Montenegro

Nutrition Survey

2022

Executive Summary

Collaborators:

Implementing agencies
Institute of Public Health of Montenegro
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Funding agencies
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Institute of Public Health of Montenegro

Technical partners
GroundWork
Ministry of Health of Montenegro
Primary Health Centre, Podgorica
Clinical Centre of Montenegro
VitMin Laboratory, Germany
Moj Lab, Podgorica / Synlab, Germany

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Peter Stonelake

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EXECUTIVE SUMMARY

Introduction

In Montenegro, data related to the health and nutritional status of the population has been scarce and previously no recent comprehensive assessment of nutritional status existed which measured both micro- and macro-nutritional indicators in any population group in Montenegro. Montenegro's 2018 Multiple Indicator Cluster Survey (MICS) provided the most recent representative data related to nutrition, but the survey only examined anthropometric markers in preschool children. This represented a notable data gap, particularly for vulnerable groups such as young children, women of reproductive age and pregnant women. Moreover, no recent comprehensive data was previously available on the prevalence of nutrition-related non-communicable diseases, which are among the main causes of death and significantly contribute to the disease burden in Montenegro.

The 2022 Montenegro Nutrition Survey (MONS) was conducted to measure the extent of micronutrient deficiencies and nutrition-related non-communicable diseases. By increasing the understanding of various nutritional conditions, the MONS will help policymakers design evidence-based nutritional intervention programmes for nationwide implementation. The MONS also provides a baseline against which to measure the future progress of the national nutrition programme. The MONS was conducted by the Institute of Public Health, UNICEF, GroundWork and other stakeholders with the financial support of the European Union.

Aim and objectives

The aim of the MONS was to obtain updated and reliable information on the current micronutrient and nutritional situation of several target groups living in Montenegro. The target population groups of the MONS were preschool children aged 6–59 months, non-pregnant women of reproductive age (15–49 years) and pregnant women. For preschool children and non-pregnant women, most of the indicators measured were representative at the national level and for each of the three strata representing the three regions (the south, centre and north). Data collected from pregnant women was only representative at the national level, as the small number surveyed precluded stratum-specific conclusions.

The objectives of the MONS included assessing the nutritional and micronutrient status, and estimating the extent and severity of nutrition-related non-communicable diseases in the target groups, evaluating infant and young child feeding (IYCF) practices, assessing the association between various factors and anaemia, and other deficiencies or conditions.

The key nutrition and micronutrient indicators were: anaemia in preschool children, non-pregnant women and pregnant women; iron deficiency (including iron deficiency anaemia) in preschool children and non-pregnant women; vitamin A deficiency in preschool children and non-pregnant women; vitamin D deficiency in preschool children, non-pregnant women and pregnant women; and folate deficiency among non-pregnant women. Nutrition-related non-

communicable disease patterns were assessed by measuring glycated haemoglobin, triglycerides, high-density lipoproteins (HDL) and blood pressure in non-pregnant and pregnant women. Additionally, waist circumference was measured in non-pregnant women.

Design

The MONS 2022 was designed as a national cross-sectional survey with three strata. The census enumeration areas (EAs) from the 2011 census served as the sampling frame for the MONS. A two-stage sampling procedure was used to randomly select households containing preschool children, non-pregnant women or pregnant women.

In the first stage of sampling, the MONS used primary sampling units (PSUs) selected from the complete list of the 2011 census EAs with equal probability using simple random sampling. The selection of PSUs was done separately for each of the three strata (south, centre and north). Different numbers of PSUs were randomly selected from each of the strata in order to obtain the desired stratum-specific precisions. This was done because of stratum-level differences in the household size, the household composition and the response rates. Thus, the MONS included the following number of PSUs in the different strata: south – 73; centre – 75; north – 65. This resulted in 213 PSUs selected for the entire survey sample.

The second stage of sampling within each PSU consisted of the selection of all preschool children, all pregnant women, and 50 per cent of non-pregnant women of the southern and central strata and 33 per cent of non-pregnant women in the northern stratum.

Results

The MONS recruited 466 preschool children, 1,633 non-pregnant women and 65 pregnant women. While the response rates for non-pregnant women were higher than anticipated, the response rates and sample sizes for children and pregnant women were lower than expected.

In this executive summary, only national estimates are presented in Table 1. Among children 6–23 months of age, 75 per cent had ever been breastfed, but only 45 per cent were put to the breast within one hour of delivery. Regarding complementary feeding, the majority of children have diets that meet the minimum criterium for diversity and meal frequency, but the compound indicator "minimum acceptable diet" is found only in about one half of children.

