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# Factors Associated with Stunted Growth of Children Aged 0-59 Months in Households in Western Cote d'Ivoire in the Health District of Man Case of the Rural Health Center (CSR) of Dainé 1

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***Abstract***

*Child malnutrition in the Dainé I health area, located in the Montagnes district (Man health district), remains a major issue, particularly among children aged 0 to 59 months, who exhibit growth delays. This study aimed to identify the social factors explaining this malnutrition, despite various state initiatives and development partners in the region. It focused on the growth delays of children in this age group, a field that has been underexplored in the western region of Côte d'Ivoire. A survey was conducted with 150 households, involving semi-structured interviews with household heads, healthcare personnel, and local authorities responsible for the implementation of the national nutrition policy. The methodological approach used was mixed, combining qualitative and quantitative methods. The results showed that the low level of knowledge and attitudes of households, influenced by environmental and cultural factors, are major obstacles to combating child malnutrition in this rural area.*

***Keywords:*** *Malnutrition - Knowledge-Attitude - Ivory Coast - Dainé 1*

## Introduction

Malnutrition remains a major problem in Côte d'Ivoire, particularly in the Tonkpi region, where the number of malnourished children has risen considerably in recent years. From 2,243 cases in 2007, the number rose to 3,552 in 2016, recording an annual growth rate of 5.24% [1]. This situation has profound repercussions on human development, affecting not only children's physical growth but also their intellectual development and learning abilities. In addition, malnutrition contributes to the burden of chronic non-communicable diseases, affects work productivity and limits the region's economic and social development.

Malnutrition also has serious consequences for the health of pregnant women, increasing the risk of post-partum haemorrhage due to iron deficiency. Despite the government's efforts, such as the implementation of the National Nutrition Policy in 2016, the National Multisectoral Plan for Nutrition [2], as well as various agricultural and school programs aimed at boosting food security, the situation remains worrying. In 2020, the Tonkpi region had a high prevalence of food insecurity (38%), compared with 27% in 2015 [3]. This finding is all the

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more worrying in the Dainé I health area, where health professionals report persistent signs of malnutrition, despite the preventive actions carried out by the Centre de Santé Rural (CSR).

Initiatives to combat malnutrition carried out by the CSR in 2021, such as reinforcing the training of community health workers (CHWs), raising awareness among young mothers and heads of households, and the twice-yearly distribution of dewormers and vitamin A, have not significantly reduced the number of cases of malnutrition. Indeed, the number of cases remains stable, with 1,096 malnourished children recorded. Visible signs of malnutrition, such as marasmus, acute underweight and discoloration of hair and skin, persist among children aged 0-59 months in this community.

Given this situation, it seems essential to gain a better understanding of the determinants of malnutrition in the Man health district, and more specifically in the Dainé I health area. This study aims to identify the social, economic and cultural factors underlying child malnutrition, as well as to analyze the spatial distribution of this phenomenon in order to formulate recommendations for strengthening nutritional interventions in the Tonkpi region.

## Methodology

The present study was carried out in the Dainé 1 health area in the Man health district in western Côte d'Ivoire, specifically in the Tonkpi region. Several factors militated in favour of the choice of this health area.

The Dainé I health area recorded 4,325 consultations over the last two years, including paediatric consultations, more than 20% of which were related to cases of malnutrition, according to data from the Man Health District.

The study population is made up of households with malnourished children, identified from the 2021-2022 database, as well as households in the same locality with similar living conditions, but no malnourished children.

