



Review Article

Update of the nutritional situation in the Benin Republic

Waliou Amoussa Hounkpatin^{1*}, Carmelle Mizehoun-Adissoda², Jaurès Lokonon¹, Ulbad Polycarpe Tougan³, Jean Luc Satchi Gbondje¹, Gloria Padonou¹, Andréa Houindote⁴, Sam Bodjrenou¹

1. Ecole de Nutrition et des Sciences et Technologies Alimentaires (ENSTA)/Faculté des Sciences Agronomiques (FSA)/ Université d'Abomey-calavi (UAC), Republic of Benin

2. Ecole de Nutrition et Diététique/ Faculté des Sciences de la Santé, Université d'Abomey-calavi (UAC), Republic of Benin

3. Open Distance Training Programs (FOAD) in Agronomical Sciences of the University of Parakou, Republic of Benin

4. Secrétariat Permanent du Conseil de l'Alimentation et de la Nutrition (SP-CAN)

Abstract

Background: Nutrition is a major determinant of health and an essential factor in the development of countries. Faced with food insecurity and malnutrition, Benin has implemented policies and programs aiming to reduce the progression of this burden. **Aims:** To take inventory of nutritional status and interventions implemented to reduce the prevalence of different forms of malnutrition and food insecurity in Benin. **Methods:** A review of nutritional and food data available at the national level and consultation of intervention management reports was carried out from May to July 2020 and then, the data were compiled and structured. **Results:** Even though Benin has natural resources and remarkable biodiversity, the country faces a double nutritional burden marked by undernutrition: stunting (32%), anemia (71.5%), underweight (17%), wasting (5%) in children under 5 years, exclusive breastfeeding rate (42%) and over-nutrition: obesity (7.4%), diabetes (12.4%) in adults. Food insecurity remains persistent in 9.6% of households and undernourishment concerns 7.4%. The main interventions at the community level are made by the National Integrated School Feeding Program and the Coordinated Early Childhood Nutrition and Development Project. In addition, are the implementation of essential nutrition actions and nutrition-sensitive interventions involving different sectors such as, non-governmental organizations and technical and financial partners. **Conclusion:** Food and nutrition situation in Benin has been slightly improved thanks to the implementation of multisectoral coordination of interventions. Nonetheless, many challenges remain to be addressed, including the scaling up of successful interventions and advocacy for a substantial mobilization of resources in order to achieve global nutrition targets and sustainable development goals.

Keywords: Nutritional status, Diet, Intervention, Benin.

Received: August 23, 2020 / Accepted: January 18, 2021 / Published: January 25, 2021

1 Introduction

1.1 Main information on the socio-demographic situation of the population, the natural and economic resources of the country

Benin is a sub-Saharan African country with 114.763 km² area, bordered to the north by Niger, to the east by Nigeria, to the west by Togo and Burkina Faso and to the south by the Atlantic Ocean (Figure 1). Southern Benin has an equatorial climate with high humidity whereas Centre and Northern have a tropical climate. Annual rainfall varies between 900 mm and 1450 mm of water per year and temperatures range between 22°C and 37°C¹. The internal hydrographic network is rich and consists of rivers, streams and lagoons.

The country benefits from a rich local biodiversity with 2500 to 3000 different species of plants, 187 species of mammals and 630 avian species. There are also several species of fishes, reptiles and invertebrates².

In economic terms, in 2019, the growth rate was estimated at 6.9%, the inflation rate at -0.9%, the budget deficit at -0.5% and the debt ratio at 41.2%³.



Figure 1: The map of Benin (INSAE, 2017-2018)

Benin's population was 10,008,749 habitants in 2013 and estimated at 11,884,127 habitants in 2019, of which about 51% were women ^{4,5}.

Recently, the country passed from low-income economies to lower-middle-income economies ⁶.

1.2 Main stakeholders involved in nutrition and public health landscape

On the back of new evidence at the global level and growing international recognition of the complexity of bringing about successful nutrition policies, the Government demonstrated a strong commitment to multisectoral and stakeholder coordination to address multifaceted challenges underlying nutrition and child growth ameliorations. The Government of Benin republic expressed their commitment when joining the global Scaling Up Nutrition (SUN) movement in 2011 and has taken strong leadership in developing multisectoral policy and actions for nutrition since 2009. A multisectoral policy coordination platform, the Food and Nutrition Council (FNC) and Permanent Secretary (PS-FNC) has been established bringing together different sectors (including agriculture, health, social protection, finance, planning, decentralization, industry sectors, national associations, academia and civil society) under the auspices of the President of the republic to develop and coordinate multi-stakeholder, multi-sectoral nutritional policies and programs for enhanced human development.

Each of these authorities is expected to take action to address nutrition strategically. The PS-FNC is the operational arm of the national structure (FNC) that ensures the multisectoral coordination of food and nutrition policies and programs. This is a new paradigm for all sectors and building the capacity of the FNC to effectively coordinate actions horizontally (between sectors) as well as vertically (between levels of administration) is a long but high-priority process.

