Study of Nutrition Status of Population in Georgia

Robizon Tsiklauri[1]*, I Parvanta[2], L Jijeishvili[3], M Kherkheulidze[4] and N Kazakhashvili[5]

[1]NCDC Georgia, USA

[2]International expert

[3]LTD "Vistamedi" lab Company

[4]Medical University

[5]UG

*Corresponding author: Robizon Tsiklauri, NCDC Georgia, USA.

Abstract

Background: Until 2015, systematic statistical data on micronutrient deficiency was not available in Georgia, to provide developing national strategy. In the same year, the National Centre for Disease Control and Public Health of Georgia (NCDC) in collaboration with the USA CDC launched the project "Strengthening surveillance of micronutrient deficiency in Georgia".

Methodology: Sentinel surveillance approach was used by selecting 8 sentinel sites from 4 regions, 2 sites in each region (1 pediatric and 1 antenatal clinic). Folate and iron deficiencies were studied in pregnant women (1st trimester) and iron deficiency was measured in children (12-23 months old). Ferritin concentration in plasma with cut-off points of <12 μg/l was used for Iron deficiency measure in toddlers, and <15 μg/l in pregnant. <3.0 ng/ml was considered as a cut-off point of Folate deficiency in pregnant. For anemia detection for the both target groups (children U2; pregnant) has been used Hb cut-off points of <11 g/l. Hemoglobin was tested using HemoQue and Multi-analyzer techniques at the sentinel sites.

Findings: In 2016-2017, Blood hemoglobin was measured among 939 children 12 to 23 months of age. 34% were anemic. Furthermore, 478 were tested for iron deficiency and 84% of them were identified as iron deficient. Hemoglobin was tested among 2,790 pregnant women and 7.4 % of them were found anemic. Additionally, 483 of 2,790 pregnant women were tested for iron and folate deficiencies. 61% were iron deficient, and 26.4% tested positive for folate deficiency. Neural tube defects (NTDs) prevalence per 1000 live births registered in sentinel sites was high 2.7.

Conclusion: Our preliminary results show that anemia and iron deficiency are prevalent among both pregnant women and children of the specified age group in Georgia. Additionally, folate deficiency was quite common during the 1st trimester of pregnancy. Our findings will inform public health policy decision makers to take relevant decisions on required interventions, such as health education, distribution of relevant supplements, and food fortification.

Introduction

Globally, micronutrient deficiencies affects approximately 2 billion people. Major morbidity and mortality are associated with vulnerable populations notably children under five and pregnant woman. Major micronutrient deficiencies include iron, folate and iodine [1]. In 2013, iron deficiency anemia affects 27% of the world's population. More than 89% of the burden comprises low income countries. Iron-deficiency anemia causes more than 60% of anemia in the general population. Children under five and women of reproductive age are particularly vulnerable by anemia, which occurs when red blood cells are below the normal level.

Epidemiological studies for assessing the micronutrient status among the population in the South Caucasus region which includes Georgia, Azerbaijan, and Armenia, are limited. Reports from Armenia (2000) estimated the prevalence of anemia to be 12 % and 12.4% among pregnant women and non-pregnant women, respectively and to be 23.9% in children under five [2].

A nationwide survey in Georgia reported prevalences of 22.8% anemic children, 25.6% in pregnant and 36.6% in non-pregnant women.

Iron is an essential element for the biosynthesis of blood hemoglobin. The symptoms of iron deficiency anemia can be mild at first and are not diagnosed until they have a routine blood test. Potential health complications of iron deficiency anemia include rapid or irregular heartbeat, pregnancy complications of

premature birth or low birth weight, and delayed growth in infants and children [3].

Folate insufficiency manifests in neural tube defects (NTDs), which is caused by low concentration of vitamin B9 (folate) in blood. Approximately 190,000 neonates are born with NTD in low Income Countries. TDs are serious and most common consequence of folic acid deficiencies. NTDs occur when neural tube closure is completed by embryonic day 28 of pregnancy and arise when the neural tube cannot close properly. The most common NTDs are the following: anencephaly and spina bifida [4].

Potential target groups

Potential target groups for surveillance of micronutrient deficiency are infants, toddlers, preschool children, school-age children, and women of childbearing age (ref). Toddlers are vulnerable to micronutrient deficiencies, are accessible for the assessment in child health clinics and community surveys and are an indicator of risk in the general population. Surveillance of iron deficiency is focused on these vulnerable groups. In the present study women at the 1st trimester of pregnancy was studied.