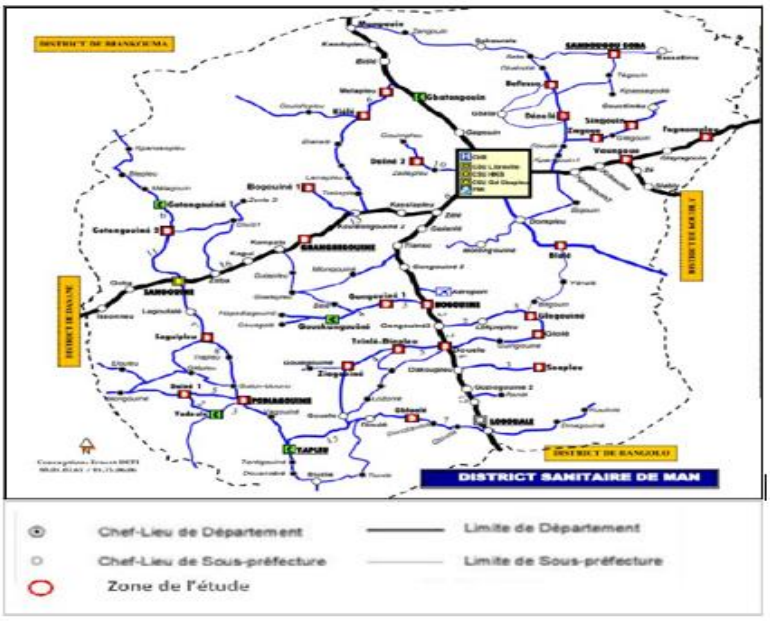


**Figure 1.** Man, Health District Coverage Area

This descriptive and analytical cross-sectional study was conducted over a 10-month period, from June 1, 2023, to March 30, 2024. Its aim was to analyze the determinants of child malnutrition in the Dainé1 health area. The study population included households with at least one malnourished child aged 0-59 months, identified from 2021-2022 data, as well as similar households with no malnourished children. Initially, 252 households were

planned, but logistical constraints, such as the unavailability of some households, reduced the final number to 217. The study compared living conditions and factors associated with malnutrition between the two groups of households. Data was processed and analyzed using SPSS 25 software.

## Results

In our study population, 62.7% of heads of household were female and 37.3% male. The average age of the head of household was around 41 years, and the most dominant age group was between 19 and 39 years, with a percentage of 53.5%. Single heads of household predominate, at 67.3%. As for level of education, only 13.4% of heads of household have secondary education, 34.1% have primary education, and over 52% have no schooling.

Christian religion predominates at 48.8%, followed by Muslim religion at 24.4%, traditional religion at 21.7% and Protestant religion at 5.1%.

As for the place of residence variable, there is a high concentration of people living on the outskirts of Dainé1 who attend the health center (80.2%), while 19.8% of those attending the center live in the Dainé1 coverage zone. In terms of gender, we note a slight predominance of malnourished boys (54.4%) versus girls (45.6%). (Table 1).

**Table 1.** Summary of Household Head Socio-demographic Characteristics

| Variables | Terms | Staff (217) | Percentages % |
|---|---|---|---|
| Sex | Masculine | 81 | 37,3 |
| | Feminine | 136 | 62,7 |
| Age | 19 to 39 years old | 116 | 53,5 |
| | 40 to 59 years old | 80 | 36,9 |
| | 60 to 79 years old | 21 | 9,7 |
| Marital status | Bachelor | 146 | 67,3 |
| | Divorced | 2 | 0,9 |
| | Married | 57 | 26,3 |
| | Widower | 12 | 5,5 |
| Level of education | Literacy | 1 | 0,5 |
| | None | 113 | 52,1 |
| | Primary | 74 | 34,1 |
| | Secondary | 29 | 13,4 |
| Religion | Catholic | 106 | 48,8 |
| | Muslim | 53 | 24,4 |
| | Protestant | 11 | 5,1 |
| | Traditional | 47 | 21,7 |
| Residential setting | Diané1 | 43 | 19,8 |
| | Periphery Dainé 1 | 174 | 80,2 |
| Number of malnourished children under 5 years of age in the household | 0 children | 57 | 26,3 |
| | 1 child | 148 | 68,2 |
| | 2 children | 12 | 5,5 |
| Number of malnourished boys under 5 years of age in the household | 0 children | 130 | 59,9 |
| | 1 child | 82 | 37,8 |
| | 2 children | 5 | 2,3 |

*Source: Dainé malnutrition survey data, January 1, 2024.*

Among the heads of households surveyed on their main source of income, we note that there are no salaried workers, but many farmers with a rate of 71% , traders with a rate of 25.8% and 1.8% with another source of income.