A municipal Consultation Framework (so-called CCC in French "Cadre de Concertation Communal") is created in the municipalities of Benin to strengthen the coordination of nutrition and child growth promotion service delivery. The CCCs bring together a wide array of actors at the commune level including commune council members, representatives from line ministries at the decentralized level, public service providers, representatives of non-governmental organizations (NGOs) and local associations, and prominent community members, including traditional and religious authorities. Each CCC is housed in and chaired by the Mayor's office, which in turn is assisted by a full-time nutrition focal point. The performance of the CCCs varies according to local leadership but is improving across the board as communes gain experience and receive ongoing technical support from the SP-CAN, the regional authorities, and the National Association of Communes of Benin (ANCB). Key challenges include coordinating a diverse package of quality services and targeting services to the most vulnerable households.

At the community level, the Community Nutritional Support Groups (so-called GAN) form the main channel through which early nutrition and child development services are delivered.

In 2016, the Government of Benin adopted an ambitious reform program called Government Program of Action 2016-2021 (PAG), with a focus on improving human capital development and decentralization. In the PAG, nutrition is a transversal priority. The Program aims to improve the productivity and living conditions of the population, aligning with the 2025 vision for Benin. Human capital development is also a pillar of the new eight-year National Development Program (NDP). The PND sets objectives and targets for human capital development.

1.3 Progress in the achievement of SDG (Sustainable Development Goals), SUN (Scaling-Up Nutrition)

Health and social services have improved but often do not reach the majority of vulnerable women and children and old people. There is not yet a geriatric service nationwide. Maternal mortality fell from 498 (per 100,000 live births) in 1996 ⁷ to 347 in 2014 ⁸. The quality of services to provide a continuum of care for women and children from pregnancy and birth through the early years remains weak. Under-five mortality rate fell from 125 per 1,000 live births in 2006 ⁷ to 115 in 2014 ⁸.

This review aims to update the nutritional situation of the Benin Republic in West Africa.

2 Dietary intake

Quality and quantity of macro and micronutrient intake/food groups

The food consumption model in Benin is mainly based on cereals, roots and tubers. Staple foods are consumed with vegetables (okra, tomato), fats (peanut and palm oil) and seasonings sauces ⁹. Percentages of households consuming each food group are as followed: cereals (98%), roots and tubers (32%), legumes (35%), vegetables (95%), fruits (19%), meats (26%), fish (16%), dairy products (20%), fat (93%), sugar (52%) and condiment and spices (89%). About 90% of households have achieved adequate dietary diversification; however, the consumption of good sources of proteins, vitamin A, Iron, Calcium and Zinc is low notably in poor households ¹⁰. Moreover, the bioavailability of micronutrients is limited by the high presence of polyphenols, phytates and tannins. For example, sorghum which is used as a staple food in Benin, is rich in this class of phenolic compounds. There are also limiting amino acids in starchy foods ¹¹⁻¹³.

As far as vulnerable groups are concerned, complementary foods given to infants and young children include cereal-based porridges and extracts from foods consumed by other members of the household when children get older ¹⁴⁻¹⁶. Only 28% of 6-23 months children achieve the minimum recommended dietary diversification ¹. Energy and macronutrient intakes are globally sufficient whereas, daily intakes of vitamin A and minerals such as iron and zinc are far below recommended nutritional intake ¹⁴⁻¹⁶. This underlies high micronutrients deficiencies rates as well as a high prevalence of stunting in young children ¹³.

Women's diet of childbearing age is also based on cereals with low consumption of animal products and fruits ¹¹. The average daily intakes of energy, protein and iron as shown by a study conducted in seven districts of the Northern Benin and two in the Southern were respectively 7217.25±1954.98 KJ; 55.79±23.99 g and 19.71±14.30mg ¹¹. The proportions of women having met their energy, protein and iron needs were respectively 33%, 72% and 30% ¹¹. In 2019, Gandonou *et al.* found that about half of women failed to reach recommended energy and protein intakes due to economic accessibility and limited physical availability of foods ¹⁷.

Pregnant women situation was addressed by Djossinou ¹⁸ in the districts of Abomey-Calavi and Sô-Ava in Southern Benin. The quality of women's diets was inadequate both before and during pregnancy; the average dietary diversity score was low (about 4 food groups out of 10) and did not change significantly when women are pregnant, whereas energy and nutritional needs increase during pregnancy ¹⁸. Women's dietary intakes of energy, macronutrients and most of minerals and vitamins were higher before conception. Before pregnancy, more than half of the women reached the recommended daily intakes of macronutrients, sodium, vitamin D and B12, compared to less than 50% during pregnancy, except in cases of carbohydrate, sodium and vitamin B12 ¹⁸.