Gap in knowledge

The last assessments of nutritional status have been done in Georgia in 2009 [5], but they do not contribute substantially to the estimation of nationwide prevalence rates of nutritional outcomes. Currently we are establishing national nutrition monitoring and surveillance system in Georgia (GNMSS). Findings of this could provide policy makers with reliable, valid data for developing national strategy of micronutrient deficiency elimination and improving the nutritional status of population.

Objectives of the study

Table 1: Anemia.

Contingent	Proportion of anaemia in studded contingent	Status/ classification
Children (12 - 23 months of age)	34%	-
Pregnant	7.40%	-

Table 2: Iron.

Contingent	Proportion of Iron deficiency in studded contingent	status
Children (12 - 23 months of age)	High (84%)	Iron deficiency
Pregnant	High (61%)	Iron deficiency

Table 3: Folate.

Contingent	Proportion of folate deficiency in studded contingent	status
Pregnant	High (26.4%)	Folate deficiency

Objective1- Determining the prevalence of micronutrient deficiency (anemia, iron) in children.

Objective 2- Determining the prevalence of micronutrient deficiency (anemia, iron, and folate) in pregnant women (Table 1-3).

Study design

The study focused on following population groups including toddlers (aged 12-23 months old), and pregnant. Selection of these target groups were based on level of risk or vulnerability, accessibility of the target group for assessment, and degree of representativeness, or the ability to reflect the extent of the problem in the overall population. Other criteria included the availability of normative data and the potential usefulness of the targeted population for surveillance of other micronutrient deficiencies.

Sites and population

With the support of USA CDC, in 2015, NCDC of Georgia launched collaborative project - "strengthening of micronutrient deficiency surveillance in Georgia". We have selected 8 sentinel sites (2 sites in each region/children and pregnant health facilities) in four regions of Georgia (Tbilisi, Kakheti, Achara, and Samegrelo), using the criteria of geographical, social, ethnical, urban/rural, and religion. We also identified existing information about malnutrition and dietary habits from the above-mentioned regions. The project protocols were approved by the Institutional review board (IRB) at the NCDC and by the Research Review Committee and Ethical review committee of the US CDC.

Laboratory methods

1.   After explaining the aim of the study (informal consent), a blood sample was collected from the anticubital vein in heparinized tube.

2.   The sample for the test was taken from a vein and is placed in an appropriate test tube (a tube with granules and clot activator). Next, the sample is processed, and the serum is separated from the clot.

3.   Iron deficiency in survey participants has been measured using ferritin concentration in serum. Ferritin was tested in serum using the ELISA method. Hemoglobin was measured at the sentinel sites.

4.   Folate deficiency has been measured using serum folate concentration measured on serum separated from blood. Testing was done using an ELISA method and a microbiologic test kit (DRG International Inc., USA. BIO-4886).

Data analysis

The Statistic Package for the Social Sciences (SPSS) was used for Data Analysis.

Results

The study in pregnant women showed 7.4% prevalence of anemia in 2790 pregnant enrolling in study; the percentage of iron deficiency in total (483 pregnant with Lab. study on ferritin) resulted in 61%). And 26.4% of folate deficiency in 483 pregnant (with Lab. study on folate) (Figure 1, Table 6). The study in children (12-23 months of age) showed 34% prevalence of anemia in 939 children enrolling in study; the percentage of iron deficiency in total (478 children with Lab. study on ferritin) resulted in 84%)

In regards to regional profiles, we have detected that prevalence in toddlers in Samegrelo region (24.3%) anemia percentage is 1.5-2 times less than in other three regions, especially when comparing with Achara region (40.2%), which has the highest result compared to the other two regions (Kakheti with 40.3% and Tbilisi-30.0%). Total percentage for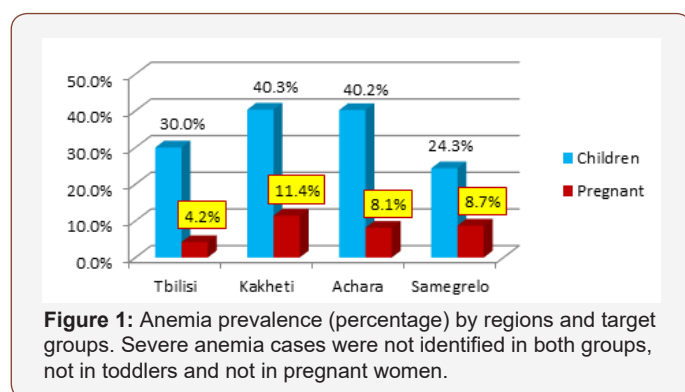 all four regions is 34% (Table 4, 5). Reviewing regional profiles for anemia in pregnant, showed that anemia prevalence in studied 4 regions is almost the same, and the percentage is around the 10% (7.4% in total), but we have a big differences in folate deficiency between Tbilisi and Achara regions (19.2% in Tbilisi vs 37.2% in Achara).

