

Vitamin D deficiency in Iranian children and strategies to prevent and control

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Outlines

- Global prevalence of vitamin D deficiency
- Importance of vitamin D
- Supplementation protocols
- Vitamin D deficiency in Iran
- Programs to prevent / control in Iran

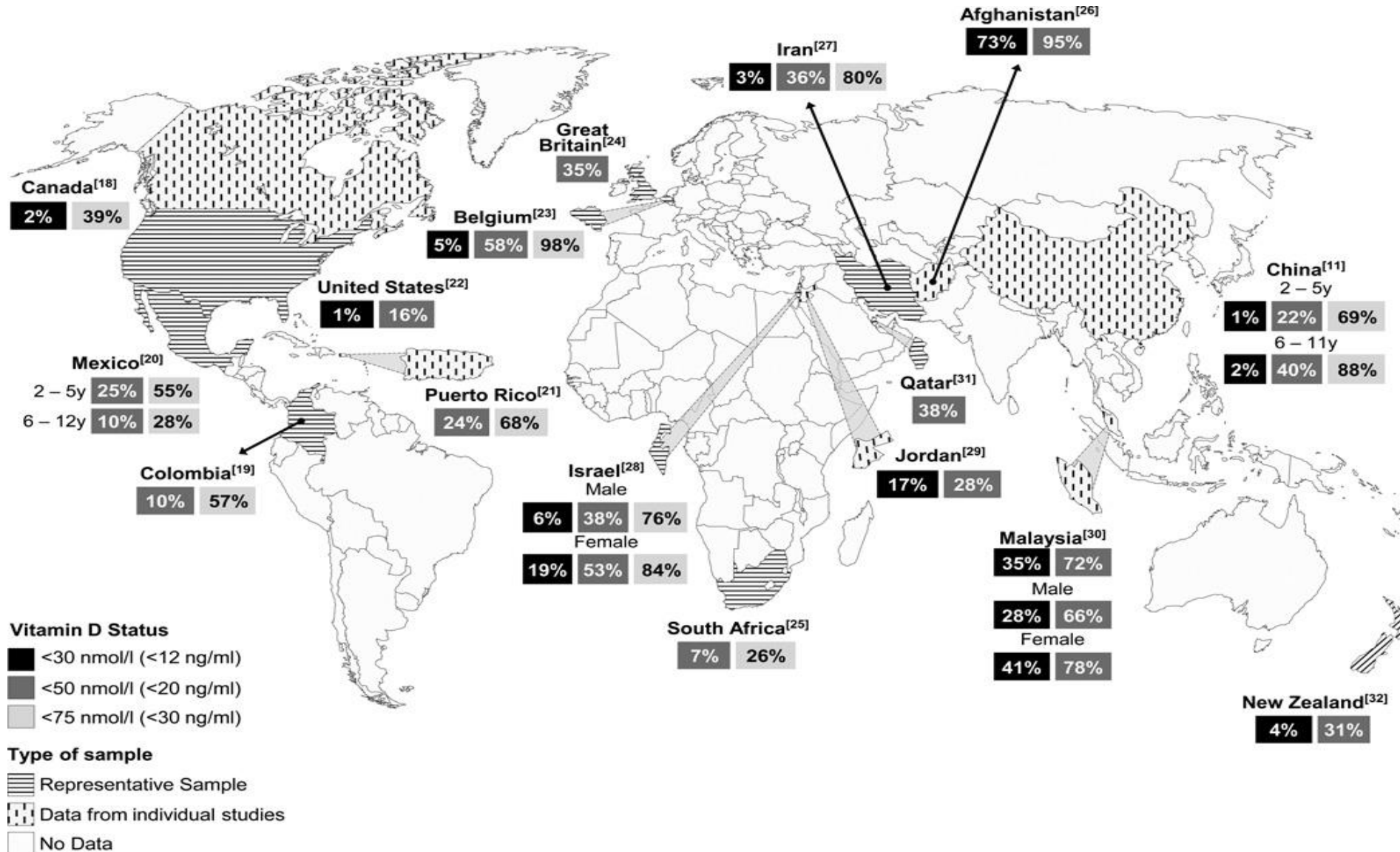
Vitamin D insufficiency / Deficiency

- Vitamin D deficiency /insufficiency is a global health issue .
- afflicts more than one billion children and adults worldwide (MF Holick 2017)

Subclinical deficiency

- Silent epidemic
- Present in 30% - 50% of the general population.
- More prevalent in infants ,children , women of child bearing age and elderly