3 Micronutrients deficiencies

Prevalence of Iron, Vitamin A, Vitamin D, Zinc, Iodine

Information on the prevalence of micronutrient deficiencies is scarce in Benin.

a. Iron deficiency

Iron deficiency is more common in Benin. Indeed, anemia is a real public health problem in the country. In 2018, the prevalence of anemia was estimated at 71.5% of children aged 6 to 59 months and 57.7% of women of reproductive age ¹. In the Kalalé district of northern Benin, Alaofè *et al.* found that the overall prevalence of anemia, iron deficiency and Fe-deficiency anemia (IDA) was 47.7, 18.3 and 11.3% respectively in women. Among the children, these prevalence were 82.4, 23.6 and 21.2 % respectively ¹⁹. This reflected a diet low in iron and probably a high incidence of parasitic diseases, in particular malaria.

b. Iodine deficiency

The epidemiological study of the fight against iodine deficiency disorders in Benin reveals that 86% of Beninese households had in 2011 adequately iodized salt, i.e. having an iodine content greater than 15 ppm ²⁰, against 54.5% in 2006 ⁷. This shows an improvement in the iodine status of the population compared to 2006 even if the figures remain slightly below the minimum threshold of 90% retained among criteria for the elimination of Iodine Deficiency Disorder (IDD). However, in 2014 the Benin Multiple Indicator Cluster Survey (MICS) has shown a clear decline compared to the situation in 2011, with only one in three households (38.9%) having adequately iodized salt ⁸. In addition, a study assessing iodine intake in an adult population in the south using 24-hour urine samples showed a median urinary iodine concentration (UIC) of 62.9 µg/L (interquartile range: 40–96.2

µg/L) ²¹, which was fairly low according to WHO criteria. The Beninese therefore remain at risk of IDD, among other goiter, cretinism, dwarfism, reduced fertility and productivity, due to the decrease in the availability and consumption of suitably iodized salt within households.

c. Vitamin A Deficiency (VAD)

The most recent study on vitamin A deficiency (based on serum retinol) at the national level dates back to 1999 and estimated a high prevalence in children aged 12 to 71 months of 64.5% and 82.0%, respectively in the South and the North ²². A study conducted in northern Benin has revealed that VAD was 17.7 % in women and greater than 33.6 % in children ¹⁹. The continued practice of universal vitamin A supplementation (biannual) in children aged 1 to 5 years in the country for several years suggests a decline in Avitaminosis A. Updated data on vitamin A deficiency in young children is needed for the whole country.

d. Zinc deficiency

There are no national data on zinc deficiency in Benin. However, according to estimates from the International Zinc Nutrition Consultative Group (IZiNC), 17% of the population of Benin is at risk of inadequate zinc intake. This estimate, coupled with a high prevalence of stunting among young children, places Benin as a country at "medium" risk of zinc deficiency ²³.

Other micronutrients deficiencies such as Vitamin D, calcium, magnesium would exist within the population, and merit the country carrying out national surveys so that data would be available.

4 Non-communicable diseases (NCD)

Prevalence of Cardiovascular diseases (CVD), Obesity/overweight, Diabetes, Cancers, Metabolic syndrome (Table 1)

Table 1: Prevalence of NCDs and their risk factors in Benin

NCDs	n	Prevalence (%)
HBP (2008)	482	Once a week
HBP (2015)	310	Occasionally
Obesity (2015)	509	Once a day
Overweight (2015)	484	Three times a week
Diabetes (2008)	324	Occasionally
Diabetes (2015)	275	Occasional
Cancer	534	Twice a day
Metabolic syndrome*	403	Twice a day

*Metabolic syndrome in Cotonou and Ouidah

Non-communicable diseases (NCDs) are now a public health problem in Benin. Two national surveys carried out in 2008 ²⁴ and 2015 ²⁵ using the Stepwise approach estimated the extent of the risk factors for these diseases and their evolution over the 2008-2015 period. In addition, hospital data and some population data are available on nutrition-related NCDs.

a. Cardiovascular diseases (CVD)

The main CVDs in Benin are high blood pressure (HBP), stroke, peripheral artery occlusive disease (PAOD) and heart failure (HF).

The prevalence of HBP according to STEPS data decreased from 28.4% (2008) to 25.9% (2015). HBP incidence was estimated at 11.1% in 2013 ²⁶. Stroke' prevalence was 4.6 % ²⁷ and PAOD stood at 3.9% in Cotonou in 2012 ²⁸. According to the IV DHS, HBP was 16% in men (30-64 y) and 13% in women of childbearing age (15-49 y) ¹.

b. Metabolic syndrome

Data published on metabolic syndrome are hospital-based and were collected in subjects with chronic diseases (obesity, arterial hypertension, cardiovascular diseases, diabetes, etc.) with prevalence exceeding 50% ^{9-11, 29-31}. It was significantly higher in women (18.8%) compared to men (9.1%).

c. Obesity / overweight

The prevalence of obesity (BMI ≥ 30 kg/m²) decreased from 9.4% in 2008 ²⁴ to 7.4% in 2015 ²⁵, and that of overweight (BMI ≥ 25 kg/m²) from 29.9% to 23.2%. Obesity was significantly more prevalent in women compared to men. It was also higher by advanced age, in urban residence, department and high socioeconomic status. The prevalence of abdominal obesity (waist circumference ≥ 102 cm in men and 88 cm in women) was 13.9% in 2015 ²⁵. This decrease in obesity could be explained by the awareness-raising efforts led by the National Program to fight against non-communicable diseases (health ministry) on obesity and its risk factors (unbalanced diet and physical activity). The existence of specialized human resources (nutritionists) to support people who want to lose weight is also an important factor.