Table 4: Prevalence of anemia among children and pregnant women from four different Georgian regions/2016-2017 (total).

Years	12-23 Months age children	Anaemia Hb<110 g/L	Severe Anaemia Hb <70 g/L	Pregnant (1st trimester)	anemia Hb<110 g/L	anemia Hb<70 g/L
2016	516	33.70%	0.0%	1680	6.30%	0.0%
2017	423	34.30%	0.0%	1110	8.40%	0.0%
Total	939	34%	0.0%	2790	7.40%	0.0%

Table 5: Prevalence of anemia among children and pregnant women /2016-2017 (total), by Regions.

Region	12-23 Months age children	Anaemia Hb<110 g/L	Pregnant (1st trimester)	Anaemia Hb<110 g/L
		სულ		სულ
Tbilisi	240	30.00%	758	4.20%
Kakheti	336	40.30%	209	11.40%
Achara	174	40.20%	1606	8.10%
Samegrelo	190	24.30%	217	8.70%
Total	939	34%	2790	7.40%

Figure 1: Anemia prevalence (percentage) by regions and target groups. Severe anemia cases were not identified in both groups, not in toddlers and not in pregnant women.

Discussion

This study surveyed micronutrient deficiencies of three nutrition indicators (iron, folate, and iodine) in three target groups (children of 12-23 months and 12years old children, and pregnant women in the first trimester). According to WHO/CDC guidelines (ref), the prevalence of anemia in children population is classified as a "moderate'' public health threat (by the public health significance of deficiency), but in pregnant, we have prevalence of "mild'' deficiency. In terms of the folate deficiency, prevalence is high in pregnant women. Comparing with other relevant studies, our data on anemia prevalence in children is 2.5 times higher than in Armenia but in childbearing women we have slightly lower prevalence (Table 7-12). Due to the project design, we could not define reasons of deficiency which require further investigation to determine proper intervention strategy.

Table 6: Ferritin (Iron Deficiency) and Folate Deficiency/total (2016-2017)

Years	12-23 Months age children	Ferritin <12.0 µg/L	pregnant (1st trimester)	Ferritin <15.0 µg/L	(Folate deficiency) serum folate <3.0 ng/mL
2016	238	84.40%	243	67.40%	31%
2017	240	83.30%	240	54.60%	22%
Total	478	83.90%	483	60.90%	26.40%

(From 478 children (were taken blood from venous on ferritin)-45.4% was anemic & 54.6 % was not anemic).
(From 483 pregnant (were taken blood from venous on ferritin)-26.4% was anemic & 73.6 % was not anemic).

Table 7: Children/ Ferritin (Iron Deficiency) 2016-2017 (total) (by Regions).

Region	2016		2017		Total 2016-2017	
	12-23 Months age children	Ferritin <12.0 µg/L	12-23 Months age children	Ferritin <12.0 µg/L	12-23 Months age children	Ferritin <12.0 µg/L
Tbilisi	56	83.9%	60	80%	116	81.9%
Kakheti	63	81.0%	60	81.70%	123	81.3%
Achara	59	89.8%	60	80.1%	119	84.0%
Samegrelo	60	83.3%	60	93%	120	88.3%
Total	238	84.4%	240	83.3%	478	83.9%

Due to similar studies in similar context, we can assume that above mentioned deficiencies are caused due to possible reasons:

a) Georgian foods do not contain sufficient number of micronutrients.

Table 8: Pregnant/ Ferritin (Iron Deficiency) 2016-2017 (total) (by Regions).

