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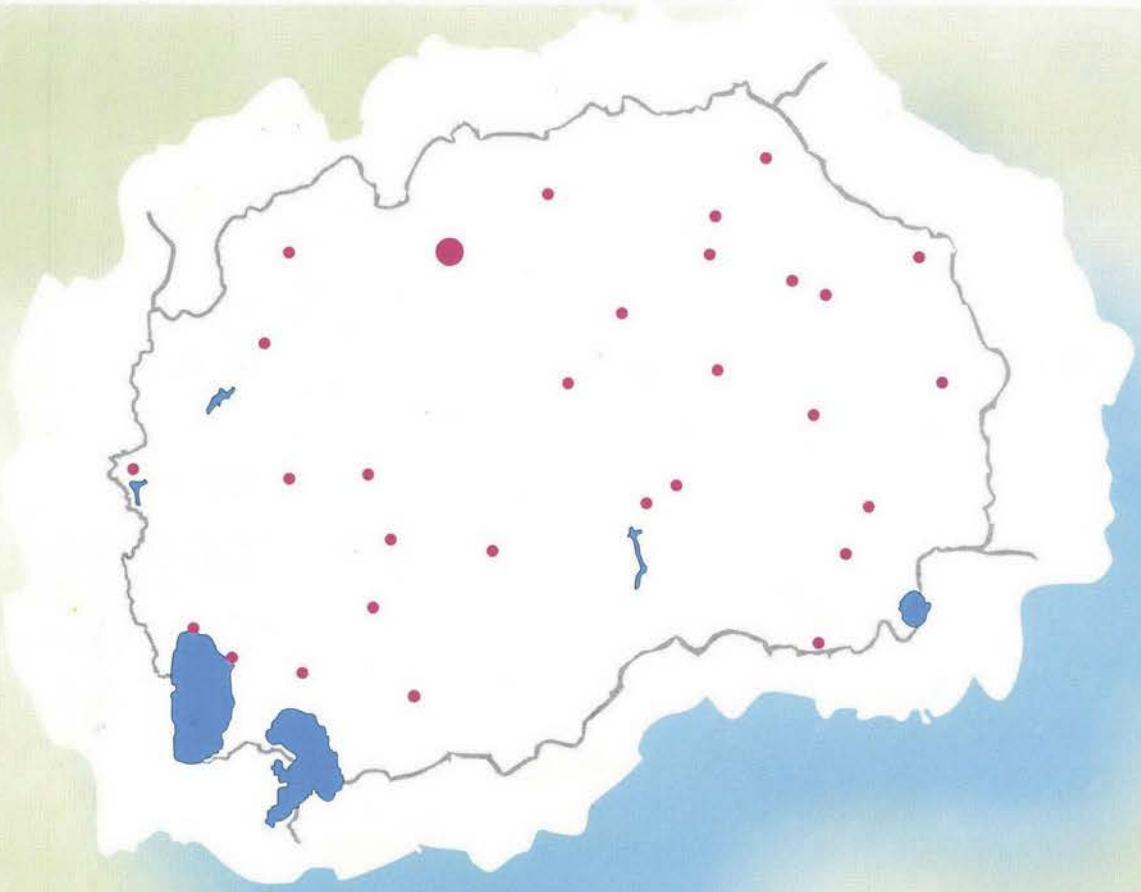
Ministry of Health of
the Republic of Macedonia

MULTIPLE INDICATOR CLUSTER SURVEY IN FYR MACEDONIA WITH MICRONUTRIENT COMPONENT



April 2000

National Institute of Nutrition - Italy

MULTIPLE INDICATOR CLUSTER SURVEY IN FYR MACEDONIA WITH MICRONUTRIENT COMPONENT

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1. Branca, F.
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Honourable guests, dear colleagues, ladies and gentlemen

It gives me an immense pleasure, that already in a row, in the course of this week, I have had the honour to promote several extremely important public health projects, which are being implemented by our Ministry of Health through its specialised institutions in cooperation with the international organisations, in this case with UNICEF.

Taking into consideration the meaning of the notion "healthy nation" for every Government, the pleasure is even larger in this case, in light of the fact that there is a word about a Project which offers us a cross-section of the nutritional status of the most important population group in the country – the children. For these reasons this segment is one of the key ones in our Health System Development Strategy, on which there has been an ongoing public debate these days.

Being a doctor in the preventive medical branch, the public - health priority as well as the social-economic priority that the medically safe food and nutrition have had in the defining of the health profile of the population is quite clear to me. Namely, we should accept with utmost concern the statistical data which the UN agencies, such as WHO, UNICEF and others make public each year, and which are related to the morbidity and mortality rates of the population in the world, connected to the problem of deficiency or the problem of inappropriate quality of food.

In line with all these, our Ministry of Health within the framework of the active cooperation with the Regional Bureau for Europe of WHO, has undertaken the obligation to prepare in the coming year, the **National Nutrition Action Plan** – an indispensable strategic document for creating the policy in this socially essential field.

In this regard, taking into consideration the insufficient quantity and quality of the basic data on the nutritional status of our population, the Ministry of Health has accepted with pleasure the initiative of UNICEF and the National Center for Nutrition in Rome, and through its highly specialized institutions – Republic Institute for Health Care, The Health Home of Skopje together with the Mother and Child Institute and the Childrens' Diseases Clinic, has implemented this study.

I believe that the application of reference expert methods of evaluation of the level of the important micronutrients, as retinol and iron, the blood count status, the rickets and the breastfeeding as parameters applied on nearly 1800 children, are sufficient warranty for the validity of the data that we receive from this study.

We will implement the further analysis of these findings as an introduction to even more intensive research in this field, already in the newly established National Committees or Councils for Food and Nutrition, the urgent establishment of which I shall personally initiate both within the framework of the Ministry of Health and at the inter – sectoral level of the Government, in order to gain in that way even more argumentative basis for the future public health activities for improvement of the health status.

Therewith, although it is clear that there is a question about issues of inter-disciplinary character, the health sector must have in all those concepts a leading and coordinating role taking into consideration the food and nutrition ratio – the health of the population.

With the hope that the activities within the framework of this study and the discussions which will be provoked by it, shall give an important contribution to the conceptualization of the future National Strategy for the improvement of the nutritional status of our population, and emphasizing from this aspect once more our gratitude towards UNICEF and its expert teams, I would like to wish you successful work.

Ministry of health
of Republic of Macedonia

Minister
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PREFACE

The Multiple Indicator Cluster Survey (MICS) is a new tool, born of the World Summit for Children in 1990. On that occasion, world leaders committed themselves to achieving an ambitious set of quantifiable goals to improve the health and wellbeing of children. These goals were based on the belief that every child in every country has a right to survive and thrive. In just two years, 1995 and 1996, MICS collected data from more countries than any other tool except national censuses.

So far, more than 60 countries have carried out a complete MICS, most as part of efforts to monitor interim progress towards the World Summit goals in 1995. More than 40 countries have added MICS modules to national surveys.

The Former Yugoslav Republic of Macedonia conducted a first MICS in 1994. The aim was to collect basic data on immunisation, nutrition and breastfeeding among children and women. Five years later, in September 1999 a new MICS was conducted with the broader aim to not only assess recent progress, but also to investigate further topics such as water and sanitation and micronutrient deficiencies that were not included in the previous MICS. The present publication is based on the data collected during the 1999 MICS and is intended as a background document for long-range planning, and implementing and monitoring interventions to improve the conditions of women and children in the country.

The 1999 MICS was the fruit of a collaborative effort by several actors. The Istituto Nazionale della Nutrizione from Rome was responsible for the original design of the survey, the supervision of its field implementation and compilation, and analysis of data in collaboration with the Institute of Mother and Child Health Care in Skopje, the Pediatric Clinic in Skopje and the Republican Institute of Health Protection. The World Health Organization was also involved with expert input from the Regional Office for Europe in Copenhagen. The Health and Nutrition Cluster of the UNICEF Office in Skopje was responsible for the preparation and field implementation including data collection and analysis. The 1999 MICS can be considered a success story thanks to the high professionalism and the spirit of collaboration and cooperation shown by all partners. To all of them goes UNICEF's and my personal gratitude.

Created to survey the decade, MICS is demonstrating its potential for the millennium. To know how far we have come on the path to fulfillment of child rights, and how far we still have to go, we must be able to check the milestones along the way – at the end of the decade, and on to the future. Much has been achieved, but without renewed commitment at all levels, the gains will be lost. MICS is a proven tool to help us fulfil our promises as we begin the new millennium.

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Finally thanks for the support provided by Mr. Edmon McLoughney, Head of UNICEF Office, for the overall implementation of the MICS, Dr. Enrico Davoli, Dr. Giuseppe Domenico Annunziata, and Ms Suncica Arsovska.

EXECUTIVE SUMMARY

1. A survey to investigate the health and nutritional status of children and mothers in Macedonia was carried out in September 1999. A two-stage cluster sampling procedure was applied to select a population representative sample of households, in two strata (urban and rural). The survey was carried out on 1036 households and included 1765 children under 5 (6-59 months) and 1749 women of fertile age (15-45 years).
2. The survey involved the administration of a questionnaire, the implementation of physical measurements in children under 5 (weight and height, or length, clinical assessment of rickets signs and vision impairment) and their mothers (weight, height, clinical assessment of thyroid size) and biochemical assessment of micronutrient status (serum haemoglobin in women and children, serum ferritin, serum retinol and serum alkaline phosphatase in children).
3. Low BMI (<18.5 kg/m^2) was observed only in about 6% of the mothers, while more than one third of the women aged 25 years and above were overweight or obese (38%). Higher degrees of obesity were uncommon (10% of BMI 30.1-40 kg/m^2 and 1% of BMI > 40 kg/m^2).
4. Mild and moderate anaemia was observed in 12% of the mothers, with no differences by strata. There were no cases of severe anaemia.
5. Thyroid was palpable in 9% of mothers with a very small percentage (0.6%) of the mothers with visible goitre. There were no differences between urban and rural areas.
6. Low height-for-age was observed in 7% of the entire sample of children (6-59 months), with a higher proportion in rural areas (9%) than in urban areas (6%).
7. The overall prevalence of low weight-for-height was low (3.5%), and no differences were seen between the two strata nor between gender.
8. Mild and moderate anaemia was observed in 26% of the children (6-59 months). The prevalence of anaemia was significantly higher in rural children (29% of which 2% severe cases) compared to children living in urban areas (23% of which less than 1% severe cases).
9. Half of the children studied had low values of ferritin with significant differences between urban (47%) and rural (54%) strata. In rural areas severe cases of iron deficiency (17%) were more common than in urban areas (11%).There were no cases of iron overload.
10. Observed rickets signs in children varied with the chosen method of detection. Frontal and parietal bossing was present in 15% of the children, more often in rural areas; the prevalence of the other signs was very uncommon (less than 3%). Biochemical confirmation of rickets was only obtained in 2% of the children studied with no differences by strata. The analysis of the distribution by age did not identify any particularly vulnerable age.
11. Poor night vision in children was reported by 1% of the mothers, with no differences between strata. However, low values of serum retinol were present in 30% of the children studied. In urban areas vitamin A deficiency (31%) was more common than in rural areas (28%) but severe cases of vitamin A deficiency were higher in rural (2%) than in urban children (1%).

12. The vast majority of children under 2 years of age were being breastfed, at least partially (92%), with no significant differences between urban and rural areas. Forty five percent of the children under 4 months were exclusively breastfed. Exclusive breastfeeding dropped to 30% at the age of 6 months. In rural areas, exclusive breastfeeding was less common than in urban areas. Up to 4 months, 38% of the infants living in urban areas were receiving breast milk and other liquids. Predominant breastfeeding increased up to age of 3 months, when 50% of the children in urban areas and 37% of the children in rural areas were fed in this way. After the age of 3 months predominant breastfeeding dropped progressively as in urban and in rural areas as well.

13. One fifth of the children were using infant formula, usually as a substitute for breast milk, with no differences were found between urban and rural areas. Cow's milk was used as an alternative to breast milk for infants under 6 months in 5% of the cases in urban areas, but in 12% in rural areas. Cow's milk became a major food after the age of 6 months, but it is worth pointing out that, even in the second year of age, one fifth of the children were not consuming it. Fermented milk was not used in the first six months of life and was therefore not used as a breast milk substitute.

14. The early introduction of liquids other than breast milk is a very popular habit in Macedonia, particularly in rural areas. Water is introduced as early as the first week of life; tea is also used in the same way, in addition or in alternative to water. Only herbal teas are consumed (camomile, mint), while black tea is not used and is almost unavailable in the country. Fruit juices are also popular, and they are introduced at around 3-4 months of age, one month earlier than that recommended by the MCH Institute.

15. Complementary foods were given to the children starting from the fourth to fifth month. Fruit is the item that is introduced first. Vegetables are introduced one to two months later. Carbohydrate rich foods (porridges, pasta, biscuits, potatoes) are also introduced in the second semester of life. Meat is not introduced until 6 months with approximately half of the older children consuming it; fish is also introduced in the second semester, but less than one fourth of the children had consumed it; the consumption of cheese and eggs was reported by half of the children in the second semester of life.

16. Bread, vegetables, fruit, milk and dairy products were consumed almost every day both in urban and rural areas. Meat or fish and pasta, rice and potatoes were consumed approximately every second day. Pulses were consumed once-twice a week. There were no significant differences between urban and rural areas.

17. The quality of the water supplied to urban households was good, with almost the entire sample being served by piped water (98%) with virtually no use of water from unprotected wells. In rural areas 64% of people were served by piped water, 12% had a tube well, 17% had a protected dug well and the percentage of cases of unprotected wells came to 6%. The total sample of people living in urban areas had constant access to water. In rural areas this percentage was lower (86%) and in 13% of the households water was available only every second day.

18. In urban areas, toilet facilities were good and connected to a sewage system for a large majority of the households (88%). Approximately 6% of the households in urban areas use latrines and 0.6% have no toilet facilities at all. In rural areas, latrines were used by 41% of households surveyed and in general the quality of the latrines in this case was poorer, even lacking a cover.

19. The survey indicates good progress towards the achievement of the year 2000 goals of the World Summit for Children (see table) and an overall good nutritional situation of mothers and children. There is however a widespread micronutrient problem, which although not severe, can be dealt with by dietary modifications and improvements.

20. Public health measures should be taken to ensure maintenance and surveillance of the immunisation programme and to promote dietary recommendations in adults: control body weight; promote fruit and vegetable consumption.

21. Actions should be taken to increase the efforts in the BFHI: improvement in the timely initiation of breastfeeding; promotion of exclusive and continued breastfeeding; early introduction of liquids should be discouraged; promoting of recommendations for complementary feeding: including meat, dairy products, fruit and vegetables from about the sixth month.

22. Actions might be taken among vulnerable groups or regions to evaluate the feasibility of nutrition support programmes, using food coupons or distribution of food products with normal or modified nutrient composition, under the surveillance of the health service.

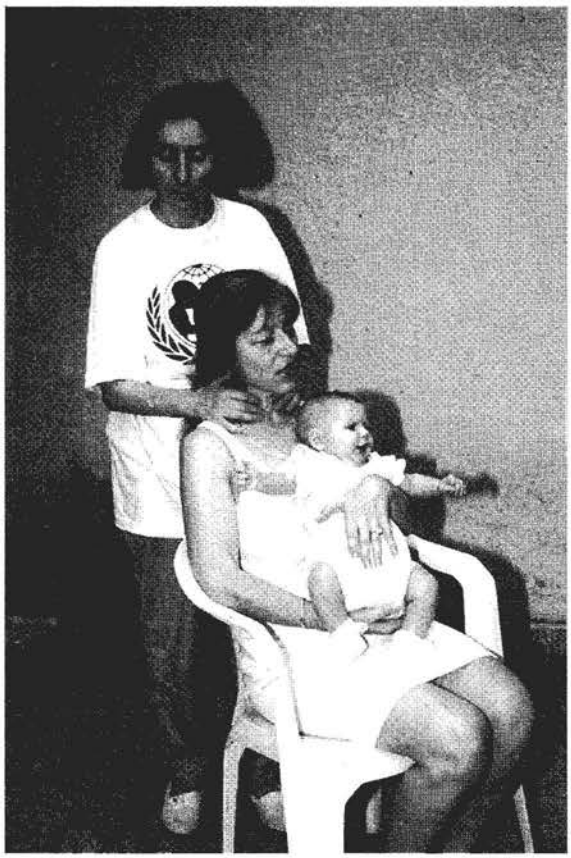
23. A multi-sectoral approach is most likely to yield sustained improvements in tackling the nutrition problems identified in this report. For maximum effect, this approach must include the mitigation of relative poverty which plays a key role in the causation of many nutritional problems.

SUMMARY TABLE OF INDICATORS – Household Information

		Urban	*Rural*	**Total**
Safe water supply	%	98.6	98.7	98.7
	C.I. 95%	97.1-100.1	97.5-100.0	97.6-99.7
Adequate sanitation	%	99.9	82.9	92.9
	C.I. 95%	99.6-100.1	70.9-94.8	88.0-97.8

SUMMARY TABLE OF INDICATORS – Mothers

		Urban	*Rural*	**Total**
Thinness	%	5.5	7.9	6.4
	C.I. 95%	3.9-7.1	4.7-11.0	4.8-7.9
Overweight/obesity	%	37.6	38.2	37.8
	C.I. 95%	33.2-41.9	30.5-46.0	33.9-41.8
Goitre (Stage I)	%	8.6	10.4	9.3
	C.I. 95%	3.6-13.5	6.7-14.2	6.0-12.7
Goitre (Stage II)	%	0.9	0.2	0.6
	C.I. 95%	0.0-1.8	0.2-0.6	0.1-1.2
Mild/moderate anaemia	%	11.7	12.4	12.0
	C.I. 95%	8.8-14.6	9.1-15.6	9.8-14.1



SUMMARY TABLE OF INDICATORS – Children

		Urban	*Rural*	**Total**
BCG Coverage	%	98.7	99.7	99.1
	C.I. 95%	97.1-100.2	99.0-100.3	98.2-100.0
DPT Coverage	%	98.7	96.9	97.9
	C.I. 95%	97.4-99.8	94.5-99.4	96.6-99.2
OPV Coverage	%	98.3	97.3	97.9
	C.I. 95%	96.9-99.7	94.9-99.7	96.6-99.2
MMR Coverage	%	93.4	90.2	92.0
	C.I. 95%	89.4-97.4	85.5-94.9	88.9-95.0
ORT Use	%	20.5	15.2	18.5
	C.I. 95%	11.9-29.0	5.0-25.3	11.9-25.1
Weight-for-Age Z	%	0.5	0.9	0.7
score < -3 SD	C.I. 95%	0.0-1.1	-0.3-2.2	0.1-1.3
Weight-for-Age Z	%	4.8	7.6	6.0
score < -2 SD	C.I. 95%	2.9-6.8	3.7-11.4	4.0-7.9
Height-for-Age Z	%	1.0	2.6	1.7
score < -3 SD	C.I. 95%	0.3-1.8	0.7-4.6	0.8-2.6
Height-for-Age Z	%	5.7	8.4	6.9
score < -2 SD	C.I. 95%	2.8-8.7	1.8-5.0	1.1-4.7
Weight-for-Height Z	%	0.5	0.4	0.7
score < -3 SD	C.I. 95%	-0.1-1.1	-0.1-0.9	0.1-1.3

Weight-for-Height Z score < -2 SD	%	3.5	3.8	3.6
	C.I. 95%	2.0-5.0	2.1-5.4	2.5-4.7
Exclusive Breastfeeding (0-4 months)	%	46.8	42.7	45.3
	C.I. 95%	38.0-55.7	28.2-57.1	33.6-53.0
Exclusive Breastfeeding (0-6 months)	%	38.6	33.6	36.6
	C.I. 95%	29.2-47.9	21.5-45.6	29.2-43.9
Predominant Breastfeeding (0-6 months)	%	31.9	27.9	30.3
	C.I. 95%	24.3-39.6	18.4-37.3	24.4-36.2
Timely complementary feeding (6-9 months)	%	6.9	8.5	7.6
	C.I. 95%	2.2-11.6	2.8-13.1	4.1-11.1
Continued breastfeeding at 1 year	%	34.3	32.4	33.4
	C.I. 95%	24.8-43.8	25.1-39.8	27.3-39.6
Continued breastfeeding at 2 years	%	9.8	10.9	10.3
	C.I. 95%	2.4-17.2	4.9-16.8	5.3-15.1
Bottle-feeding rate (0-12 months)	%	55.6	60.7	57.8
	C.I. 95%	49.4-61.8	52.6-68.8	52.8-62.8
Ever breastfed rate (0-12 months)	%	94.1	91.7	93.1
	C.I. 95%	90.0-98.2	87.2-96.3	90.1-96.1
Mild/moderate anaemia	%	22.8	27.3	24.8
	C.I. 95%	17.4-28.2	22.0-32.6	20.9-28.6
Severe anaemia	%	0.4	1.9	1.0
	C.I. 95%	-0.1-0.9	0.8-3.0	0.5-1.6
Severe low serum ferritin	%	11.0	17.1	13.7
	C.I. 95%	8.0-14.1	12.6-21.7	11.0-16.3
Mild low serum ferritin	%	36.1	37.3	36.7
	C.I. 95%	32.0-40.3	32.4-42.3	33.5-39.8
High serum alkaline phosphatase	%	2.2	2.4	2.3
	C.I. 95%	1.0-3.3	0.7-4.1	1.3-3.2
Severe low serum retinol	%	1.1	1.9	1.4
	C.I. 95%	0.0-2.1	0.0-3.8	0.4-2.5
Mild low serum retinol	%	30.3	25.7	28.3
	C.I. 95%	23.8-36.8	18.3-33.2	23.3-33.2

PROGRESS TOWARDS THE ACHIEVEMENT OF THE GOALS FOR YEAR 2000 OF THE WORLD SUMMIT FOR CHILDREN

Year 2000 Goal	***1994 MICS***	***Present MICS***	***Progress***
Maintenance of a high level of immunisation coverage (at least 90% of children under one year of age by the year 2000) against diphtheria, pertussis, tetanus, measles, poliomyelitis, tuberculosis, and against tetanus for women of child-bearing age	DPT III => 97%[1] Polio III => 97%[1] MMR => 98%[1]	DPT III => 98% MMR => 92%	Good achievement of the goal
Virtual elimination of vitamin A deficiency, and its consequences, including blindness	No information	Severe low serum retinol => 1.4% Mild serum retinol => 28.3%	Public health problem that requires intervention
Virtual elimination of iodine deficiency disorders	No information	9% of mothers with palpable goitre and 0.6% of mothers with visible goitre	Low prevalence but continued distribution of iodised salt
Empowerment of all women to breastfeed their children exclusively for four to six months and to continue breastfeeding, with complementary food, well into the second year	0-4 months Exclusive BF => 8% Predominant BF => 78%	0-4 months Exclusive BF => 45% Predominant BF => 34%	Good achievement of the goal that still needs educational efforts
Between 1990 and the year 2000, reduction of severe and moderate malnutrition among under-five children by half	HAZ <-2 => 9% (12% in rural areas)[2] WHZ <-2 => low[2]	HAZ <-2 => 10% (13% in rural areas)[2] WHZ <-2 => 6.5 (6% in rural areas)[2]	Low prevalence but dietary modification required
Universal access to safe drinking water	64%	99%	Good achievement of the goal
Universal access to sanitary means of excreta disposal	No information	93%	Good achievement of the goal

[1] Data collected in 1996
[2] 6-12 months old children

INTRODUCTION

The health and nutritional status of children in FYROM, although close to standards of the developed world, is still affected by a number of problems, resulting from poor economic development, environmental constraints and inadequate child care habits.

The infant mortality rate was 22.7 per thousand live births in 1995, largely accounted for by intestinal and respiratory infections. Child immunisation rates are high, and the country maintains a sound record of achievements, with the exception of a short period after independence when the supply of vaccines was interrupted. In 1996 DPT III had been regularly administered to 96.6% of the children, Polio III to 97.4% and MMR to 97.8% of children under one year of age.

The majority of the urban population (64%) has access to water from a main supply although in the rural population this proportion is only 20%.

The nutritional status of Macedonian children, particularly in early infancy, has created some concerns. In 1994, UNICEF MICS survey[1] showed a low prevalence of low weight-for-height, other than in children 6-12 months in the rural areas; but pointed out a higher prevalence of low height-for-age (9%), in the rural areas reaching 12%.

Although acute forms of malnutrition do not seem to be a public health problem, marginal forms, particularly as far as micronutrients are concerned, may occur in some population groups. According to clinicians and to public health specialists, anaemia seems to be a public health concern, although there is no quantitative information. A clinical study on 100 infants aged 1-12 months showed a 25.6% prevalence of mild/moderate anaemia, attributed to improper child feeding habits, i.e. use of cow's milk feeding[2] from the first few months of life. Other causes of anaemia may be attributed, such as β-thalassemia, gluten sensitive enteropathy and folate deficiency, but iron deficiency is likely to be a major cause of anaemia, as diagnosed children promptly respond to treatment with iron and folic acid supplements. According to the 1994 MICS survey[1], signs of rickets were present in 16% of the children examined. In a selected sample of 150 children affected by rickets, insufficient exposure to sun was detected[3]. No information is available on the vitamin A status of children. Clinical studies show decreased serum retinol in children affected by repeated infections (Peova S. and Stavrik K., personal communication). A survey carried out in 1995-96 showed the presence of thyroid enlargement in 18% of the children[4]. However, the median urinary excretion of iodine is 11.7 μg/dL, indicative of good iodine intakes, as a result of a salt fortification policy.

Children's feeding practices may be responsible for the nutritional problems observed. In 1994 78% of the infants under the age of 4 months were predominantly breastfed, but only 8% of the children were exclusively breastfed. Furthermore, diluted cow's milk is widely used to feed infants and fruit and vegetables are not commonly used as complementary foods.

---

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[3] Gocevska L. Ivanovska N., Trencevska N., Lazova D. Prevalence of rickets in infants from o to 12 months of age. Mimeo s.d.

[4] Karanfilski B., Bogdanova V., Vaskova O., Loparska S., Ristevska S.M., Shestakov G. Iodine deficiency in the FY Republic of Macedonia. UNICEF 1998.

After consideration of the unavailability of recent data on the nutritional status of children, UNICEF and the Ministry of Health of the FYROM promoted a survey on the health and nutrition of mothers and children. This resulted in the decision to conduct a nation-wide survey during November 1999. The information collected and presented in this report will be used in preparation of an Action Plan for children's nutrition in FYROM and as a baseline for Nutrition Monitoring Activities.