d. Diabetes

The prevalence of hyperglycemia, the hallmark of diabetes mellitus revealed by a capillary whole blood value ≥ 6.1 mmol / L or ≥ 110 mg / dL, was 1.1% in 2001 then, 2.6% in 2008 and 12.4% in 2015 ^{24,25}. In 2015, the highest prevalence of hyperglycemia (24.8%) was observed in the Borgou department in northern Benin, followed by Littoral (19.2%) and Atlantic (18.5%) in the southern Benin; while the lowest prevalence was observed in Couffo (4.8%) in the southern, Zou (4.4%) and the Plateau (3.6%) in middle Benin ²⁵.

e. Cancers

Little data is available on the frequency of cancers in Benin because of the lack of adequate surveillance system. However, according to the first results of the Cotonou cancer registry covering the 2014 to 2016 period, breast cancer was the most common (22.6 out of 100,000) ³¹. According to Globocan, the national incidence of all cancers combined should reach 8,036 new cases in Benin in 2018. The most frequent cancers are respectively breast (26.5 out of 10,000) followed by prostate (22.9 out of 100,000) ³². Apart data on the main NCDs, excessive sodium intake (11.4g/day) and low potassium intake (1.8 g/day) ³³, insufficient fruit and vegetable consumption (93.1%), insufficient physical activity (84.1%), excessive alcohol consumption (7,6%) and tobacco use (5%) ²⁵ are avoidable risks but present in the Benin' adult population.

5 Special focus on infant and children < 5 y

The prevalence of low birth weight, stunting, wasting and underweight are presented in Table 2.

Table 2: Prevalence of low birth weight, stunting, wasting and underweight for children under 5 y in Benin

Types of malnutrition	Percentage of children	
	Global	Severe form
Lowbirth weight	13%	-
Stunting	32%	11%
Wasting	5%	1%
Underweight	17%	4%

Source : Benin Demographic and Health Survey, 2017-2018

a. Low birth weight

The low birthweight situation in Benin has remained constant; in 2006, the DHS reported 13% low birth weight and in 2014, the MICS survey reported 12.5%, representing 50,000 low birth weight babies out of 400,000 live births. Low birth weight continues to be a public health problem. In 2017, 12% of children were born with low birthweight ¹.

b. Stunting

In the last decade, the nutritional situation of the children under five years was not satisfying. The latest Demographic and Health Survey has shown that 32% of children under the age of five were stunted with 11% in its severe form. According to the 2018 standards ³⁴, that indicated a very high situation, making stunting a serious public health and development problem in the country. Significant differences were noted by sex (35% for boys compared to 29% for girls). The prevalence increases with the age of children, going from 16.8% in children under 6 months to a peak of 41.1% in 24-35 months. Children in rural areas were more affected than those in urban areas (36% versus 28%). Regarding the departments, 7 out of 12 have a prevalence higher than 30%. Therefore, children in rural regions are at an alert threshold. Considering the economic status, we observed that 41% of children in poor households suffer from stunting, while only 19% of children in high households were concerned ¹.

c. Wasting

In Benin, 5% of children under five years are wasted and only 1% suffer from severe acute malnutrition (SAM). Particularly, high percentage (10%) of the children aged 9-11 months are affected. There is a difference but not sensitive between the sexes (5.6% for boys and 4.3% for girls). The prevalence of wasting varies little depending on the place of residence (5.1% in urban areas compared to 4.9% in rural areas). There has been a decrease in the prevalence of wasting from 2001 to 2017, from 8 to 5%. The current prevalence of wasting in Benin indicates an acceptable nutritional situation. However, it hides some disparities between departments and between municipalities ¹.

d. Underweight

Globally, 17% of Beninese children are underweight and 4% in severe form. In some age groups, the prevalence is higher (21% at 9-11 months and 20% at 18-23 months). There is a variation by

gender (17.8% for boys and 15.8% for girls). Underweight is more common in rural areas than in urban areas (18% versus 15%). The prevalence of underweight is more prominent in low socioeconomic class with a percentage of 21% when compared with that of the upper socioeconomic class, 12%¹. The prevalence of underweight decreased from 23% in 2001 to 17% in 2017, suggesting an improvement in the nutritional situation¹.

6 Exclusive breastfeeding practice versus early complementary feeding

Prevalence of exclusive breastfeeding and practices are presented in Table 3

Table 3: Prevalence and practices of exclusive breastfeeding and early complementary feeding

NCDs	% of children
Children aged 0-5 months who exclusively breastfed	42
Children under 2 y who breastfed within one hour after birth	54
Children under 6 months who received water only in addition to breast milk	28
Children under 6 months who received another food in addition to breast milk	12
Continued breastfeeding after one year	91.2
Continued breastfeeding after two years	51
Introduction to solid/semi-solid or soft foods (6-8 months)	56

Source : Benin Demographic and Health Survey 2017-2018

Breastfeeding is a widespread practice in Benin. Almost all (97%) of children born during the two years preceding the DHS survey were breastfed¹. However, the percentage of breastfed children decreased with the age of the child. At 18-23 months, only one out of two children was still breastfed (51%), whereas it is recommended to breastfeed the child until the age of two years.