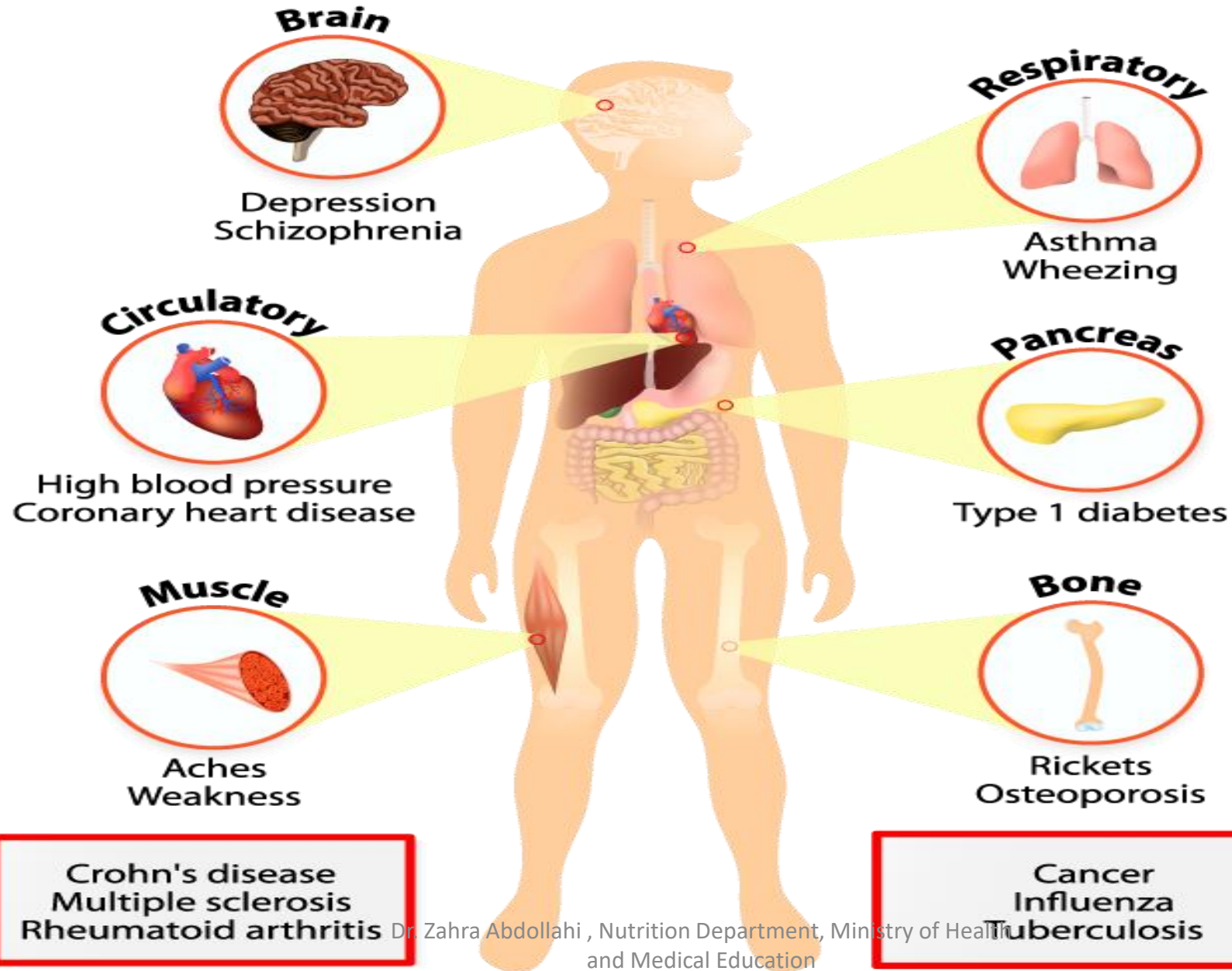
Prevalence of low vitamin D status in children worldwide.



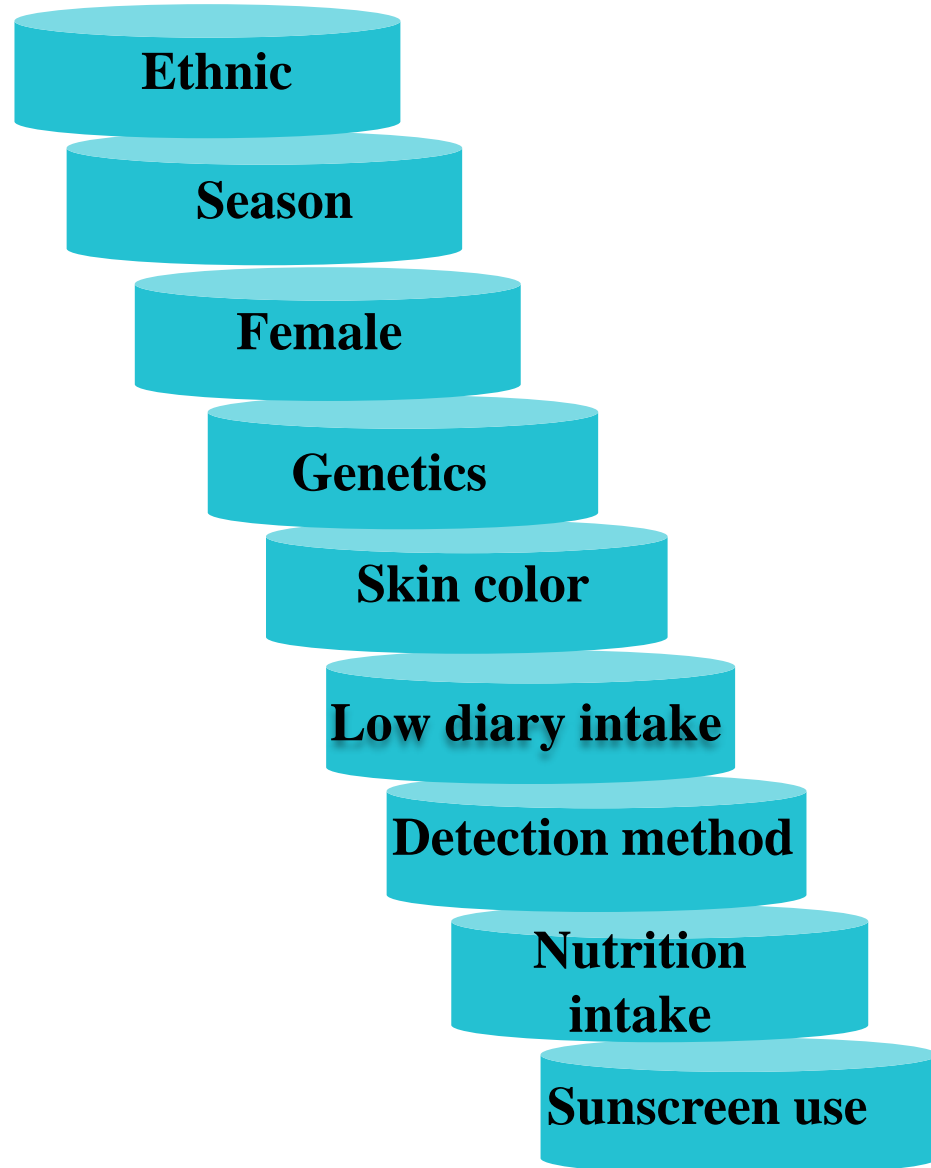
Vitamin D as a superfood

- Vitamin D has an important role together with calcium in mineral metabolism and bone growth and maintenance.
- Most cells in the body have been found to have receptors for vitamin D, and is therefore now seen as an important nutrient in preventing many chronic diseases.

The importance of Vitamin D



Factors affecting Vitamin D levels



Vitamin D Sources

The Sunshine Vitamin

80%



Fortified foods:

Typically supply 150 IU per day, but highly variable (100 - 400 IU per day).