Anaemia is found in 13 per cent of children aged 6–59 months, denoting only a "mild" public health problem, according to criteria set by the World Health Organization (WHO). In contrast, more than 40 per cent of children are iron-deficient and nearly all anaemic children have concurrent iron deficiency. Vitamin D deficiency is low in children, but the combined prevalence of vitamin D deficiency and insufficiency affects approximately 22 per cent of children.

Among non-pregnant women, more than 75 per cent have a minimally diverse diet. In contrast to children, more than 25 per cent of non-pregnant women are anaemic, denoting a "moderate" public health problem, according to the WHO criteria. Nearly 60 per cent of non-

pregnant women are iron-deficient and nearly all anaemic women have concurrent iron deficiency. Almost 20 per cent of non-pregnant women are folate-deficient and folate deficiency is highest among adolescent girls between 15 and 19 years of age (33%). While vitamin D deficiency affects fewer than 10 per cent of women, combined vitamin D deficiency and insufficiency is more common (> 40%).

Indicators of cardiometabolic health show that while there are few cases of pre-diabetes (defined as glycated haemoglobin (HbA1c) ≥ 5.7% to < 6.5%) or diabetes (defined as HbA1c ≥ 6.5%), cardiovascular health and obesity indicators affect a notable proportion of women. More than 30 per cent of non-pregnant women have low HDL cholesterol and more than 40 per cent have a high triglycerides/HDL ratio. Nearly 50 per cent of non-pregnant women have central/visceral obesity, and approximately 15 per cent are hypertensive. Overall, more than 11 per cent of non-pregnant women have metabolic syndrome – a condition where three or more poor metabolic health indicators are found in the same person.

Among pregnant women, the prevalence of minimum dietary diversity is 87 per cent, which is notably higher than in non-pregnant women. The prevalences of anaemia, vitamin D deficiency, and vitamin D deficiency and insufficiency are similar to those found in non-pregnant women. Pregnant women have a high prevalence of elevated triglycerides (45%), and approximately 63 per cent have an elevated triglyceride/HDL ratio. In addition, approximately 9 per cent of pregnant women are hypertensive.

Table 1.   Summary of the results of the MONS 2022

Target group	Indicator	Result (%)
	Children aged 6–23 or 6–59 months	
6–23 months	Ever breastfed	75.5
	Early initiation of breastfeeding	45.4
	Exclusive breastfeeding for the first two days after birth	55.4
	Introduction of solid foods (6–8 months)	94.7
	Minimum dietary diversity	74.7
	Minimum meal frequency	87.3
	Minimum acceptable diet	58.0
	Bottle feeding in the past 24 hours	73.5
6–59 months	Anaemia	13.2
	Iron deficiency	40.7
	Iron deficiency anaemia	9.3
	Vitamin A deficiency	0.3
	Vitamin D deficiency	3.6
	Vitamin D deficiency or insufficiency	22.4
	Non-pregnant women (15–49 years)	
	Meets minimum dietary diversity	75.6
	Anaemia	25.8
	Iron deficiency	58.3
	Iron deficiency anaemia	23.0
	Vitamin A deficiency	0.2
	Folate deficiency	19.7
	Vitamin D deficiency	9.7
	Vitamin D deficiency or insufficiency	42.8
	Diabetes mellitus	0.5
	Elevated triglycerides	13.9
	Low HDL cholesterol	30.4
	Elevated triglycerides/HDL ratio	40.5
	Visceral/central obesity	48.5
	Hypertension	14.7
	Metabolic syndrome	11.4
	Pregnant women	
	Meets minimum dietary diversity	87.0
	Anaemia	29.7
	Vitamin D deficiency	9.5
	Vitamin D deficiency or insufficiency	50.9
	Diabetes mellitus	0.0
	Elevated triglycerides	44.7
	Low HDL cholesterol	7.9
	Elevated triglycerides/HDL ratio	63.4
	Hypertension	9.3

Discussion

Anemia and micronutrient deficiencies

The results of the MONS show that anaemia is more common in women than in preschool children. Nonetheless, the prevalence of iron deficiency is high in both groups, and iron deficiency is likely responsible for the majority of cases of anaemia found. Nearly all anaemic children and women are iron-deficient, and iron deficiency is the only nutritional indicator that is significantly associated with anaemia in both children and women.

Iron deficiency is the most common micronutrient deficiency in Montenegro and affects about 40 per cent of children and almost 60 per cent of non-pregnant women. The prevalence of iron deficiency (roughly 70%) is particularly high in children 12–23 months of age and also tends to be higher in children living in urban centres. For non-pregnant women, the MONS found that taking multivitamin supplements is associated with a lower prevalence of iron deficiency. As multivitamins are prescribed less frequently than other vitamin or mineral supplements, the association between multivitamin consumption and iron deficiency may indicate that women are taking multivitamin supplements prophylactically and that additional iron included in the supplements increases women's iron stores. In contrast, non-pregnant women who take iron supplements have a higher prevalence of iron deficiency. While this finding is perhaps counterintuitive, the MONS found that more than 80 per cent of women consuming iron supplements were prescribed these supplements by their doctors. Thus, these results suggest that iron-deficient and anaemic non-pregnant women are being successfully diagnosed by Montenegro's healthcare system.