OBJECTIVES

The purpose of the survey is to monitor the progress towards the achievement of the goals of the World Summit for Children and to investigate the nutritional status of mothers and children.

The specific objectives of the survey are:

1. to measure the indicators envisaged by the MICS survey;
2. to measure indicators of nutritional status of mothers and children;
3. to measure indicators of micronutrient deficiencies;
4. to evaluate feeding patterns of infants and young children.

METHODS

Definition of the indicators

Table 2.1 - Household Information

Indicator	*Numerator*	*Denominator*
Safe Water Supply	Number of households in which 1. source of drinking water is piped-in or public 2. tap or tube well or borehole or protected dug well or protected spring; 3. water is constant or once a day 4. the source of water is on premises or less than 100 m.	Total number of household surveyed
Adequate Sanitation	Number of households in which 1. the toilet facility has flush to sewage system or flush to septic tank or pour flush latrine or covered by dry latrine; 2. the toilet facility is within dwelling or at less than 50 m.	Total number of household surveyed

Table 2.2 – Mother's Indicators

Indicator	*Numerator*	*Denominator*
Thinness	Number of mothers 25-45 years with BMI < 18.5 kg/m^2	Total number of mothers 25-45 years observed
Overweight/ Obesity	Number of mothers 25-45 years with BMI > 25 kg/m^2	Total number of mothers 25-45 years observed
Goitre (Stage I)	Number of mothers 15-45 years with goitre detectable only by palpation and not visible	Total number of mothers 15-45 years observed
Goitre (Stage II)	Number of mothers 15-45 years with palpable and visible goitre	Total number of mothers 15-45 years observed
Mild/moderate anaemia	Number of mothers 15-45 with Haemoglobin 7-11.9 g/dL	Total number of mothers 15-45 years observed

Table 2.3 – Children's Indicators

Indicator	*Numerator*	*Denominator*
BCG Coverage	Number 13-24 month-olds receiving BCG vaccine before 13 months[1]	Total number of 13-24 month-olds surveyed
DPT Coverage	Number 13-24 month-olds receiving DPT3 vaccine before 13 months[1]	Total number of 13-24 month-olds surveyed

[1] The 13-24 month age interval rates were chosen over the 12-23, as required by the MICS methodology, because the administration of MMR in Macedonia is scheduled at 13 months.

OPV Coverage	Number 13-24 month-olds receiving OPV3 vaccine before 13 months[1]	Total number of 13-24 month-olds surveyed
MMR Coverage	Number 13-24 month-olds receiving MMR vaccine before 13 months[1]	Total number of 12-23 month-olds surveyed
ORT Use	Number of diarrhoea cases in children 0-59 months during 2 weeks before the survey who receiving ORT	Total number of diarrhoea cases among under-five in two weeks preceding survey
Weight-for-Age Z score (WAZ)	Number of 6-59 month-olds who fall below –2 standard deviations from the median weight-for-age of the NCHS/WHO standard; number who fall below –3 SDs	Total number of 6-59 month-olds weighted
Height-for-Age Z score (HAZ)	Number of 6-59 month-olds who fall below –2 standard deviations from the median height-for-age of the NCHS/WHO standard; number who fall below –3 SDs	Total number of 6-59 month-olds measured
Weight-for-Height Z score (HAZ)	Number of 6-59 month-olds who fall below –2 standard deviations from the median weight-for-age of the NCHS/WHO standard; number who fall below –3 SDs	Total number of 6-59 month-olds measured
Exclusive Breastfeeding (0-4 months)	Number of infants less than 4 months of age who receive only breastmilk with no other liquids or solid with the exception of drops or syrups consisting of vitamins, mineral supplements, or medicines[2].	Total number of infants 0-3 months of age surveyed
Exclusive Breastfeeding (0-6 months)	Number of infants less than 6 months of age who receive only breastmilk with no other liquids or solid with the exception of drops or syrups consisting of vitamins, mineral supplements, or medicines[2].	Total number of infants 0-5 months of age surveyed
Predominant Breastfeeding (0-6 months)	Number of infants less than 6 months of age who receive breastmilk along with water, water-based drinks (sweetened and flavored water, teas, infusions, etc.), fruit juice, oral rehydratation salts solution, but does not receive any other liquids or solids. No food-based fluids (except fruit juice and sugar-water) are allowed[2].	Total number of infants 0-5 months of age surveyed
Timely complementary feeding (6-9 months)	Number of children 6-9 month-olds receiving breast milk and complementary foods[2]	Total number of infants 6-9 months old surveyed
Continued breastfeeding at 1 year	Number of infants 12-15 months still breastfeeding[2]	Total number of 12-15 month-olds surveyed

[2] The information about infant feeding pattern were collected with a 24 hour recall questionnaire; the methodology suggested by the Tool Kit Monitoring and Evaluating Breastfeeding Practices and Programs of the Wellstart International's Expanded Promotion of Breastfeeding Program was followed.

Continued breastfeeding at 2 year	Number of infants 20-23 months still breastfeeding[2]	Total number of 20-23 month-olds surveyed
Bottle-feeding rate (0-12 months)	Number of infants less than 12 months old receiving any food or drink from a bottle[2]	Total number of under-ones surveyed
Ever breastfed rate (0-12 months)	Number of infants less than 12 months old ever breastfed[2]	Total number of under-ones surveyed
Low birth weight	Number of children 0-59 months in whom a birth weight of less than 2.5 kg is reported	Total number of children 0-59 months surveyed
Mild/moderate anaemia	Number of children 6-59 months with Haemoglobin 7-10.9 g/dL	Total number of children 6-59 months observed
Severe anaemia	Number of children 6-59 months with Haemoglobin < 7 g/dL	Total number of children 6-59 months observed
Severe Low serum ferritin	Number of children 6-59 months with serum ferritin < 10 ng/mL	Total number of children 6-59 months observed
Mild Low serum ferritin	Number of children 6-59 months with serum ferritin 10-20 ng/mL	Total number of children 6-59 months observed
High serum alkaline phosphatase	Number of children: 6-12 months (male) ALKP > 300 IU/L 6-12 months (female) ALKP > 330 IU/L 12-36 months (both sex) ALKP > 320 IU/L 36-59 months (both sex) ALKP > 380 IU/L	Total number of children 6-59 months observed
Severe low serum retinol	Number of children 6-59 months with serum retinol < 10 µg/dL	Total number of children 6-59 months observed
Mild low serum retinol	Number of children 6-59 months with serum retinol 10-20 µg/dL	Total number of children 6-59 months observed

Sampling

The survey was carried out on a nationally representative sample of rural and urban households to estimate national levels of the selected indicators. Table 2.1 shows the sample size required to calculate the prevalence of the main conditions in children and adult women with a relative precision of 5%, a 95% confidence level and a 10% sample loss. The calculation of the sample size was based on the expected prevalence of the main target conditions listed in the objectives, using estimates given by previous surveys.

Table 2.1 – Calculation of sample size in children and women

Indicator	*Population*	*Estimated Prevalence*	*Exp. Precision*	*Cl. Factor*	*Sample size*	*+10% non participation*
Immunisation coverage in children 13-24 months	30,490	91	5	2	251	276
Ht-for-age <-2 SD in children 6-59 mos.	137,210	9	5	2	252	277
Exclusive breastfeeding in children 0-4 mos.	10,163	8	5	2	224	246

Anaemia in children 6-59 mos.	137,210	25	5	2	576	633
Rickets in children 6-59 mos	137,210	16	5	2	413	454
Anaemia in mothers 15-44 yrs.	362,616	10	5	2	277	305

A sample size of 633 children aged 6-59 months and 305 mothers aged 15-44 years is sufficient to give estimates of the proportions of all indicators with a 5% error at the 95% confidence level in each stratum. For the assessment of exclusive breastfeeding a sample of 246 children aged 0-4 months is required and for the assessment of immunization coverage a sample of 275 children aged 13-24 months is required. Households with at least one child under 5 (0-59 months) were included. Calculating that an average of 1.1 children 6-59 months old could be found in each household with children under 5, a number of 575 households should have been surveyed. Considering a further 5% sample loss due to the unavailability of the selected families, a total number of 604 households should have been surveyed in each stratum. This number could be achieved by selecting 30 clusters of 20 households in each stratum. The selection of the households was based on the 1994 census. In each stratum only 60 children 0-4 months old and 180 children 13-24 months old were likely to be found; therefore, 186 additional 0-4 months old infants (7 per cluster) and 95 additional 13-24 months old children (4 per cluster) had then to be identified by going to additional households. Anthropometry, biochemical and clinical assessments were not performed in the additional sample of children aged 0-4 months and 13-24 months. This sampling procedure was necessary to ensure adequate numbers of individuals in the age classes required to describe the main MICS indicators. The data on households and on mothers obtained in the additional sample of children 0-4 months and 13-24 months were not pooled with those obtained in the main sample of 6-59 months old children. In the absence of detailed census data with such an age breakdown, it is not possible to calculate weighting factors that could balance the sample.

Sampling strategy

The location of the clusters was decided with a two-stage procedure. At the first stage, the number of individuals that could be classified in each of the two strata (urban and rural) was listed by region, using 1994 census information. In the absence of a clear definition of rural, all centres below 8,000 inhabitants, in which agriculture was the main occupation, and houses the main dwelling type, were considered as rural. Clusters were allocated to each of the regions with a probability proportional to size methodology. At the second stage, within each region and within each stratum, clusters were allocated to smaller administrative units (cities, villages, settlements) with a probability proportional to size methodology. The list of administrative units chosen is provided in Annex I. In each location a household selected at random was chosen as a starting point of a random walk. Household selection procedures are specified in the guidelines for field staff, provided in Annex II and summarised by the flow chart presented.

Questionnaire

A questionnaire was designed to provide relevant indicators of the health/nutrition status of the children below 5 years old and women in reproductive age as outlined in the survey objectives. The questions were translated into Macedonian and back translated into English. The questionnaire covered the following areas:

- Household characteristics: number of people in different age groups; gender and educational level of the head of household.
- Household vulnerability and food security: presence of disabled people; income source, sale of assets, meal skipping, home production of fruit and vegetables or animal products; availability of food in the past week; humanitarian aid received.
- Mortality: number and age of household members who died in the past year.
- Water and sanitation
- Child health and infant feeding: immunisation coverage (DPT, OPV, MMR, and BCG); morbidity for diarrhoea; infant feeding practices (breastfeeding and complementary feeding).
- Women's health status: family status; mother's education and job; number of pregnancies; pregnancy status; access to antenatal care.

The full questionnaire is provided in Annex III.

Anthropometry

Weight and supine length were measured in all children 6-23 months; weight and standing height in all children 24-59 months; weight and height in all mothers. Neither weight or height were measured in pregnant women. Anthropometric measurement procedures have been standardised using guidelines published by the United Nations (1989) and WHO (1995)[5]. Measurers were adequately trained and performed a quality control exercise.

Weight

Women were weighed on digital electronic scales (UNICEF cat. no.**) and the measurements recorded to the nearest 0.1 kg. The subjects were dressed in a standard way, with skirt, blouse and underwear and without shoes hence a fixed value of 1 kg was subtracted from the recorded weight during data analysis. Children 6-59 months able to stand were measured like their mothers. Children unable to stand were weighed with an adult and their weight determined as the difference between the woman's individual weight and combined weight with the child. The scale allowed for subtraction of the mother's weight so that net values of the child's weight could be directly displayed. In children a fixed value of 0.3 kg corresponding to shirt and underpants, was subtracted during the data analysis.

Height

Women and children were measured to the nearest 0.1 cm using portable stadiometers (UNICEF) suitably modified to hold a height measuring tape. Survey teams were instructed to repeat measuring the subjects until two measures differed by no more than 0.5 cm and then to record the second of the two measures.

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[5] United Nations (1989). How to weight and measure children: assessing the nutritional status of young children in household surveys. New York
World Health Organisation (1995). Physical status: the use and interpretation of anthropometry report of a WHO expert committee. WHO Technical Report Series 854.

Clinical assessment

Clinical assessments were performed by team paediatricians during the household visits.

The presence of rickets signs was assessed in all children under 5. Physicians looked for the presence of the following signs:

a) epiphyseal enlargement at the wrist;

b) presence of areas of softening of the skull (usually involving the occipital and parietal bones);

c) frontal and parietal bossing;

d) persistently open anterior fontanella on palpation after the age of 18 months;

e) beading of the ribs (symmetrical nodular enlargement of the costochondral junctions, producing a «rosary» effect).

In all mothers in the house, thyroid palpation was carried out. Physicians evaluated the presence of palpable and visible thyroid and recorded their findings with simplified WHO (1995)[6] criteria as stage 0 (no goitre), stage 1 (goitre detectable only by palpation and not visible) or stage 2 (goitre palpable and visible).

Biochemical assessment

In all children 6-59 months and in non-pregnant mothers, capillary blood was collected for the measurements of haemoglobin, ferritin, serum retinol and alkaline phosphatase. Laboratory staff were extensively trained to obtain good capillary samples. The subjects were asked to sit and relax, their middle finger of the left hand was massaged gently and pricked with a sterile lancet. The first drop of blood was removed and the second one was sucked by capillarity with a cuvette containing dry Drabkin reagent.

Subsequently, laboratory technicians collected approximately 300 μL blood with a capillary. The blood was collected in a tube (Tervuo) containing serum separator gel with amber wells. The labelled tube was put in a cold box and kept until the team returned to the base, at the end of the day. The blood sample was then transferred to a central laboratory and analysed within 24 hours from collection. The samples were then centrifuged for serum separation and aliquoted for the single determinations.

Haemoglobin

A field haemoglobin analyser (Hemocue™) was used to assess haemoglobin to the nearest 0.1g/dL. Haemoglobinometers were checked several times a day with a control cuvette. The instruments were only used if the reading was within ±0.3 g/dL of the cuvette factory value.

The cut-off points used to define the different classes of anaemia are shown in table 2.2[7].

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[6] World Health Organisation (1995). Regional office for the Eastern Mediterranean. Iodine deficiency: What is and how to prevent it. Alexandria Egypt.

[7] World Health Organisation, United Nations Children's Fund, United Nations University (1998). Iron Deficiency Anaemia: Assessment, Prevention and Control. WHO Geneva.

Tab. 2.2 – Definition of anaemia based on blood haemoglobin concentrations (g/dL)

AGE	Severe anemia	Moderate anemia	Mild anemia	No anemia
Children (6-59 months)	<7	7–9.9	10-10.9	≥11
Women (15-45 years)	<7	7–9.9	10-11.9	≥12

In considering the public health significance of this indicator, WHO/UNICEF/UNU (1996)[8] propose to classify "high" a prevalence of anemia of at least 40%, "medium" a prevalence of 15-40% and "low" a prevalence of less than 15%.

Ferritin

Ferritin is an important iron-binding protein and its main function is iron storage. Low serum ferritin indicates low iron stores while iron overload conditions are recognisable by elevated serum ferritin concentrations. However, serum ferritin is also an acute-phase reactant protein that is elevated in response to infection.

A 60 μL serum sample was aliquoted and analysed in a Cobas Mira analyser with an immunoturbidimetric method (UNIMATE 3 FERR by Roche). The human serum ferritin forms a precipitate with the suspended anti-ferritin coated latex particles. This results in an increase in turbidity that is determined turbidimetrically. The measurement of cloudiness occurs at 600nm after a fixed time and the ferritin concentration is expressed in ng/ml.

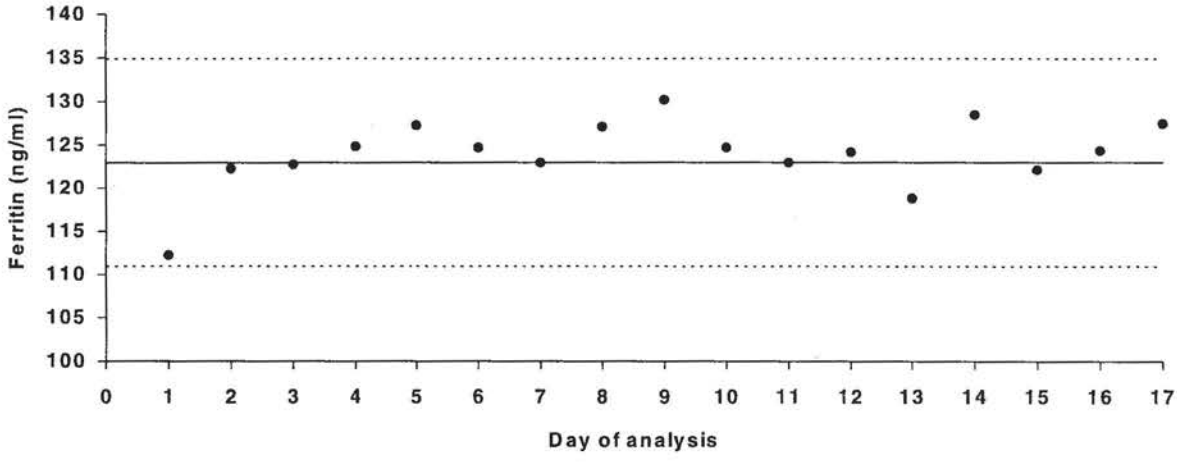
A calibration curve was generated by using the 0, 12.5, 50, 100, 200 and 300 ng/ml of a standard solution of human liver ferritin (FERR T Standard by Roche). The concentration of the standard solutions have been determined using a turbidimetric technique and are traceable to the World Health Organisation Reference Preparation for Human Liver Ferritin[9]. The instrument was calibrated at the start of the work. The calibration is stable for up to 30 days.

A quality control (FERR/MYO Control T by Roche) was utilised daily to monitor accuracy and precision. Figure 2.1 shows the quality control chart. The coefficient of variation was 3.7%; the fluctuations were random and within the given ranges (111-135 ng/ml).

[8] World Health Organisation, United Nations Children's Fund, United Nations University (1996). Indicators for assessing iron deficiency and strategies for its prevention (draft based on a WHO/UNICEF/UNU Consultation, 6-10 December 1993). WHO, 20 Avenue Appia, CH-1211, Geneva 27, Switzerland.

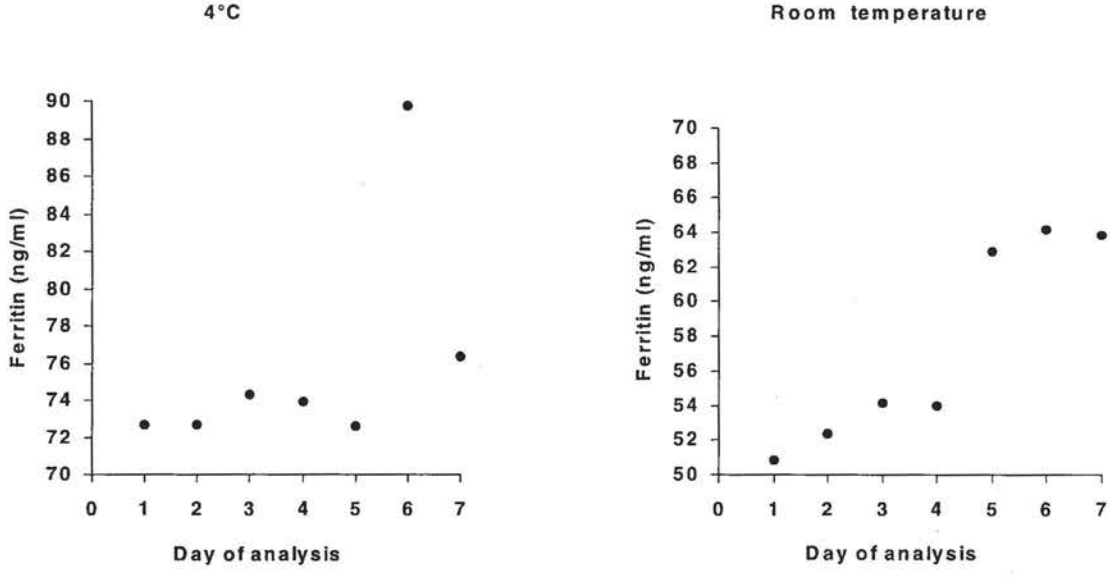
[9] World Health Organisation (1985). Biological standardisation. Thirty-fifth report of a WHO Expert Committee. WHO Technical Report Series 725

Figure 2.1 - Quality control chart of serum ferritin measurements



In order to test the stability of the samples at 4°C and at room temperature a pool of serum collected from healthy children was analysed daily for 7 days. Figure 2.2 shows the results of these determinations. The coefficient of variation at 4°C was 8% and at room temperature was 10%. Ferritin concentration increased under the two condition of storage. Besides the concentration of ferritin in serum kept at 4°C (76±6) was significantly higher than that in serum kept at room temperature (57±6). However, in 24 hours, there was no significant change of concentration in samples kept refrigerated.

Figure 2.2 - Stability of serum for ferritin measurements



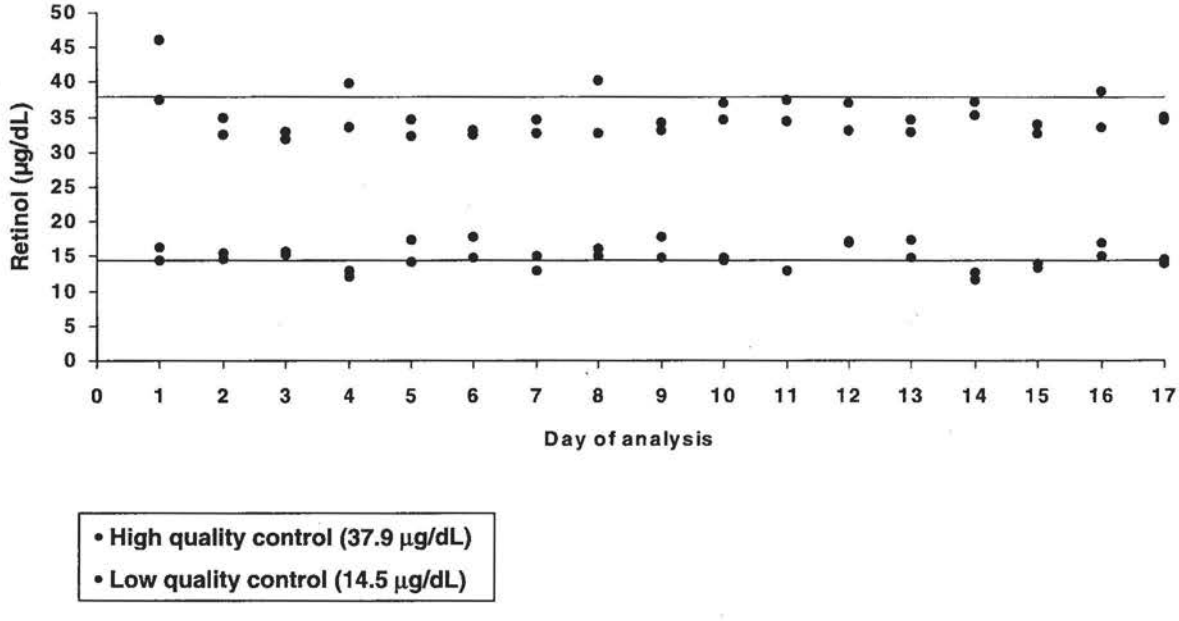
In infants and young children there are still some uncertainties about the appropriate cut-off values for serum ferritin levels. These reference ranges have been obtained by another immunoturbidimetric test (Tina-quant Ferritin 2nd generation), giving similar results. For children 4 months-16 years old normal values lie between 20-200 ng/ml[10]. Values lower than 10 ng/ml indicate virtual exhaustion of the body iron stores (severe deficiency) and values over 200 indicate iron overload.

Retinol

Laboratory assessment was carried out by measuring serum retinol in all children 6-59 months. After centrifugation (5 minutes at 2500 rpm), 40 µL serum were mixed with 2 ml of 0.1m NaCl. The tubes were thoroughly mixed with a vortex.

Serum retinol was measured with a fluorometric method. The instrument used was a Turner Fluorometer TD-700 equipped with a mercury lamp with an excitation filter NB313 and an emission filter SC450. The reading was carried out in a quartz cuvette, in a fixed time of 12 seconds to control for fluctuations in fluorescence with changes in temperature. The instrument was calibrated daily with three standards, the concentration of which had been determined by HPLC (STD1 low=23.6 µg/dL; STD2 medium=35.0 µg/dL; STD3 high=50.6 µg/dL), after blanking the instrument. Quality controls were used for testing the instrument conditions. Standards and quality controls were kindly provided by CDC and prepared as samples. Twice a day, at the beginning and at the end of the determination series, a serum quality control with a low concentration (14.5 µg/dL) and a quality control with a high concentration (37.9 µg/dL) were analysed. Figure 2.3 shows the quality control chart for the two concentrations. The coefficient of variation of low quality controls was 11% and of high quality controls was 8%. Figure 2.3 also shows that the fluctuation was random.