Supplements:

- Over-the-counter usually vitamin D3
- Prescription versions are usually vitamin D2 (synthetic).
- Vitamin D3 is more than three times powerful than D2.

Diet : Vitamin D2
20% Vitamin D3



How much is enough?

Guidelines for Vitamin D Intake

Age	RDA (recommended daily allowance)	Safe upper limit
0 - 1 yr *	400 IU	1000 - 1500 IU
1 – 3 yr	600 IU	2500 IU
4 - 70 yr	600 IU	4000 IU
> 70 Yr	800 IU	4000 IU

Institute of Medicine, and Endocrine Society Recommended Vitamin D intake 2011

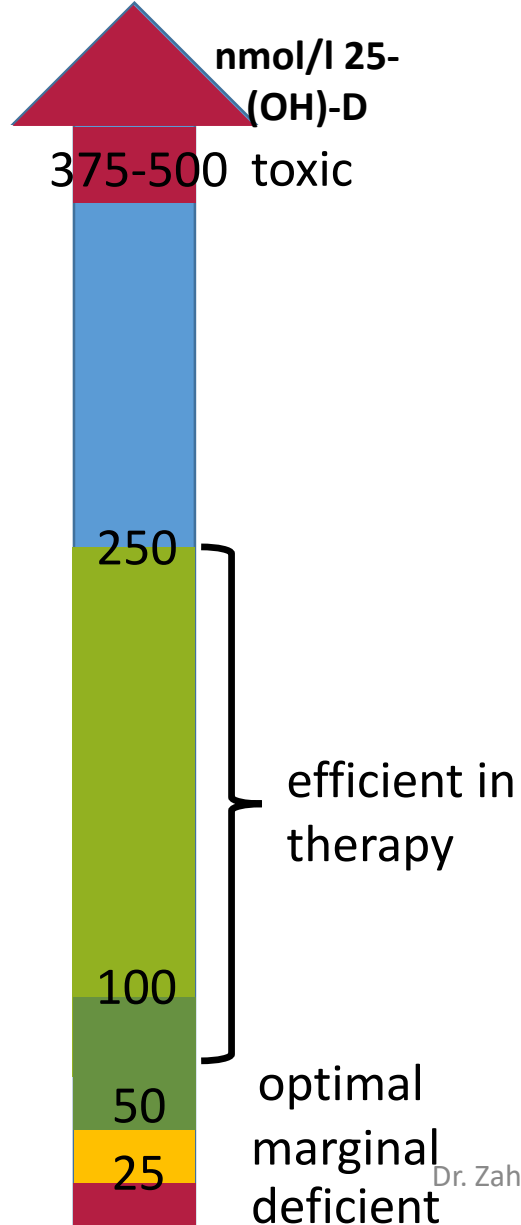
***Adequate Intake (AI)**

Safety of single dose

- A single, large dose of vitamin D given at timed intervals may be an alternative strategy.
- monthly 50000 IU doses, has been shown sufficient in certain populations.
- After a year of monthly supplementation (60,000IU), average levels of 25(OH)D had risen from 12.0 ng/mL at the start to 32.6 ng/mL at the end of the study,
- subjects with insufficiency were reduced from 92.2% at time zero to 2.6% after 12 months,
- none of the subjects developed cases of hypercalcemia

Kuchay M.S, J. Pediatr. Endocrinol. Metab. 2016;29:413–416. doi: 10.1515/jpem-2015-0187.

Reference range for 25(OH)D₃ in the serum/plasma



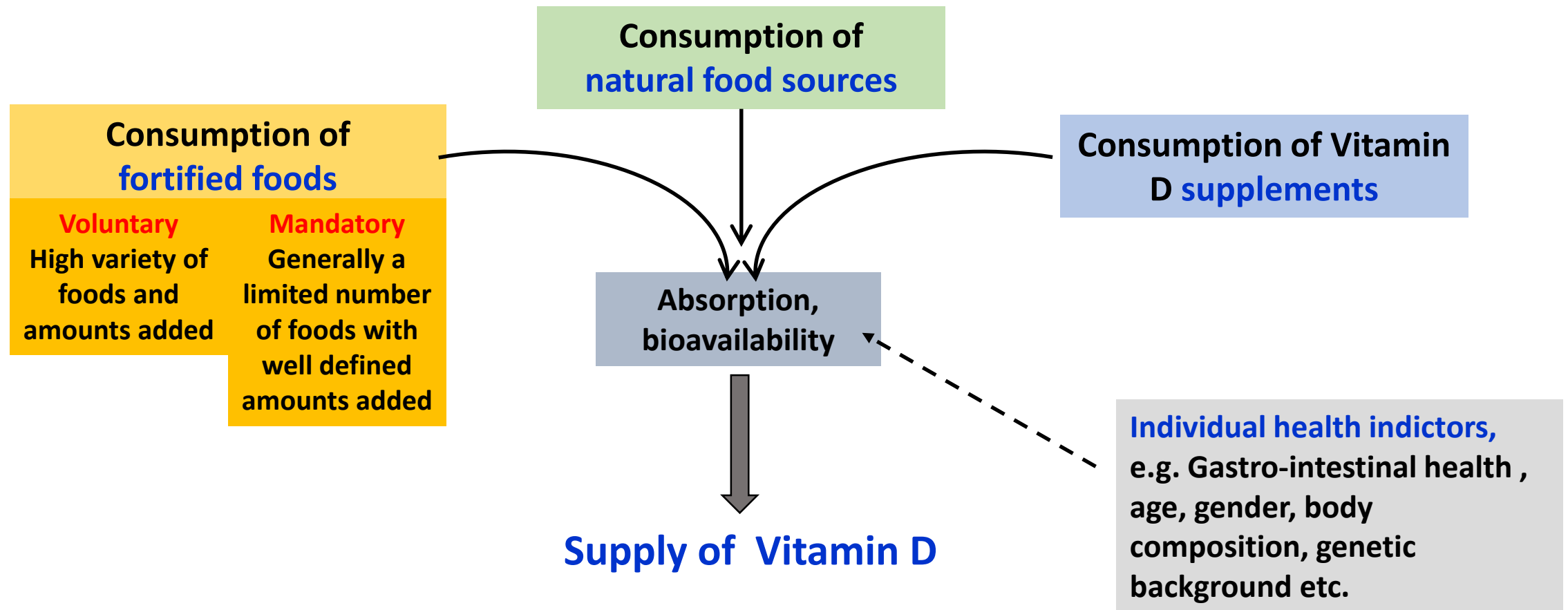
- Epidemiological studies suggest a plasma level 25-OH-cholecalciferol between 50 and 100 nmol/l to be associated with the lowest risk for health impairments.
- This range is thus considered optimal, although levels of 50-250 nmol/l have been used for therapy.
- However, this classification still needs corroboration by more studies.
- In the meantime, national health entities like the IOM and the EFSA consider a level of ≥ 50 nmol/l sufficient.