On the question of source of income, our analyses show that 76.5% of heads of household have a monthly income of less than 75,000f, and more than 62% eat only two meals a day. In addition, 50.7% of malnourished children eat only 2 meals a day, although over 40% of malnourished children manage to eat 3 meals a day.

We note that 83.4% of households travel less than 5kms to reach the health center, which shows the proximity of health centers (Table 2).

**Table 2.** Summary of Household Socio-economic Characteristics

| **Variables** | **Terms** | **Staff** | **Percentages %** |
|---|---|---|---|
| Main source of household income | Salaried | 0 | 0 |
| | Peasant | 154 | 71 |
| | Merchant | 56 | 25,8 |
| | Artisan | 4 | 1,8 |
| | Other to be specified | 3 | 1,4 |
| Monthly income | Less than 75000f | 166 | 76,5 |
| | 75000f to 125000f | 49 | 22,6 |
| | 125001f to 175000f | 2 | 0,9 |
| Number of meals consumed/day by the household | 1 meal/day | 7 | 3,2 |
| | 2 meals/day | 135 | 62,2 |
| | 3 meals/day | 75 | 34,6 |
| Number of meals consumed/day by the child from 0 to 59 months | 1 meal/day | 6 | 2,8 |
| | 2 meals/day | 110 | 50,7 |
| | 3 meals/day | 88 | 40,6 |
| | 4 meals/day | 13 | 6 |
| Distance to the health centre | Less than 5 km | 181 | 83,4 |
| | 5 to 15 km | 31 | 14,3 |
| | 16 to 25 km | 4 | 1,8 |
| | More than 25 km | 1 | 0,5 |

*Source: Dainé malnutrition survey data, January 1, 2024.*

Looking at certain health factors that encourage malnutrition, 53.1% of the heads of households surveyed said that malnutrition is encouraged by a lack of access to adequate food, 59.4% said it was due to a lack of hygiene, and 27.5% said it was linked to recurrent illnesses.

Of the 160 households surveyed with at least one malnourished child, 75.6% of heads of household only have access to a varied and balanced diet for their children. In addition, 98.8% of heads of household stated that they had not received any training in preparing a varied and balanced diet, 91.3% stated that they had not received any awareness-raising on good feeding practices for children, and 96.9% testified that they had never taken part in an awareness-raising campaign on malnutrition.

Regarding children's diet, 80.6% of heads of households stated that their children did not benefit from a varied and balanced diet. Paradoxically, not only did 95.6% state that their children were cared for by the Dainé 1 rural health center, but 66.3% also stated that

their children received food supplements or nutritional supplements from the Dainé 1 rural health center (Table 3).

**Table 3.** Health Factors Favoring Child Malnutrition

| **Variable** | **Terms** | **Workforce (n=160)** | **Percentages %** |
|---|---|---|---|
| Lack of access to adequate food | No | 75 | 46,9 |
| | Yes | 85 | 53,1 |
| Lack of hygiene | No | 65 | 40,6 |
| | Yes | 95 | 59,4 |
| Diseases recurrences | No | 116 | 72,5 |
| | Yes | 44 | 27,5 |
| Access to a varied and balanced diet for your child | No | 121 | 75,6 |
| | Yes | 39 | 24,4 |
| Training on the quality of a varied and balanced diet | No | 158 | 98,8 |
| | Yes | 2 | 1,3 |
| Awareness raising on good eating practices for children aged 0 to 59 months | No | 146 | 91,3 |
| | Yes | 14 | 8,8 |
| Already taken part in an awareness campaign on malnutrition | No | 155 | 96,9 |
| | Yes | 5 | 3,1 |
| Access to a varied and balanced diet | No | 129 | 80,6 |
| | Yes | 31 | 19,4 |
| Existence of a national plan to combat malnutrition in your locality | No | 116 | 72,5 |
| | Yes | 44 | 27,5 |
| Care of malnourished children by the rural health centre of Dainé 1 | No | 7 | 4,4 |
| | Yes | 153 | 95,6 |
| The quality of this care | Good | 152 | 95 |
| | Passable | 8 | 5 |
| Level of satisfaction with your child's care | Satisfied | 142 | 88,8 |
| | Very satisfied | 18 | 11,3 |
| Donations of food supplements from the rural health centre of Dainé 1 | No | 106 | 66,3 |
| | Yes | 54 | 33,8 |