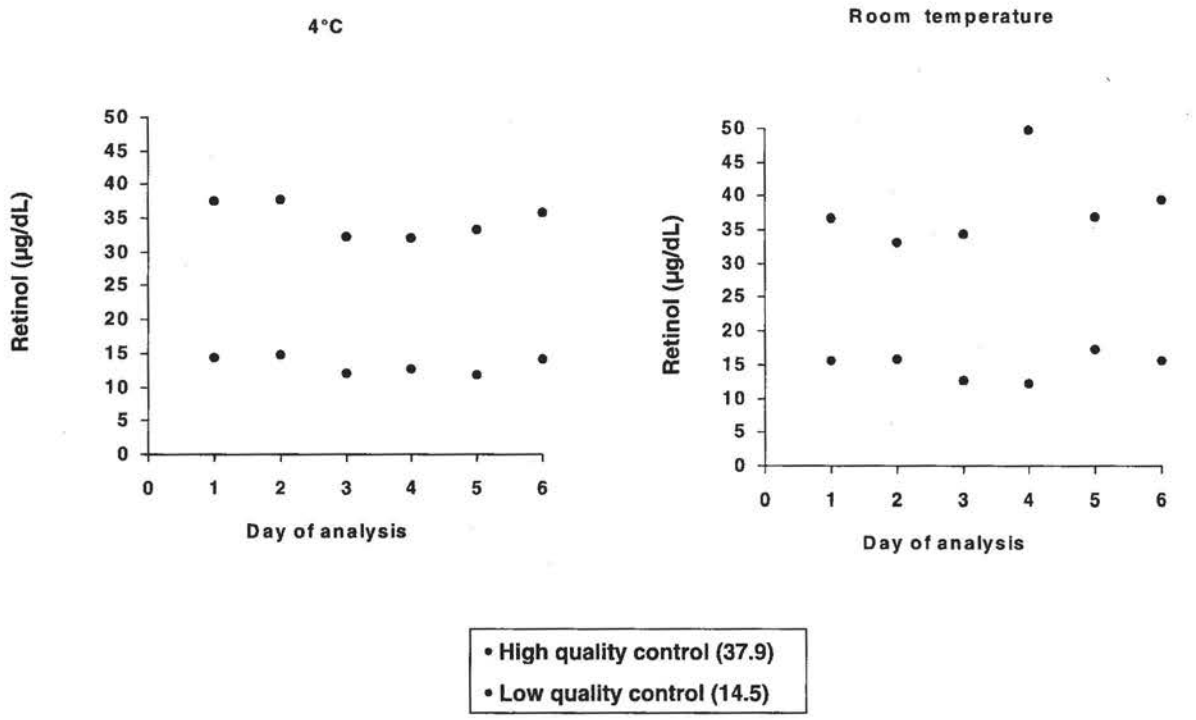
Figure 2.3 - Quality control chart of serum retinol measurements



[10] Fischbach F. (1990). Ermittlung altersabhangiger referenzwerte des transferrins in plasma und des ferritins in serum und plasma. Diatrend 15:7

In order to test the stability of serum retinol within the present survey, two pairs of quality controls were measured daily for six days. One of the pair was kept at 4°C and the other left at room temperature. Figure 2.4 shows the results of these determinations. At 4°C the coefficient of variation was 10% for low quality controls and 7% for high quality controls. At room temperature the values were more variable with wider fluctuations: low quality controls showed a coefficient of variation of 19% and high quality controls of 23%. In both cases there was no drift. Samples kept at 4°C for 24 hours did not show significant changes in retinol concentrations.

Figure 2.4 - Stability of serum retinol quality controls



For children, a serum retinol concentration below 10 µg/dL indicates severe deficiency; a value between 10 and 20 µg/dL indicates mild/moderate deficiency; values ≥20 µg/dL are considered normal[11] (FAO, 1989). When more than 10% of the population has serum retinol below 20 µg/dL (0.7 µmol/L) vitamin A deficiency is considered a public health problem[12].

Alkaline phosphatase

Serum total alkaline phosphatase activity is the most commonly used biochemical marker of rickets. Serum alkaline phosphatase is elevated in nutritional rickets and is instead decreased in growth retardation.

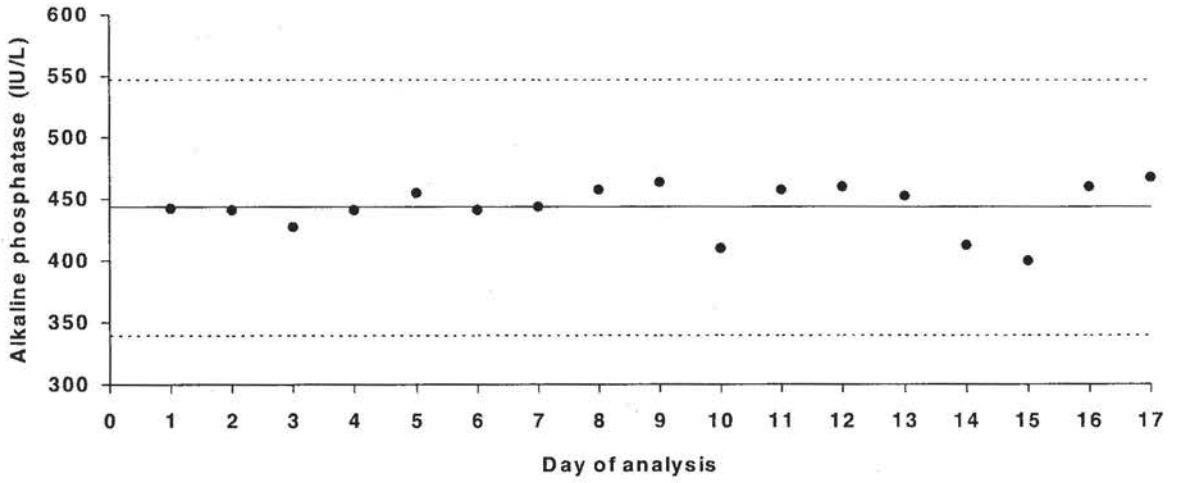
[11] Food and Agriculture Organisation 1989. Besoins en vitamine A, fer, acide folique et vitamine B_{12}. Rapport d'une consultation conjointe FAO/OMS d'experts. Roma.

[12] World Health Organisation (1996). Indicators for assessing vitamin a deficiency and their application in monitoring and evaluating intervention programmes. Miconutrient Series. WHO/NUT/96.10. WHO, Geneva.

Measurement of serum alkaline phosphatase was carried out in all children 6-59 months. Alkaline phosphatase was measured with a micromethod on a dry-slide chemistry analyzer. The equipment utilised was a Vitros System Ektachem 250 (Johnson & Johnson). The method is based on the enzymatic hydrolysis of p-nitrophenil phosphate, catalyzed by alkaline phosphatase in the serum sample; the products formed are H_3PO_4 and p-nitrophenol. The reaction occurs on a multistratum dry-slide. The dry-slides were kept at 4°C and were left at room temperature for at least 30 minutes before use. The determination required 20 µL of serum that was placed in a sample cup. An automated system collected 11 µL serum from the cup and dispensed it onto the top diffusion stratum of the dry slide, isotropic porotic structure that ensures a uniform distribution. The diffusion stratum also contains the substratum for enzymatic hydrolysis. In an alkaline environment and in the presence of a buffer and aminometilpropanol, a yellow complex is produced that migrates in the underlying stratum, where it is measured by reflection photometry. The activity of alkaline phosphatase is proportional to the rate of p-nitrophenol formation measured by kinetic determination. The time of incubation was 5 minutes at 37°C, the wavelength 400nm and the enzymatic activity was expressed in IU/ L. Hemolysis interferes with the phosphatase alkaline measurement. Thus, hemolyzed samples could not be used.

The instrument was calibrated daily with a calibrator kit. A quality control with a physiological concentration was used for testing instrument performance. Figure 2.5 shows the quality control chart. The coefficient of variation was 4.5%; the fluctuations were random and within the given ranges (340-548 IU/L).

Figure 2.5 - Quality control chart of serum alkaline phosphatase measurements



To test the stability of serum at 4°C and at room temperature, an aliquot from a pool of children's sera was analysed daily for 7 days, as for the other analytes. Figure 2.6 shows the results of these determinations. The coefficient of variation was 2.5% at 4°C and 5.7% at room temperature. Concentration increased with time. The serum concentration of alkaline phospatase at 4°C (147±4) was significantly lower than at room temperature (157±9). In samples kept refrigerated for 24 hours alkaline phophatase concentration was not different from that of the fresh sample.

Figure 2.6 - Stability of serum for alkaline phosphatase measurements

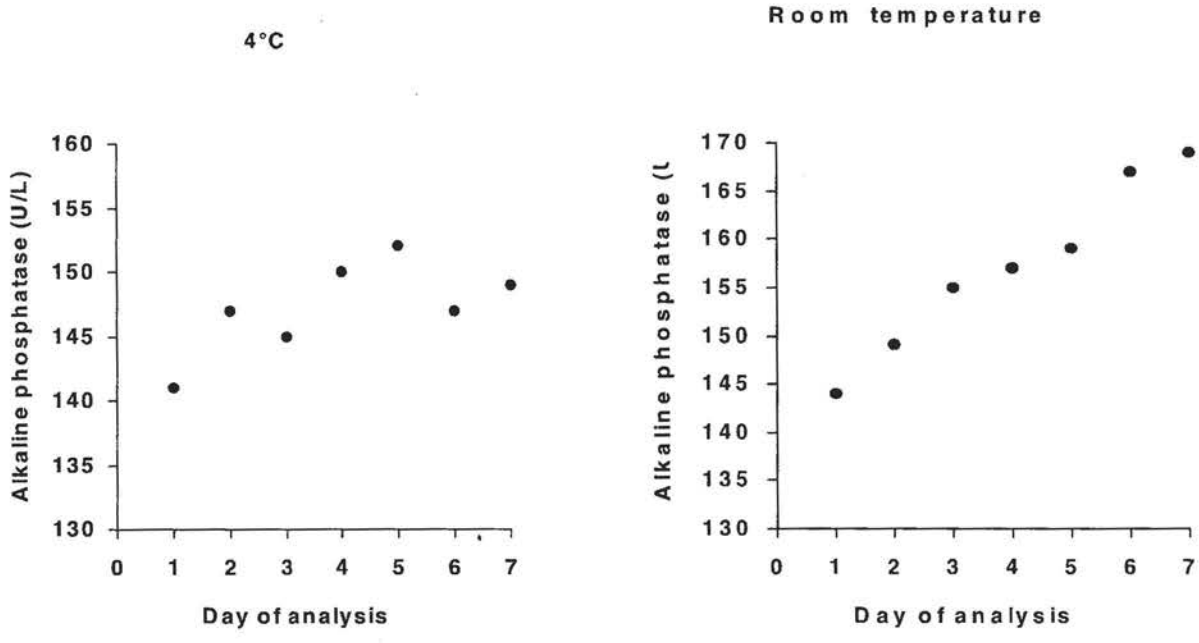


Table 2.3 shows the reference values for the enzyme in different classes of age and for both sex[13].

Tab. 2.3 - Reference values for serum alkaline phosphatase

AGE	MALE (IU/L)	FEMALE (IU/L)
7-12 months	60-300	60-330
1-3 years	145-320	145-320
4-6 years	150-380	150-380

Field work

Data collection was carried out by 9 teams of three people each. All teams were composed of 1 person with specific training in interview techniques, 1 paediatrician and 1 laboratory technician.

A senior person was appointed to supervise a set of three teams. The supervisors were responsible for selecting the cluster, controlling interview techniques, standardising measurement procedures, controlling data entry, controlling biological sample collection, storage and transport to the central laboratory.

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[13] Lockitch G., Halstead AC, Albersheim S, MacCallum C, Quigley G. (1988). Age- and sex-specific paediatric reference intervals for biochemistry analytes as measured with the Ektachem-700 analyzer. Clin Chem 34(8):1622-5.
Soldin SJ, Savwoir TV, GuoY. (1997). Paediatric reference ranges for alkaline phosphatase, aspartate aminotransferase, and alanine aminotranferase in children less than 1 year old on the Vitros 500. Clin Chem 43:S199.

Data Management

Data Entry

Daily input of information collected was carried out by a team of four data entry specialists, with a specifically designed Access software in order to reduce data entry errors.

Data Cleaning

Data sets were checked for outliers. Some outliers were real values, due to exceptional subjects being included in the sample (e.g. a 130 kg woman). In order to identify outliers, distributions for each variable were plotted. The following values were considered outliers and excluded from further data analysis: haemoglobin (g/dl): <5 and >16; height-for-age, weight-for-age; weight-for-height: Z-score <-5 and >5; women's weight (kg): <30; women's height (cm): <130. 'Don't know' was recorded as missing value.

Calculating Population Weight

In order to calculate national prevalence figures, a different weighting factor was applied to each of the two strata. This population weight was obtained by dividing the total number of children under 5 in each strata by the number of children under 5 included in the sample (Tab.2.4). According to this method, each weight is the number of individuals represented by the record in which it appears, and the sum of the weights for the entire sample corresponds to the size of the population from which the sample was drawn.

Table 2.4 – Calculation of population weight

POPW = Total Population/Studied Sample			
	Total Population of Children Under 5	**Studied Sample of Children Under 5**	**POPW**
Urban	121385	1050	115,605
Rural	94724	1045	90,645

Data analysis

Data analysis was carried out on using Epi6 and Access for Windows software packages. In order to examine the results for each population strata, cross tabulations were produced for all variables in the data set. The same technique was followed for examining results by strata and by sex.

For continuous variables (e.g. Haemoglobin, Alkaline Phosphatase, Serum Retinol, Weight-for-Height, Height-for-Age, Weight-for-Age, Birth weight, BMI) Student T-test was performed. Such variables were then transformed into categorical and cross tabulations were produced.

Confidence Intervals of proportions were calculated using Epi6 Cluster Sampling Analysis (CSAMPLE). The Primary Sampling Unit (PSU) was the cluster number. The primary stratum from which PSUs were chosen were the population strata. The sample weight was the population weight. In these calculations the "design effect" was also considered.

3. RESULTS

Description of the sample

Tables 3.1 to 3.4 report the number of children under 6-59 months, the number of children 0-24 months, the number of children 13-24 months and the number of mothers in fertile age included in the sample. The required sample size was achieved for each age group considered.

Tab. 3.1 - Number of children 6-59 months by Population Strata

	Count	Cumulative Count	Target	% Target
Urban	873	873	633	138
Rural	892	1765	633	141

Tab. 3.2 - Number of children 0-24 months by Population Strata

	Count	Cumulative Count	Target	% Target
Urban	700	700	246	285
Rural	692	1392	246	281

Tab. 3.3 - Number of children 13-24 months by Population Strata

	Count	Cumulative Count	Target	% Target
Urban	335	335	275	122
Rural	324	659	275	118

Tab. 3.4 - Number of mothers 15-45 years by Population Strata

	Count	Cumulative Count	Target	% Target
Urban	906	906	305	297
Rural	843	1749	305	276

3.1. Household information

Table 3.1.1 shows the type of dwelling of the household studied. Most of the population lived in houses (80%). In urban areas the percentage of people that live in flats (32%) is bigger than in rural areas (3%). The households studied had a mean of 4 rooms (table 3.1.2) with no differences between urban and rural areas. Table 3.1.3 indicates the low percentage of the resident population hosting refugees. Figure 3.1.1 shows the ethnic composition of the population within the two strata. Albanian speakers comprised a smaller percentage of the urban population (11%) than the population of rural areas (28%). Conversely, both Macedonian and Roma speaking groups are found more frequently in urban than in rural areas.

Tab. 3.1.1 – Type of dwelling by Population Strata

	Type of dwelling		Total
	Flat	**House**	
Urban	177	391	568
*Row %	31.2	68.8	100.0
*95% C.I.	17.2-45.1	54.9-82.8	
Rural	14	454	468
*Row %	3.0	97.0	100.0
95% C.I.	1.5-4.5	95.5-98.5	
Total	191	845	1036
*Row %	20.1	79.9	100.0
*95% C.I.	11.2-28.9	71.0-88.8	

*weighted

Pearson Chi-square: 135.41, p=0.0000; Missing Values=0

Tab. 3.1.2 – Average Number of Rooms per House by Population Strata

	n	Mean ± SD
Urban	568	3.53±1.47
Rural	465	3.73±1.50
Total	1033	3.61±1.49

t-Test: t=-2.09 and p=0.04; *Missing Values=3.*

Tab. 3.1.3 – Residential Status by Population Strata

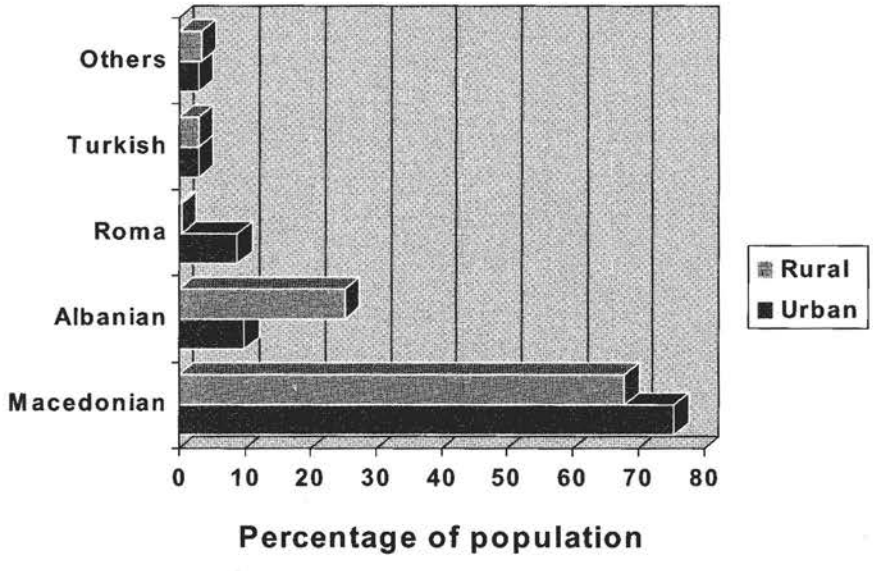
	Hosting of Refugees		Total
	Households not Hosting Refugees	**Households Hosting Refugees**	
Urban	567	1	568
*Row %	99.8	0.2	100.0
*95% C.I.	99.5-100.2	-0.2-0.5	
Rural	466	2	468
*Row %	99.6	0.4	100.0
*95% C.I.	98.7-100.4	-0.4-1.3	

Total	1033	3	1036
*Total %	99.7	0.3	100.0
*95% C.I.	99.3-100.1	-0.1-0.7	

*weighted

Pearson Chi-square: 0.56, p=0.45; Missing Values=0

Figure 3.1.1 -Prevalence of Ethnic Group by Population Strata



Demographic information

Household composition

In rural areas there were larger families than in urban areas (Tab. 3.1.4). Households included in the survey had, on average, more than one child under 5 (1.3±0.6), with significantly more children in rural than in urban areas (Tab. 3.1.5). The ratio of dependent (boys and girls under 18 + adults above 65) to independent (adults 18-65 years) was less than 1 in the whole population, with a significantly higher ratio in rural areas than in urban areas (Tab. 3.1.6).

Tab. 3.1.4 – Average number of household members by Population Strata

	n	Mean±SD
Urban	568	4.82±1.59
Rural	468	5.27±1.85
Total	1036	5.03±1.73

t-Test: t=-4.16 and p=0.00003; *Missing Values=0.*

Tab. 3.1.5 – Average number of children 0-59 months per household by Population Strata

	n	Mean ± SD
Urban	568	1.27±0.53
Rural	468	1.40±0.62
Total	1036	1.33±0.57

t-Test: t=-3.62 and p=0.0003; *Missing Values=0.*

Tab. 3.1.6 - Distribution of Dependency Ratio by Population Strata

	n	Mean ± SD
Urban	568	0.80±0.54
Rural	468	0.89±0.64
Total	1036	0.84±0.59

t-Test: t=-2.14 and p=0.016; *Missing Values=0.*

Socio-economic characteristics of the households

Almost all the households were headed by a man (table 3.1.7). Female headed households were more frequent in urban (4%) than in rural areas (1%). In Table 3.1.8 the educational level of the household heads is shown. In both strata the majority of the interviewees had attended elementary or secondary schools; only 7% of the population had a university degree with a remarkable difference between urban (11%) and rural (1%) areas. Table 3.1.9 reports the declared sources of cash income. In urban and rural areas an official salary was the main source. In rural areas there was a higher percentage (21%) of people that lived off farming than in urban areas (2%). An important role in both strata must have been played by social aid, 14% in urban and 15% in rural areas.

Measures to alleviate poverty, such as food donations, between friends and neighbours (table 3.1.10), were scarce (4% of the households) and more in urban (5%) than rural areas (2%). The sale of household goods (table 3.1.11) was practised by a small percentage of population (3%) with a higher prevalence in rural (6%) than in urban areas (2%). Table 3.1.12 shows that 17% of the household studied received social assistance in food aid with small, insignificant differences by strata. A big part of the population (40%) had the possibility of growing fruit and vegetables (table 3.1.13). In rural areas the percentage was significantly higher (69%) than in urban areas (22%). The same situation arose for the keeping of small animals for meat and milk production (table 3.1.14). Disabilities of various degrees (table 3.1.15) were present in 10% of the households with higher prevalence in urban (12%) than in rural areas (7%). The most common disability was blindness, present in 11% of urban households and in 3% of rural households.

Tab. 3.1.7- Gender of the Household Head by Population Strata

	Gender		Total
	Male	**Female**	
Urban	545	23	568
*Row %	95.9	4.1	100.0
*95% C.I.	92.8-99.1	0.8-7.2	

Rural	461	6	467
*Row %	98.7	1.3	100.0
*95% C.I.	97.6-99.8	0.15-2.4	
Total	1006	29	1035
*Row %	97.0	3.0	100.0
*95% C.I.	95.0-99.0	0.9-5.0	

*weighted

Pearson Chi-square: 7.19, p=0.007; Missing Values=1

Tab. 3.1.8 – Education of the Head of the Household by Population Strata

	Level of Education						Total
	Illiterate	**Incomplete Elementary School**	**Elementary School**	**Secondary School**	**Short University Degree**	**Long University Degree**	
Urban	19	39	108	322	20	60	568
*Row% *95% C.I.	3.3 1.3-5.4	6.9 4.2-9.6	19.0 13.9-24.1	56.7 50.8-62.5	3.5 2.1-4.9	10.6 6.2-14.9	100.0
Rural	14	87	180	168	12	6	467
*Row % *95% C.I.	3.0 0.6-5.4	18.6 11.6-25.6	38.5 31.2-45.8	36.0 26.6-45.4	2.6 0.9-4.2	1.3 0.2-2.3	100.0
Total	33	126	288	490	32	66	1035
*Row % *95% C.I.	3.2 1.6-4.8	11.5 8.3-14.7	26.7 22.4-30.9	48.6 43.4-53.7	3.1 2.1-4.2	6.9 4.2-9.6	100.0

*weighted

Pearson Chi-square: 122.94, p=0.00000; Missing Values=1

Tab.3.1.9 - Main Source of Household Income by Population Strata

	Source of Cash Income						Total
	Private Business	**Official Salary**	**Pension**	**Farming**	**Social Aid**	**No cash income**	
Urban	79	319	64	10	80	16	568
*Row% *95%C.I.	13.9 9.6-18.2	56.2 50.2-62.1	11.3 7.2-15.3	1.8 -0.7-4.2	14.1 9.9-18.3	2.8 1.5-4.1	100.0
Rural	54	177	54	97	67	10	459
Row % *95%C.I.	11.8 7.7-15.8	38.6 28.8-48.3	11.8 7.5-16.0	21.1 12.1-30.2	14.6 10.6-18.6	2.2 0.7-3.7	100.0
Total	133	496	118	107	147	26	1027
*Row % *95%C.I.	13.1 10.0-16.1	49.3 44.1-54.5	11.5 8.5-14.4	9.3 5.5-13.1	14.3 11.3-17.3	2.6 1.6-3.6	100.0

*weighted

Pearson Chi-square: 109.13, p=0.00000; Missing Values=9

Tab. 3.1.10 - Receiving Food from Relatives/Friends/Neighbours by Population Strata

	Receiving Food		Total
	Yes	No	
Urban	27	541	568
*Row %	4.8	95.2	100.0
*95% C.I.	2.7-6.8	93.2-97.5	
Rural	11	456	467
*Row %	2.4	97.6	100.0
*95% C.I.	0.9-3.8	96.2-99.1	
Total	38	997	1035
*Row %	3.8	96.2	100.0
*95% C.I.	2.5-5.2	94.8-97.5	

*weighted

Pearson Chi-square: 4.17, p=0.04; Missing Values=1

Tab. 3.1.11 - Selling or Trading Household Goods in the Last Month by Population Strata

	Selling Household Good		Total
	Yes	No	
Urban	10	558	568
*Row %	1.8	98.2	100.0
*95% C.I.	0.2-3.3	96.7-99.8	
Rural	27	440	467
*Row %	5.8	94.2	100.0
*95% C.I.	1.0-10.6	89.4-99.0	
Total	37	998	1035
*Row %	3.3	96.7	100.0
*95% C.I.	1.2-5.4	94.6-98.8	

*weighted

Pearson Chi-square: 12.02, p=0.0005; Missing Values=1

Tab.3.1.12 - Prevalence of Households receiving Humanitarian Food Aid during '97/'98

	Humanitarian Food Aid		Total
	Yes	No	
Urban	95	471	566
*Row %	16.8	83.2	100.0
Rural	84	383	467
*Row %	18.0	82.0	100.0
Total	179	854	1033
*Row %	17.3	82.7	100.0

*weighted

Pearson Chi-square: 0.26, p=0.61; Missing Values=3

Tab. 3.1.13 - Growing Fruit and Vegetables by Population Strata

	Growing Fruit and Vegetables		Total
	Yes	No	
Urban	123	445	568
*Row %	21.7	78.3	100.0
*95% C.I.	11.8-31.5	68.5-88.1	
Rural	323	144	467
*Row %	69.2	30.8	100.0
*95% C.I.	59.0-79.4	20.6-41.0	
Total	446	589	1035
*Row %	40.3	59.7	100.0
*95% C.I.	32.7-47.9	52.1-67.3	

*weighted

Pearson Chi-square: 235.90, p=0.0000; Missing Values=1

Tab. 3.1.14 - Keeping Small Animals For Meat and Milk Production by Population Strata

	Keeping Small Animals		Total
	Yes	No	
Urban	79	489	568
*Row %	13.9	86.1	100.0
*95% C.I.	6.4-21.4	78.6-93.6	
Rural	295	172	467
*Row %	63.2	36.8	100.0
*95% C.I.	53.8-72.5	27.5-46.2	
Total	374	661	1035
*Row %	33.2	66.8	100.0
*95% C.I.	26.9-39.5	60.5-73.1	

*weighted

Pearson Chi-square: 269.48, p=0.0000; Missing Values=1

Tab. 3.1.15 - Presence of Disabled Person by Population Strata

	Kind of Disability						Total
	No disability	Blind	Deaf	Motor Disability	Mental Disability	Terminal Disease	
Urban	498	65	-	-	1	4	568
*Row%	87.7	11.4	-	-	0.2	0.3	100.0
*95% C.I.	77.0-98.3	0.7-22.2			-0.2-0.5	0.0-1.4	
Rural	433	15	1	9	6	3	467
*Row %	92.7	3.2	0.2	1.9	1.3	0.6	100.0
*95% C.I.	89.0-96.4	1.0-5.4	-0.2-0.6	0.7-3.2	0.1-2.4	1.3-2.4	

Total	931	80	1	9	7	7	1035
*Row % *95% C.I.	89.6 83.0-96.3	8.2 1.6-14.9	0.1 -0.1-0.2	0.8 0.3-1.2	0.6 0.1-1.1	0.7 0.2-1.2	100.0

*weighted

Pearson Chi-square: 40.03, p=0.00000; Missing Values=1

Water and sanitation

The quality of the drinking water supply system for urban households was good (table 3.1.16), with almost the entire sample of households served by piped water (98%) with virtually no cases of use of water from unprotected wells. In rural areas 64% of people were served by piped water, 12% had a tube well, 17% had a protected dug well and the percentage of cases of unprotected wells came to 6%. In addition water availability was constant for all the people living in urban areas (table 3.1.17). In rural areas this percentage was lower (86%) and in 13% of the households water was available only every second day. In the majority of urban households water was easily accessible (table 3.1.18), the sources being located either on the premises (95%) themselves or within 100 m (4%). Only in 7% of the rural households did the distance of the water source exceed 100 m, in 60% the sources were on the premises and in 33% within 100 m.