Despite these high breastfeeding rates, early breastfeeding (within one hour of birth) remains relatively low and concerns 54% of breastfed children in 2017¹. There is observed a constant trend over the last 4 years. Between 2001 and 2017, the percentage of infants born within two years of the survey who were breastfed within 1 hour of birth increased from 48% to 54%.

In 2017, only 42% of children under 6 months of age were exclusively breastfed. The exclusive breastfeeding rate was 43% in 2006³⁵, 33% in 2012³⁶ and 41.4% in 2014⁸. Thus, there is an increase in the EBF rate between 2012 and 2017. In addition, it has been noted that rate EBF was slightly more observed in rural areas than in urban areas.

On the other hand, contrary to the WHO recommendations, about 28% of children under 6 months received water in addition to breast milk, and 12% were already been fed with complementary foods (artificial milk or/and infant porridge) in addition to breastfeeding. The percentage of exclusively breastfed children decreases rapidly, from 64% at 0-1 month to 2% at 9-11 months¹. About, 15% of children 0-23 months are bottle-fed¹. The results of the DHS-2017 also showed that the percentage of breastfed children decreases with the age of the child. At 18-23

months, only one out of two children is still breastfed (51%), whereas it is recommended to breastfeed the child until the age of 2 years.

The rate of exclusive breastfeeding, given in national data, has to be taken with reserve due to the limited method of 24h recall used usually. Using of deuterium oxide dose to mothers in the regions of southern Benin has revealed a rate of 24%, low than the average national³⁷.

7 Food insecurity

Overall, description of food security/insecurity, population/regions mostly affected by food insecurity, main challenges to achieve "global food security" in the country (Table 4 and 5).

This section addresses the food security issue and presents the trend of different indicators used to assess food insecurity level in Benin last decade³⁸.

Table 4: Prevalence of Food insecurity in Benin at 2013 and 2017

Food security level	March 2013	August 2017
Food security	55.0	47.5
Limit Food security	34.0	42.9
Moderate Food insecurity	10.5	8.9
Severe Food insecurity	0.5	0.7

Source: World Food Program –AGVSA, 2017

In 2017, according to a Global analysis of food security and vulnerability (AGVSA), overall food security was improved slightly since 2013 from 89 % to 90.4%. However, 9.6% of the population are food insecure, of which 0.7% are severely food insecure (Table 4). This corresponded to 1.09 million food-insecure people of whom about 80 000 are severely affected¹⁰.

The prevalence of food insecurity varies within the regions of the countries. The Atacora departments are mostly affected by food insecurity (20.9% moderate and 2.7% severe), especially in the communes of Boukoumbe, Toucountouna, Tanguéta, Matéri, Coby similarly to the communes of Glazoue, Savè and Ouessè (in the department of Collines), Djidja (in the department of Zou), Toviklin and Lalo (in the department of Couffo)¹⁰.

The trend of undernourishment prevalence decreased from 8.1 % (2011) to 7.4% (2019). The Average dietary energy supply adequacy is quite stable ranging from 122.0 to 124.0, during the last decade. The average of food production was increasing (213.0 to 221.0 constant I\$ per person), from 2011-2013 to 2012-2014. A regression from 221 to 214.0 constant I\$ per person, was noted from the 2012- 2014 period to 2014-2016 (Table 5).

Food and nutrition security is multidimensional, multi-sectorial complex concepts³⁹ and need to be tackled by the varied actors. The challenges of food security are multiple and change from period to another and by the pillars of food security (food availability, accessibility, stability and utilization).

According to the World Food Program⁴⁰, agricultural development in Benin is hindered by factors such as lack of modern production technology, poor soil, high food prices and inadequate storage, preservation and food processing. The

Republic of Benin is also highly vulnerable to natural disasters which contribute further to nutritional instability.

The main challenges to achieve “global food security” in Benin are to improve the resilience of all food systems to any perturbations including the COVID-19 pandemic on the one hand and to strengthen food security and nutrition governance on the other hand.

Table 5: Food availability in Benin during the last decade

Periods	Prevalence of undernourishment (%)	Average protein supply (g/capita/day)	Average supply of protein of animal origin (g/capita/day)	Average dietary energy supply adequacy (%)	Average value of food production (constant I\$ per person)
2011-2013	8.1	63.4	13.7	122.0	213.0
2012-2014	7.8	65.4	15.0	123.0	221.0
2013-2015	7.7	66.0	15.7	123.0	219.0
2014-2016	7.6	66.3	16.0	124.0	214.0
2015-2017	7.5	65.0	15.0	124.0	-
2016-2018	7.4	-	-	124.0	-
2017-2019	7.4	-	-	124.0	-

Source: adapted from FAOSTAT (2020)

Nowadays, the pandemic of COVID-19 comes to emphasize the existent problem and affects unfortunately the production and purchase of the population. This pandemic threatens both the health status and the live hoods of the population. The current description of the food security status of Benin from 2011 to 2019 might be affected by the current worldwide crisis of SARS-CoV-2 ⁴¹.