*Source : données de l'enquête malnutrition à Dainé 1 janvier 2024.*

At the end of the bivariate analysis, in this case the Chi2 test, we retained 10 out of the 26 variables significantly associated with malnutrition at the 5% threshold to introduce into the multivariate model (binary logistic regression) in order to consider, the interactions.

between the independent variables and the influence of the independent variables on the dependent variable. To achieve this, we use the dependent variable "malnutrition" dichotomized as follows: 0 = No and 1 = Yes.

**NB:** the ten **(**10) variables significantly associated with malnutrition at the 5% threshold retained for the multivariate model come from the different categories of factors in the conceptual framework that we consider the most relevant variables. These are socio-demographic and economic factors, knowledge factors and health factors.

Place of residence is significant with Ref. Hors diaine1 and OR = 0.125, so it influences malnutrition. Indeed, we can say that households living outside diaine1 are 87.5% less likely to have children suffering from malnutrition than those living in diaine1.

Knowledge about the signs of malnutrition is significant with Ref. "Yes" and OR = 44.890, so it influences malnutrition. We therefore say that households who know the signs of malnutrition are 44.890 times more likely to have children suffering from malnutrition than those who don't know the signs of malnutrition.

Access to a varied and balanced diet for the child is significant with Ref. "Yes" (those who have access to a varied and balanced diet for the child) and OR = 0.140, so it influences malnutrition. Hence, we say that heads of households who have access to a varied and balanced diet for the child have 86% less risk that their children will suffer from malnutrition compared with those who do not have access to a varied and balanced diet (Table 4).

**Table 4.** Binary Logistic Regression

| **Variables/modalities** | **P-value** | **GOLD** | **95% confidence interval for EXP(B)** | |
|---|---|---|---|---|
| | | | **Inferior** | **Upper** |
| Marital status | Ns | | | |
| Bachelor | 0,78 | Ref. | | |
| Married | 0,325 | 0,366 | 0,05 | 2,707 |
| Divorced | 0,999 | 1E+08 | 0 | |
| Widower | 0,831 | 1,273 | 0,139 | 11,65 |
| Level of education of the head of household | Ns | | | |
| Not in school | 0,501 | Ref. | | |
| Alphabetize | 1 | 3E+09 | 0 | |
| Primary | 0,141 | 2,409 | 0,746 | 7,778 |
| Secondary | 0,367 | 2,225 | 0,391 | 12,645 |
| Religion of the head of household | Ns | | | |
| Christian | 0,57 | Ref. | | |
| Muslim | 0,563 | 0,563 | 0,08 | 3,942 |
| Protestant | 0,211 | 9,032 | 0,287 | 284,367 |
| Traditional | 0,887 | 1,096 | 0,312 | 3,846 |
| Residential setting | ** | | | |
| Diaine1 | | Ref. | | |
| Excluding diaine1 | 0,042 | 0,125 | 0,017 | 0,931 |
| Meat | Ns | | | |
| No | | Ref. | | |
| Yes | 0,659 | 0,674 | 0,116 | 3,897 |
| Vegetables | Ns | | | |
| No | | Ref. | | |
| Yes | 0,107 | 0,346 | 0,095 | 1,259 |
| benefited from Dainé 1 food support programs | Ns | | | |
| No | | | | |