Criteria for the assessment of nutritional status

Status	Criteria
Defficient	>20% of the sample have markedly low status Sum of slightly and markedly deficient persons >50%
Insufficient	5-20% of the sample have markedly low status Sum of slightly and markedly deficient persons >25%
Sufficient	<5% of the sample have markedly low status
markedly low ≤ 25 nmol/l; slightly low 25-50 nmol/l; sufficient ≥ 50 nmol/l	

Sauberlich HE. Laboratory Tests for the Assessment of Nutritional Status. 2nd ed. CRC, Boca Raton, 1999

Sources and factors of vitamin D supply



WHO Statement

Preventing vitamin D deficiency

- People who have very low sun exposure , deeply pigmented skin , living in high latitudes or those who, for religious or cultural reasons cover their entire body surface – should, in consultation with their doctor, consider oral vitamin D supplementation.
- 30 minutes of daily sun exposure on arms and face provides sufficient generation of vitamin D

Source: <http://www.who.int/mediacentre/factsheets/fs305/en/>

Vitamin D in childhood and adolescence: an expert position statement

Vitamin D supplementation during childhood and adolescence

➤ Recommended vitamin D intakes for children and adolescents without risk factors (Obese children and adolescents , Premature infants) **for vitamin D deficiency are:**

- ✓ 400 IU/day during the first year of life
- ✓ 600 IU/day after the first year of life (1–18 years)

Recommended vitamin D intakes for infants, children, and adolescents

✓ with risk factors **for vitamin D deficiency are:**

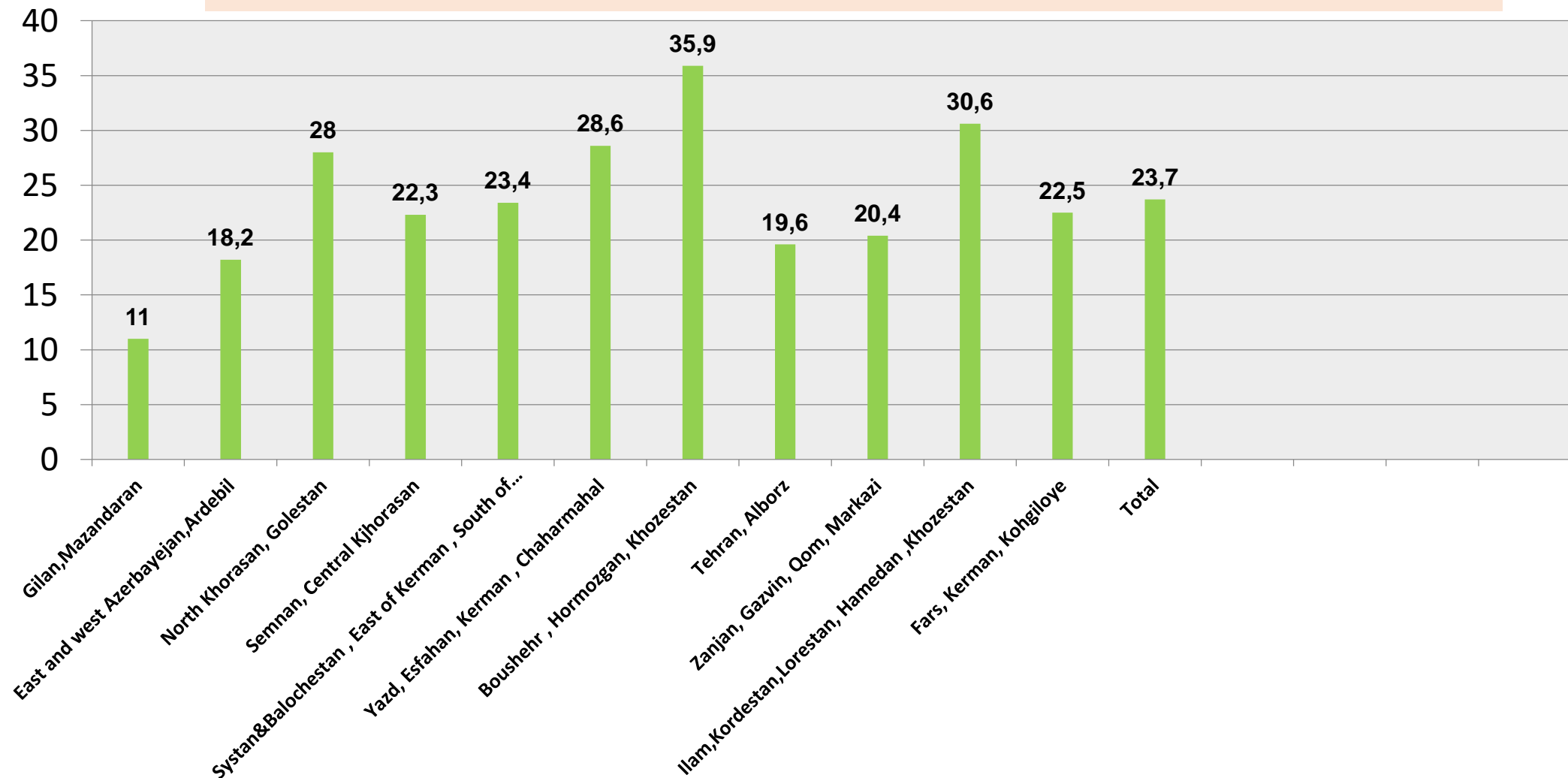
- ✓ 400–1,000 IU/day during the first year of life
- ✓ 600–1,000 IU/day after the first year of life (1–18 years)

