

## The Diet of The People of Ngali II: What Role Does it Play on Malaria Morbidity?

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### ABSTRACT

Ngali II is a malaria-infested area, situated at about 30km from Yaounde. We carried out a survey of the diet of the people collected the dishes consumed and determined their nutritive value with emphasis on the content in the micronutrients which have an effect on the development of malaria. The results are analysed by comparing the observed micronutrient values with the recommended values with emphasis on those micronutrients whose role in the evolution of infection by *Plasmodium falciparum* has been previously demonstrated. We are also aimed at looking at the correlations between the ingestion of micronutrients and parasitemia by *Plasmodium falciparum*. Only the results of the survey and contents in minerals (Iron, Zinc, Copper and Magnesium) are presented in this part of the work.

**Key words:** Micronutrients, Cooked foods, Malaria, *Plasmodium falciparum*, Food composition table.

### RÉSUMÉ

NGALI II est une zone endémique au paludisme, située à une trentaine de kilomètres de Yaoundé. Nous avons mené une enquête alimentaire dans cette localité, collecté les aliments consommés et déterminer leur valeur nutritive en insistant sur les teneurs en micronutriments ayant un effet sur le développement du paludisme. L'analyse des résultats est faite par comparaison des apports réels en micronutriments avec les apports recommandés, avec insistance sur les micronutriments dont le rôle dans l'évolution de l'infection à *Plasmodium falciparum* a déjà été démontré dans la littérature. Les corrélations entre l'ingestion des micronutriments et la parasitémie à *Plasmodium falciparum* sont aussi recherchées. Seuls les résultats de l'enquête et les teneurs en minéraux (Fer, Zinc, Cuivre et Magnésium) sont présentés dans la présente partie.

## INTRODUCTION

Malaria is an illness caused by hematozoans of the genus *Plasmodium* (UNDP, World Bank, WHO, 1999). It kills between 1.1 and 2.7 million people in the World each year.

In the strategic plan of the fight against malaria published in March 2002 by the Minister of Public Health, malaria is the first cause of mortality and morbidity in Cameroon.

Several factors such as resistance to antimalarial drugs and the ecological conditions favourable for the development of the vector make the eradication strategy difficult. The people are therefore forced to live with malaria.

It is well known that the nutritional state of an individual particularly his micronutrient state influences the development of infection.

In fact, previous research shows that a deficiency in vitamin E reduce the parasitemia of *Plasmodium falciparum* (Levander and Alger, 1993). The deficiency of iron also does so (Shankar et al., 2000). while a deficiency in zinc and vitamin A increases this parasitemia (Shankar et al., 1997; 1999; 2000). It is due to these observations that this work has its objectives:

## OBJECTIVES

### General objectives

To determine the contents in the minerals that have an effect on the development of malaria in the foods

consumed by people living in an area that is highly infested by malaria.

### Specific objectives

- To carry out a survey on the methods of cooking and consumption in the area of study.
- To collect the dishes consumed and determine their content in the minerals which play a role in the evolution of malaria.

## I - MATERIALS AND METHODS

### I-1 Survey and Collection of Samples

Fifty families were chosen at random from the area of study ( Ngali II) which is a malaria infested area situated at about 30 Km from the Yaounde city. Unpublished works by ICIDR malaria project showed a malaria prevalence of 57.2% in 1998 and 52% in 2002 in this region. The collected foods were stored in a freezer at  $-18^{\circ}\text{C}$  until the time of analysis. In all cases the moisture content was determined on unfrozen fresh samples.

### I-2 Methods of Analysis

The moisture content was determined by oven drying at  $103^{\circ}\text{C}$  until constant weight. (AOAC, 1980),

Minerals (Iron, Magnesium, Zinc, Copper) by Atomic Absorption Spectrophotometry (Novozamsky et al., 1983),

