The increment of 4.310 in our case indicates that the differences in endowments between FHs and MHs account for about one-third of the food consumption score and that the difference in endowments explains most of the difference in outcomes; i.e., the food consumption score between MHs and FHs. The second term quantifies the change in the FH food consumption score when applying the MH coefficients to women's characteristics. The third part is the interaction term that measures the simultaneous effect of differences in endowments and coefficients between the two groups.

In more detail, the results show the extent to which differences in individual variables contribute to the overall explained food insecurity gap. In our analysis, the estimates point out that demographic variables such as household size, single and widow status, and rural area as place of residence primarily explain the food insecurity gap between MH and FH in Côte d'Ivoire. In other words, our results in the context of Côte d'Ivoire pinpoint that the variables that significantly affect the food consumption gap between MH and FH are household size, widow status, single status, and area of residence.

Indeed, household size positively affects the food insecurity gap between MH and FH because larger female-headed households are more exposed to food insecurity due to their greater need for food and financial resources. It is important to note that this type of social scenario occurs in the event of the death of the male head of the household, who ultimately leaves all the family's social burdens to his wife, who is now struggling to provide for the family. These results are consistent with those of Asefach and Nigatu (2007), Aido et al (2013) and Muhoyi et al (2014), who note in their work that household size negatively influences the level of food security but positively influences the level of household food insecurity due to increase in the number of dependency ratios in the household, among other things.

Unsurprisingly, our results emphasize that widowed female household heads have a low level of food consumption compared to men because they are subject to the constraints of customs and all other forms of stereotypes that restrict women's productive capacities and prevent them from fully expressing their productive potential. The single status of female household heads also positively affects this food consumption gap, as single women are more vulnerable due to the scarcity of resources and the challenge for them to find properly paid jobs, in addition to the significant fixed current expenses they face (house, energy bill, schooling, health, etc). These results are consistent with Broussard (2019), who finds that gender differences in household income, education, and social networks explain much of the gender gap in food insecurity.

Education is equally important in this context. Smith and Haddad (2000), who conducted extensive research on the role women play in ensuring food and nutrition security for other household members, found that improvements in women's education contributed to 43% of the reduction in child malnutrition that occurred between 1970 and 1995. Sraboni et al (2014) show that households with an autonomous wife have greater level of calories intake availability and dietary diversity, but that she prioritizes to ensure household food security at the expense of her own food situation. In our case, the food consumption gap between MH and FH is not influenced by education. These results could be likened to those of David (2013), who found that education level was not a significant determinant of food security even among rural low-income families.

Finally, the rural environment as place of residence explains the gap in food consumption between FHs and MHs. In fact, with their higher average age, female household heads residing in rural areas have less physical strength to exploit arable land and are content to grow only food crops instead of cash crops, which have higher incomes and financial returns, unlike male household heads who tend to focus more on cash crops that are more profitable. These findings are relatively consistent with the results of Akinsanmi and Doppler (2005), who point out that rural female household heads in southeastern Nigeria were poorer and more vulnerable to food insecurity than their male counterparts. They were poorer than men were and had turned to agriculture and livestock with casual farm labour as their main source of income.

Table 2 shows that, first, the endowment effect has a positive sign in contrast to the coefficient effects and the interaction effects, which have a negative sign. The endowment effect (i.e. the proportion of the gap in food consumption between MHs and FHs due to observed level differences between men and women) accounts for 4.310 of the gender gap in favour of FHs; while the coefficients effect (i.e. the share of the gender gap attributable to the benefits associated with the observed elements) accounts for a share of 3.212 of the magnitude of the gap in favour of MHs. Moreover, this difference is significant.

In addition, Table 3 shows that interaction disadvantages related to the benefits of the observed elements for women explain a 2.045 share of the differences in food consumption levels. Thus, before designing policy interventions to reduce or close this gap (currently in favour of MHs), emphasis should be placed on identifying and understanding the fundamental sources of disadvantages for women in the quest for household food security. The last part of Table 3 presents a detailed breakdown of the 3 sources of gender gaps.

It is possible to determine the contribution of each component to the gap due to endowments, coefficients, and interactions. The gap due to endowments is essentially explained by rural area as place of residence (0.181), household size (1.003), single status (2.538), and widow status (0.568). In terms of the gap related to coefficients, it is essentially the household size that explains the gap between the FH and the MH.

6. Conclusion and policy implications

Conclusion

The purpose of this study is to explain the food consumption gap between male-headed households (MHs) and female-headed households (FHs) in Côte d'Ivoire. To do so, we used the Blinder-Oaxaca decomposition to find explanations for the food insecurity gaps between male-headed and female-headed groups of households. The model constructed took into account the food consumption score, and socio-economic and demographic variables or factors.

The decomposition of the sources of food insecurity differences between men and women in Côte d'Ivoire reveals four main results. Demographic variables such as household size, single and widow status, and rural area as place of residence primarily explain the food insecurity gap between MHs and FHs in Côte d'Ivoire. In addition, the decomposition of the sources of food insecurity differences between men and women in Côte d'Ivoire found that female-headed households have more housing facilities, on average, but remain relatively older than MHs. In addition, this situation is accentuated for single and/or widowed female household heads, further increasing their food vulnerability.