Vitamin D in childhood and adolescence: an expert position statement

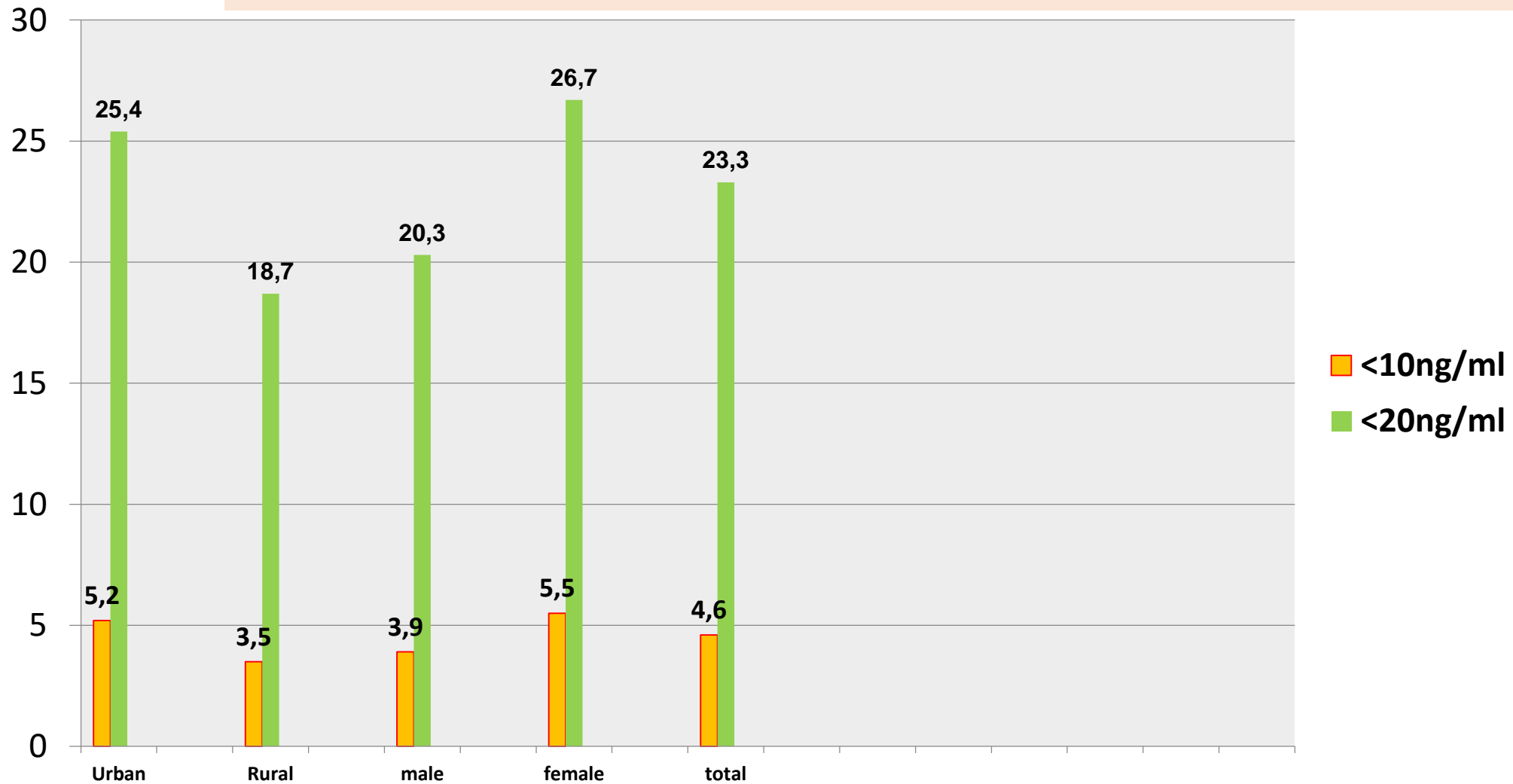
- The exact duration of vitamin D supplementation has not been established.
- As long as growth velocity is high in the first 2 years, supplementation should be offered to all children younger than 2 years.
- Similarly, adolescence is also a period of fast growth .
- Seasonal variation of sunlight efficacy in vitamin D synthesis should be taken into account when considering supplementation.
- Therefore, every country should consider local factors involved in vitamin D status.

Giuseppe Seggese , European Journal of Pediatrics , 2015

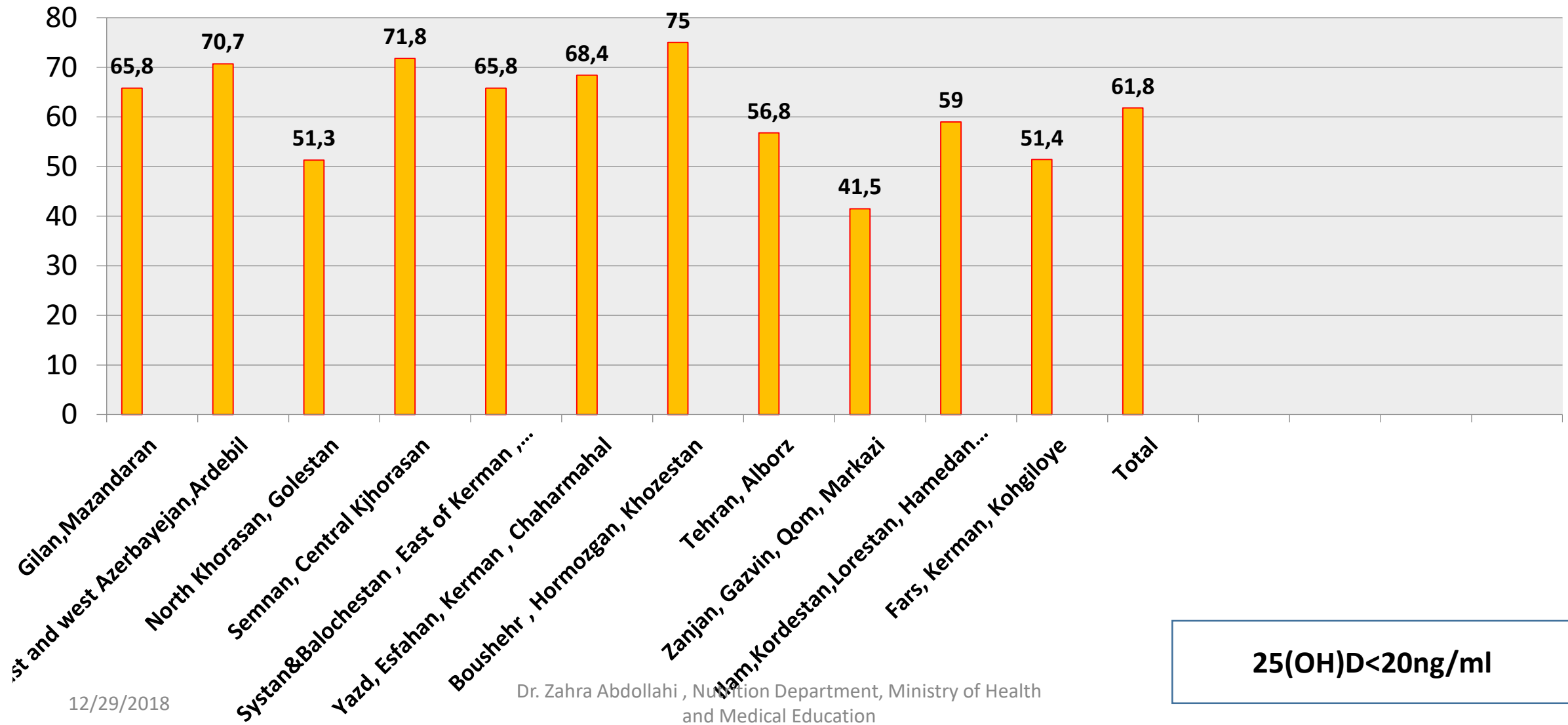
Vitamin D deficiency in children 15-23 months -2012