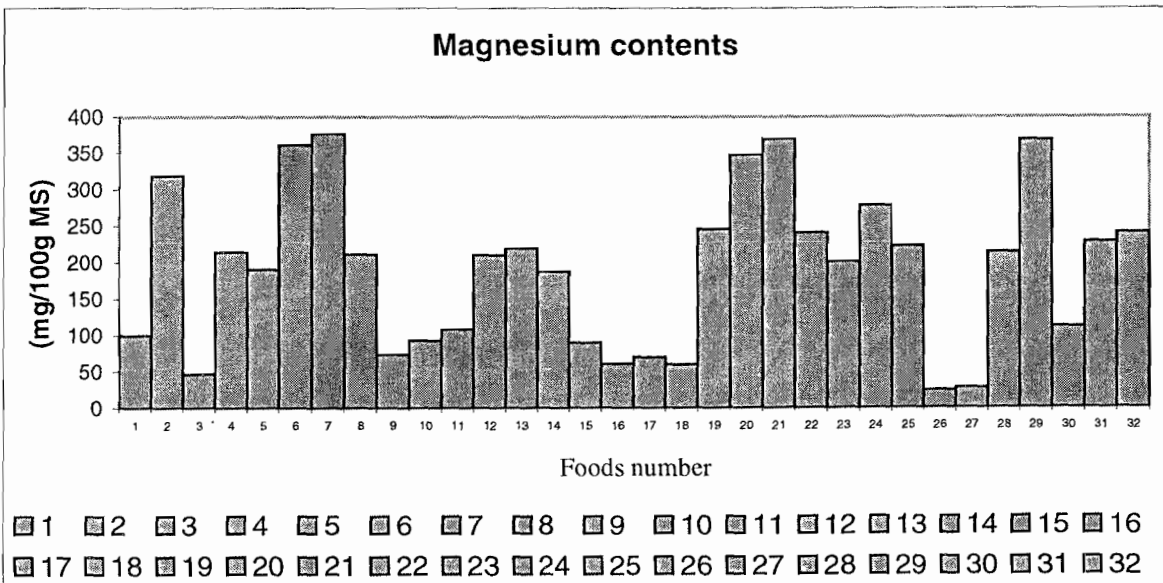
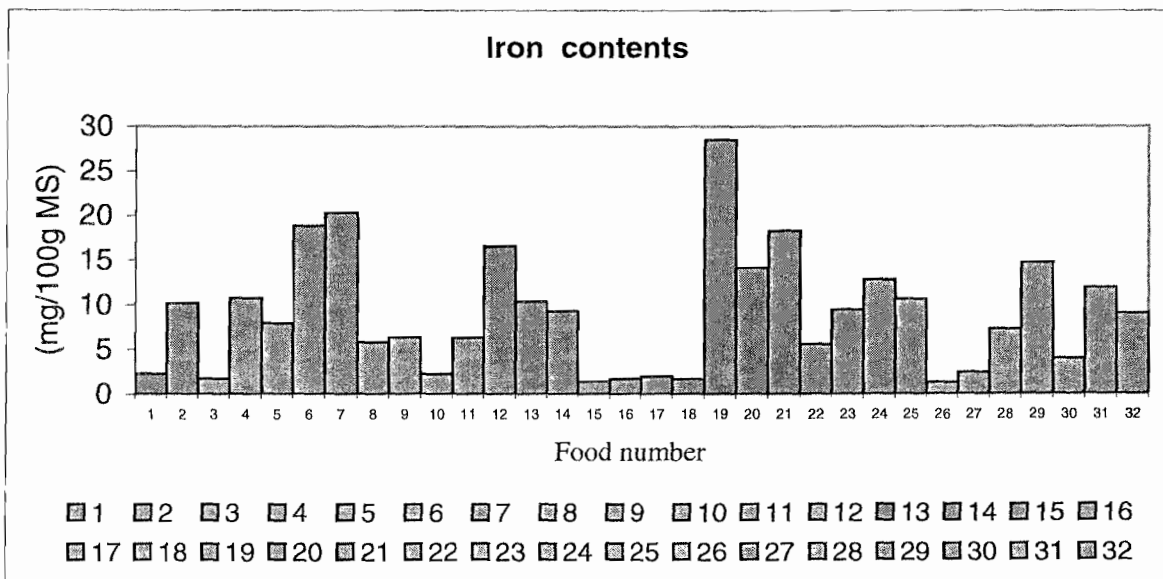
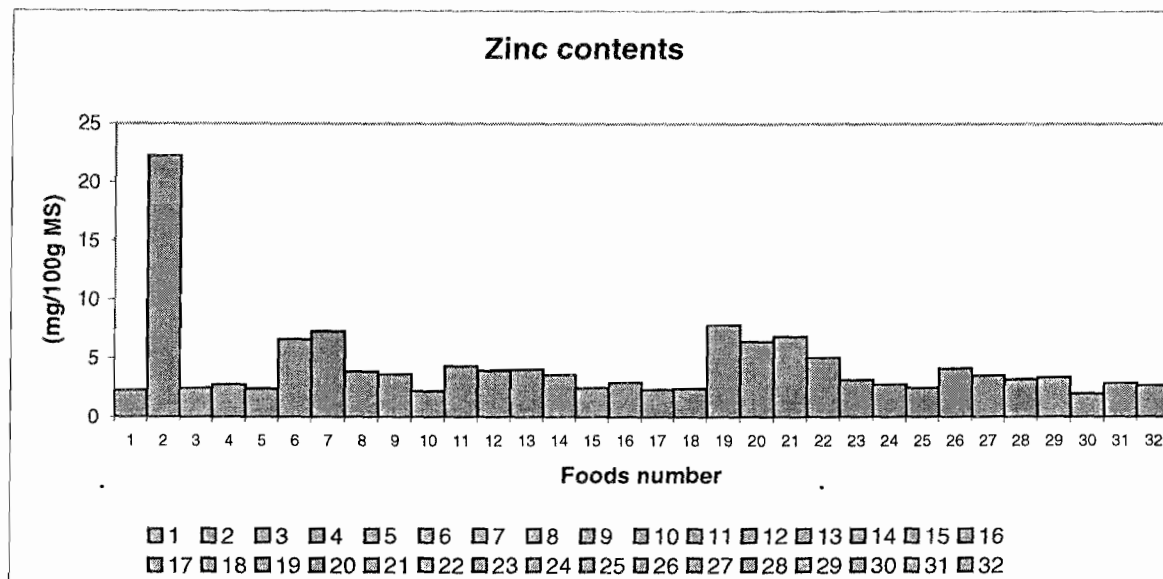
Statistical Analysis was using the software SPSS, version 7.5.