| | | | | |
|---|---|---|---|---|
| Yes | 0,107 | 17,653 | 1,927 | 161,721 |
| benefited from Dainé 1 awareness | Ns | | | |
| No | | Ref. | | |
| Yes | 0,804 | 1,431 | 0,084 | 24,283 |
| Do you know the signs of malnutrition | *** | | | |
| No | | Ref. | | |
| Yes | 0 | 44,89 | 7,99 | 252,199 |
| Access to a varied and balanced diet for the child | *** | | | |
| No | | Ref. | | |
| Yes | 0,005 | 0,14 | 0,036 | 0,55 |
| Constant | 0,816 | 1,304 | | |

*Source: Dainé malnutrition survey data, January 1, 2024.*

*Legend: * = 10%; ** = 5%; *** = 1% Ns = not significant and Ref. = reference modality.*

## Discussion

In this section, we discuss the results obtained in our study with those of other authors who have worked in the same field, to draw the following conclusions.

### Socio-demographic and Socio-economic Characteristics of Households

The analysis of malnutrition cannot be complete without considering the socio-demographic and socio-economic characteristics of household heads. Several researcher-led studies have examined these factors and provided empirical data on their relationship with malnutrition write [4]. Our study also reveals that household socio-demographic and socio- economic characteristics are essential in the analysis of malnutrition in children. With this in mind, [5] analyzed that social and economic factors are associated with childhood malnutrition in 36 low- and middle-income countries. They found that malnutrition was more prevalent among children from families with low levels of maternal education, low income, low socio-economic status and rural households. Furthermore, in a study published in 2013 by [6], it concluded that factors such as maternal education, socio-economic status, access to health and nutrition services, as well as the availability of food resources, were all linked to the prevalence of malnutrition [6]. In addition, socio-economic and demographic factors associated with malnutrition in children in developing countries are also analyzed by [7]. The results of this analysis highlighted that variables such as maternal education, household income, parental employment status and household size were all linked to child malnutrition [7, 8] also examined the links between child malnutrition and the socio-economic characteristics of households in Ethiopia. The results showed that socio-economic status, measured by indicators such as parental education, household head income and economic assets, was strongly associated with child malnutrition. This study corroborates our own, which also indicates an association between socio-demographic and socio-economic household characteristics.

### Household Knowledge of Child Malnutrition

Household heads' knowledge of child malnutrition is a crucial element in preventing and combating this public health problem.

Indeed, household heads' knowledge of child malnutrition is an essential factor in effectively preventing, diagnosing and treating this health problem. Adequate knowledge enables parents and caregivers to make informed decisions about diet, health care and hygiene practices, which can have a significant impact on preventing malnutrition [9]. Studies conducted by researchers have examined the level of knowledge of household heads about malnutrition and provided empirical data to support this question. The question of household knowledge of child malnutrition is intrinsically linked to mothers' knowledge of the factors associated with malnutrition. Indeed, [10] assessed mothers' knowledge of the causes of child malnutrition in Bangladesh. They revealed that only 38% of mothers had adequate knowledge of the causes of malnutrition, while the majority had limited or incorrect knowledge. These results underline the importance of improving mothers' awareness and education about the causes of malnutrition [10]. This indicates that mothers' knowledge of the causes or signs of malnutrition is a variable associated with the phenomenon.

Joining Semba and colleagues, Bhandari and allies also argued after a study in Nepal that only 27% of mothers were able to correctly recognize the signs of malnutrition. This poor knowledge of the signs of malnutrition can lead to delays in the detection and treatment of malnutrition [11]. These analyses corroborate our study, as they show that the variable is significantly associated and that knowledge gaps remain.