In urban areas, toilet facilities (table 3.1.19) were good and connected to a sewage system for a large majority of households (89%). Approximately 6% of the households in urban areas use latrines and there were no cases of uncovered latrines nor a total absence of facilities. In rural areas, latrines are used by 41% of the households and in general the quality of the latrines in this case was poorer, even lacking a cover. In urban areas toilet facilities are usually located in the house (91%), while in rural areas they are usually outside (57%), within 50 m from the premises (table 3.1.20).

Tab.3.1.16 - Source of Drinking Water by Population Strata

	Source of Drinking Water					**Total**
	Piped-in dwelling	**Public Tap**	**Tube Well or Borehole**	**Protected Dug Well or Protected Spring**	**Pond, River or Stream**	
Urban	557	6	5	-	-	568
*Row % *95%C.I.	98.0 96.4-99.7	1.1 -0.2-2.3	0.9 -0.3-2.1	-	-	100.0
Rural	312	51	70	32	1	466
*Row % *95%C.I.	67.0 52.2-81.9	10.9 1.7-20.2	15.0 3.6-26.5	6.9 0.1-13.6	0.2 -0.2-0.6	100.0
Total	869	57	75	32	1	1034
*Row % *95%C.I.	85.9 80.1-91.7	4.9 1.2-8.6	6.4 1.9-10.9	2.7 0.1-5.3	0.1 -0.1-0.2	100.0

*weighted

Pearson Chi-square: 185.68, p=0.0000; Missing Values=2

Tab. 3.1.17 - Frequency of the Availability of Piped Water by Population Strata

	Water from Pipe			Total
	Constantly	Every day	Every two or more day	
Urban	555	1	1	557
*Row %	99.6	0.2	0.2	100.0
*95% C.I.	99.2-100.1	-0.2-0.5	-0.2-0.5	
Rural	267	-	39	306
*Row %	87.3	-	12.7	100.0
*95% C.I.	73.4-101.1		-1.1-26.6	
Total	822	1	40	863
*Row %	95.9	0.1	4.0	100.0
*95% C.I.	91.7-100.1	-0.1-0.4	-0.2-8.2	

*weighted

Pearson Chi-square: 71.01, p=0.00000; Missing Values=173

Tab. 3.1.18 - Distance of the Source of Drinking Water from Dwelling by Population Strata

	Distance of the Source of Drinking Water					Total
	On premises	Less than 100 m	From 100 m to 500 m	From 500 m to 1 km	More than 1 km	
Urban	544	24	-	-	-	568
*Row %	95.8	4.2	-	-	-	100.0
*95% C.I.	93.1-98.5	1.6-6.9				
Rural	302	135	18	1	11	467
*Row %	64.7	28.9	3.9	0.2	2.3	100.0
*95% C.I.	51.3-78.0	16.8-41.0	-0.6-8.3	-0.2-0.6	-2.3-7.0	
Total	846	159	18	1	11	1035
*Row %	83.6	13.9	1.5	0.1	0.9	100.0
*95% C.I.	78.2-89.0	9.0-18.9	-0.2-3.2	-0.1-0.2	-0.9-2.7	

*weighted

Pearson Chi-square: 168.46, p=0.0000; Missing Values=1

Tab. 3.1.19 - Type of Toilet Facility by Population Strata

	Toilet Facility					Total
	Flush to sewage system	Flush to septic tank	Pour flush latrine	Covered by dry latrine	Uncovered latrine	
Urban	506	30	24	7	-	567
*Row %	89.2	5.3	4.2	1.3	-	100.0
*95% C.I.	81.6-96.8	-0.1-10.7	-0.7-9.1	0.2-2.3		

Rural	149	133	28	156	1	467
*Row % *95% C.I.	31.9 17.2-46.6	28.5 14.3-42.6	6.0 0.7-11.3	33.4 17.9-48.9	0.2 -0.2-0.6	100.0
Total	655	163	52	163	1	1034
*Row % *95% C.I.	66.7 58.9-74.6	14.4 7.7-21.0	4.9 1.3-8.5	13.9 7.6-20.1	0.1 -0.1-0.2	100.0

*weighted

Pearson Chi-square: 391.16, p=0.0000; Missing Values=2

Tab. 3.1.20 - Distance of the Toilet Facility from Dwelling by Population Strata

	Distance from Dwelling			**Total**
	In dwelling	**Less than 50 m**	**50 m or more away**	
Urban	516	47	5	568
*Row %	90.8	8.3	0.9	100.0
*95% C.I.	85.8-95.9	3.8-12.7	-0.1-1.9	
Rural	201	263	3	467
*Row %	43.1	56.3	0.6	100.0
*95% C.I.	28.4-57.7	41.7-71.0	-0.1-1.3	
Total	717	310	8	1035
*Row %	72.1	27.1	0.8	100.0
*95% C.I.	65.3-78.9	20.5-33.7	0.1-1.4	

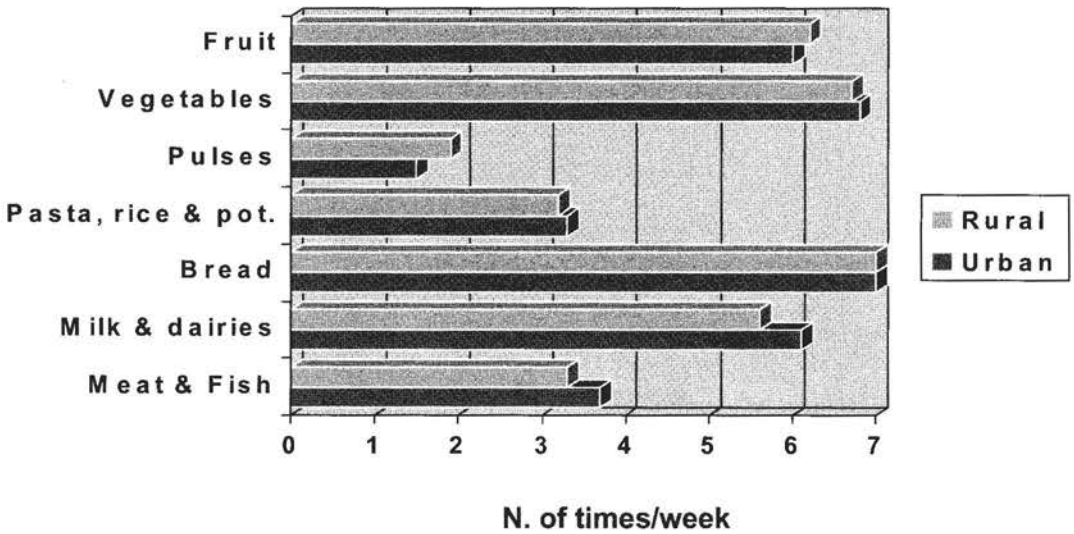
*weighted

Pearson Chi-square: 282.22, p=0.0000; Missing Values=1

Food intake

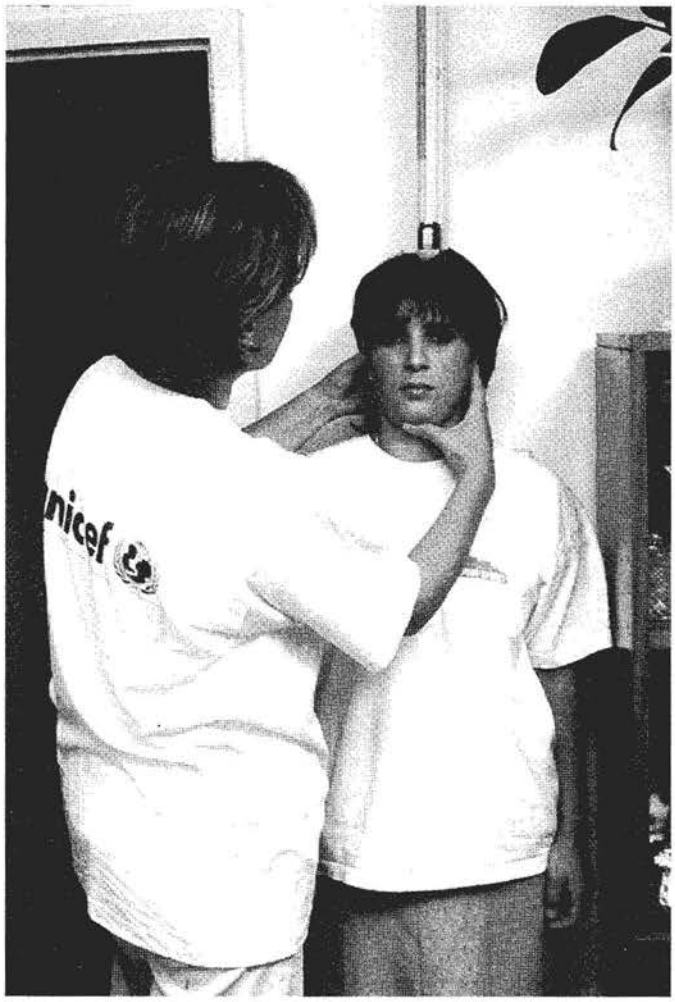
Figure 3.1.2 shows consumption of selected foods during the week preceding the survey. In Macedonia bread, vegetables, fruit, milk and dairy products were consumed almost every day both in urban and rural areas. Meat or fish and pasta, rice and potatoes were consumed approximately every second day. Pulses were consumed once to twice a week. There were no significant differences between urban and rural areas in food consumption.

Figure 3.1.2 - Mean Frequency Consumption of Selected Items by Population Strata



3.2. Individual data

3.2.1. Mothers 15-45 years



Most of the women were married (97%), either officially (94%) or non-officially (3%). There was a small group of women without a partner (2%) with no differences between strata (Tab. 3.2.1.1). One third of the women in urban areas had formal employment while in rural areas this percentage was dramatically lower (8%) (Tab. 3.2.1.2). The educational level of women was high: almost half of the women had completed secondary education (Tab. 3.2.1.3) however the percentage differs for urban women (56%) and for rural women (35%) with significant differences by population strata. Less than 4% of the women were pregnant at the time of the survey. Table 3.2.1.4 shows the average number of pregnancies in mothers studied; rural mothers had more pregnancies than urban but the differences were slight and not significant. Abortions or miscarriages were not commonly reported (Tab.3.2.1.5). The interruption of pregnancy was significantly more frequent in mothers that lived in urban areas than in rural. Registration at Women's clinics was common for most women (98%); more in urban (98%) than rural areas (96%) (Tab. 3.2.1.6).

Tab. 3.2.1.1 – Family Status by Population Strata

	Family Status				Total
	Single	Registered Marriage	Non Registered Marriage	Divorced	
Urban	13	545	19	3	580
*Row % *95% C.I.	2.2 0.5-4.0	94.0 91.2-96.7	3.3 1.1-5.5	0.5 -0.0-1.1	100.0
Rural	10	458	18	5	491
*Row % *95% C.I.	2.0 0.6-3.5	93.3 88.5-98.1	3.7 -0.8-8.1	1.0 0.0-2.0	100.0
Total	23	1003	37	8	1071
*Row % 95% C.I.	2.2 0.9-3.4	93.7 91.1-96.2	3.4 1.2-5.7	0.7 0.2-1.2	100.0

*weighted

Pearson Chi-square: 1.08, p=0.78; Missing Values=1

Tab. 3.2.1.2 - Prevalence of Employment by Population Strata

	Employment		Total
	Yes	No	
Urban	172	408	580
*Row %	29.7	70.3	100.0
*95% C.I.	23.0-36.3	63.7-77.0	
Rural	39	453	492
*Row %	7.9	92.1	100.0
*95% C.I.	3.5-12.3	87.7-96.5	
Total	211	861	1072
*Row %	21.0	79.0	100.0
*95% C.I.	16.6-25.3	74.7-83.4	

*weighted

Pearson Chi-square: 79.50, p=0.00000; Missing Values=0

Tab. 3.2.1.3 - Level of Education by Population Strata

	Level of Education						Total
	Illiterate	Incomplete Elementary School	Elementary School	Secondary School	Short University Degree	Long University Degree	
Urban	20	28	113	326	27	66	580
*Row % *95% C.I.	3.4 0.7-6.2	4.8 2.4-7.2	19.5 12.6-26.3	56.2 48.7-63.7	4.7 2.7-6.6	11.4 6.3-16.5	100.0
Rural	15	82	207	174	8	6	492
*Row % *95% C.I.	3.0 0.9-5.2	16.7 9.4-23.9	42.1 32.4-51.7	35.4 24.7-46.0	1.6 0.0-3.2	1.2 0.2-2.2	100.0
Total	35	110	320	500	35	72	1072
*Row % *95% C.I.	3.3 1.4-5.1	9.6 6.4-12.7	28.5 22.7-34.3	47.9 41.7-54.1	3.4 2.1-4.8	7.3 4.2-10.5	100.0

*weighted

Pearson Chi-square: 155.18, p=0.0000; Missing Values=0

Tab. 3.2.1.4 – N. of Pregnancies (Including Abortions and Still Births) by Population Strata

	n	Mean ± SD
Urban	580	2.06±1.22
Rural	492	2.19±1.31
Total	1072	2.12±1.26

t-Test: t=-1.65 and p=0.10; *Missing Values=0.*

Tab. 3.2.1.5 – N. of Miscarriages or Abortions by Population Strata

	n	Mean ± SD
Urban	579	0.35±0.74
Rural	491	0.24±0.62
Total	1070	0.30±0.69

t-Test: t=2.65 and p=0.008; *Missing Values=2.*

Tab. 3.2.1.6 – Prevalence of Registration at Women's Clinics by Population Strata

	Registration		Total
	Yes	**No**	
Urban	568	9	577
*Row %	98.4	1.6	100.0
*95% C.I.	96.9-99.9	0.1-3.1	
Rural	472	17	489
*Row %	96.5	3.5	100.0
*95% C.I.	93.5-99.5	0.5-6.5	
Total	1040	26	1066
*Row %	97.7	2.3	100.0
*95% C.I.	96.2-99.2	0.8-3.8	

*weighted

Pearson Chi-square: 4.09, p=0.04; Missing Values=6

Thyroid was palpable in 9% of women with a very small percentage (0.6%) of the women with visible goitre. There were no differences between urban and rural areas (Tab. 3.2.1.7).

Tab. 3.2.1.7 - Prevalence of Goitre by Population Strata

	Goitre			Total
	No Goitre	**Palpable Goitre**	**Visible Goitre**	
Urban	506	48	5	559
*Row %	90.5	8.6	0.9	100.0
*95% C.I.	85.6-95.4	3.6-13.5	0.0-1.8	
Rural	420	49	1	470
*Row %	89.4	10.4	0.2	100.0
*95% C.I.	85.7-93.0	6.7-14.2	-0.2-0.6	
Total	926	97	6	1029
*Row %	90.1	9.3	0.6	100.0
*95% C.I.	86.8-93.3	6.0-12.6	0.1-1.2	

*weighted

Pearson Chi-square: 2.99, p=0.22; Missing Values=43

Mothers in fertile age had mean blood haemoglobin of 13.4±0.1 g/dL with no differences by population strata (Tab. 3.2.1.8). Table 3.2.1.9 shows the prevalence of anaemia of mothers studied. There were no cases of severe anaemia; mild and moderate anaemia was observed in 12% of non pregnant mothers in both strata, there were no differences between urban and rural areas.

Tab. 3.2.1.8 – Serum Haemoglobin Concentration by Population Strata

	n	Mean±SD
Urban	550	13.46±1.35
Rural	468	13.33±1.38
Total	1018	13.40±1.36

t-Test: t=1.42 and p=0.16; *Missing Values=54.*

Tab. 3.2.1.9 – Prevalence of Anaemia in NON-pregnant Mothers by Population Strata

	Anaemia			Total
	Moderate (Hb7-9.9 g/dL)	Mild (Hb10-11.9 g/dL)	No Anaemia (Hb≥12 g/dL)	
Urban	8	57	485	550
*Row %	1.5	10.4	88.2	100.0
*95% C.I.	0.4-2.5	7.8-13.0	85.3-91.1	
Rural	14	45	409	468
*Row %	3.0	9.6	87.4	100.0
*95% C.I.	1.5-4.5	6.8-12.5	84.1-90.7	
Total	22	102	894	1018
*Row %	2.1	10.1	87.9	100.0
*95% C.I.	1.2-2.9	8.1-12.0	85.7-90.1	

*weighted

Pearson Chi-square: 2.92, p=0.23; Missing Values=54

As shown in table 3.2.1.10 the higher prevalence of anaemia in mothers was observed in Roma speaking population (26%) with 4% of severe cases and in Albanian (18%) with 5% of severe cases. In the others groups the prevalence of anaemia was lower, 13% (3% of severe cases) in Turkish and 10% (2% of severe cases) in Macedonian.

The concentration of haemoglobin of the mothers was not correlated to the concentration of haemoglobin in children. Also the analysis of ethnic groups did not show a significant correlation between the two concentration.

Tab. 3.2.1.10 –Anaemia in NON-Pregnant Mothers of Different Ethnic Groups

	Anaemia Status		Total
	Anaemia <12μg/dL	No Anaemia ≥12μg/dL	
Macedonian	70	647	717
*Row %	9.7	90.3	100.0
*95% C.I.	7.4-12.0	88.0-92.6	
Albanian	32	153	185
*Row %	17.3	82.7	100.0
*95% C.I.	13.7-21.0	79.0-86.3	

Roma	10	38	48
*Row %	21.0	79.0	100.0
*95% C.I.	8.7-33.3	66.7-91.3	
Turkish	5	28	33
*Row %	14.5	85.5	100.0
*95% C.I.	0.1-28.9	71.1-99.8	
Others	7	27	34
*Row %	20.9	79.1	100.0
*95% C.I.	9.8-32.0	68.0-90.1	
Total	124	893	1017
*Row %	12.1	87.9	100.0
*95% C.I.	9.9-14.3	85.7-90.1	

*weighted

Pearson Chi-square: 14.31, p=0.0064; Missing Values=55

As shown in table 3.2.1.11 low BMI (<18.5 kg/m^2) was observed only in about 6% of the mothers, while 38% of the women were overweight or obese (BMI>25 kg/m^2). Higher degrees of obesity (BMI>30 kg/m^2) were uncommon (10% of moderate obesity and 1% of severe obesity).

Tab. 3.2.1.11 – Distribution of Different Classes of BMI in NON Pregnant Mothers 25-45 Years by Population Strata

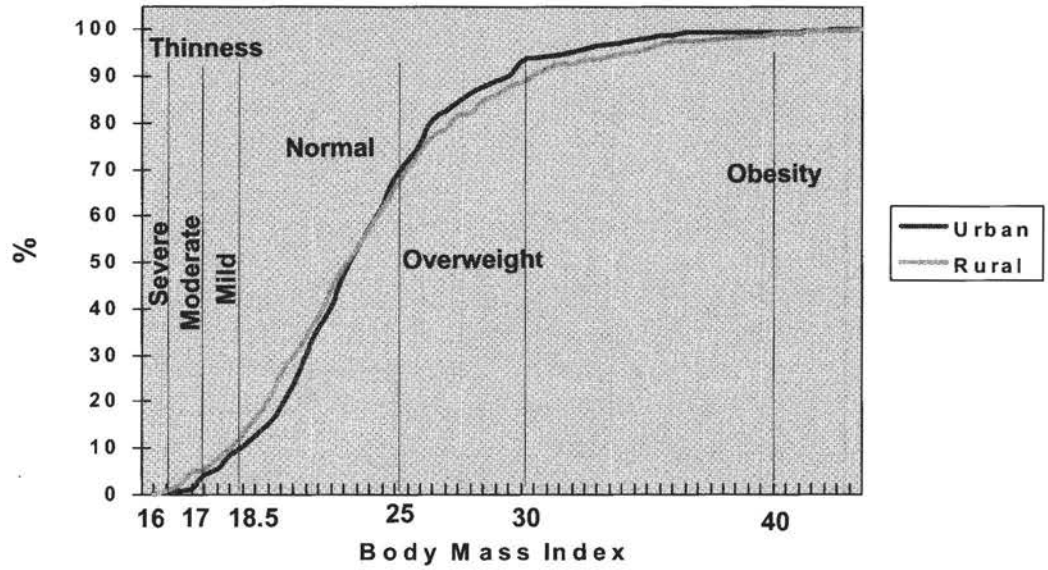
	Classes of BMI							**Total**
	<16	**16-16.9**	**17-18.4**	**18.5-25**	**25.1-30**	**30.1-40**	**>40**	
Urban	1	2	19	227	111	37	2	399
*Row %	0.3	0.5	4.8	56.9	27.8	9.3	0.5	100.0
*95% C.I.	-0.2-0.7	-0.2-1.2	3.2-6.3	52.3-61.5	24.2-31.4	6.8-12.8	-0.2-1.2	
Rural	0	6	17	158	76	32	4	293
*Row %	0.0	2.0	5.8	54.0	25.9	10.9	1.4	100.0
*95% C.I.		0.2-3.9	3.3-8.3	47.3-60.6	19.4-32.2	6.9-14.9	-0.2-2.9	
Total	1	8	36	385	187	69	6	692
*Row %	0.2	1.1	5.1	55.8	27.1	9.9	0.8	100.0
*95% C.I.	-0.1-0.5	0.3-1.9	3.8-6.5	52.0-59.6	23.9-30.4	7.2-12.6	0.2-1.6	

*weighted

Pearson Chi-square: 6.98 p=0.32; Missing Values=380

Figure 3.2.1.1 shows the cumulative distribution of BMI in women 25-45 years, further illustrating the women's nutritional status, with a majority of individuals falling in the normal range.

Figure 3.2.1.1- Distribution of BMI in women 25-45 years by Population Strata



3.2.2. Children

Morbidity

Low birth weight was observed in 6% of children studied without differences by strata (Tab. 3.2.2.1). Diarrhoea (more than three loose stools a day) was reported for 12% of the children (Tab. 3.2.2.2), with similar rates in urban (13%) and rural (10%) areas. The use of oral re-hydratation salts (Tab. 3.2.2.3) in case of diarrhoea was generally low. It was more common in urban (20%) than in rural (15%) areas but the differences were not significant. Children that live in urban zones showed more frequent coughing episodes (22%) than rural children (14%) (Tab. 3.2.2.4). Children's vision impairment at night time was reported by 1% of the mothers with no differences by strata (Tab. 3.2.2.5).

Tab. 3.2.2.1 – Prevalence of Low (<2,5kg) Birth weight in Children 0-59 months by Population Strata

	Classes of Birth Weight			Total
	<2,5	2,5-3,8	>3,8	
Urban	45	547	107	699
*Row %	6.4	78.3	15.3	100.0
*95% C.I.	3.9-8.9	74.9-81.6	12.7-17.9	
Rural	41	526	67	634
*Row %	6.5	83.0	10.6	100.0
*95% C.I.	4.3-8.6	80.0-85.9	8.1-13.0	
Total	86	1073	174	1333
*Row %	6.4	80.2	13.3	100.0
*95% C.I.	4.7-8.2	77.9-82.5	11.6-15.1	

*weighted

Pearson Chi-square: 6.64, p=0.04; Missing Values=12

Tab. 3.2.2.2 – Prevalence of Diarrhoea in the Two Weeks Preceding the Survey in Children 0-59 months by Population Strata

	Diarrhoea		Total
	Yes	No	
Urban	89	610	699
*Row %	12.7	87.3	100.0
*95% C.I.	8.7-16.8	83.2-91.3	
Rural	65	572	637
*Row %	10.2	89.8	100.0
*95% C.I.	6.5-13.9	86.1-93.5	
Total	154	1182	1336
*Row %	11.7	88.3	100.0
*95% C.I.	8.8-14.5	85.5-91.1	

*weighted

Pearson Chi-square: 2.09, p=0.15; Missing Values=9

Tab. 3.2.2.3 – Use of Oral Rehydratation Salts in Case of Diarrhoea in Children 0-59 months by Population Strata

	Oral Rehydratation Salts		Total
	Yes	No	
Urban	18	70	88
*Row %	20.5	79.5	100.0
*95% C.I.	11.9-29.0	71.0-88.1	
Rural	10	56	66
*Row %	15.1	84.8	100.0
*95% C.I.	5.0-25.3	74.7-95.0	
Total	28	126	154
*Row %	18.5	81.5	100.0
*95% C.I.	11.9-25.1	74.9-88.1	

*weighted

Pearson Chi-square: 0.71, p=0.40; Missing Values=1191

Tab. 3.2.2.4 – Prevalence of Cough in the Two Weeks Preceding the Survey in Children 0-59 months by Population Strata

	Cough		Total
	Yes	No	
Urban	156	543	699
*Row %	22.3	77.7	100.0
*95% C.I.	17.5-27.2	72.8-82.5	
Rural	92	546	638
*Row %	14.4	85.6	100.0
*95% C.I.	9.9-19.0	81.0-90.1	

Total	248	1089	1337
*Row %	19.0	81.0	100.0
*95% C.I.	15.6-22.4	77.6-84.4	

*weighted

Pearson Chi-square: 13.77, p=0.0002; Missing Values=8

Tab. 3.2.2.5 – Prevalence of Vision Problems at Night in Children 0-59 months by Population Strata

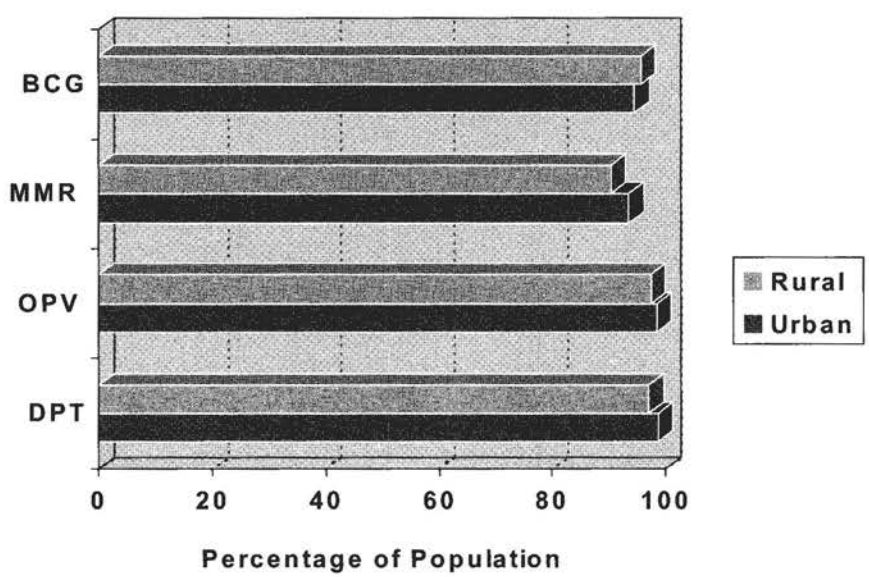
	Vision Problems at Night		Total
Urban	6	651	657
*Row %	0.9	99.1	100.0
*95% C.I.	-0.3-2.2	97.8-100.3	
Rural	6	609	615
*Row %	1.0	99.0	100.0
*95% C.I.	-0.6-2.6	97.4-100.6	
Total	12	1260	1272
*Row %	0.9	99.1	100.0
*95% C.I.	-0.1-1.9	98.1-100.1	

*weighted

Pearson Chi-square: 0.01, p=0.91; Missing Values=73

Immunisation coverage was investigated in children aged 13-24 months and figure 3.2.2.1 shows the results. In general the majority of the children had had been vaccinated with no significant differences detected between urban and rural. The third dose of DPT had been administered to 98% of the children (99% urban and 97% rural). The third dose of OPV had been administered to 98% of children that live in urban areas and to 97% of children that live in rural areas. The coverage for measles immunisation was 93% for urban children and 90% for rural children. Virtually the entire child population (95%) was immunised for BCG.