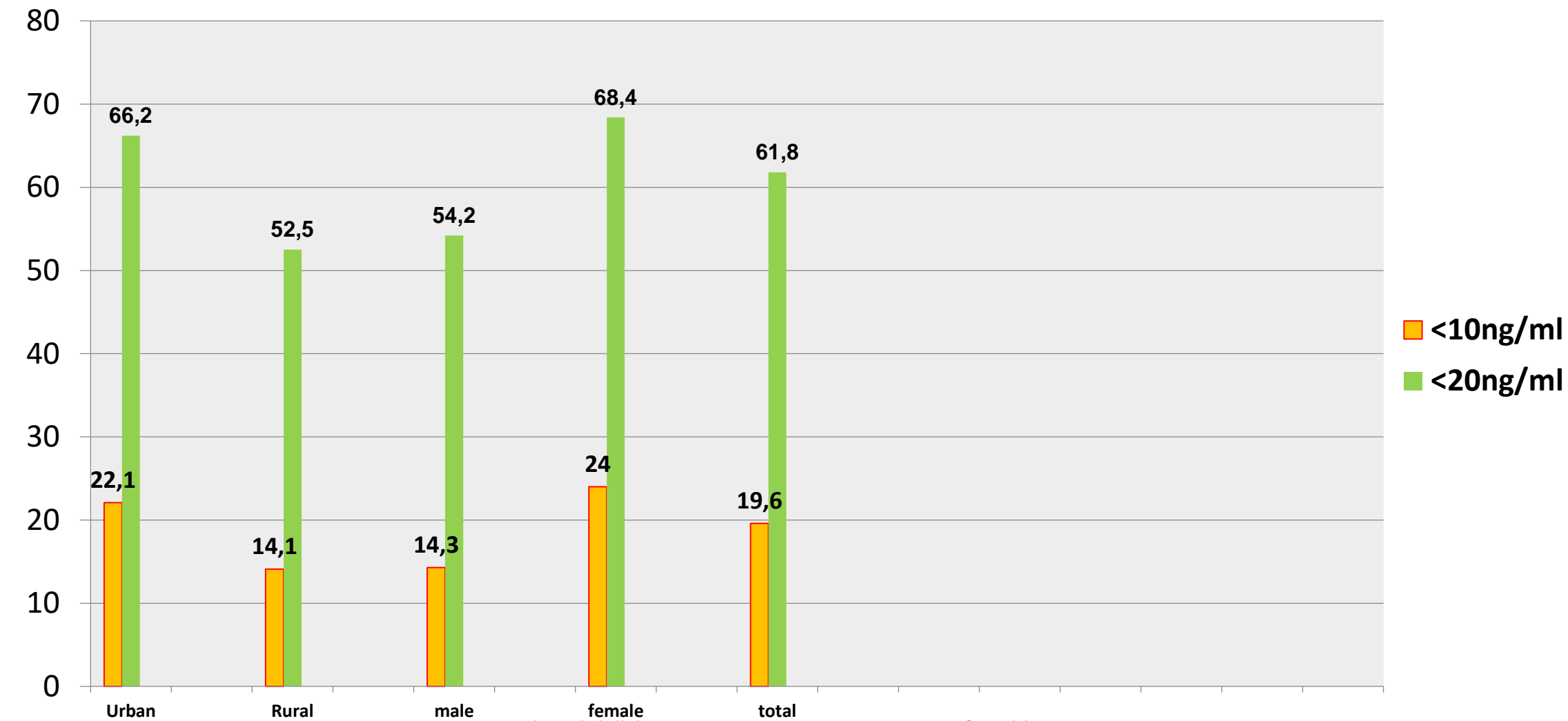
vitamin D deficiency in children 15-23 months , 2012