Region	2016		2017		Total 2016-2017	
	Pregnant (1st trimester)	Ferritin <15.0 μg/L	Pregnant (1st trimester)	Ferritin <15.0 μg/L	Pregnant (1st trimester)	Ferritin <15.0 μg/L
Tbilisi	56	78.6%	60	78.3%	116	70.0%
Kakheti	60	61.7%	60	46.7%	120	54.2%
Achara	61	63.9%	60	28.3%	121	45.5%
Samegrelo	66	68.2%	60	68.3%	126	67.5%
Total	243	67.4%	240	54.6%	483	60.9%

Table 9: Pregnant/ Ferritin (Iron Deficiency) 2016-2017 (total) (by Regions).

Region	2016		2017		Total (2016-2017)	
	Pregnant (1st trimester)	Serum folate <3.0 ng/mL	Pregnant (1st trimester)	Serum folate <3.0 ng/mL	Pregnant (1st trimester)	Serum folate <3.0 ng/mL
Tbilisi	56	12.5%	60	11.7%	116	19.2%
Kakheti	60	26.7%	60	10.1%	120	18.3%
Achara	61	47.5%	60	26.7%	121	37.2%
Samegrelo	66	40.9%	60	35.0%	126	37.3%
Total	243	31%	240	22%	483	26.4%

Table 10: NTDs prevalence 2016-2017 (total) by years

Years	Live births	NTDs (Neural tube defects)	NTDs per 1000 live-birth
2016	2910	8	2.75
2017	2969	8	2.69
Total	5879	16	2.72

Table 11: NTDs prevalence 2016-2017 (total) by Regions.

Sentinels	Live births		Still-births		NTDs (Neural tube defects) (diagnosed by ultrasound)			Abortion		NTDs per 1000 live-birth
	total	With NTDs	total	With NTDs	Total	Spina Bifida	Anencephaly	Total	With NTDs	
Tbilisi	3877	2	3	0	7	5	2	980	6	
Kakheti	572	0	1	0	2	2	0	82	2	
Achara	1073	0	1	0	5	4	1	564	5	
Samegrelo	357	0	0	0	2	2	0	28	1	
Total	5879	2	5	0	16	13	3	1654	14	2.72

Table 12: Anthropometric measurements/Prevalence of other forms of malnutrition (2016-2017) (children's data).

Target group	Percentage of children with**					
Children (12-23 Months)	Stunting Height-for-age	Wasting Weight-for-height		Underweight Weight-for-age		Overweight Weight-for-height
	< -2 Z-scores*	< -3 Z-scores	< -2 Z-scores*	< -3 Z-scores	< -2 Z-scores*	> +2 Z-scores
940	8.7	0.2	0.6	0.1	0.7	22.3

*Category <-2 Z-scores includes <-3 Z-scores.

**Used WHO growth references.

b) "Formula" for toddlers' nutrition does not contain the needed micronutrients that should meet physiological requirements of children after breastfeeding.

Limitations

This study has one main limitation: We defined the prevalence of Iron Deficiency Anemia (IDA) and Folate Deficiency but could not investigate the reasons of the deficiency because, the study project did not include personal interviews on dietary habits.

Conclusion

After reviewing of preliminary analyses of the sentinel approach surveillance system's 2 years (2016-2017yy) functioning results we can conclude that: we have anemia problem in children U2; Folate deficiency problem in pregnant; Iron deficiency problem, that is reflection of the general situation existing in Georgia. According to expert's opinion it is the quite sufficient evidences for conclusion and recommendations for the initiation of nutrition interventions

(mainly, food fortification) and for making the adequate changes/amendments in relative legislation. Exception of provision of Children (6-23 months) from social unprotected families with Multimicronutrients powder.

Recommendations

a)   Need to advocate for nutrition interventions regarding food fortification (with iron and folic acid) strategy.

b)   Should implement one additional project for studying the dietary habits of population using standard questionnaires.

c)   Promote the main principle of healthy eating.

d)   In toddlers, special nutrition powder can be used to supplement feeding menus.

Acknowledgements

Conflict of Interest

No conflict of interest.

References

1. Bailey RL, West KP, Black RE (2015) The Epidemiology of Global Micronutrient Deficiencies.

2. (2000) Armenia Demographic and Health Survey, country profile, Asia.

3. Iron Deficiency Anaemia Assessment, Prevention and Control/A guide for programmed managers.

4. (2008) Conclusions of a WHO Technical Consultation on folate and vitamin B12 deficiencies/ Food and Nutrition Bulletin 29(2), The United Nations University, Japan.

5. GNS -2009/report book.