Figure 3.2.2.1- Immunisation Coverage in Children 13-24 months by Population Strata



Feeding patterns

Breastfeeding

The vast majority of sampled children under 2 years of age had been breastfed, at least partially (92%), with no significant differences between urban and rural areas (Tab. 3.2.2.6). Forty five percent of the children under 4 months were exclusively breastfed (Tab. 3.2.2.7). Exclusive breastfeeding dropped progressively, until it was practised almost by no one after the age of 5 months (Fig. 3.2.2.2). Thus, the figure for exclusive breastfeeding under the age of 6 months is lower (30%). In rural areas, exclusive breastfeeding was less common than in urban areas. Up to 4 months, 35% of the infants living in urban areas were receiving breast milk and other liquids. Predominant breastfeeding increased up to the age of 3 months, when 50% of the children in urban areas and 38% of the children in rural areas were fed in this way (Fig. 3.2.2.3). After the age of 3 months predominant breastfeeding dropped progressively both in urban and in rural areas. Predominant, exclusive or any other pattern of breast milk consumption was not influenced by mother's education or source of cash income of the household. Breastfeeding patterns were instead different among ethnic groups (Tab. 3.2.2.8, Tab. 3.2.2.9 and Tab. 3.2.2.10). The Turkish had the highest rates of exclusive predominant and ever breastfed; Macedonian were lower than the mean of the population.

Breastfeeding on demand was widely practised (97% of the infants Tab. 3.2.2.11). Feeding occasions were typically 6 in the morning and 3 at night in the first month, then 4 in the morning and 3 at night (Tab. 3.2.2.12 and Tab. 3.2.2.13). Breastfeeding was started within the first 6 hours after delivery in less than one third of the cases (Tab. 3.2.2.14) and often (40%) with no help from health professionals (Tab. 3.2.2.15). The main reason for stopping breastfeeding was the perception that the mother had insufficient milk to feed the baby. This perception was more common in rural areas (Tab. 3.2.2.16).

Vitamin supplements are commonly given to the infants from the first month of life. Table 3.2.2.17 shows that almost all the children were receiving supplements or medicines in the twenty-four hours preceding the interview.

Tab. 3.2.2.6 – Prevalence of Breastfeeding in Children 0-24 months by Population Strata

	Breastfeeding		Total
	Yes	No	
Urban	625	51	676
*Row %	92.5	7.5	100.0
*95% C.I.	87.4-97.5	2.5-12.6	
Rural	609	60	669
*Row %	91.0	9.0	100.0
*95% C.I.	86.5-95.5	4.5-13.5	
Total	1234	111	1345
*Row %	91.8	8.2	100.0
*95% C.I.	88.4-95.3	4.7-11.6	

*weighted

Pearson Chi-square: 0.90, p=0.34; Missing Values=47

Tab. 3.2.2.7 – Feeding Pattern of Children 0-4 months (a) and 0-6 months (b) by Population Strata

	0-4 Months				
	Exclusive	**Predominant**	**Non Breastfed**	**Breastfed + other energetic foods**	**Total**
Urban	52	42	16	1	111
*Row %	46.8	37.8	14.4	0.9	100.0
*95% C.I.	38.0-55.7	29.3-46.3	8.2-20.6	-0.8-2.6	
Rural	35	28	17	2	82
*Row %	42.7	34.1	20.7	2.4	100.0
*95% C.I.	28.2-57.1	21.9-46.4	10.3-31.2	-0.8-5.6	
Total	87	70	33	3	193
*Row %	45.3	36.5	16.7	1.5	100.0
*95% C.I.	33.6-53.0	29.5-43.5	11.3-22.1	-0.1-3.1	

*weighted

Pearson Chi-square: 2.18, p=0.54; Missing Values=1199

	0-6 Months				
	Exclusive	**Predominant**	**Non Breastfed**	**Breastfed + other energetic foods**	**Total**
Urban	64	53	48	1	166
*Row %	38.6	31.9	28.9	0.6	100.0
*95% C.I.	29.2-47.9	24.3-39.6	20.3-37.5	-0.5-1.7	
Rural	47	39	49	5	140
*Row %	33.6	27.9	35.0	3.6	100.0
*95% C.I.	21.5-45.6	18.4-37.3	26.8-43.2	0.1-7.0	
Total	111	92	97	6	306
*Row %	36.6	30.3	31.3	1.8	100.0
*95% C.I.	29.2-43.9	24.4-36.2	25.3-37.4	0.2-3.3	

*weighted

Pearson Chi-square: 5.24, p=0.15; Missing Values=1086

Figure 3.2.2.2 - Prevalence of Exclusive Breastfeeding in Children 0-24 months by Population Strata

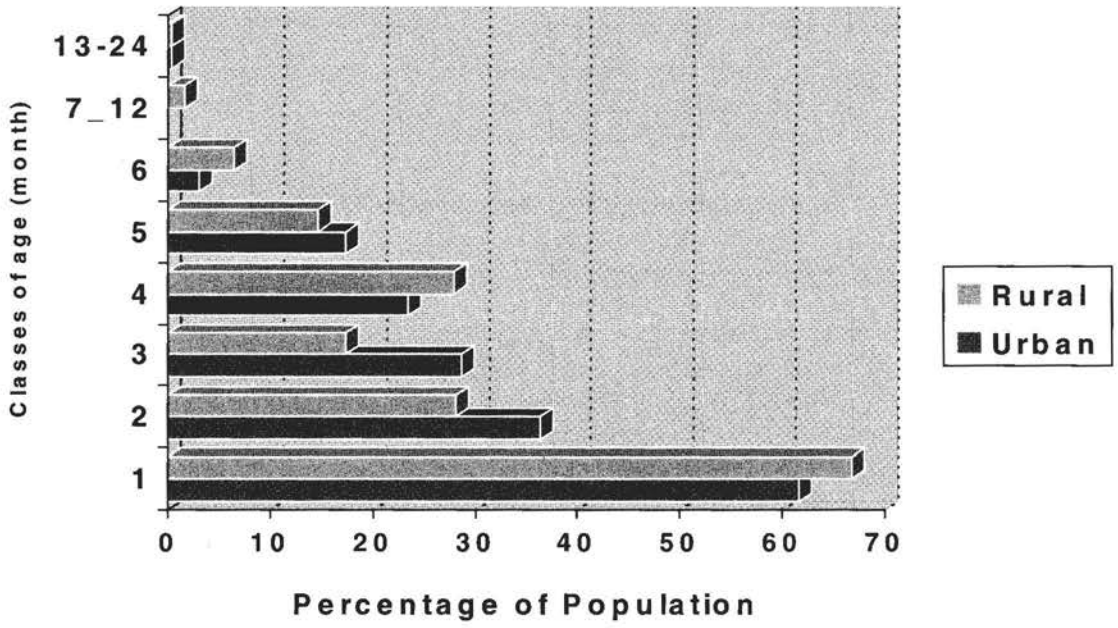
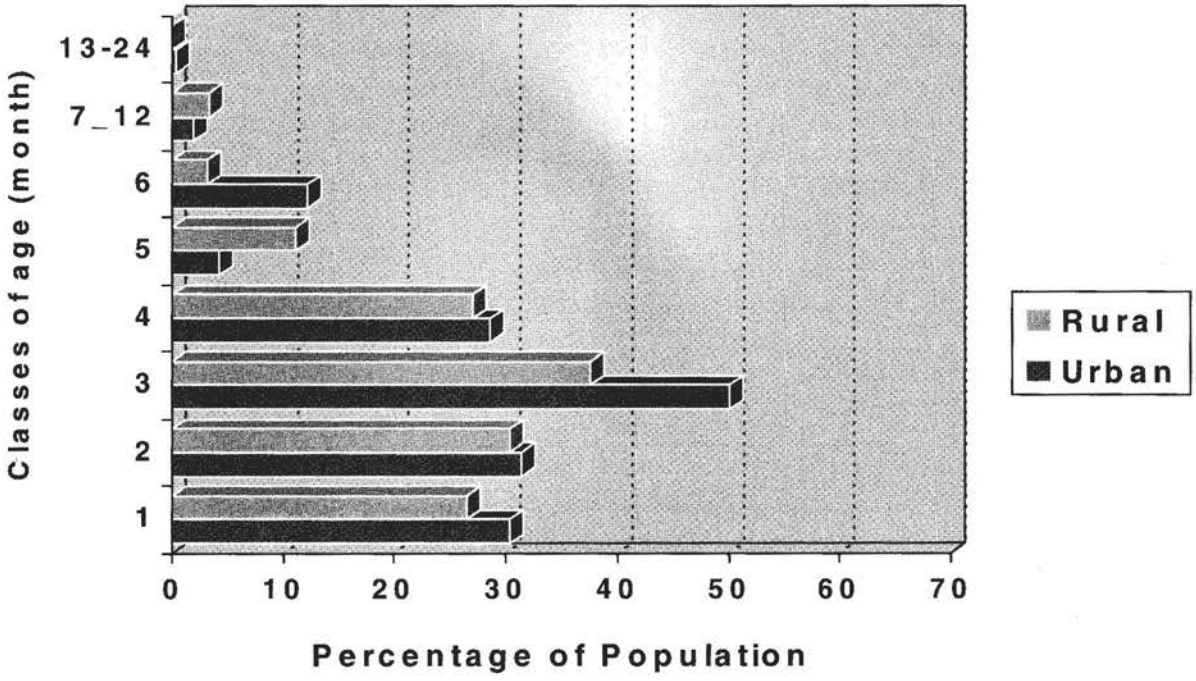


Figure 3.2.2.3 - Prevalence of Predominant Breastfeeding in 0-24 months old Children



Tab. 3.2.2.8 – Prevalence of Breastfeeding in Different Ethnic Groups in Children 0-24 months

	Ever breastfed		Total
	Yes	No	
Macedonian	853	54	907
*Row %	94.1	5.9	100.0
*95% C.I.	91.6-96.7	3.3-8.4	
Albanian	216	48	264
*Row %	81.2	18.8	100.0
*95% C.I.	69.9-92.5	7.5-30.1	
Roma	63	2	65
*Row %	96.8	3.2	100.0
*95% C.I.	92.8-100.9	-0.9-7.2	
Turkish	42	0	42
*Row %	100.0	0.0	100.0
*95% C.I.	100-100		
Others	59	7	66
*Row %	89.5	10.5	100.0
*95% C.I.	82.4-96.6	3.4-17.6	
Total	1233	111	1344
*Row %	91.8	8.2	100.0
*95% C.I.	88.4-95.3	4.7-11.6	

*weighted

Pearson Chi-square: 47.23, p=0.0000; Missing Values=48

Tab. 3.2.2.9 – Prevalence of Exclusive Breastfeeding in Different Ethnic Groups in Children 0-6 months

	Exclusive Breastfeeding		Total
	Yes	No	
Macedonian	73	161	234
*Row %	32.0	68.0	100.0
*95% C.I.	24.4-39.5	60.5-75.6	
Albanian	20	36	56
*Row %	36.0	64.0	100.0
*95% C.I.	19.9-52.1	47.9-80.1	
Roma	6	11	17
*Row %	35.4	64.6	100.0
*95% C.I.	11.3-59.4	40.6-88.7	
Turkish	7	6	13
*Row %	50.6	49.4	100.0
*95% C.I.	13.1-88.1	11.9-86.9	

Others	5	5	10
*Row %	47.5	52.5	100.0
*95% C.I.	18.7-76.3	23.7-81.3	
Total	111	219	330
*Row %	34.0	66.0	100.0
*95% C.I.	27.1-40.9	59.1-72.9	

*weighted

Pearson Chi-square: 4.33, p=0.36; Missing Values=1062

Tab. 3.2.2.10 – Prevalence of Predominant Breastfeeding in Different Ethnic Groups in Children 0-6 months

	Predominant Breastfeeding		**Total**
	Yes	**No**	
Macedonian	67	167	234
*Row %	28.5	71.5	100.0
*95% C.I.	22.1-34.8	66.2-77.9	
Albanian	13	43	56
*Row %	23.9	76.1	100.0
*95% C.I.	12.2-35.6	64.4-87.8	
Roma	7	10	17
*Row %	41.5	58.5	100.0
*95% C.I.	23.1-59.9	40.1-76.9	
Turkish	3	10	13
*Row %	24.7	75.3	100.0
*95% C.I.	6.8-42.6	57.4-93.2	
Others	2	8	10
*Row %	23.0	77.0	100.0
*95% C.I.	-8.3-54.2	45.8-108.3	
Total	92	238	330
*Row %	28.1	71.9	100.0
*95% C.I.	22.6-33.7	66.3-77.4	

*weighted

Pearson Chi-square: 3.22, p=0.52; Missing Values=998

Tab. 3.2.2.11 – Habit of Breastfeeding in Children 0-24 months by Population Strata

	Habit		**Total**
	On Demand	**At Fixed Intervals**	
Urban	289	14	303
*Row %	95.4	4.6	100.0
*95% C.I.	92.5-98.3	1.7-7.6	

Rural	262	4	266
*Row %	98.5	1.5	100.0
*95% C.I.	96.7-100.3	-0.3-3.3	
Total	551	18	569
*Row %	96.6	3.4	100.0
*95% C.I.	94.8-98.5	1.5-5.2	

*weighted

Pearson Chi-square: 4.49, p=0.03; Missing Values=823

Tab. 3.2.2.12 – N. of Suckles During the Night in Children 0-24 Months by Population Strata

	n	Median
Urban		
0-6 months	163	3
7-12 months	73	3
13-24 months	58	3
Rural		
0-6 months	128	3
7-12 months	81	3
13-24 months	55	2
Total		
0-6 months	291	3
7-12 months	154	3
13-24 months	113	2

Tab. 3.2.2.13 – N. of Suckles During the Day in Children 0-24 Months by Population Strata

	n	Median
Urban		
0-6 months	165	6
7-12 months	77	4
13-24 months	58	4
Rural		
0-6 months	127	5
7-12 months	81	4
13-24 months	55	4
Total		
0-6 months	292	5
7-12 months	158	4
13-24 months	113	4

Tab. 3.2.2.14 – Time Lapse After Birth for Breastfeeding Children 0-24 months by Population Strata

	Time Lapse After Birth			Total
	30 minutes	6 hours	> 6 hours	
Urban	20	183	410	613
*Row %	3.3	29.9	66.9	100.0
*95% C.I.	1.6-5.0	21.8-37.9	58.0-75.8	
Rural	77	167	356	600
*Row %	12.8	27.8	59.3	100.0
*95% C.I.	4.6-21.0	17.7-37.9	47.6-71.0	
Total	97	350	766	1213
*Row %	7.4	29.0	63.6	100.0
*95% C.I.	3.7-11.1	22.7-35.3	56.4-70.8	

*weighted

Pearson Chi-square: 37.90, p=0.00000; Missing Values=179

Tab. 3.2.2.15 – Help in Breastfeeding Children 0-24 months by Population Strata

	Kind of Help			Total
	Health Professional	Other	Nobody	
Urban	386	11	227	624
*Row %	61.9	1.8	36.4	100.0
*95% C.I.	52.1-71.7	0.8-2.7	26.5-46.3	
Rural	316	13	279	608
*Row %	52.0	2.1	45.9	100.0
*95% C.I.	39.6-64.3	0.1-4.2	33.1-58.6	
Total	702	24	506	1232
*Row %	57.6	1.9	40.5	100.0
*95% C.I.	49.9-65.3	0.9-3.0	32.6-48.3	

*weighted

Pearson Chi-square: 12.28, p=0.002; Missing Values=160

Tab. 3.2.2.16 - Reasons for Breastfeeding Cessation for Children 0-24 Months by Population Strata

	Reasons to Stop Breastfeeding						Total
	No Milk	Mother's illness	Baby's illness	No weight	No time	Pregnant	
Urban	148	30	12	12	7	15	224
*Row %	66.1	13.4	5.4	5.4	3.1	6.7	100.0
*95% C.I.	58.6-73.6	8.7-18.1	2.2-8.6	2.3-8.4	0.7-5.5	2.5-10.9	

Rural	211	14	9	10	-	11	255
*Row % *95% C.I.	82.7 76.6-88.9	5.5 2.5-8.5	3.5 1.2-5.9	3.9 1.3-6.5	-	4.3 1.7-6.9	100.0
Total	359	44	21	22	7	26	479
*Total % *95% C.I.	73.9 68.9-78.9	9.7 6.8-12.6	4.5 2.5-6.5	4.7 2.7-6.7	1.7 0.4-2.9	5.6 3.0-8.1	100.0

*weighted

Pearson Chi-square: 23.19, p=0.0003; Missing Values=913

Tab. 3.2.2.17 – Prevalence of Use of Vitamins, Mineral Supplements or Medicines in Children 0-24 months by Population Strata

	Breastfeeding		**Total**
Urban	407	268	675
*Row %	60.3	39.7	100.0
*95% C.I.	54.5-66.1	33.9-45.5	
Rural	258	412	670
*Row %	38.5	61.5	100.0
*95% C.I.	30.7-46.3	53.7-69.3	
Total	665	680	1345
*Row %	50.8	49.2	100.0
*95% C.I.	46.0-55.5	44.5-54.0	

*weighted

Pearson Chi-square: 63.86, p=0.00000; Missing Values=47

Breast Milk substitution

One fifth of the children were using infant formula, usually as a substitute for breast milk, with no differences between urban and rural areas. Infant formula was used in more cases at around the age of 5-6 months, as a transition to other foods at the cessation of breastfeeding (Fig. 3.2.2.4). Cow's milk was used as an alternative to breast milk for infants under 6 months in 5% of the cases in urban areas, but in 12% in rural areas. Cow's milk became a major food after the age of 6 months, but it is worth pointing out that, even in the second year of age, one fifth of the children were reported as having consumed it in the 24 hours before the survey (Fig. 3.2.2.5). The use of cow's milk was not related to the prevalence of anaemia in children 6-12 months old but the prevalence of severe cases of anaemia was higher in infants that consumed cow's milk (not shown). Fermented milk was not used in the first six months of life and was therefore not used as a breast milk substitute (Fig. 3.2.2.6). The dilution of cow's milk was more common (65%) in children under 6 (Tab. 3.2.2.18) than in older children (13%) (Tab. 3.2.2.19) and in more than half of the sample with the addition of sugar (Tab. 3.2.2.20). Indeed, sugar was added by almost three quarters of carers in rural areas.

Figure 3.2.2.4 - Prevalence of Use of Infant Formula in Children 0-24 months by Population Strata

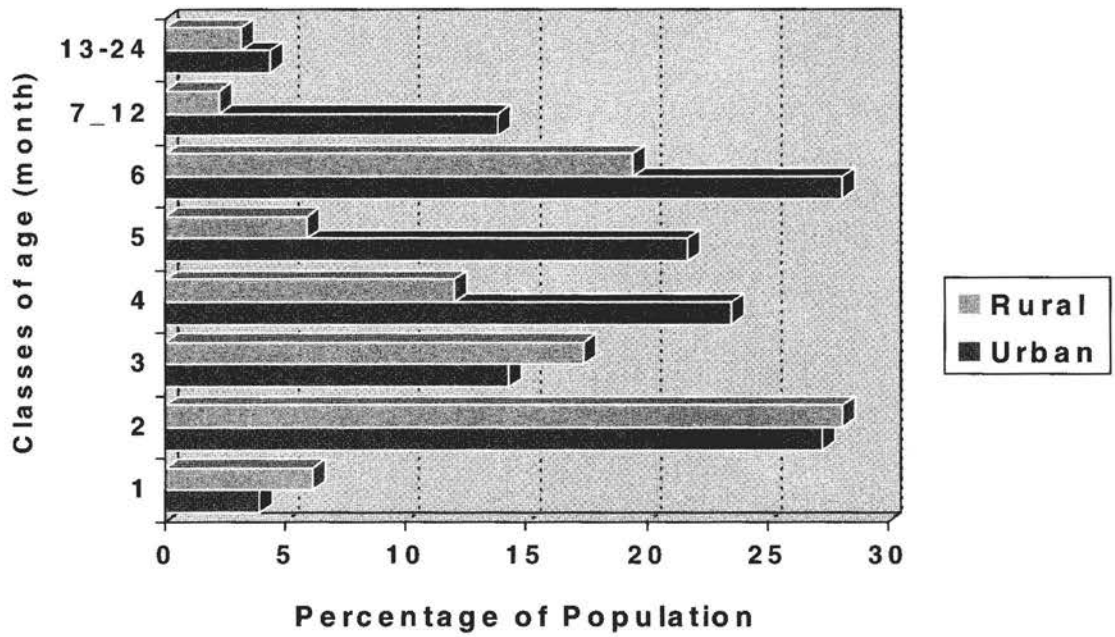


Figure 3.2.2.5 - Prevalence of Use of Cow's Milk in Children 0-24 months by Population Strata

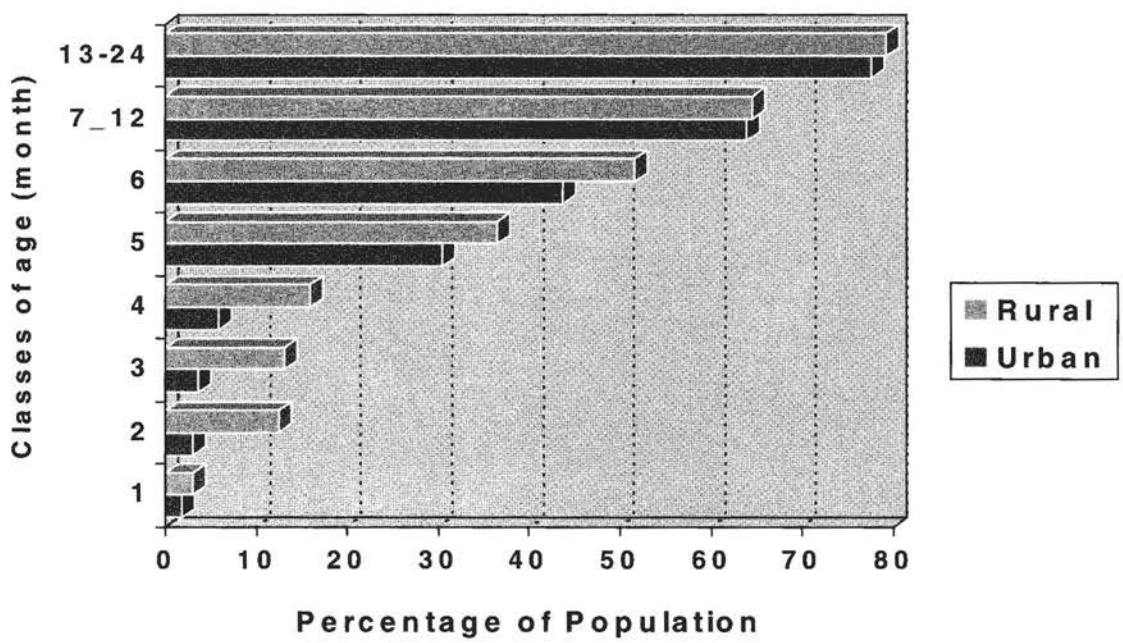
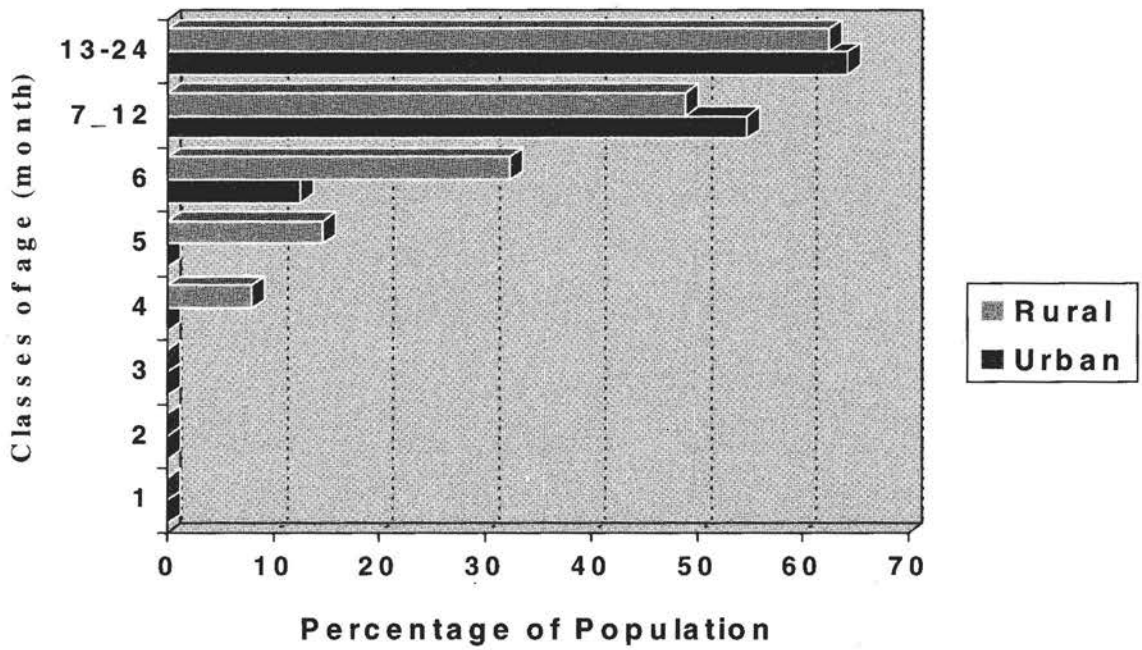