8 Conclusion

Diet and nutrition data inventory in Benin showed that the nutritional status of children under 5 years and women of childbearing age has improved slightly in recent years for most indicators of undernutrition including iron deficiency. The little data available on the coverage of dietary intake of vitamin A, vitamin D, zinc and vitamin B12 remain insufficient to appreciate the current populations' micronutrients status at national level. Regarding over-nutrition, the prevalence of obesity has decreased by 2 points among adults while the prevalence of diabetes has almost quintupled. In addition, food behavioral risk factors and those related to lifestyle are also strongly present in households. Food insecurity still affects one-tenth of households.

It therefore emerges from this inventory that the significant progress observed is still a long way from achieving the objectives that the country has set in its own nutrition policy documents as well as global targets. A strengthening of the interventions currently implemented and greater investment in nutrition are needed to address the main challenges.

Authors contribution: All authors have contributed to literature reviewing, preparing and drafting of sections of the manuscript. Additionally, WAH, CMA and JL planned and were involved in the design, compilation reviewing, structuring and editing the manuscript. WAH has coordinate the whole manuscript drafting. All authors read and approved the final manuscript.

Acknowledgment: The authors would like to thank all those who have contributed in one way or another to the realization of this review, particularly the authors of the different papers used.

Funding: The drafting of this paper did not require a financial partner

Conflict of interest: The author declares no conflicts of interest.

Ethical approval: Not applicable

ORCID:

Waliou Amoussa Hounkpatin: <https://orcid.org/0000-0002-2902-8248>

Carmelle Mizchoun-Adissoda : <https://orcid.org/0000-0002-7586-9291>

Jaurès Lokonon: <https://orcid.org/0000-0002-3208-1138>

Ulbad Polycarpe Tougan: <https://orcid.org/0000-0002-0838-0146>

Jean Luc Satchi Gbondje: <https://orcid.org/0000-0001-8460-2321>

Gloria Padonou: <https://orcid.org/0000-0001-9629-619X>

Andréa Houindoté : <https://orcid.org/0000-0003-1459-8982>

Sam Bodjrenou: <https://orcid.org/0000-0002-5619-3409>

References

- 1 Institut National de la Statistique et de l'Analyse Économique (INSAE), et ICF. Enquête Démographique et de Santé au Bénin, 2017-2018. In: INSAE, ed. Cotonou, Bénin et Rockville, Maryland, USA: INSAE et ICF, 2019:675. Available from : https://insae.bj/images/docs/insae-statistiques/enquetes-recensements/EDS/2017-2018/1.Benin_EDSBV_Rapport_final.pdf
- 2 Ministry of Environment Habitat and Urban Planning, Benin Centre for Sustainable Development. National Report among Biological Diversity. Cotonou, Bénin, 1998:69.
- 3 Indicateurs clés. (2020, January 30). Site officiel du Ministère de l'Économie et des Finances du Bénin. <https://finances.bj/indicateurs-cles/2020>
- 4 INSAE-Rédaction. (2018, August 7). Population. INSAE - Institut National de la Statistique et de l'Analyse Économique. <https://www.insae-bj.org/statistiques/indicateurs-recents/43-population>
- 5 Institut National de la Statistique et de l'Analyse Économique (INSAE). RGPH4 : Que retenir des effectifs de population en 2013 ? In: INSAE, ed. Cotonou, Bénin: INSAE, 2015:33. Available from: <https://insae.bj/>
- 6 World Bank country and lending groups – World Bank data help desk. (n.d.). <https://datahelpdesk.worldbank.org/knowledgebase/articles/906519>
- 7 Institut National de la Statistique et de l'Analyse Économique (INSAE). Demography and Health Survey (DHS 1996). In: INSAE, ed. Cotonou, Bénin: INSAE, 1997.
- 8 Institut National de la Statistique et de l'Analyse Économique (INSAE). Multiple Indicator Cluster Survey (MICS) 2014, final report. In: INSAE, ed. Cotonou, Bénin: INSAE, 2015. Available from: http://mics.unicef.org/news_entries/75/BENIN-FINAL-REPORT-RELEASED
- 9 Gandonou E, Gounou E, Mitchikpè E, Biao A., & Kpénavoun S. Ministère de La Prospective, du Développement, de L'Évaluation des Politiques Publiques et de la Coordination de l'Action Gouvernementale (MPDEPPCAG), centre de Partenariat et d'Expertise pour le Développement Durable (CePED), Benin Consulting Group (BeCG). Etude sur les