The MONS found that vitamin D deficiency is rare in children and affects nearly one tenth of women. Despite the relatively low deficiency levels, the combined prevalence of both vitamin D deficiency and insufficiency are high, particularly considering that skin-covering practices are rarely practised in both groups. The prevalence of both vitamin D deficiency and insufficiency were likely affected by the season when the MONS was conducted (i.e. autumn) as vitamin D status is predominantly driven by exposure to sun. Thus, one could anticipate that the prevalence of vitamin D deficiency and insufficiency in Montenegro would be lower during the spring/summer months and higher during the winter months, as exposure to sunlight increases and decreases, respectively, during these seasons. Similar seasonal findings have been observed in other European countries.

Nearly 20 per cent of non-pregnant women are folate deficient, with significantly higher levels found in younger women. As macrocytosis was found in anaemic adolescent girls 15–19 years of age, it is likely that part of the anaemia in this age group is caused by folate deficiency. Folate deficiency can also cause neural tube defects during the early stages of gestation, thus, addressing folate deficiency can be used in Montenegro to both reduce anaemia and prevent birth defects.

The MONS found that vitamin A deficiency is nearly non-existent in Montenegrin women and children. While there is little population-representative data on vitamin A deficiency in

Europe, this finding is not surprising, as vitamin A deficiency in developed countries is rare, with the exception of individuals with diseases that cause lipid maldigestion or malabsorption.

Cardiometabolic health and metabolic syndrome

In addition to micronutrient deficiencies, the MONS identified multiple concerns related to the cardiometabolic health of women. The most concerning finding is that more than 10 per cent of women have metabolic syndrome. Individuals with metabolic syndrome have higher rates of diabetes, heart disease and certain cancers. Using 2022 population estimates and the prevalence of metabolic syndrome, there are an estimated 16,110 women 15–49 years of age with metabolic syndrome in Montenegro. This is a concern as the adverse health effects of metabolic syndrome are responsible for a sizable proportion of Montenegro's disease burden.

While the five components of metabolic syndrome are all highly associated with each other, some conditions, such as diabetes, are relatively rare. In contrast, the most common components of metabolic syndrome identified by the MONS are visceral/central obesity and low HDL cholesterol. Visceral/central obesity reflects a condition where an individual has excess adipose tissue, which is associated with increased circulating triglyceride levels and chronic inflammation. HDL cholesterol, often referred to as "good" cholesterol, removes other forms of cholesterol from the blood and subsequently helps to prevent heart disease.

In Montenegro, the most common "cluster" of conditions is low HDL cholesterol, visceral/ central obesity, and elevated triglycerides; these concurrent conditions account for approximately half of the cases of metabolic syndrome observed in Montenegrin women. This "clustering" is accompanied by a relatively high prevalence of a high triglycerides/HDL ratio, which is a strong predictor of cardiovascular diseases and gestational diabetes. This "clustering" also indicates that metabolic syndrome in Montenegro is largely driven by obesity.

Smoking is also a serious public health problem in Montenegro. The MONS shows that smoking is practised by a large proportion of women, including pregnant and breastfeeding women. In addition to causing cancer, smoking is a main contributor to cardiovascular diseases, particularly by limiting the production of HDL cholesterol.

Cardiometabolic health and nutrition

The MONS found that women with vitamin D deficiency/insufficiency have significantly higher prevalences of elevated triglycerides, low HDL cholesterol or central/visceral obesity. These associations have been previously observed by researchers examining the linkages between vitamin D deficiency and metabolic health. A recent systematic review and meta-analysis found that vitamin D supplementation helps lower total cholesterol, LDL cholesterol and triglyceride levels, but not HDL cholesterol levels, with larger effects on total cholesterol and triglycerides found in subjects that were deficient in vitamin D at baseline. Regarding vitamin D and obesity, while the association between these two factors has been identified previously, the directionality of the association remains unclear. Obesity can result in lower circulating vitamin D concentrations, as vitamin D can be diluted by larger volumes of fat, serum, liver

and muscle. At the same time, vitamin D deficiency limits the proliferation and creation of fat cells (adipogenesis) and thus could help to reduce the risk of obesity.