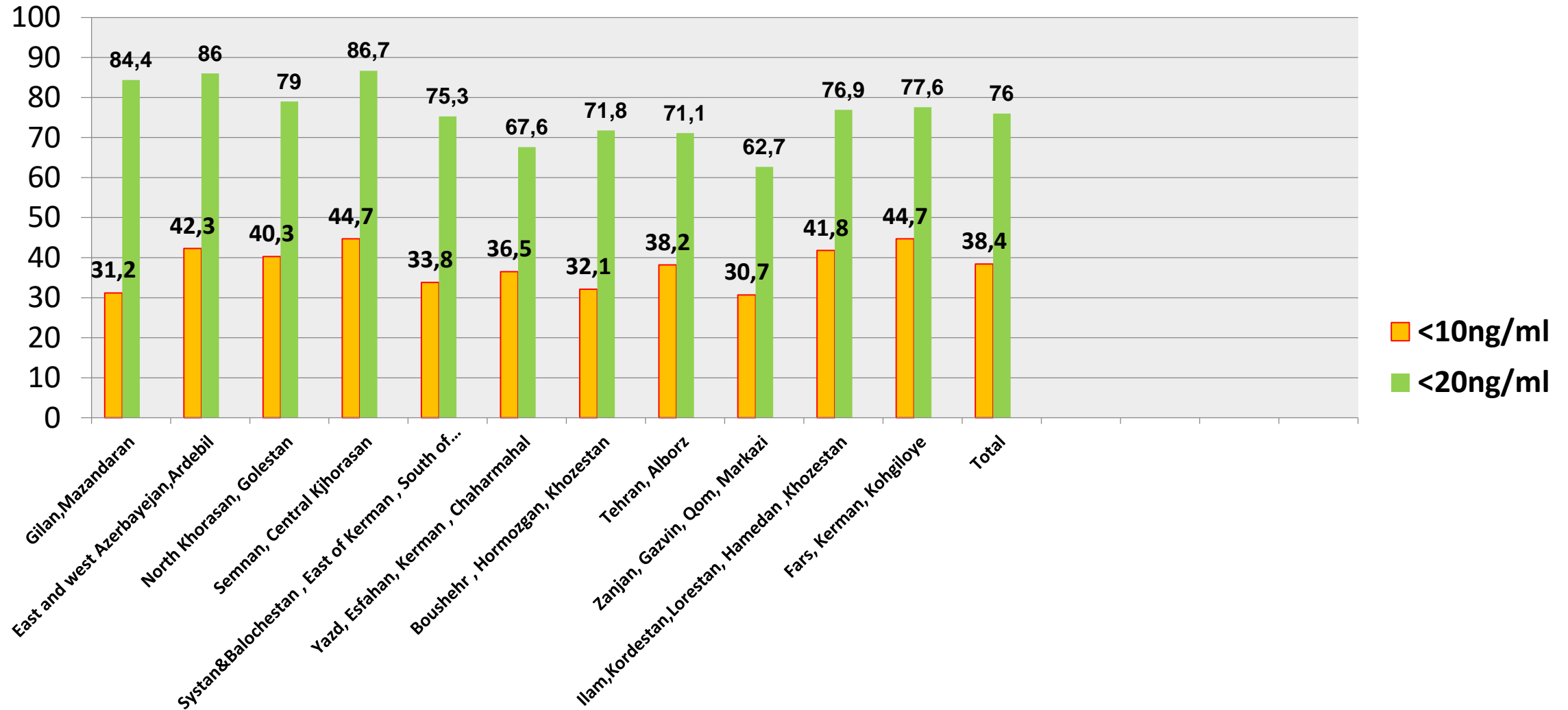
vitamin D deficiency in children 6 Y , 2012



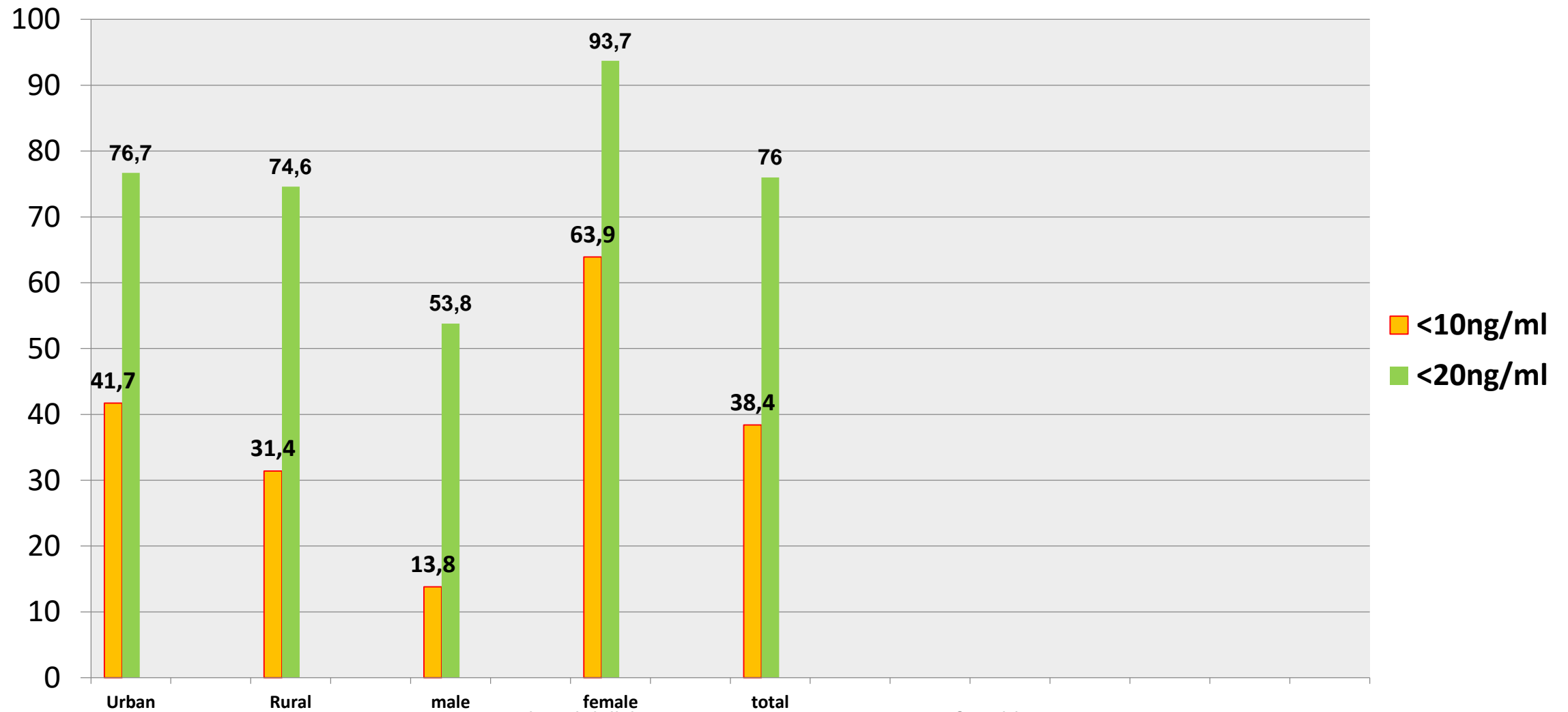
vitamin D deficiency in children 6 Y old, 2012