Figure 3.2.2.6 - Prevalence of Use of Yoghurt or Fermented Milk in Children 0-24 months by Population Strata



Tab. 3.2.2.18 – Use of Diluted Cow's Milk in Children 0-6 Months by Population Strata

	Diluted Cow's Milk		Total
	Yes	No	
Urban	8	4	12
*Row %	66.7	33.3	100.0
*95% C.I.	38.4-94.9	5.1-61.6	
Rural	16	9	25
*Row %	64.0	36.0	100.0
*95% C.I.	44.5-83.5	16.5-55.5	
Total	24	13	37
*Total %	65.0	35.0	100.0
*95% C.I.	48.9-81.1	18.9-51.1	

*weighted

Pearson Chi-square: 0.02, p=0.87; Missing Values=293

Tab. 3.2.2.19 – Use of Diluted Cow's Milk in Children 6-24 Months by Population Strata

	Diluted Cow's Milk		Total
	Yes	No	
Urban	39	321	360
*Row %	10.8	89.2	100.0
*95% C.I.	7.6-14.0	86.92.4	

Rural	63	317	380
*Row %	16.6	83.4	100.0
*95% C.I.	10.1-23.1	76.9-89.9	
Total	102	638	740
*Total %	13.4	86.6	100.0
*95% C.I.	10.0-16.9	83.1-90.0	

*weighted

Pearson Chi-square: 5.13, p=0.02; Missing Values=322

Tab. 3.2.2.20 – Sugar Addition to the Cow's Milk in Children 0-24 Months by Population Strata

	Sugar Addition		Total
	Yes	**No**	
Urban	177	194	371
*Row %	47.7	52.3	100.0
*95% C.I.	38.8-56.6	43.4-61.2	
Rural	296	107	403
*Row %	73.4	26.6	100.0
*95% C.I.	64.8-82.1	17.9-35.2	
Total	473	301	774
*Row %	65.3	34.7	100.0
*95% C.I.	53.1-66.0	34.0-46.9	

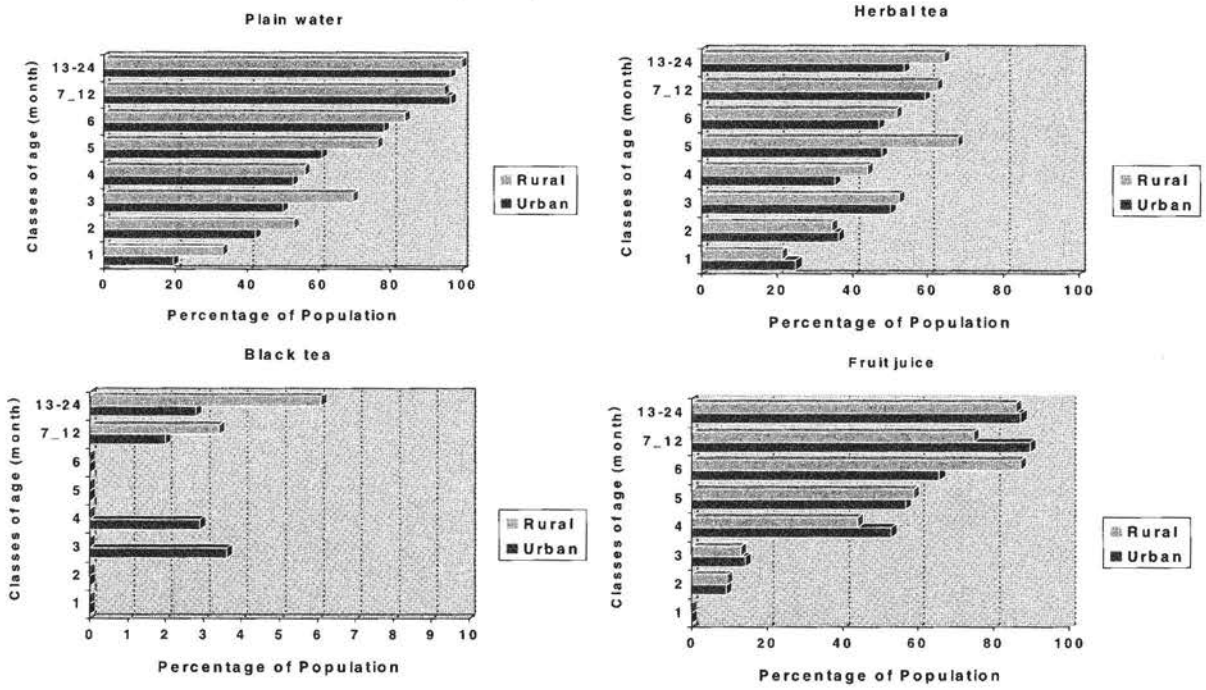
*weighted

Pearson Chi-square: 53.85, p=0.00000; Missing Values=618

Other liquids

The early introduction of liquids other than breast milk is a very popular habit in Macedonia, particularly in rural areas (Fig. 3.2.2.7). Water is introduced as early as the first week of life and by the age of 3 months more than half of the children are given water. Tea is also used in the same way, in addition or as an alternative to water. Only herbal teas are consumed (camomile, mint), while black tea is seldom used and is almost unavailable in the country. Fruit juices are also popular, and they are started introduced at around 3-4 months of age, one month earlier than the recommendation given by the MCH Institute.

Figure 3.2.2.7 - Introduction of Liquids in Children 0-24 months by Population Strata



Sugar is added to drinks in less than half of the cases (Tab. 3.2.2.21). It may be presumed that liquids were given to the infants with a bottle, as almost two thirds of the mothers said they had used a bottle with a nipple for feeding within the last 24 hours. 40% of children under 6 months (Tab. 3.2.2.22) and 83% of children 6-24 months (Tab. 3.2.2.23) were using them with no differences between urban and rural areas.

Tab. 3.2.2.21 – Sugar Addition to the Liquids in Children 0-24 Months by Population Strata

	Sugar Addition		Total
	Yes	No	
Urban	224	447	671
*Row %	33.4	66.6	100.0
*95% C.I.	27.1-39.7	60.3-72.9	
Rural	320	346	666
*Row %	48.0	52.0	100.0
*95% C.I.	39.7-56.4	43.6-60.3	
Total	544	793	1337
*Row %	39.8	60.2	100.0
*95% C.I.	34.7-44.9	55.1-65.3	

*weighted

Pearson Chi-square: 29.70, p=0.00000; Missing Values=55

Tab. 3.2.2.22 – Drinking from a Bottle with a Nipple in Children 0-6 Months by Population Strata

	Bottle with a Nipple		Total
	Yes	No	
Urban	61	108	169
*Row %	36.1	63.9	100.0
*95% C.I.	27.1-45.1	54.9-72.9	
Rural	65	80	145
*Row %	44.8	55.2	100.0
*95% C.I.	34.7-54.9	45.1-65.2	
Total	126	188	314
*Row %	39.6	60.4	100.0
*95% C.I.	32.8-46.4	53.6-67.2	

*weighted

Pearson Chi-square: 2.48, p=0.12; Missing Values=16

Tab. 3.2.2.23 – Drinking from a Bottle with a Nipple in Children 6-24 Months by Population Strata

	Bottle with a Nipple		Total
	Yes	No	
Urban	417	88	505
*Row %	82.6	17.4	100.0
*95% C.I.	78.9-86.2	13.8-21.1	
Rural	433	89	522
*Row %	83.0	17.0	100.0
*95% C.I.	78.0-87.9	12.1-22.0	
Total	850	177	1027
*Row %	82.7	17.3	100.0
*95% C.I.	79.7-85.7	14.2-20.2	

*weighted

Pearson Chi-square: 0.02, p=0.87; Missing Values=35

Complementary Foods

Complementary foods were given to the children starting from the fourth to fifth month. Fruit was the foodstuff that is introduced first. One fourth of the four month old infants had consumed fruit in the twenty-four hours preceding the interview (Fig. 3.2.2.8) Vegetables were introduced one to two months later, as the consumption was reported in five-six month old infants (Fig. 3.2.2.8). It must also be pointed out that there still was a proportion of children in the second semester of life, and even in the second year, that were not consuming

fruit and vegetables. Carbohydrate rich foods (porridges, pasta, biscuits, potatoes) were also introduced in the second semester of life (Fig. 3.2.2.9). Biscuits had been given to one third of the 5 month old children; porridges were less common, as only one fifth of the six month old children had had it and the proportion of consumers did not exceed 25% even in the following semester; bread, pasta and rice had the same initiation pattern, however by the second semester two thirds of the children had consumed them (Fig. 3.2.2.9); potatoes were consumed by more than half of the infants above the age of 6 months (Fig. 3.2.2.9). Meat is not introduced until 6 months and in approximately half of the older children consumed it (Fig. 3.2.2.10); fish is also introduced in the second semester, but less than one fourth of the children had consumed it (Fig. 3.2.2.10); the consumption of cheese and eggs was reported for half of the children in the second semester of life (Fig. 3.2.2.10).

Figure 3.2.2.8 - Introduction of Fruit and Vegetables in Children 0-24 months by Population Strata

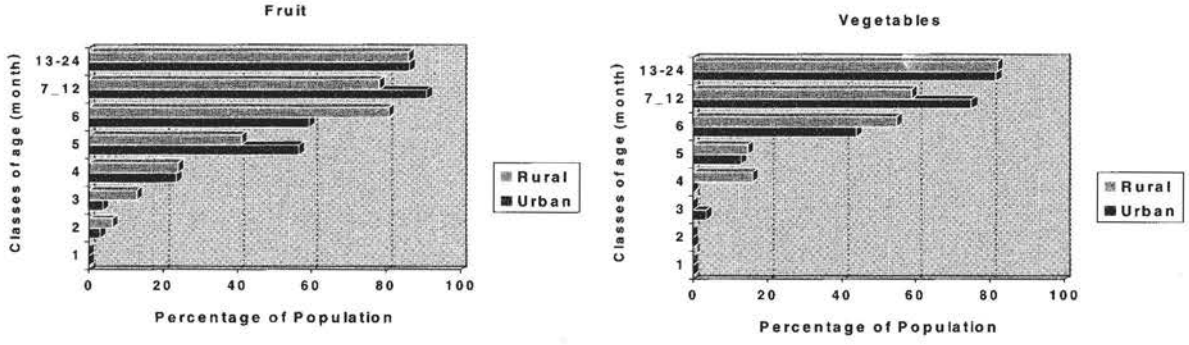
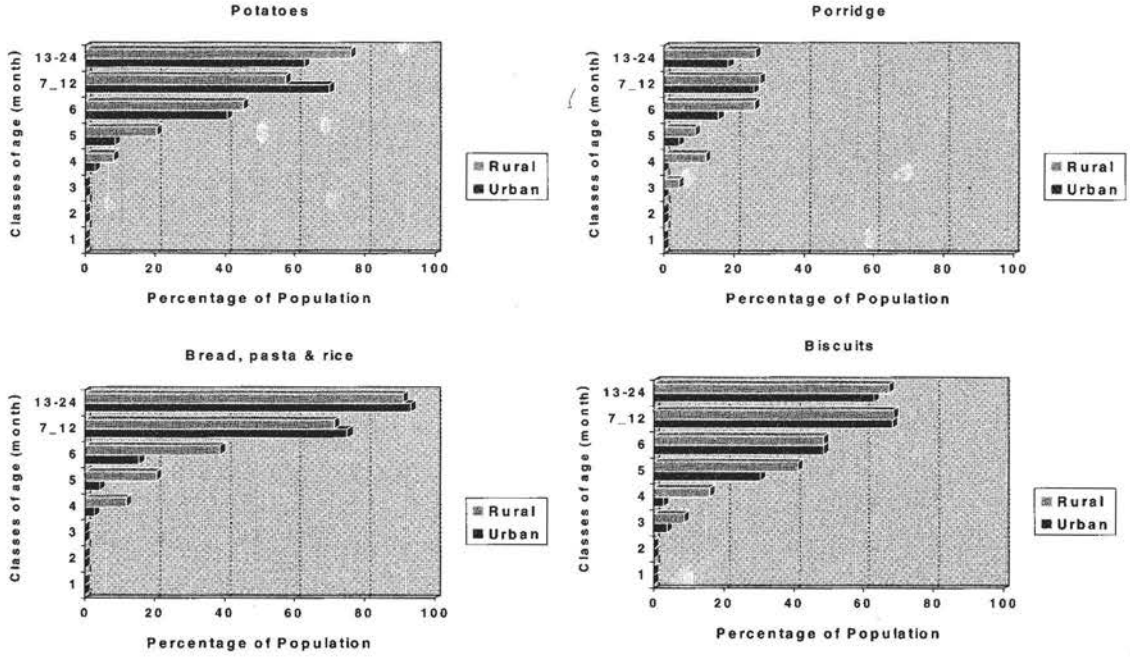


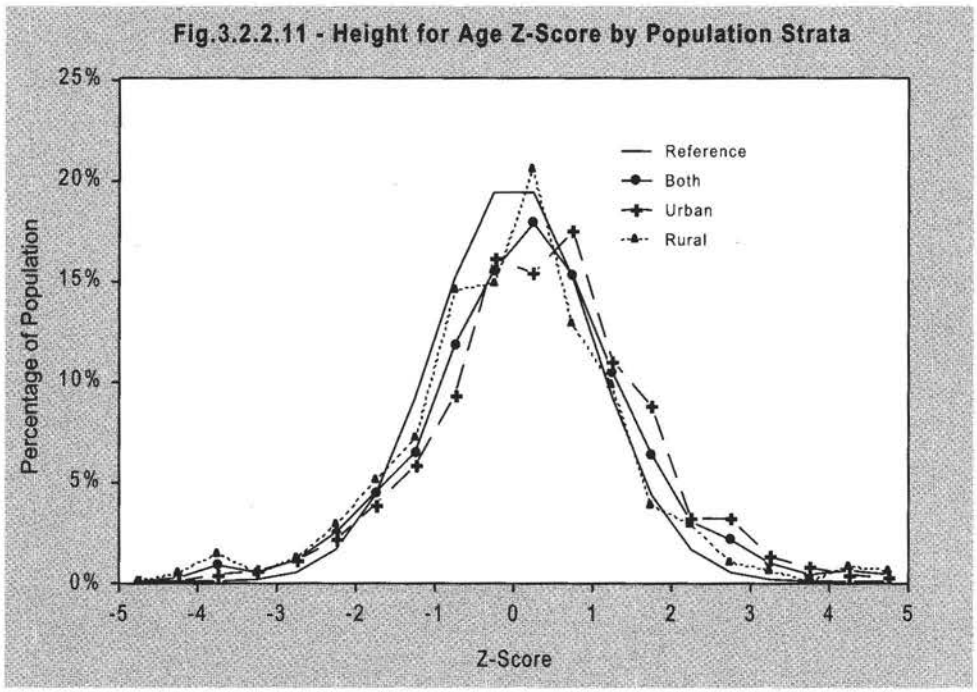
Figure 3.2.2.9 - Introduction of Carbohydrate Rich Foods in Children 0-24 months by Population Strata

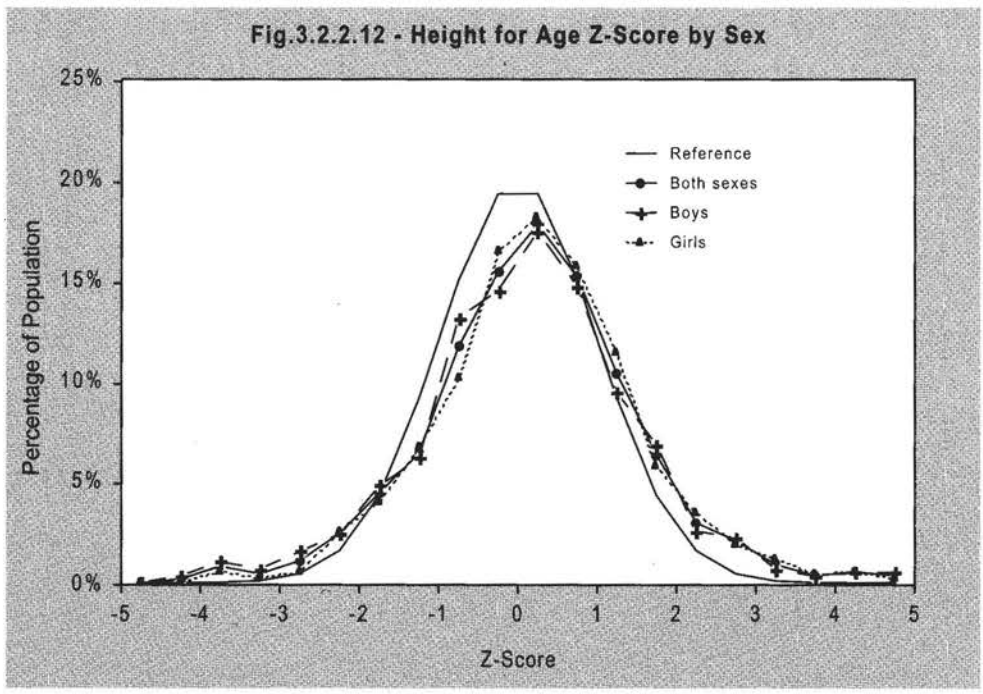


Nutritional status

Anthropometry

Anthropometric measurements were taken in children aged 6-59 months. Figure 3.2.2.10 shows the distribution of height-for-age Z score in the two population strata. The mean value for the whole population was –0.08±1.33, with significantly lower values for children living in rural areas. In rural children the mean of height-for-age Z score was below the international references (-0.26±1.33) while in urban areas this value was near zero. The distribution of height-for-age Z score was the same in male and female children with no significantly differences of the mean values by sex (Fig. 3.2.2.11).





Approximately 7% of the children aged 6-59 months had height-for-age below – 2 Z score (Tab. 3.2.2.24), a figure in excess of the 3% that can be expected in a population of well nourished children. A significant higher proportion (9%) of low height-for-age was observed in rural than in urban children (6%). The prevalence of low height-for age was particularly elevated in Roma children (32%) followed by Albanian (11%); the other ethnic groups showed prevalence lower than 5% (Tab. 3.2.2.25). One fourth (24%) of the children with low birth weight continued to be small up to 5 years of age (Tab. 3.2.2.26). The percentage of children with low birth weight that remain small was particularly higher in rural areas (31%) than in urban areas (19%).

Tab. 3.2.2.24 – Prevalence of Low Height-for-Age z score (HAZ) in children 6-59 months by Population Strata

	HAZ			Total
	< -3	< 2	Normal	
Urban	6	27	541	574
*Row %	1.0	4.7	94.3	100.0
*95% C.I.	0.3-1.8	1.9-7.5	91.3-97.2	
Rural	14	31	488	533
*Row %	2.6	5.8	91.6	100.0
*95% C.I.	0.7-4.6	3.3-8.3	88.1-95.0	
Total	20	58	1029	1107
*Row %	1.7	5.2	93.1	100.0
*95% C.I.	0.8-2.6	3.2-7.1	90.9-95.3	

*weighted

Pearson Chi-square: 4.69, p=0.09; Missing Values=66

Tab. 3.2.2.25 – Prevalence of Low Height-for-Age z score (HAZ) in Children 6-59 Months of Different Ethnic Groups

	HAZ		Total
	<-2	≥-2	
Macedonian	32	706	738
*Row %	4.2	95.8	100.0
*95% C.I.	2.2-6.2	93.8-97.8	
Albanian	27	211	238
*Row %	10.8	89.2	100.0
*95% C.I.	5.9-15.7	84.3-94.1	
Roma	17	35	52
*Row %	32.4	67.6	100.0
*95% C.I.	15.8-49.0	51.0-84.2	
Turkish	2	36	38
*Row %	5.3	94.7	100.0
*95% C.I.	-1.1-11.7	88.3-101.1	
Others	-	40	40
*Row %	-	100.0	100.0
*95% C.I.		100.0-100.0	
Total	78	1028	1106
*Row %	6.9	93.1	100.0
*95% C.I.	4.7-9.1	90.9-95.3	

*weighted

Pearson Chi-square: 70.37, p=0.0000; Missing Values=67

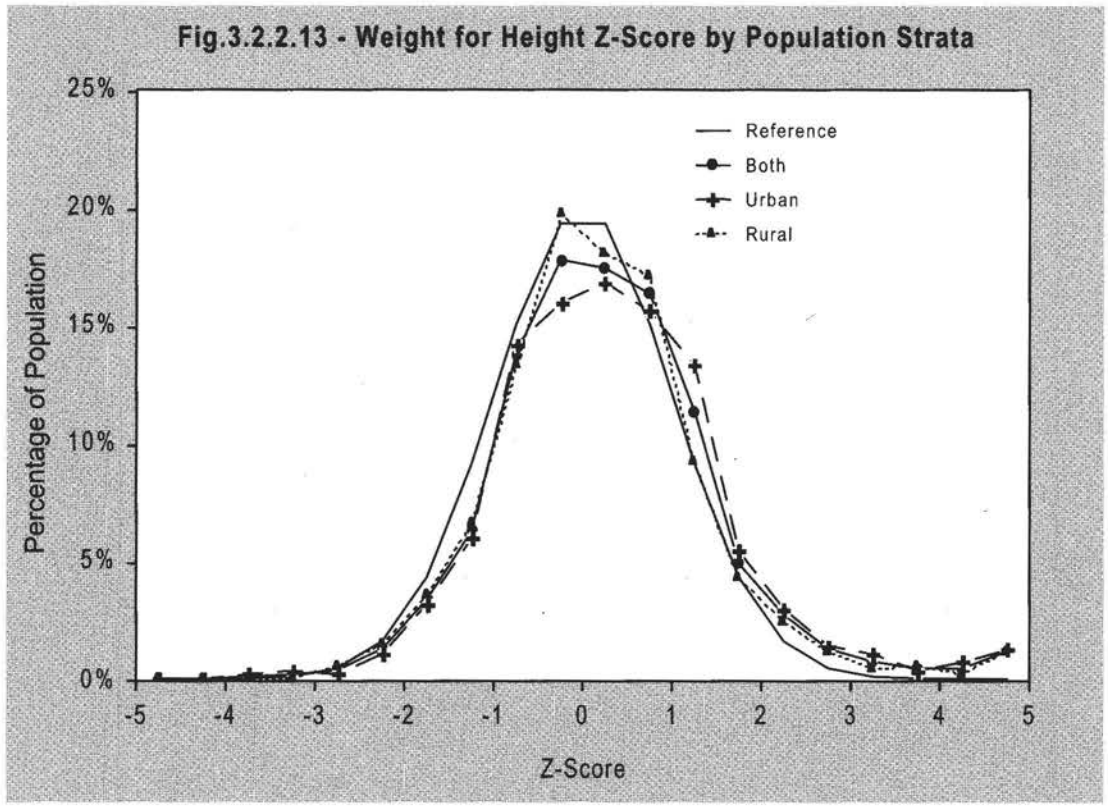
Tab. 3.2.2.26 - Birth Weight and Stunting in Children 6-59 Months

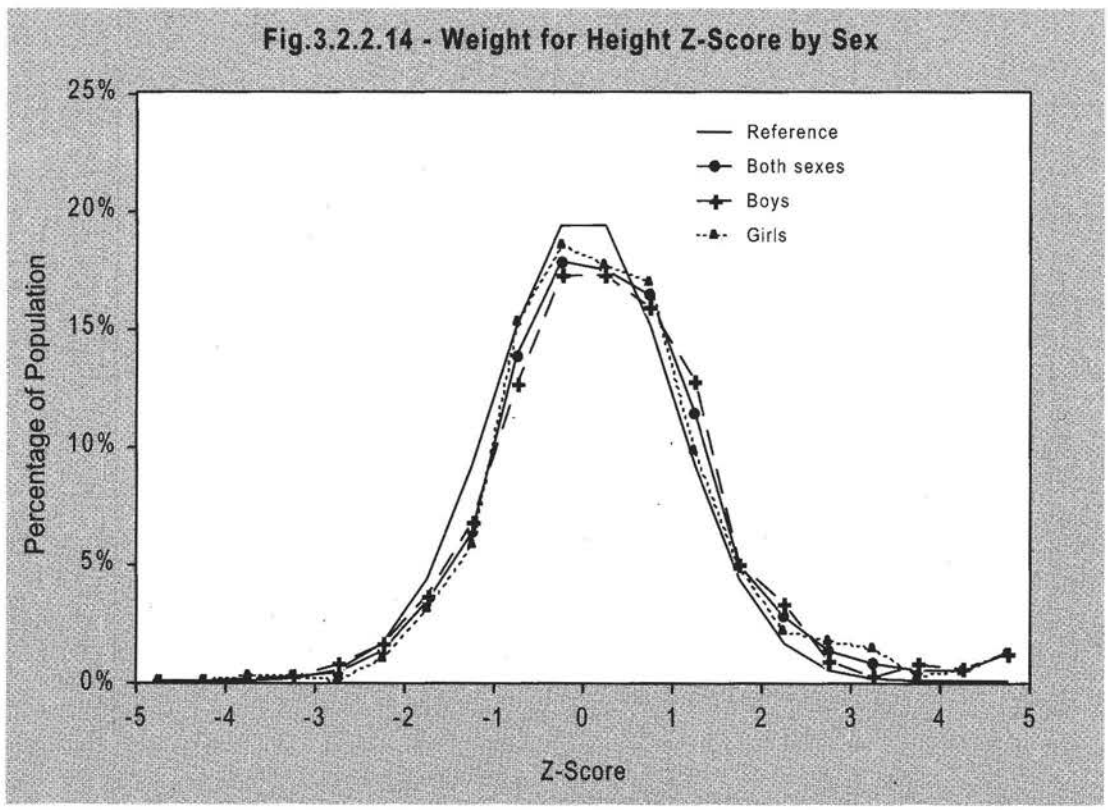
	HAZ		Total
	<-2	≥-2	
Low	19	59	78
*Row %	23.7	76.3	100.0
*95% C.I.	11.5-35.8	64.2-88.5	
Normal	52	816	868
*Row %	5.8	94.2	100.0
*95% C.I.	3.5-8.2	91.8-96.5	
High	6	144	150
*Row %	4.1	95.9	100.0
*95% C.I.	0.9-7.2	92.8-99.1	
Total	77	1019	1096
*Row %	6.9	93.1	100.0
*95% C.I.	4.6-9.1	90.9-95.4	

*weighted

Pearson Chi-square: 39.40, p=0.0000; Missing Values=77

The weight-for-height distributions of the Macedonian children was corresponding to the international reference with no differences between urban and rural areas (Fig. 3.2.2.13) and no differences by sex (Fig. 3.2.2.14).