- normes de consommation des principaux produits vivriers au Bénin. République du Bénin: 2010.
- 10 Institut National de la Statistique et de l'Analyse Économique (INSAE), et ICF. République du Bénin : Analyse Globale de la Vulnérabilité et la Sécurité Alimentaire (AGVSA). In: INSAE, ed. Cotonou, Bénin: INSAE, 2017:170.
 - 11 Fassinou SL-G. Consommation alimentaire et apports nutritionnels des femmes béninoises de 20 à 45 ans. Thesis of Master Professionnel, defended in March 2018. Faculté des Sciences Agronomiques -Université d'Abomey-Calavi, République du Bénin, 2018.
 - 12 Kayodé APP. Diversity, users' perception and food processing of sorghum: Implications for dietary iron and zinc supply. PhD Thesis. Wageningen University. The Netherlands, 2006.
 - 13 Mitchikpe, C., Dossa, R., Ategbo, E., Van Raaij, J., & Kok, F. (2008). Seasonal variation in food pattern but not in energy and nutrient intakes of rural beninese school-aged children. *Public Health Nutrition*, 1. <https://doi.org/10.1017/s1368980008002929>
 - 14 Amoussa Hounkpatin WBA. Evaluation du potentiel de couverture des besoins en vitamine A des jeunes enfants à partir des sauces accompagnant les aliments de base consommés au Bénin. Thèse de Doctorat soutenue à l'Université de Montpellier 2. Montpellier, France, 2011. Available at : <https://www.documentation.ird.fr/hor/fdi:010055048>
 - 15 Ategbo E-AD. Food and Nutrition insecurity in northern Benin: impact on growth performance of children and on year to year nutritional status of adults. PhD Dissertation, 1993.
 - 16 Glidja TMM. L'alimentation de complément chez les enfants de 6 à 12 mois dans la Commune de Bopa (Département du Mono): pratiques en usage et qualités nutritionnelle et microbiologique des aliments de complément consommés. Thèse d'Ingénieur Agronome. Faculté des Sciences Agronomiques, Université d'Abomey-Calavi, Bénin, 2004. Available at : <https://koha.uac.bj/cgi-bin/koha/opac-detail.pl?biblionumber=32426>
 - 17 Gandonou E, Kpenavoun Chogou S, & Mitchikpe E. (2019). Mesure et profil de l'insécurité alimentaire individuelle au Bénin: une approche en termes de consommation d'énergie et de protéines. *Revue Internationale des Sciences Appliquées*, 2(2):34-47
 - 18 Djossinou DRA. Alimentation et nutrition des femmes avant et pendant la grossesse au Sud-Bénin : Qualité et facteurs d'influence. Thèse de doctorat, Universités de Montpellier et d'Abomey-Calavi, 2019.
 - 19 Alaofe, H., Burney, J., Naylor, R., & Taren, D. (2017). Prevalence of anaemia, deficiencies of iron and vitamin A and their determinants in rural women and young children: A cross-sectional study in Kalalé district of northern Benin. *Public Health Nutrition*, 20(7), 1203-1213. <https://doi.org/10.1017/s1368980016003608>
 - 20 DANA, INSAE, UNICEF. Etude épidémiologique de la lutte contre les troubles dus à la carence en iode au Bénin. Cotonou, UNICEF, 2011.
 - 21 Mizéhoun-Adissoda, C., Desport, J., Houinato, D., Bigot, A., Dalmay, F., Preux, P., Bovet, P., & Moesch, C. (2016). Evaluation of iodine intake and status using inductively coupled plasma mass spectrometry in urban and rural areas in Benin, West Africa. *Nutrition*, 32(5), 560-565. <https://doi.org/10.1016/j.nut.2015.11.007>
 - 22 MSPB, UNICEF. Enquête nationale sur la carence en vitamine A et la disponibilité en sel iodé dans les ménages. Rapport de l'enquête familiale. Cotonou: Ministère de la Santé Publique/Direction de la Santé Familiale, République du Bénin (MSPB). Fond des Nations Unies pour l'Enfance, 2000:64
 - 23 FAO. Profil Nutritionnel du Bénin - Division de la nutrition et de la protection des consommateurs, 2011: Available from : <http://www.fao.org/tempref/AG/agn/nutrition/ncp/ben.pdf>
 - 24 Houinato D, Segnon Agueh J, Djrolo F, Djigbenoude O. Final Report of STEPS survey in Benin. Cotonou. Available from: http://www.who.int/chp/steps/2008_STEPS_Report_Benin.pdf WHO, Ministry of Health, 2008.
 - 25 Ministère de la Santé. Programme national de lutte contre les maladies non transmissibles: Rapport final de l'enquête pour la surveillance des facteurs de risque des maladies non transmissibles par l'approche STEPSwise de l'OMS. Cotonou Ministère de la Santé, 2016:152. Available from : https://www.who.int/ncds/surveillance/steps/Benin_2015_STEP_S_Report_FR.pdf
 - 26 Ministère de la Santé. Direction de la programmation et de la prospective: Annuaire des statistiques sanitaires 2012. Cotonou, Ministère de la Santé, 2013.
 - 27 Cossi, M., Gobron, C., Preux, P., Niama, D., Chabriat, H., & Houinato, D. (2012). Stroke: Prevalence and disability in Cotonou, Benin. *Cerebrovascular Diseases*, 33(2), 166-172. <https://doi.org/10.1159/000334195>
 - 28 Sonou YCNH. Épidémiologie des facteurs de risque cardiovasculaire en population tropicale - cas du Bénin. PhD Thesis. Université de Limoges, 2015. Available from: <https://tel.archives-ouvertes.fr/tel-01332830>
 - 29 Agboton, B.L., Agueh, V.D., Bodjrenou, A.S., Vigan, J., Ahoui, S., Agboton, C.G., Zannou, M.D., & Djrolo, F. (2017). Etat des lieux et évaluation de la qualité de la thérapie nutritionnelle des patients porteurs de syndrome métabolique au CNHU-HKM de Cotonou. *Revue Africaine de Médecine Interne*, 4(1-2):24-8
 - 30 Yessoufou AG, Behanzin J, Djihoumeto E, Istina ZA, Ahokpè M, Sezan A. (2015). Aspects épidémiologiques du syndrome métabolique au sein de la population obèse de la Commune Ouidah au Sud-ouest du Bénin. *Antropo*, 33, 111-116. www.didac.ehu.es/antropo
 - 31 Ministère de la Santé. Programme National de lutte contre les maladies non transmissibles. Plan stratégique de lutte contre le cancer du col de l'utérus et les autres cancers gynécologiques et mammaires au Bénin 2019-2023. Cotonou: Ministère de la santé, 2019:99.
 - 32 Bray, F., Ferlay, J., Soerjomataram, I., Siegel, R. L., Torre, L. A., & Jemal, A. (2018). Global cancer statistics 2018: Globocan estimates of incidence and mortality worldwide for 36 cancers in 185 countries. *CA: A Cancer Journal for Clinicians*, 68(6), 394-424. <https://doi.org/10.3322/caac.21492>
 - 33 Mizéhoun-Adissoda, C., Houehanou, C., Chianéa, T., Dalmay, F., Bigot, A., Preux, P., Bovet, P., Houinato, D., & Desport, J. (2015). Estimation of daily sodium and potassium excretion using spot urine and 24-Hour urine samples in a Black population (Benin). *The Journal of Clinical Hypertension*, 18(7), 634-640. <https://doi.org/10.1111/jch.12722>
 - 34 De Onis, M., Borghi, E., Arimond, M., Webb, P., Croft, T., Saha, K., De-Regil, L. M., Thuita, F., Heidkamp, R., Krasevec, J., Hayashi, C., & Flores-Ayala, R. (2018). Prevalence thresholds for wasting, overweight and stunting in children under 5 years. *Public Health Nutrition*, 22(1), 175-179. <https://doi.org/10.1017/s1368980018002434>
 - 35 Institut National de la Statistique et de l'Analyse Économique (INSAE). Demography and Health Survey (DHS 2006). INSAE: Cotonou, Bénin, 2007.
 - 36 Institut National de Statistique et de l'Analyse Economique (INSAE) and ICF International. 4th Demography and Health Survey (DHS-IV) 2011-2012. Cotonou, Benin and Calverton,