Finally, it appears that rural environment as place of residence explains the gap in food consumption between FHs and MHs. In fact, with an older average age, female household heads residing in rural areas have less physical strength to exploit their land and are content to grow only food crops instead of cash crops, which have higher incomes and financial returns.

These results are robust in the sense that they affirm our suspicions that the determinants are primarily financial and economic. This study rightly reveals that the causes of the gaps in food consumption between MHs and FHs are to be found in social factors linked to the multiple stereotypes, of which women household heads are victims. Thus, strengthening and improving legal and economic provisions in favour of women's well-being could help guarantee household food security in Côte d'Ivoire.

Policy implications

The analysis carried out previously showed that the determinants or causes of the gaps in food consumption between MHs and FHs are not to be found in the financial and economic factors of the households, but rather in socio-demographic factors linked to the multiple stereotypes of which women household heads are victims.

Indeed, factors such as household size, area of residence, and marital status (single and widowed) among household heads are the main factors explaining the food insecurity gap between male and female household heads.

Such results have policy implications. Like several other empirical studies, our analysis suggests that while income differences between FHs and MHs induced by differences in educational attainment, employment status, and household size explain the observed gender gap in food insecurity, it suggests furthermore that the causes are related to factors such as single and widowed status.

The analysis suggests that policies aimed at empowering women, protecting and assisting vulnerable women, family planning, and reducing spatial disparities can have important implications for improving the food resilience of households in Côte d'Ivoire, particularly those headed by women.

Indeed, eliminating gender inequalities in food insecurity in Côte d'Ivoire would ensure a healthy, quality food situation for female-headed households by improving their social well-being. To achieve this, decision-makers must take the necessary measures to improve and guarantee women's access to all types of productive resources on the same basis as men. First, as inspired by this study, cash transfer programmes for vulnerable women would significantly reduce the food consumption gap between male and female household heads. Contextually, in Côte d'Ivoire, customs and other forms of stereotypes still restrict women's productive capacities and prevent them from fully expressing their potential. Therefore, improving land tenure systems and addressing inequitable laws and resource access constraints are essential if we are to target gender inequality in productivity and income. Thus, strengthening and improving legal and economic provisions for women's welfare could help ensure household food security in Côte d'Ivoire.

Secondly, equal opportunities and income in the labour market should be diligently addressed in favour of women (see descriptive statistics). Women household heads have relatively low earnings from their main activity compared to men and work more in the informal sector, which is characterized by low value-addition activities. These stylized facts are associated with the household constraints and force them to restrict their choice of professional opportunities in favour of family welfare. Thus, policy measures are needed to encourage more women to occupy decision-making positions and to improve both their educational level and their professional qualifications. This would allow them to exercise their professional activity, like their husbands. Therefore, in the event of their husband's death, women who become household heads will easily be able to cover the usual household expenses.

The size of the household is also one of the important factors with regard to gap in food consumption between FHs and MHs. That said, the national health system should communicate sufficiently on the promotion of family planning to encourage households to control their births and optimize the resources available to the household. This could lead to an average reduction in household size and move towards sustainable household food security.

Notes

- 1 National Agricultural Investment Programme.
- 2 Analysis of the nutritional situation in Côte d'Ivoire, Report, July 2015.
- 3 UNDP. 2016. Human Development Report
- 4 World Bank. 2015. State of the National Education System Report (RESEN). Côte d'Ivoire.

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Annex

Annex 1: Foods used to calculate the food consumption score

Food types	Food types	Weight	Rationale
Maize, millet, sorghum, rice, bread/doughnuts, pasta	Cereals and tubers	2	High in energy, contains low and lower quality protein (lower protein to energy ratio) than vegetables, micronutrients (inhibited by the presence of phytates)
Cassava, yams, plantain, other tubers			
Peanuts/legumes (beans, cowpeas, peas, lentils, etc)	Pulse crops	3	High in energy, high in protein but lower in quality than animal products, micronutrients (inhibited by the presence of phytates), low in fat
Vegetables (+ leaves)	Vegetables and leaves	1	Low in energy and protein, no fat, rich in micro-nutrients
Fruits (mangoes, oranges, bananas, etc)	Fruits	1	Low in energy and protein, no fat, rich in micro-nutrients
Meat, fish, seafood, snails, eggs	Animal proteins	4	Rich in good quality protein, easily absorbed micronutrients (no phytates), energy-dense, high in fat. Even consumed in small quantities, the improvement in the diet is significant
Milk/dairy products	Dairy products	4	Rich in good quality proteins, micronutrients, vitamin A, energy. However, milk can be consumed in small quantities and should be considered as a condiment, which requires a reclassification in some cases
Sugar, honey, other sweets	Sugars	0.5	High in empty calories. Normally consumed in small quantities
Oils and fats	Oils	0.5	High in energy but low in micronutrients. Normally consumed in small quantities



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To strengthen local capacity for conducting independent, rigorous inquiry into the problems facing the management of economies in sub-Saharan Africa.

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African Economic Research Consortium
Consortium pour la Recherche Economique en Afrique
Middle East Bank Towers,
3rd Floor, Jakaya Kikwete Road
Nairobi 00200, Kenya
Tel: +254 (0) 20 273 4150
communications@aercafrica.org