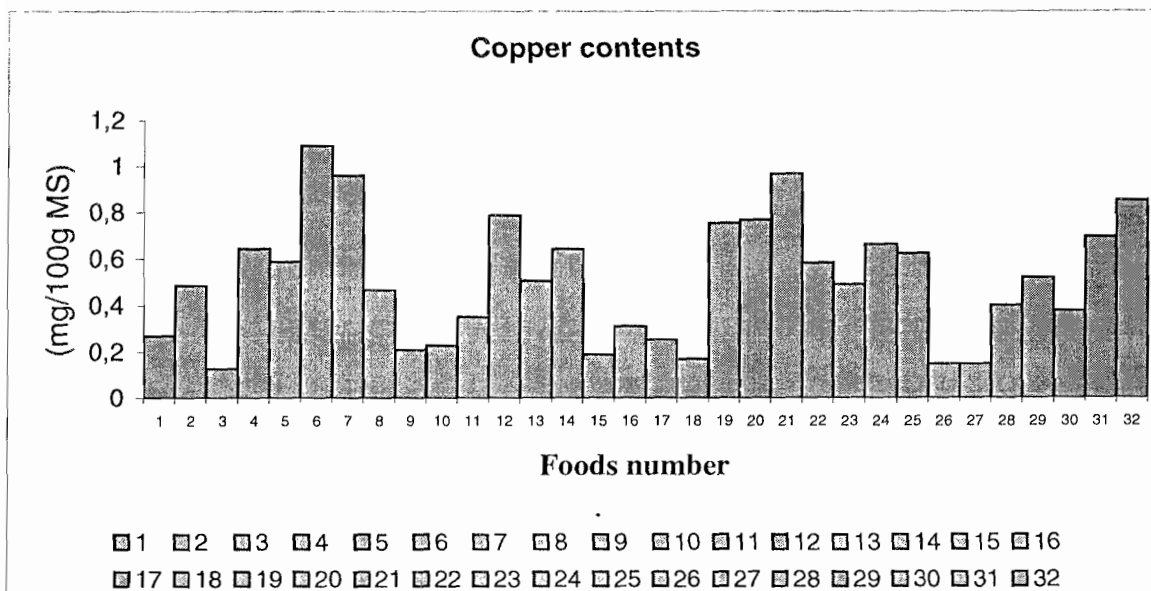
Table: II-1 Result of survey

## Lists of foods presently consumed in Ngali II

Vernacular name in "éton"	Mains ingredients	Scientific name of mains ingredients	Foods number
"Condres"	Bananas + groundnuts+palm oil	<i>Musa sp.</i> <i>arachis hypogea</i>	1
"Coucouma"	Leaves of amaranthus+ groundnuts +palm oil	<i>Amaranthus hybridus</i>	2
"Ebobolo"	Cassava tuber	<i>Manihot esculenta</i>	3
"Etondo non salé"	Leaves of garde eggs + groundnuts+ palm nut juice without salt	<i>Solanum macrocarpum</i>	4
"Etondo salé"	Leaves of garde eggs + groundnuts + palm nut juice	<i>Solanum macrocarpum</i>	5
"Fian Ngon"	Large egusi seeds+ palm oil	<i>Curcumeropsis mannii</i>	6
"Fian Ongoulidik"	Small egusi seeds+ palm oil		7
"Fian Owondo"	Groundnuts + palm oil	<i>Arachis hypogea</i>	8
"Fian tomate"	Tomatos + palm oil	<i>Lycopersicum esculentum</i>	9
"Ikouan"	Plantains	<i>Musa sp.</i>	10
"Kon"	Beans + palm oil	<i>Phaeolus vulgaris</i>	11
"Kwemp non salé"	Cassava leaves+ palm nut juice without salt	<i>Manihot utilisima</i>	12
"Kwemp salé"	Cassava leaves + groundnuts + palm oil	<i>Manihot utilisima</i>	13
"Lombo"	Leaves of macabo + groundnuts+ palm oil	<i>Xanthosoma sp.</i>	14
"Mbou"	Cassava tuber	<i>Manihot esculenta</i>	15
"Mebanga"	Macabo tuber	<i>Xanthosoma sp.</i>	16
"Mebuna"	Sweet potatoes tuber	<i>Ipomea batatas</i>	17
"Mendjana Mebanga"	Macabo tuber	<i>Xanthosoma sp.</i>	18
"Midjem"	Leaves of Pumping. +groundnuts +palm oil	<i>Cucunus sp.</i>	19
"Nnam Ngon"	Large egusi seeds	<i>Curcumeropsis mannii</i>	20
"Nnam Ongoulidik"	Small egusi seeds		21
Nnam Owondo""	Groundnut	<i>Arachis hypogea</i>	22
"Nnem salé"	Leaves of queliquelin+ groundnuts + palm oil	<i>Corchorus olitorius</i>	23
"Nnem non salé"	Leaves of okro + palm nut juice + groundnuts without salt	<i>Hibiscus esculentus</i>	24
"Okok"	Leaves of <i>Gnetum</i> + groundnuts + palm nut juice.	<i>Gnetum africanum</i>	25
"Oles"	Rice	<i>Oryza sativa</i>	26
"Oles"	Rice+ palm oil.	<i>Oryza sativa</i>	27
"Pes"	Groundnut + Okro + paml oil	<i>Arachis hypogea</i> + <i>Hibiscus esculentus</i>	28
"Salad"	"Water leave"+ groundnuts + palm oil.	<i>Talinum fruticosum</i>	29
"Sanga"	Cassava leaves + fresh maize grains+ palm nut juice	<i>Zea mays</i>	30
"Zom salé"	Leaves of "Zom non amer". groundnuts +palm oil.	<i>Solanum nigrum</i>	31
"Zom non salé"	Leaves of "Zom amer"+ groundnuts + juice of palm nut without salt	<i>Solanum aethiopicum</i>	32

Fig. II-1 Results of analysis