Recommendations

Address anemia and iron deficiency via fortification

The prevalence of iron deficiency is high in both children and women, and iron deficiency is likely the main risk factor of anaemia in Montenegro. Increasing iron intake can be accomplished with multiple approaches. Multiple micronutrient fortification of staple foods (e.g. wheat flour), including iron and folic acid, is a population-level intervention that has been shown to reduce the prevalence of iron deficiency and folate deficiency, and is thus a viable approach to reduce the prevalence of anaemia and neural tube birth defects. Food balance sheet data from the Food and Agriculture Organization indicates that wheat flour is consumed in high amounts in Montenegro and could be a possible vehicle for food fortification.

Vitamin D supplementation during breastfeeding

Since the MONS found that approximately 16 per cent of breastfeeding women are deficient in vitamin D, a targeted supplementation programme should be considered. Vitamin D supplements targeted at breastfeeding women can be used to prevent osteoporosis, hypocalcaemia and hypertension. Thus, it is recommended that breastfeeding mothers are either screened for vitamin D deficiency during postnatal paediatric visits or prescribed prophylactic vitamin D supplements.

Improve vitamin D status via fortification

The prevalence of vitamin D deficiency and insufficiency are relatively high in children older than 12 months and in women. As such, the fortification of staple foods with vitamin D should be considered as an approach to increase vitamin D intake and to prevent the sequelae of vitamin D deficiency. According to the FAO's 2020 food balance sheets, Montenegro has a high consumption of milk, and thus this is a potential food vehicle for fortification with vitamin D.

Improve infant and young child feeding practices

The MONS found that some breastfeeding and complementary feeding practices are suboptimal. Early initiation of breastfeeding reduces the risk of infections and feeding newborns liquids other than breastmilk after birth can adversely affect the practice of breastfeeding. It is plausible that insufficient information and/or support are provided to women during the antenatal and postnatal period. As such, the continued expansion of the Baby Friendly Hospital Initiative in Montenegro and breastfeeding counselling can be recommended. In addition, to clearly identify the barriers to optimal breastfeeding practices after birth, research about the breastfeeding support provided at hospitals/clinics and the breastfeeding knowledge, attitudes, and practices of women that have recently given birth should be conducted.

In addition to breastfeeding, the minimum acceptable diet in children 6-23 months of age should be improved. As the MONS found that meal frequency of children 6-23 months of age was relatively high for all wealth quintiles, a lack of dietary diversity in low-wealth households is responsible for low minimum acceptable diet prevalence. As such, supplemental nutrition programmes, income support programmes , and/or awareness campaigns targeted at children in low-wealth/low-income households could be considered in order to improve the dietary diversity in children.

Address risk factors of metabolic syndrome

The MONS found that obesity is a key risk factor for metabolic syndrome. Diagnosis of obesity, rather than other components of metabolic syndrome, is recommended, as obesity can be ascertained using non-invasive approaches and at a relatively low cost. Thus, it is imperative that doctors and healthcare providers have the knowledge and equipment to diagnose obesity in adults. In particular, measurement of waist circumference — the obesity measurement used by the MONS — should be used for obesity screening, as measurement of body mass index is a less sensitive indicator of cardiometabolic risk factors. Following a diagnosis of visceral/central obesity, other components of metabolic syndrome can be assessed.

At the population level, public health interventions to modify the food environment can be pursued. Demand-creation activities, such as educational campaigns and behaviour-change communication programmes have been shown, albeit inconsistently, to increase the consumption of vegetables in adults. Importantly, the most effective behaviour-change interventions engaged stakeholders during the design phase, and thus any future behaviour-change programme in Montenegro should be carefully designed in order to increase its effectiveness and sustainability. Although the MONS did not assess physical activity, the WHO has identified the promotion of physical activity as an approach to prevent and reduce overweight and obesity. This can include community-level programmes that encourage physical activity by modifying the "built environment" (e.g. sidewalks, bicycle lanes and exercise sites) and by promoting the benefits of active lifestyles.

Population-level programmes that encourage adults to quit smoking or prevent the commencement of smoking should also be pursued. Smoking prevention and cessation programmes can be seen as an approach to reduce the prevalence of both metabolic syndrome components and smoking-related cancers and diseases. Despite government taxes on cigarettes, the price of cigarettes in Montenegro is substantially lower than in countries in the European Union. The relatively low price of cigarettes is likely exacerbated by the illegal selling of tobacco products in Montenegro. As such, government policies to both tax cigarettes and obstruct the illegal trade of tobacco can be considered to be approaches to reduce the prevalence of smoking, and subsequently metabolic syndrome.

Study focusing on health and nutrition status of Roma communities in Montenegro

The MONS was not designed to produce representative results for children and women residing in Montenegro's Roma communities. Montenegro's 2018 MICS found that the

prevalence of stunting in Roma children was nearly three times as high as in non-Roma children, and this may suggest that micronutrient deficiencies and other health problems are more common among Roma children and women. Thus, a comprehensive study that assesses the nutrition and health status of children and women in Montenegro's Roma communities should be considered.