## Household Attitudes towards Malnutrition and Cultural Factors Favoring Malnutrition

Household heads' attitudes towards malnutrition and the cultural factors that encourage malnutrition are important aspects to consider in understanding and combating this public health problem. Our study reveals an association between the attitudes of households towards malnutrition. This situation has been confirmed by a number of researchers. Indeed, [12], estimated that 60% of household heads considered malnourished children to be "naturally weak" or "predestined", which can lead to a passive acceptance of malnutrition rather than an active search for solutions. In addition, cultural beliefs can influence household food choices and contribute to malnutrition. [13] has shown that certain cultural practices, such as the avoidance of nutritious foods during pregnancy or breastfeeding, can increase the risk of malnutrition in mothers and children.

There is another, no less important factor to consider. Traditional dietary practices can play a role in malnutrition. A recent study [14] revealed that certain cultural practices, such as the early introduction of solid foods or the excessive use of weaning tea, can contribute to infant malnutrition.

## Health Factors Contributing to Child Malnutrition

Health factors play an important role in child malnutrition. Several studies have examined these factors and provided empirical evidence to support this question. [7] showed that limited access to health services, including antenatal care services, immunization programs and malnutrition screening services, was associated with a higher prevalence of malnutrition in children, corroborating our research. According to this study, around 41% of children under the age of five in low-income countries did not have access to adequate healthcare services, as our study also indicated. Infections such as acute respiratory infections, diarrhea and parasitic infections can contribute to malnutrition in children. [15] showed that the prevalence of malnutrition was significantly higher in children suffering from frequent infections. Furthermore, in this study, around 52% of malnourished children showed symptoms of infection, compared with only 30% of well-nourished children. Malnutrition

in children is often multifactorial, resulting from the interaction of several causes. The most common causes include insufficient quantity and quality of food, limited access to nutritious food, recurrent infections, inappropriate feeding practices, unfavorable socio-economic factors, natural disasters and armed conflict. These causes may vary according to the geographical and socio-cultural contexts outlined above.

Management of malnutrition is a crucial issue in the fight against this global scourge. Empirical studies have shown that appropriate interventions can significantly improve the nutritional status of affected children. According to [16], improved nutrition in early childhood can lead to a 20% increase in adult income, helping to reduce poverty. In terms of nutritional rehabilitation, evidence suggests that the use of ready-to-use therapeutic milk-based nutritional rehabilitation therapy (RUTF) can reduce mortality rates by 50% in children suffering from severe acute malnutrition [17]. In terms of long-term follow-up and support, studies have shown that follow-up and family support interventions, including nutrition counseling and health education programs, can help maintain healthy feeding practices and prevent the recurrence of malnutrition [18]. Finally, strengthened health systems and political commitment are essential

to ensure the sustainability and scalability of malnutrition management programs [19]. This research corroborates the findings of our study and thus supports the argument that the issue of malnutrition should be of greater concern to political and financial decision-makers.

In short, tackling malnutrition requires a comprehensive, multidimensional approach, including evidence-based interventions and strong political commitment. Investments in nutrition can generate significant returns, both economically and in terms of the health and well-being of the children affected.

## Conclusion

The study carried out on "Factors associated with stunted growth in children aged 0-59 months within households in western Côte d'Ivoire, in the Man health district, case of the Dainé 1 rural health center (CSR)" highlighted several determining factors in child malnutrition in this region. The main hypothesis, that household knowledge and attitudes, as well as environmental and cultural factors, are associated with child malnutrition, was confirmed.

The results show that several variables are significantly related to child malnutrition, including the marital status of the head of household, level of education, dietary practices (meat and vegetable consumption), knowledge of the signs of malnutrition, recurrent illnesses and access to nutritional support and awareness programs. Children benefiting from nutritional care and food support programs showed reduced rates of malnutrition. The study also revealed that socio-economic factors, such as limited access to a varied and balanced diet, are major determinants of stunting in children.

## Study Limitations

The study was limited by the unavailability of certain households and the lack of funds for data collection.

## Conflict of Interest

All authors and co-authors declare that they have no conflict of interest in the work submitted.

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