**II- RESULTS AND DISCUSSIONS**

The results of the survey show that the foods consumed are made up of several leafy vegetables, leguminous seeds and Cucurbitaceae, pastes prepared with leguminous seeds and egusi seeds, tubers, cereals and plantains. The consumption of foods of animal origin is scarce. In fact, the people live mostly on plant products. Their standard of living is too low for them to easily buy meat and fish.

Statistical analysis of the results by the SPSS software version 7.5 shows a significant difference between the minerals contents of the foods analysed. The chemical composition of a dish depends on the ingredients used and also on the cooking methods.

The consumption of foods prepared with leaves of *Amaranthus*, "Coucouma", is beneficial due to its high content in Zinc, which is a micronutrient which takes part in the good functioning of the Immune System and consequently protects the body from malaria attacks (Shankar *et al.*, 1997 and 2000).

The consumption of foods prepared with leaves of pumpkin, "Midjem", is unadvisable during an attack by malaria, for this dish is rich in iron and this mineral exacerbates malaria, when it is consumed in excess (Shankar *et al.*, 2000).

**IV- CONCLUSION AND PROSPECTS FOR FURTHER RESEARCH**

This preliminary study enables us to sample cooked foods consumed by people living in a malaria-infested area and to determine the minerals that influence the development of malaria. This work has therefore enabled us to document the food composition for this area.

tion for this area.

Further research could be conducted to determine the phytates that can disturb the absorption of minerals in order to better evaluate their bioavailability; the rest of the micronutrients which also have an effect on the development of malaria fever (vitamine A and vitamine E); the quantity of food consumed daily by these people in order to determine the levels of micronutrients consumed each day and to establish correlations between these micronutrient values and data available on parasitemia for these people. Such a study could bring out nutritional advice for the management of the malaria in this region.

**ACKNOWLEDGEMENTS**

We are very grateful to all those who helped in the realisation of this work especially the people of Ngali II for their cooperation in sample collection and to Mrs Achu Mercy Bih for translating the work into English.

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