The prevalence of low weight-for-height was not much greater (3.5%) without appreciable differences between the different strata (Tab. 3.2.2.27). The prevalence of high weight-for-height (>2 z score), an indicator of being overweight, was 6% with no differences between urban and rural areas.

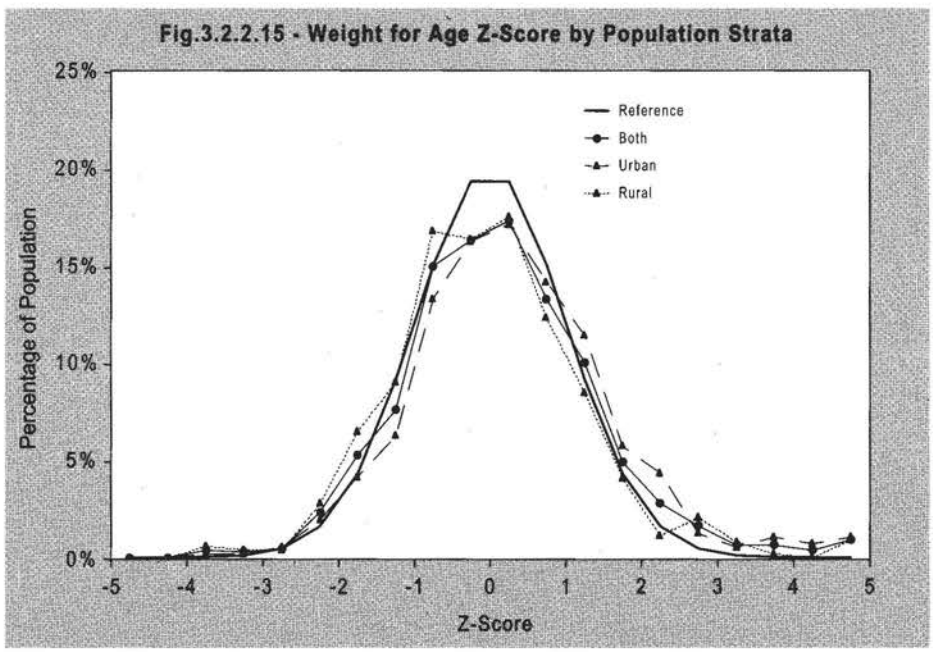
Tab.3.2.2.27 – Prevalence of Low Weight-for-Height Z score (WHZ) in children 6-59 months by Population Strata

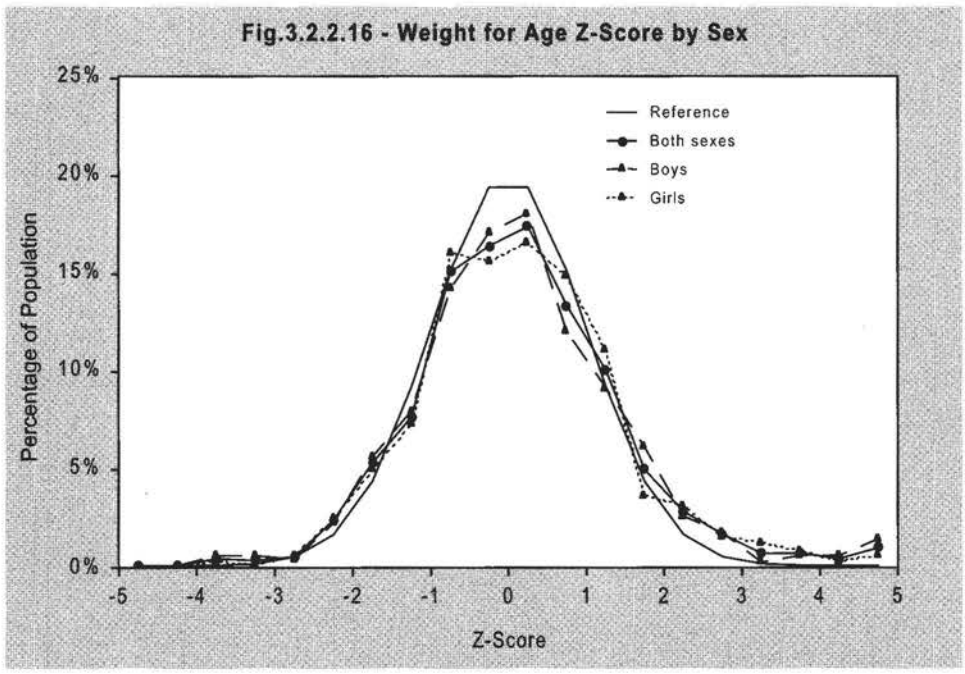
	WHZ				Total
	< -3	< 2	Normal	>2	
Urban	3	17	520	30	570
*Row %	0.5	3.0	91.2	5.3	100.0
*95% C.I.	-0.1-1.1	1.6-4.3	88.7-93.8	3.4-7.2	
Rural	2	18	489	23	532
*Row %	0.4	3.4	91.9	4.3	100.0
*95% C.I.	-0.1-0.9	1.8-4.9	89.6-94.2	2.7-5.9	
Total	5	35	1009	53	1102
*Row %	0.5	3.1	91.5	4.9	100.0
*95% C.I.	0.1-0.9	2.1-4.2	89.8-93.3	3.6-6.2	

*weighted

Pearson Chi-square: 0.80, p=0.85; Missing Values=71

The weight-for-age indicator combines the effects of height and soft tissue growth in children. The distribution of weight-for-age by population strata is shown in figure 3.2.2.15 and the distribution by sex in figure 3.2.2.16. According to this indicator, most Macedonian children were classified as normal (Tab. 3.2.2.28), with 6% below –2 z score, this percentage is higher in rural areas (7%) than in urban (5%).





Tab. 3.2.2.28 – Prevalence of low Weight-for-Age z score (WAZ) in Children 6-59 Months by Population Strata

	WAZ			Total
	< -3	< 2	Normal	
Urban	3	25	550	578
*Row %	0.5	4.3	95.2	100.0
*95% C.I.	0.0-1.1	2.5-6.1	93.2-97.1	
Rural	5	36	502	543
*Row %	0.9	6.6	92.5	100.0
*95% C.I.	-0.3-2.2	3.3-9.9	88.6-96.3	
Total	8	61	1052	1121
*Row %	0.7	5.3	94.0	100.0
*95% C.I.	0.1-1.3	3.6-7.0	92.0-96.0	

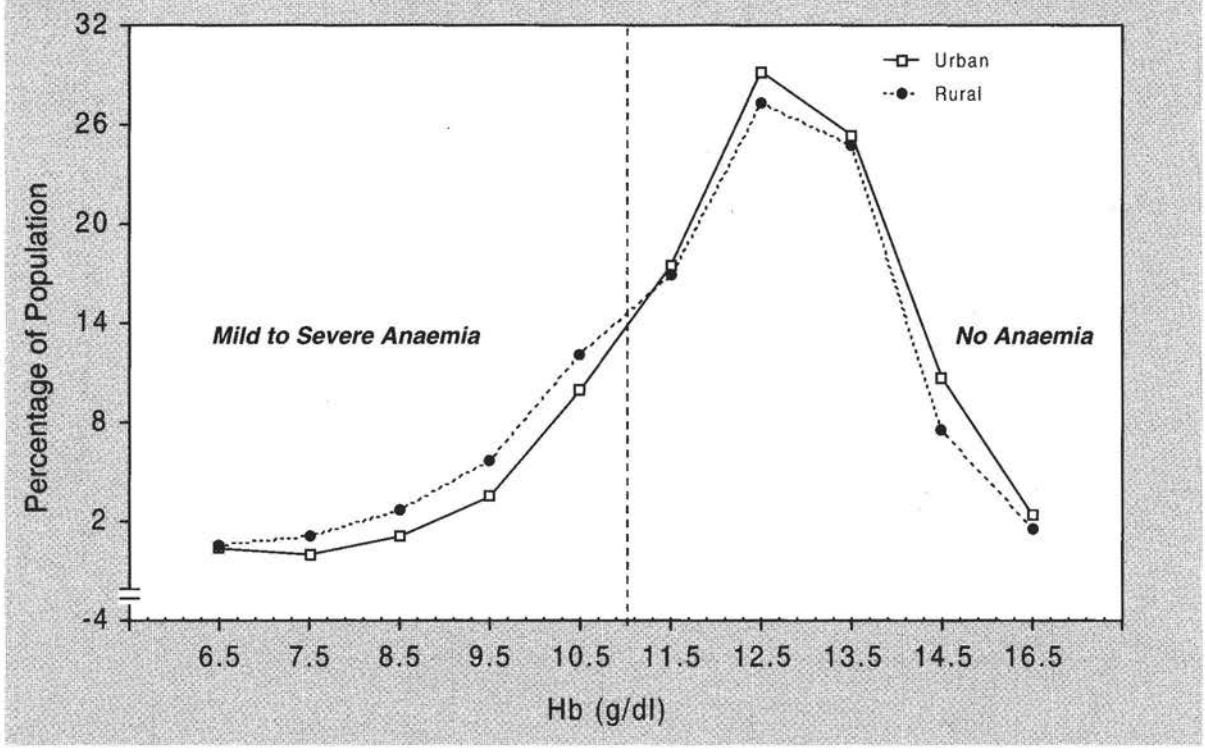
*weighted

Pearson Chi-square: 8.16, p=0.04; Missing Values=52

Micronutrients

Figure 3.2.2.17 shows the haemoglobin distribution in children 6-59 months. The left side of the distribution is skewed, indicating the presence of anaemia.

Fig. 3.2.2.17 - Distribution of Hemoglobin in Children 6-59 Months by Population Strata



The mean haemoglobin value of children aged 6-59 months was significantly lower in rural than in urban areas (Tab. 3.2.2.29). The prevalence of anaemia (Tab. 3.2.2.30) was significantly higher in rural children (29% with 2% of severe cases) compared with the children living in urban areas (23% with virtual absence of severe cases).

Tab. 3.2.2.29 – Haemoglobin Concentration (g/dL) in Children 6-59 Months by Population Strata

	n	Mean±SD
Urban	544	11.95±1.43
Rural	535	11.60±1.68
Total	1079	11.77±1.57

t-Test: t=3.66 and p=0.0003; *Missing Values=94.*

Tab. 3.2.2.30–Prevalence of Anaemia in Children 6-59 Months by Population Strata

	Anaemia				Total
	Severe (Hb <7 g/dL)	Moderate (Hb7-9.9 g/dL)	Mild (Hb10-10.9 g/dL)	No Anaemia (Hb≥11 g/dL)	
Urban	2	45	79	418	544
*Row %	0.4	8.3	14.5	76.8	100.0
*95% C.I.	-0.1-0.9	5.3-11.2	10.7-18.3	71.0-82.7	

Rural	10	67	79	379	535
*Row %	1.9	12.5	14.8	70.8	100.0
*95% C.I.	0.8-3.0	8.8-16.2	11.2-18.3	65.0-76.6	
Total	12	112	158	797	1079
*Row %	1.0	10.1	14.6	74.2	100.0
*95% C.I.	0.5-1.6	7.8-12.4	12.0-17.3	70.1-78.3	

*weighted

Pearson Chi-square: 11.49, p=0.009; Missing Values=94

Table 3.2.2.31 shows the prevalence of anaemia in different age classes. Anaemia was more common in the first and second years of life that were particularly critical with almost 40% of the children having less than 12 g/dL. The prevalence decreased in older children reaching 12% at 5 years of age.

Tab. 3.2.2.31–Prevalence of Anaemia in Children 6-59 Months at Different Ages

	Anaemia Status		**Total**
	Anaemia <12g/dL	**No Anaemia ≥12g/dL**	
6-12 months	47	76	123
*Row %	37.4	62.6	100.0
*95% C.I.	27.3-47.4	52.6-72.6	
12-24 months	116	169	285
*Row %	39.8	60.2	100.0
*95% C.I.	34.1-45.5	54.5-65.9	
24-36 months	60	165	225
*Row %	25.8	74.2	100.0
*95% C.I.	18.0-33.7	66.3-82.0	
36-48 months	33	201	234
*Row %	14.3	85.7	100.0
*95% C.I.	9.1-19.6	80.4-90.9	
48-59 months	26	186	212
*Row %	12.4	87.6	100.0
*95% C.I.	7.0-17.7	82.3-93.0	
Total	282	797	1079
*Row %	25.8	74.2	100.0
*95% C.I.	21.6-29.9	70.1-78.4	

*weighted

Pearson Chi-square: 79.33, p=0.0000; Missing Values=94

The highest prevalence of anaemia (Tab. 3.2.2.32) was observed among the Albanians (45%) followed by the Turkish (36%) and the Roma (33%). Macedonians had the lowest prevalence of anaemia (19%). Severe anaemia was present in a very small percentage of Macedonians (0.5%) and in a higher percentage of Albanians (3%).

Tab. 3.2.2.32 – Prevalence of Anaemia in Children 6-59 Months of Different Ethnic Groups

	HB concentration		Total
	<12g/dL	≥12g/dL	
Macedonian	135	577	712
*Row %	18.6	81.4	100.0
*95% C.I.	15.6-21.6	78.5-84.4	
Albanian	106	131	237
*Row %	45.1	54.9	100.0
*95% C.I.	34.6-55.5	44.5-65.4	
Roma	17	35	52
*Row %	32.8	67.2	100.0
*95% C.I.	23.0-42.6	57.4-77.0	
Turkish	13	25	38
*Row %	36.3	63.7	100.0
*95% C.I.	18.2-54.4	45.6-81.8	
Others	11	28	39
*Row %	27.7	72.3	100.0
*95% C.I.	19.0-36.4	63.6-81.0	
Total	282	796	1078
*Row %	25.8	74.2	100.0
*95% C.I.	21.6-29.9	70.1-78.4	

*weighted

Pearson Chi-square: 63.90, p=0.0000; Missing Values=95

Serum ferritin concentration, as indicator of iron deficiency, was significantly higher in urban than in rural children. (Tab. 3.2.2.33). Table 3.2.2.34 shows the frequency distribution of ferritin levels. Half of the children studied had low values of ferritin with significant differences between urban (47%) and rural (54%). In rural areas severe cases of iron deficiency (17%) were more common than in urban areas (11%). There were no cases of overloaded of iron.

Tab. 3.2.2.33 – Serum Ferritin Concentration (ng/mL) in Children 6-59 Months by Population Strata

	n	Mean±SD
Urban	534	25.34±41.79
Rural	514	21.45±14.27
Total	1048	23.43±31.50

t-Test: t=2.00 and p=0.04; *Missing Values=125.*

Tab. 3.2.2.34 – Prevalence of Normal and Abnormal Values of Ferritin in Children 6-59 Months by Population Strata

	Ferritin Levels				Total
	Severe (<10 ng/ml)	Mild (10-20 ng/ml)	Normal (20-200 ng/ml)	Over (>200 ng/ml)	
Urban	59	193	281	1	534
*Row %	11.0	36.1	52.6	0.2	100.0
95% C.I.	8.0-14.1	32.0-40.3	48.2-57.0	-0.2-0.6	
Rural	88	192	234	-	514
*Row %	17.1	37.3	45.5	-	100.0
95% C.I.	12.6-21.7	32.4-42.3	39.9-51.1		
Total	147	385	515	1	1048
*Row %	13.7	36.7	49.6	0.1	100.0
95% C.I.	11.0-16.3	33.5-39.8	46.1-53.0	-0.1-0.3	

*weighted

Pearson Chi-square: 10.63, p=0.01; Missing Values=125

Anaemia was associated to low ferritin in almost 70% of the cases, indicating that the cause of the condition is low iron status (Tab. 3.2.2.35).

Tab. 3.2.2.35 – Anaemia and Iron Status in Children 6-59 months

	Iron Status		Total
	Low	Normal	
Anaemia	190	85	275
*Row %	68.6	31.4	100.0
*95% C.I.	63.1-74.1	25.9-36.9	
No Anaemia	341	427	768
*Row %	44.1	55.9	100.0
*95% C.I.	40.6-47.6	52.3-59.4	
Total	531	512	1043
*Row %	50.5	49.5	100.0
*95% C.I.	47.0-53.9	46.1-53.0	

*weighted

Pearson Chi-square: 49.39, p=0.0000; Missing Values=130

The children's vitamin A status was investigated by the evaluation of serum retinol. Mean retinol concentration was significant higher in rural children than in urban (Tab. 3.2.2.36). In table 3.2.2.37 the frequency distribution of different levels of retinol in the two population strata is shown. In urban areas vitamin A deficiency (31%) was more common than in rural areas (28%) but severe cases of vitamin A deficiency were higher in rural (2%) than in urban children (1%). Low retinol was present in 39% of anaemic children, significantly more than in non anaemic children (Tab. 3.2.2.38)

Tab. 3.2.2.36 – Serum Retinol Concentration (µg/dL) in Children 6-59 Months by Population Strata

	n	Mean±SD
Urban	465	22.50±5.78
Rural	474	23.78±6.88
Total	939	22.94±6.37

t-Test: t=-2.35 and p=0.02; *Missing Values=234.*

Tab. 3.2.2.37 – Prevalence of Normal and Abnormal Values of Retinol in Children 6-59 Months by Population Strata

	Retinol Levels			Total
	Severe (< 10 µg/dL)	Mild (10-20 µg/dL)	Normal (> 20 µg/dL)	
Urban	5	141	319	465
*Row %	1.1	30.3	68.6	100.0
*95% C.I.	0.0-2.1	23.8-36.8	61.7-75.4	

Rural	9	122	343	474
*Row %	1.9	25.7	72.4	100.0
*95% C.I.	0.0-3.8	18.3-33.2	63.6-81.1	
Total	14	263	662	939
*Row %	1.4	28.3	70.3	100.0
*95% C.I.	0.4-2.5	23.3-33.2	64.8-75.7	

*weighted

Pearson Chi-square: 3.30, p=0.19; Missing Values=234

Tab. 3.2.2.38 - Anaemia and Retinol Status in Children 6-59 Months

	Retinol Status		**Total**
	Low	**Normal**	
Anaemia	93	147	240
*Row %	39.4	60.6	100.0
*95% C.I.	31.5-47.2	52.8-68.5	
No Anaemia	182	512	694
*Row %	26.4	73.6	100.0
*95% C.I.	20.8-32.0	68.0-79.2	
Total	275	659	934
*Row %	29.7	70.3	100.0
*95% C.I.	24.3-35.1	64.9-75.7	

*weighted

Pearson Chi-square: 13.47, p=0.0002; Missing Values=239

Tab. 3.2.2.39 – Serum Alkaline Phosphatase Concentration (IU/L) in Children 6-59 Months by Population Strata

	n	**Mean±SD**
Urban	509	177.98±91.40
Rural	501	178.61±52.23
Total	1010	178.26±77.55

t-Test: t=-0.13 and p=0.89; *Missing Values=163.*

Tab. 3.2.2.40 – Prevalence of Normal and Abnormal Values of Alkaline Phosphatase in Children 6-59 Months by Population Strata

	Alkaline Phosphatase Levels			**Total**
	Low	**Normal**	**High**	
Urban	127	371	11	509
*Row %	24.9	72.9	2.2	100.0
*95% C.I.	19.3-30.5	67.4-78.3	1.0-3.3	

Rural	106	383	12	501
*Row %	21.2	76.4	2.4	100.0
*95% C.I.	16.9-25.4	71.8-81.1	0.7-4.1	
Total	233	754	23	1010
*Row %	23.3	74.4	2.3	100.0
*95% C.I.	19.6-27.0	70.7-78.1	1.3-3.2	

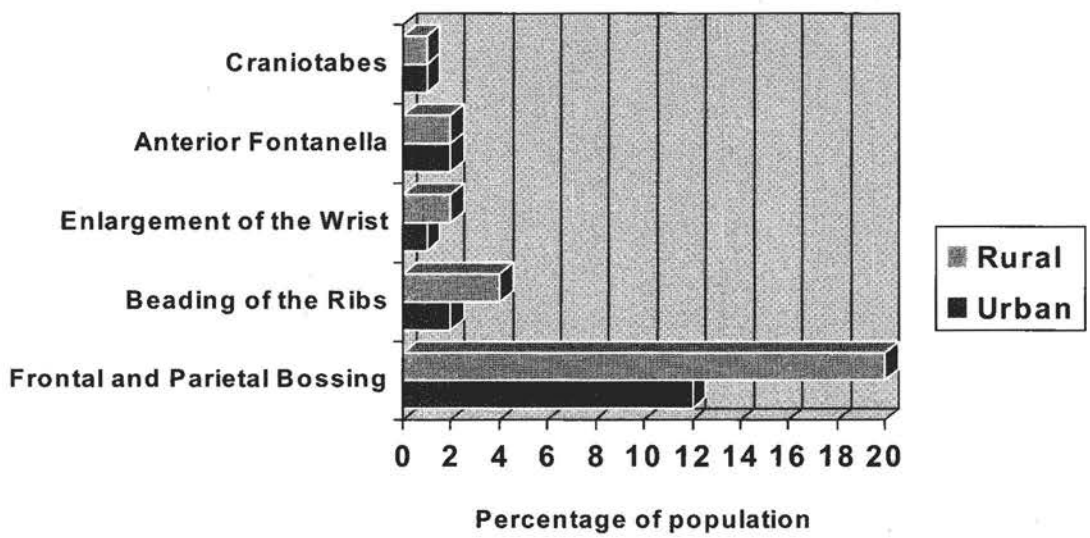
*weighted

Pearson Chi-square: 2.06, p=0.36; Missing Values=163

A high level of serum alkaline phosphatase was used as a biochemical indicator of the presence of rickets. This pointed to a prevalence of 2% in the children studied with no significant differences by strata (Tab. 3.2.2.40). The analysis of the distribution by age classes did not show a particularly critical age. Low values of alkaline phosphatase may be indicative of poor growth, but the observed prevalence of 23% contrasts with the stunting observed prevalence (7%).

Rickets signs were observed in a variable proportion of children (Fig. 3.2.2.18). The most common was frontal and parietal bossing (FPB), observed in 15% of the children with a significant higher prevalence in rural (20%) than in urban areas (12%). The second most common signs was beading of the ribs (R 3%); here rural children (4%) also had a significantly higher prevalence than urban children (2%). The epiphyseal enlargement of the wrist (W 2%), the delay of the closure of anterior fontanella (AF) beyond 18 months (2%) and craniotabes (CT) were the least commonly observed signs (1%) with no differences between urban and rural areas.

Figure 3.2.2.18 - Prevalence of Clinical Signs of Rickets in Children 0-59 months by Population Strata



DISCUSSION AND CONCLUSIONS

The survey has shown a good achievement of the UNICEF programme objectives in the a of immunisation. Coverage is very high, with rates close to 100% for DPT and OPV a slightly lower rates (90-95%) for MMR and BCG. Continuous surveillance and maintenai of the system is required, but the present programme organisation seems to be satisfacto with regards to population impact. However, limitations in survey data due to problems locating all record cards makes a full evaluation difficult.

In as far as access to water and sanitation, the survey has shown that some rural areas ne improvements, particularly for sanitation facilities. Microbiological monitoring of wa supplies and effective chlorination should be ensured in remote rural areas.

As far as the nutrition component is concerned, the survey did not show major deficienc in adults. Low BMI was present in 6% of the women and anaemia was present in 12% of mothers, mainly in a mild and moderate form. On the other hand, high BMI (above 30) v present in 11% of the women, more in rural than urban areas. Goitre still affects 10% women and can be dealt with via simple dietary modifications. The development of diet guidelines, still not achieved in Macedonia, should therefore be supported and included part of a National Action Plan for Nutrition.

In children, low weig for-height was low, p sent in 6% of the cl dren as was stunt (7%). Both values slightly higher than ceptable, indicating t although there are major nutritional pr lems are not present the whole populati they do exist but in sn population sub-grou Poverty, particularly urban areas, is a ma contributing factor. Sub-groups of the population, characterised by different culture and fc patterns may be affected by chronic malnutrition and should be the target for specific hea interventions.

The observed micronutrient deficiencies may constitute more of a public health problem large proportion of the children had mild retinol deficiency (30%), with higher rates in urb areas. Low retinol is likely to have an impact on immune function and should be correct Due to an absence of severe forms, vitamin A supplementation programmes are not advis Existing moderate manifestations might be dealt with by dietary modifications, particula by improved complementary feeding practices.

Low haemoglobin was present in 27% of the children, but again only mild forms were det ted. The measurement of serum ferritin confirmed that in most instances anaemia was cau by iron deficiency. Severe iron deficiency was observed in 14% of the cases; mild in 37% the cases; severe forms were more common in rural areas. Dietary modification might a

overcome iron deficiency in young children. The use of cow's milk as a breast milk substitute, often undiluted, is a cause of microscopic intestinal blood loss, and the poor accessibility and availability of products with high iron bioavailability, such as meat, in some population groups may be another explanation.

There is a presence of Rickets in Macedonia, but in a lower proportion of children than expected. High alkaline phosphatase was only observed in 2% of the cases. Again, the consumption of dairy products in winter and the early exposure to the sun during the summer are the best way of preventing the development of this condition.

Observation of children's feeding patterns suggest that educational efforts in this area might be rewarding in terms of public health impact. Levels of exclusive breastfeeding are still unsatisfactory, received by less than half of the children under 4 months. This is due to the bad practice of early liquid introduction. The use of breastmilk substitutes is not widespread, but it could be further reduced. Better support should be given by the health staff at the time of delivery, as only a minority seems to be helping mothers to breastfeed and very few follow the advice to put the child to the breast as early as possible.