vitamin D deficiency in adolescents 14-20 Y , 2012



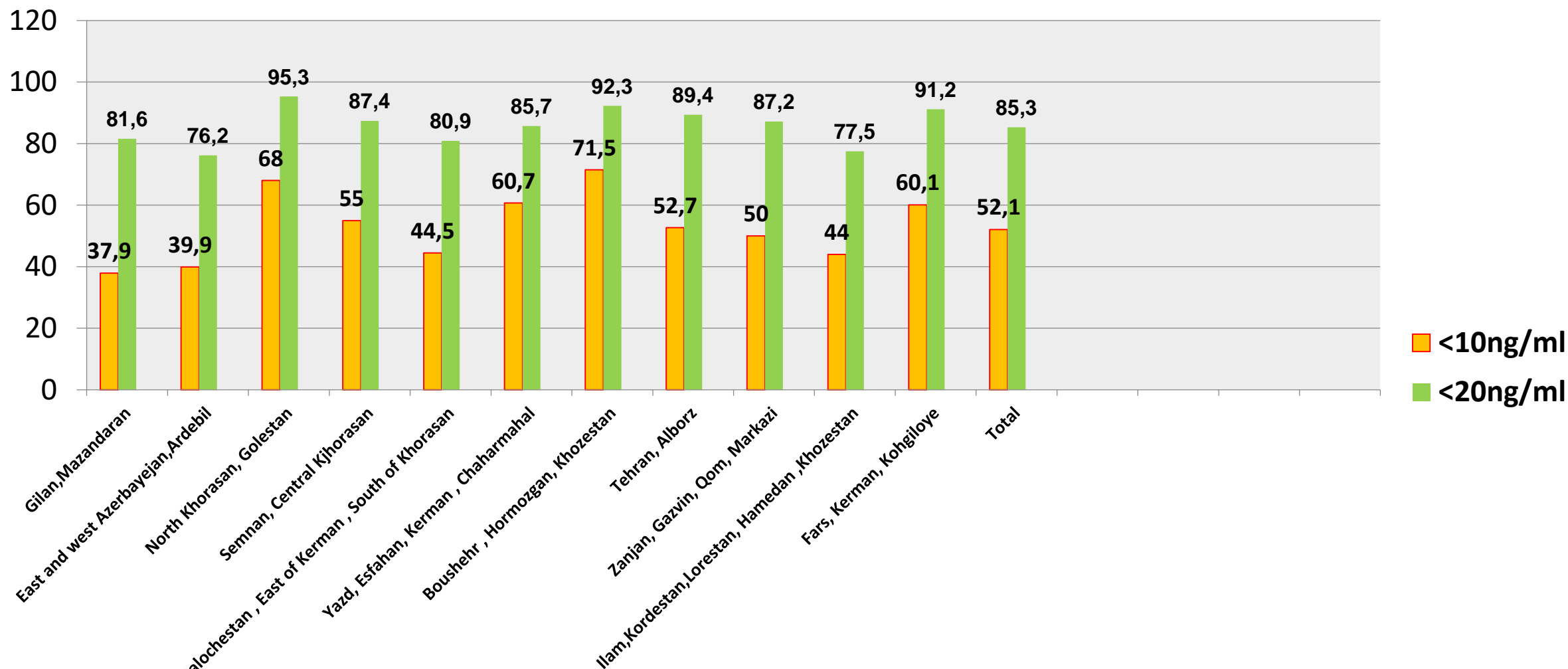
vitamin D deficiency in adolescents 14-20 Y old, 2012



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vitamin D deficiency in pregnant women, 2012



Strategies to prevent and control vitamin D deficiency in Iran

Two main strategies are : Supplementation and food fortification

Supplementation:

- Through PHC system since 1981 all children from 15 days after birth until 24 months of life receive Vitamin A+D drop (400 IU vitamin D and 1500 Vitamin A)
- In 2014 , the national committee revised the guideline for supplementation from 3-5 days after birth during newborn screening for congenital Hypothyroidism

Vitamin D supplementation in Iran

Group	Recommended Dosage	
0 -24 Months	400 IU	Daily from 3-5 days after birth until 24 months
Adolescent boys and girls	50,000 IU	One tablet per month for 9 months in each school year
≥ 18 Y old	50,000 IU	One tablet per month
Pregnant women	1000IU	One tablet daily from beginning of pregnancy until delivery

Prevalence of vitamin D deficiency in adolescent girls before /after supplementation

Variables		Status		Prevalence (%)
Vitamin D (Before)	Total	<20 ng/ml	Deficient	91.2
		21-29	Insufficient	3.9
		≥30	Sufficient	4.8
Vitamin D (After)	Total	<20 ng/ml	Deficient	16.4
		21-29	Insufficient	18.1
		≥30	Sufficient	65.5

Treatment and prevention strategies

- 50,000 IU of vitamin D3 once a week for at least 6 weeks to achieve a blood level of 25(OH)D above 30 ng/ml for children aged 1–18 yr
- maintenance therapy of 50,000 IU per month

Common carriers for vitamin D fortification

Suitability of a carrier varies between countries / cultures and even population groups.

Wheat or maize / corn flour or bread:



- + long shelf life
- + widely consumed staples
- + affordable for all population groups
- + good availability of vit.D in its water-soluble form



Vegetable oil

- + fat matrix for the lipophilic vitamin D
- + widely consumed
- fat intake should be limited to prevent / fight obesity

Milk



- + source of high quality protein and Ca (esp. for children)
- Not universally consumed (lactose intolerance, veganism)

Strategies to prevent and control vitamin D deficiency in Iran

Food fortification with vitamin D

- National mandatory flour fortification with Iron and Folic Acid is in place since 2007
- Adding vitamin D in addition of Iron and Folic Acid is under process (**10 µg vitamin D per 100g**)
- Optional milk and oil fortification is being implemented as another approach
- School milk vitamin D fortification



**Thank you for your
attention**