- USA: National Institute of Statistics and Economic Analysis and ICF International, 2013.
- 37 Lokonon, J. H., Hounkpatin, W. A., & Idohou-Dossou, N. (2020). Participation in the “nutrition at the centre” project through women’s group improved exclusive breastfeeding practices, as measured by the deuterium oxide dose-to-mother technique. *International Breastfeeding Journal*, 15(1). <https://doi.org/10.1186/s13006-020-00302-y>
 - 38 FAOSTAT. Hunger and food insecurity indicators in Benin. Secondary Hunger and food insecurity indicators in Benin. <http://www.fao.org.2020>
 - 39 Lokonon, J., Amoussa Hounkpatin, W. Profil de la sécurité alimentaire et nutritionnelle des communes de Dangbo et de Tori-Bossito au Sud-Bénin. *Annales de l'Université de Parakou*, 9(1):21-32.
 - 40 FAO. The State of Food Insecurity in the World. Secondary The State of Food Insecurity in the World 2015.
 - 41 Tougan UP, Théwis A. (2020). Covid-19 and Food Security in Sub-Saharan Africa: Implications and Proactive Measures to Mitigate the Risks of Malnutrition and Famine. *International Journal of Progressive Sciences and Technologies* 20(1):172-93,

Cite this article as: Amoussa Hounkpatin W., Mizehoun-Adissoda C., Lokonon J., Tougan U.P., Satchi Gbondje J.L., Padonou, G., Houindote, A., & Bodjrenou, S. (2020). Update of the nutritional situation in Benin Republic. *The North African Journal of Food and Nutrition Research*, 4(9): S116-S123. <https://doi.org/10.51745/najfnr.4.9.S116-S123>

© 2020 The Author(s). This is an open-access article distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/4.0>), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.