Complementary feeding practices can also be improved. Meat, milk, fruit and vegetables are not given as often as is recommended, probably for reasons of availability and affordability.

RECOMMENDATIONS

As a result of the survey findings, the following recommendations can be formulated:

For the general population

1. Continue maintenance and surveillance of the immunisation system;
2. Children's feeding practices;

   a) Objectives
   - increase exclusive BF rates until the age of 6 months
   - improve complementary feeding practices

   b) Actions
   - Implementation of BFHI: improvements in the timely initiation of breastfeeding is one priority area
   - Implementation of IMCI
   - adaptation of IMCI feeding recommendations
     - training of health staff
     - implementation of public health education

   c) Training messages
   - breastfeeding counselling: promote exclusive and continued breastfeeding in the community and early introduction of liquids should be discouraged
   - feeding recommendations: promote recommendations for complementary feeding including the introduction of meat, dairy products, fruit and vegetables from the sixth month
   - management of diarrhoeal diseases
   - diagnosis and management of rickets

   d) Health education messages
   - Infant feeding (<6 months)
     - earlier BF initiation
     - Promote exclusive breastfeeding
     - Discourage early introduction of liquids
     - Discourage tea
     - Discourage cow's milk
   - Infant feeding (6-12 months)
     - Encourage mashed fruit and vegetables
     - Encourage earlier introduction of meat and fish
   - ORT use
   - Child care
   - Encourage exposure to sunshine

3) Antenatal care

   a) Objectives
   - Reduce anaemia in women of fertile age

b) Actions

- training of health staff
- preparation of educational materials
- nutritional advice to women

c) Health education message

- use fresh fruit juices
- use vegetables
- use meat and fish, if available

4) Dietary improvement in the general population

a) Objectives

- Increase the consumption of fruit and vegetables
- Improve dietary variety
- Control body weight

b) Actions

- Design of Dietary Guidelines as part of a National Action Plan for Nutrition
- Promote dietary recommendations in adults: control body weight; promote fruit and vegetable consumption;

5) Micronutrient fortification of food

a) The rates of anaemia observed in children under 5 years (26%) and in non pregnant women (12%) in reproductive age place Macedonia in a low risk category. Iron fortification is not considered a priority nor justified at present.

b) The high prevalence of low serum retinol in children place Macedonia in a high risk category. Food fortification strategies may be considered, although the feasibility, cost and beneficiaries that can be reached should be carefully evaluated.

6) Micronutrient supplementation

- Supplementation may be considered a provisional measure, while more long term strategies, such as dietary improvement and food fortification are established. Supplementation requires a capillary distribution system and careful monitoring. Decisions should be taken as to which age group should be included and to which protocol should be adopted (dose/frequency of administration).
- Vitamin supplements may have disadvantages: side effects, cause nutrient imbalances, toxicity, malabsorption, create long-term dependency and lack of confidence in locally supplements; cost of programme implementation

7) Health and nutrition surveillance

a) Objectives

- monitor nutrition related diseases and nutrition risk factors
- formulate nutrition policy recommendations
- evaluate impact of nutrition programmes

b) Actions

- Design the system
  - area 1 : children and women in reproductive age
  - area 2 : adults and elderly
- Training of health staff and standardisation of data collection and management
- Provision of equipment
  - to sentinel sites
  - to central food safety laboratory
- Implement pilot collection for 1-2 years
  - in health centers
  - in sentinel sites

For population sub-groups with poorer nutritional status

Evaluate the feasibility of nutrition support programmes, using food coupons or distribution of food products with normal or modified nutrient composition, under the surveillance of the health service.

8) Improvement of dietary quality

a) Objectives

- to improve fruit and vegetable consumption
- to improve availability throughout the year
- to improve accessibility

b) Actions

- food donations
- subsidised purchases
- support to home gardening
- improvements of production and marketing infrastructure

9) Improvements in water and sanitation

10) Micronutrient supplementation

SAMPLE 2nd STAGE

Urban	
Cluster Number	*Municipality*
1	Kicevo
2	Kochani
3	Kumanovo
4	Kumanovo
5	Ohrid
6	Ohrid
7	Prilep
8	Probistip
9	Sveti Nikole
10	Strumica
11	Tetovo
12	Stip
13	Gazi Baba
14	Gazi Baba
15	Gorche Petrov
16	Karposh
17	Karposh
18	Kisela Voda
19	Kisela Voda
20	Kisela Voda
21	Centar
22	Centar
23	Chair
24	Chair
25	Bitola
26	Bitola
27	Veles
28	Vinica
29	Gostivar
30	Delcevo

Rural	
Cluster Number	*Municipality*
31	Bitola
32	Bosilovo
33	Valandovo
34	Veles
35	Vrapciste
36	Gostivar
37	Demir Kapija
38	Dolneni
39	Zelino
40	Ilinden
41	Kavadarci
42	Klecevce
43	Kriva Palanka
44	Kukurecani
45	Labunista
46	Lozovo
47	Mogila
48	Negotino
49	Orizari
50	Petrovec
51	Radovis
52	Rostusa
53	Saraj
54	Star Dojran
55	Strumica
56	Tearce
57	Tetovo
58	Cesinovo
59	Gazi Baba
60	Kisela Voda

GUIDELINES FOR INTERVIEWERS AND MEASURERS

I. Choosing Clusters

The Team Supervisors and Team Leader are responsible for choosing clusters. They should proceed in the following order, with the suggestions listed in order of desirability. You may have to use a combi-nation of these methods.

Option 1. Ask the local Authorities to provide you with a list of households and their addresses. Number progressively the households listed and randomly pick a single household.

Option 2. Map the area and number all dwellings. Randomly pick a single household.

Option 3. Divide the area into segments of approximately equal population and randomly choose a single segment. Continue to segment that area until you have a small area, then count and number the households and randomly choose the first household.

Option 4. Divide the cluster by natural boundaries, e.g. a stream and a mountain range, then approximate the number of persons living in each segment. Number the population in each segment consecutively, e.g. if segment A contains 450 people, assign the number 1 - 450 to that segment. Randomly choose a number between 1 and the total population of that cluster. Choose the segment that includes that number. Continue to segment that area until you have a small area, then count and number the households, and randomly choose the first household.

Option 5. Allocate a number of starting points spread out on the boundary map. Put these points on easy to locate spots along the boundary of the map, with at least two points in the middle of the map. Link points to a landmark so they can be identified. Randomly choose one of the numbers, and make that your starting point.

Option 6. Locate the center of your cluster. Spin a bottle. Follow a line out of the edge of the village/area of the town, count all the households that fall on that line. Pick a random number between 1 and the total number of households that fall on that line. That will be your first household.

II. Choosing households

- Begin at the single household that was randomly chosen. Ask if among the household members there is a child under 5 or an elderly man or woman. If there are members of that category of people you are looking for, proceed with your survey. If there are not, continue to the next closest house to your left, as you exit the house. This is the next house that you survey. Always proceed to the next house to the left, until you have completed your cluster.
- If you arrive at the edge of town before you have completed your quota of interviews, continue to the next closest house to the left, even if it is in the next town/village.
- If you visit 10 consecutive households whose members do not include any of the people you are looking for, ask a local person where the next suitable household can be found in the same direction you were heading (i.e. to the left). Proceed to that household.

- If you come across an apartment block or other multi-storied building, choose a random number between 1 and the total number of floors and begin your next interview at the first door to the left as you come into that floor. After surveying all households on that floor, flip a coin. If the coin is "heads", proceed with the next floors up, until all households above have been surveyed and proceed with the next dwelling to the left of the apartment building. Likewise, if that coin is "tails" proceed with the next floors down.
- Watch the running totals for different target groups (children 0-59 months; children 0-24 months; men >65 and women >65). Until you survey 22 children aged 0-59 months, complete all relevant parts of the questionnaire for those children and their mothers. After you have completed your quota of children aged 0-59 months, carry on looking only for other households containing target individuals for whom you have not yet completed a quota (i.e. children 0-24 months and elderly people).
- For the additional households that only include children 0-24 months complete the relevant parts of the questionnaire, but do not perform anthropometry, clinical or laboratory measurements.
- For the additional households that only include elderly people, complete the household section and the relevant parts of the questionnaire.
- ♦ If you have completed the quota for elderly, do not include additional elderly even if you find them in the households that are included because of children.
- ♦ If you have completed the quota for children under 5, do not include additional children even if you find them in the households that are included because of elderly people.

II. Definitions

- Dwelling: a building or residential unit. It may contain one or more households.
- Households: a group of persons who live together and share their meals and share their resources..

III. What each interviewer should do

- Follow the instructions to select the next household in the cluster (look at flow chart).
- Fill out the cluster control sheet for each cluster. Note the time of second visit. Each empty house, refusal, or house where not all the women or children were at home, must be revisited at least once. If the mothers are not back within the day, go to the next house and do not include data on children.
- Introduce yourself to household members and conduct the interview.
- Apply the questionnaire to the mother of every selected child. Measure all the selected children and all their mothers. Don't measure weight, height or haemoglobin, nor examine the thyroid of pregnant women.
- If the household also has elderly men and women, administer the elderly questionnaire. If the household has elderly people but not children under 5, only apply the household and elderly questionnaire.

- If the household is composed of multiple couples, but all share their meals and income source, they should be treated as a single household, and information about women, children and elderly should be included in the same questionnaire. If the couples only share the dwelling, they should be treated as separate households.
- If the household hosts other individuals temporarily (i.e. for less than 1 year) and if they qualify for the assessment, do not include them as the other members of that household; if other individuals or relatives are hosted for longer periods, regard them as members of that household.
- Fill out the data collection sheet carefully, with neat handwriting.
- Check all answer sheets at the end of the day to validate accuracy, completeness and legibility. Then review again with the supervisor.

Special situations in the field

1. The selected small area can not be reached.

Survey the closest area to the original one that cannot be reached. Record all replacements in the field notebook.

2. The selected small area contains fewer households that the required cluster size.

Survey all houses in the area, then move to the area that is closest to the last household you did in the original area.

3. The household contains refugees in addition to residents.

Survey the residents only, if the household complies with inclusion criteria. Note the presence of refugees in the questionnaire (Q.3)

4. Some members of the household are not at home.

If the missing household members are persons we would measure, ask if the household member will be home at a later time and make arrangements to return, if possible. If it is not possible to meet the missing person later, record the _information for this person as "don't know/no answer" on the answer sheet.

5. The residents refuse to be interviewed

Never accept a refusal as definite. Encourage the household members to participate, offer to return later in the day, etc. Ask the other team interviewer to try later in the day. Make at least one additional attempt to convince the household member to participate. If they still refuse, do not add any additional households.

CLUSTER CONTROL SHEET

Strata (Urban or Rural):_____ Cluster name:_____

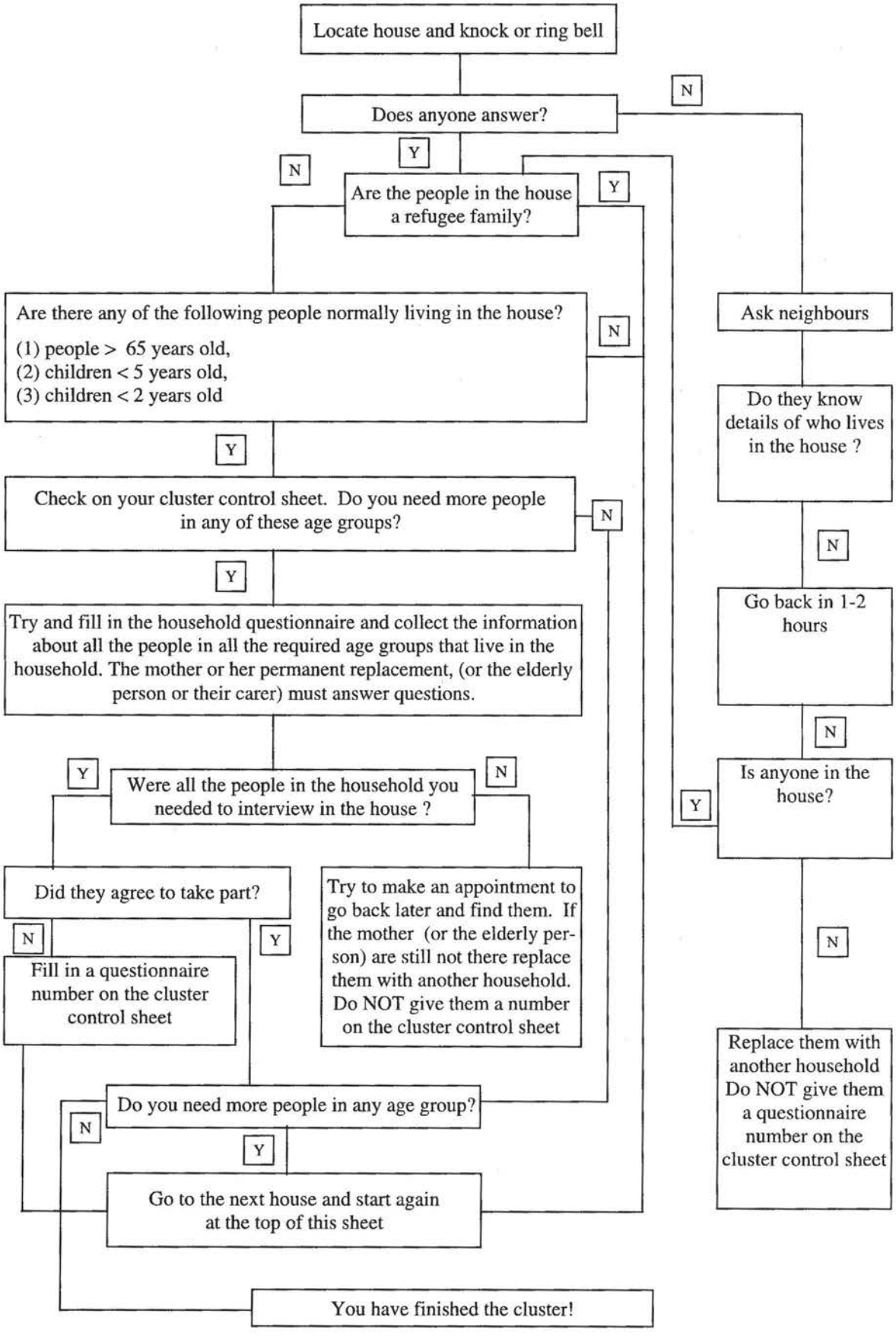
Cluster Number: /__/__/ Team Leader:_____ Team Number: /__/

Remember you need a total of: 11 men > 65 years
11 women >65 years
22 children 0-59 months
and their mothers
plus additional children
to give a total of 24 children
aged 0-24 months

Address (House or flat number and road name)	Did you speak to people: 1 = in the house 2 = to neighbors 3 = no one	Did the house contain people you needed to complete your quota? 1 = yes 2 = no	If they refused, what was the reason? 1 = not interested 2 = no reason given 3 = household head not present 4 = other	Questionnaire Number given to the household	Number of men > 65 in each house (A) and running total (B)		Number of women > 65 in each house (A) and running total (B)		Number of children aged 0-59 months in each house (A) and running total (B)		Number of children aged 0-24 months in each house (A) and running total (B))	
					A	B	A	B	A	B	A	B

Continue on a new sheet if necessary (remember to fill in all the information at the top of the sheet).

FLOW CHART FOR ACTION BY TEAM LEADERS



QUESTIONNAIRE

Household information: to be observed and registered by the interviewer		
1	Type of dwelling	1=flat; 2= house;
2	No. of rooms	Enter number

Household interview **Respondent : mother**		
3	Status	1 = Residents; 2 = Residents hosting refugees;
4	Ethnic group	1 = Macedonian; 2 = Albanian; 3 = Roma; 4 = Turkish; 5 = others
5	Report age (in years and months) and sex of each household member. List mothers with codes W1-W4; children under 5 with codes C1-C4; elderly people with codes E1-E4 and other individuals with codes O1-O4	
6	Gender of the household head ?	1=male; 2=female
7	What is the head of household level of education?	1 = illiterate 2 = incomplete elementary school ; 3 = elementary school; 4 = secondary school; 5 = short university degree; 6 = long university degree; 9 = don't know/no answer
8	What is your family's main source of cash income?	1 = private business; 2 = salary; 3 = pension; 4 = farming; 5 = social aid; 6 = no cash income; 9 = don't know/no answer
9	In the last week did your family receive food from your relatives/ friends/neighbours?	1 = yes; 2=no; 9 = don't know/no answer
10	Did your family sell or trade any household goods in the past month?	1 = yes; 2=no; 9 = don't know/no answer
11	Did you receive social assistance in food aid in the last six months?	1 = yes; 2=no; 9 = don't know/no answer
12	Do you grow fruit or vegetables?	1 = yes; 2=no; 9 = don't know/no answer
13	Do you keep small animals for meat and milk production?	1 = yes; 2=no; 9 = don't know/no answer
14	Are there any disabled among the household members?	1 = no; 2 = yes, blind; 3 =yes, deaf; 4 = yes, motor disability; 5 = yes, mental disability; 6 = yes, terminal disease; 9 = don't know/no answer

15	In the last week how many times did the family meals include meat or fish?	Enter number (0-7times/week); 9 = don't know/no answer
16	In the last week how many times did the family meals include milk, sour milk, yoghurt or cheese?	Enter number (0-7 times/week); 9 = don't know/no answer
17	In the last week how many times did the family meals include bread?	Enter number (0-7 times/week); 9 = don't know/no answer
18	In the last week how many times did the family meals include pasta, rice or potatoes?	Enter number (0-7 times/week); 9 = don't know/no answer
19	In the last week how many times did the family meals include pulses (beans, lentils, peas, etc.)?	Enter number (0-7 times/week); 9 = don't know/no answer
20	In the last week how many times did the family meals include vegetables?	Enter number (0-7 times/week); 9 = don't know/no answer
21	In the last week how many times did the family meals include fruit?	Enter number (0-7 times/week); 9 = don't know/no answer
22	In the last year, did any members of your family die? (if no, jump to 24)	1 = yes; 2=no; 9 = don't know/no answer
23	At what age did the person die (for children aged<12 months, write 1 year) (more than one answer is allowed).	Enter number of years 999 = don't know/no answer
24	What is the source of drinking water for members of your household?	1 = Piped-in dwelling; 2 = Public tap; 3 = Tube well or borehole; 4 = Protected dug well or protected spring; 5 = Unprotected dug well or spring, rainwater; 6 = Pond, river or stream; 7 = Tanker/truck; 8 = other; 9 = don't know/no answer
25	How far is this source from your dwelling?	1 = On premises; 2 = Less than 100 metres; 3 = 100m- 500 m; 4 = 500m-1km; 5 = More than 1km; 9 = Don't know/no answer;
26	If there is a pipe, how often do you have water?	1 = constantly; 2=once a day; 3 = every two or more days and so on; 9 = don't know/no answer
27	What kind of toilet facility does your household use?	1 = Flush to sewage system; 2 = Flush to septic tank; 3 = Pour flush latrine; 4 = Covered by dry latrine (luftcloset); 5 = Uncovered latrine; 6 = No facilities at all 9 = Don't know/no answer;

28	How far is the facility from your dwelling?	1 = In dwelling; 2 = Less than 50 m away; 3 = 50 m or more away; 9 = Don't know;

Child health and infant feeding interview: **all children 0-59 months** (beginning with the youngest) Respondent : mother or permanent replacement		
29	Child code	Report code from question 5
30	Mother's code	Report code from question 5
31	What is [your child's] date of birth?	Enter day/month/year
32	What was [your child's] birth weight?	Enter child's birth weight in Kg 9.9 =d on't know/no answer
33	Has [your child] had diarrhoea (more than three loose stools day) in the past two weeks? (if no jump to 35)	1 = yes; 2 = no; 9 = don't know/no answer
34	Did you use Oral Rehydration Salts?	1 = yes; 2 = no; 9 = don't know/no answer
35	Did [your child] have cough in the past 2 weeks?	1 = yes; 2 = no; 9 = don't know/no answer
36	Does [your child] have vision problems at nigh? (vision adaptation to darkness)	1 = yes; 2 = no; 9 = don't know/no answer

If the child is aged 13-24 months: (check immunization card or accept mother's report)		
37	Has the child taken DPT dose III?	1 = yes; 2 = no; 9 = don't know/no answer
38	Has the child taken OPV dose III?	1 = yes; 2=no; 9 = don't know/no answer
39	Has the child been administered MMR?	1 = yes; 2=no; 9 = don't know/no answer
40	Has the child been administered BCG?	1 = yes: scar present; 2 = yes: documented with card; 3 = no: documented with card; 9 = don't know/no answer
	How was the information in questions 37-40 obtained?	1 = immunization card; 2 = mother's report;

If the child is aged 0-24 months:		
41	Has [your child] ever been breastfed? (if no or don't know, skip to 49)	1 = yes; 2 = no; 9 = don't know/no answer
42	Since this time yesterday, has [your child] been breastfed? (If no, skip to 46)	1 = yes; 2 = no; 9 = don't know/no answer
43	How many times did you breastfeed [your child] last night between sunset and sunrise?	Enter number of times

44	How many times did you breastfeed [your child] yesterday during the daylight hours?	Enter number of times
45	How do you breastfeed [your child]?	1 = on demand; 2 = at fixed intervals; 9 = don't know/no answer
46	How long after birth did you put [your child] to the breast?	1 = within the first 30 minutes from delivery; 2 = within the first 6 hours; 3 = more than 6 hours after delivery; 9 = don't know/no answer
47	Did somebody help you with BF, in the first week?	1 = health professional; 2 = other; 3 = nobody; 9 = don't know/no answer
48	Why did you stop breastfeeding?	1 = not enough milk; 2 = mother's illness; 3 = baby's illness; 4 = baby was not gaining enough weight; 5 = no time; 6 = mother became pregnant; 9 = don't know/no answer
49	Since this time yesterday, has [your child] received any of the following drinks? a) Plain water b) Herbal tea (camomille, fennel, hibiscus) c) Black tea (Indian, Chinese) d) Fruit juices (if not to all of them, jump to 51)	1= yes; 2 = no; 9 = don't know/no answer
50	Did you add sugar to the above drinks?	1 = yes; 2 = no; 9 = don't know/no answer
51	Since this time yesterday, has [your child] received any of the following items? a) Vitamins, mineral supplements, medicines b) Infant formula c) Yoghurt or other fermented milk d) Vegetables e) Potatoes f) Fruit g) Porridge (polenta, kachamak) h) Bread, pasta, rice i) Meat j) Fish k) Cheese l) Eggs m) Biscuits	1 = yes; 2 = no; 9 = don't know/no answer

52	Since this time yesterday, did you give cow's milk to [your child]? (if the answer is no, jump to 55)	1 = yes; 2 = no 9 = don't know/no answer
53	Did you dilute the cow's milk?	1 = yes; 2 = no; 9 = don't know/no answer
54	Did you add sugar to the cow's milk?	1 = yes; 2 = no; 9 = don't know/no answer
55	Since this time yesterday, did [your child] drink anything from a bottle with a nipple?	1 = yes; 2 = no; 9 = don't know/no answer

Mothers' interview: **(include pregnant women)**		
56	Woman's code	Report code from question 5
57	What is your family status?	1 = single; 2 = registered marriage; 3 = not registered marriage; 4 = divorced or lived apart from husband; 5 = widow; 9 = don't know/no answer
58	What is your level of education?	1 = illiterate; 2 = incomplete elementary school ; 3 = elementary school; 4 = secondary school; 5 = short university degree; 6 = long university degree; 9 = don't know/no answer
59	Are you employed?	1 = employed; 2 = no employment outside the household; 9 =don't know/no answer
60	How many pregnancies did you have? (including abortions and still births)	Enter number; 0 = none; 99 = don't know/no answer
61	How many miscarriages or abortions did you have?	Enter number; 0 = none; 99 = don't know/no answer
62	If pregnant, which is the month of current pregnancy? (completed months)	Enter number; 0 = not pregnant; 99 = don't know/no answer
63	When you were pregnant, did you register at well women's clinic? (pregnant women should reply for the present pregnancy)	1 = yes; 2 = no; 9=don't know/no answer

Mothers' anthropometry, laboratory and clinical examination: **(Exclude pregnant women)**		
64	Height. Measure woman's height in cm to the nearest 0.1 cm	Enter value; 888.8 = refused;
65	Weight. Measure woman's weight in kg to the nearest 0.1 kg	Enter value; 888.8 = refused;

66	Examine woman' s thyroid	1 = no goitre; 2 = goitre detectable only by palpation and not visible; 3 = goitre palpable and visible; 8 = refused; 9=not examined
67	Anaemia. Record haemoglobin value (from Hemocue) to the nearest 0.1 g/dL	Enter value; 88.8 = refused;

Children's anthropometry and laboratory examination: **all children aged 6-59 months (until you have filled the quota)**		
68	Child code	Report code from question 5
69	Height. Measure recumbent length for children 6 - 23.9 months old (in cm, to the nearest 0.1 cm); measure standing height for children ≥24 months old (in cm, to the nearest 0.1 cm)	Enter value; 888.8 = refused; 999.9 = not present
70	Weight. If the child is unable to stand, measure the weight of the adult who will be holding the child for weighing (in kg, to the nearest 0.1 kg)	Enter value; 0 = the child is able to stand; 888.8 = refused; 999.9 = not present
71	Weight. If the child is able to stand, measure the weight of the child (in kg, to the nearest 0.1 kg); if the child is unable to stand, measure the weight of the child plus adult (in kg, to the nearest 0.1 kg)	Enter value; 888.8 = refused; 999.9 = not present
72	Anaemia. Record haemoglobin value (from Hemocue) to the nearest 0.1 g/dL	Enter the value; 88.8 = refused; 99.9 = not present
	Collect blood sample	

Children's clinical examination: **all children aged 0-59 months**		
73	Presence of epiphyseal enlargement of the wrist	1 = yes; 2 = no; 8 = refused; 9 = not examined
74	Presence of craniotabes	1 = yes; 2 = no; 8 = refused; 9 = not examined
75	Presence of frontal and parietal bossing	1 = yes; 2 = no; 8 = refused; 9 = not examined
76	Presence of beading of the ribs	1 = yes; 2 = no; 8 = refused; 9 = not examined
77	**If the child is more than 18 months** : presence of open anterior fontanelle on palpation;	1 = yes; 2 = no; 8 = refused; 9 = not examined

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