

# Applying the Institute of Medicine proposed methods to estimate iron and vitamin C intake inadequacy in patients with CKD.

## INTRODUCTION

Studies have shown a large variation in the prevalence of micronutrients intake inadequacy in patients with CKD. However, these results are usually obtained by simply comparing the mean intake with the Recommended Dietary Allowances (RDA) value. This approach may lead to unreliable estimation of nutrient intake inadequacy, according to the Institute of Medicine (IOM).

## OBJECTIVE

To estimate the prevalence of iron and vitamin C intake inadequacy among non-dialysis dependent CKD patients, by using the IOM recommended methods, and to compare it with the results obtained using the RDA values.

## METHODS

- Cross-sectional study
- 100 patients with CKD stages 3, 4 and 5
- Methodological procedures:

### 1. Dietary intake assessment

- ✓ 3 non-consecutive days food record
- ✓ Underreporters were excluded

### 2. Adjustments of iron and vitamin C intake distributions

#### National Research Council equation, based on external within-person variances:

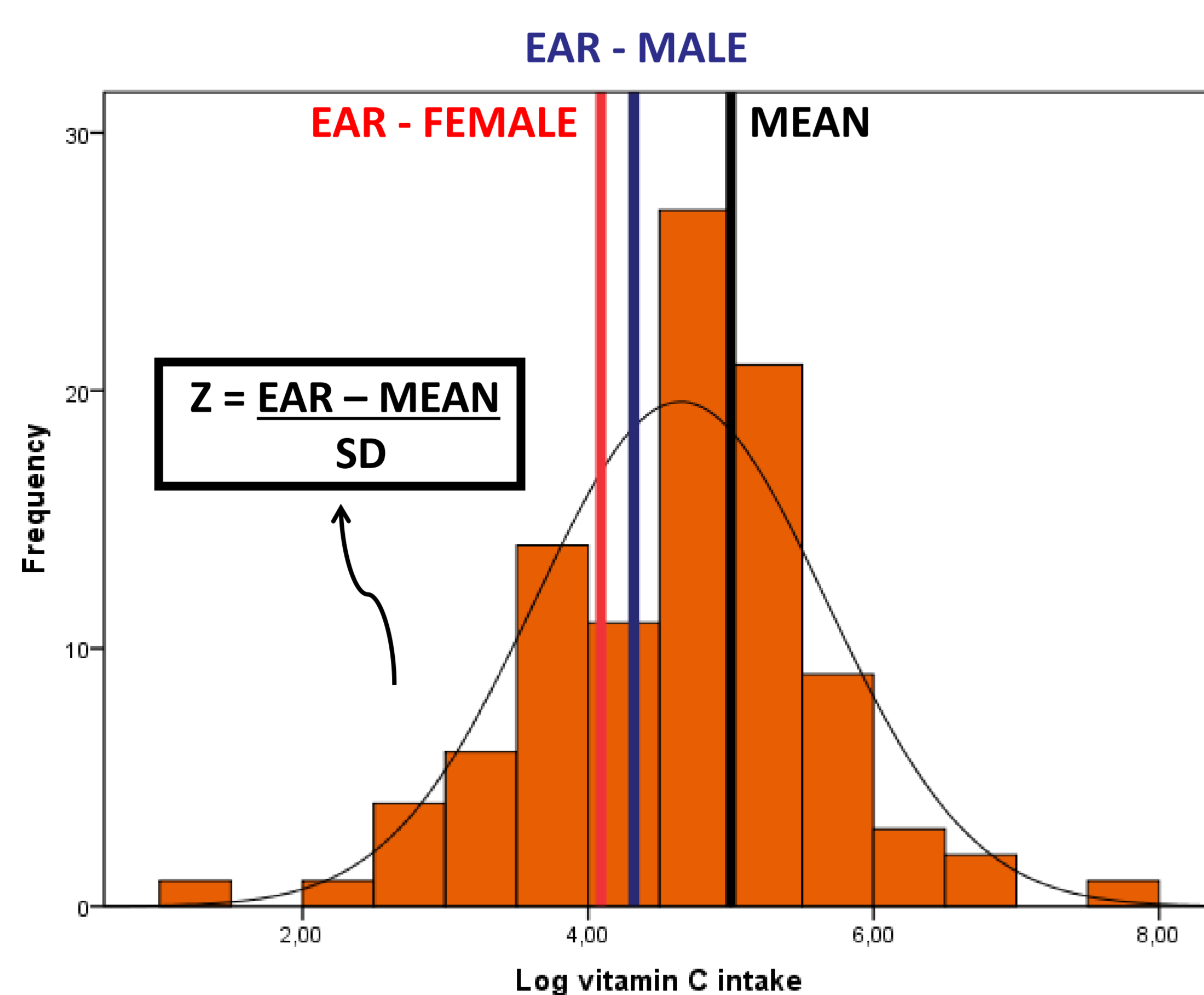
- ✓ Population-based survey from São Paulo, Brazil (vitamin C and iron among women)
- ✓ Non-reliable Brazilian data for iron intake among men → NHANES database

### 3. Establishment of the prevalence of inadequacy \*

- ✓ **Iron:** Manual probabilistic approach → asymmetric distribution of iron requirements among women
- ✓ **Vitamin C:** Estimate Average Requirement (EAR) cut-off point method

\* Stratified by age and gender

Figure 1: Logarithmic distribution of adjusted vitamin C intake : EAR cut-off point method illustration.



## RESULTS

Table 1. Demographic, clinical and dietary characteristics, according to the gender (n=100).

	Male (n=52)	Female (n=48)	p
Age (years)	67.0 [55.2 – 72.0]	66.0 [53.5 – 73.7]	0.96
BMI (kg/m <sup>2</sup> )	27.3 ± 4.9	25.2 ± 5.0	0.04
DM (%)	32.7%	35.4%	0.78
<b>Biochemical</b>			
eGFR (mL/min/1.73m <sup>2</sup> )	22.9 [17.7 – 30.7]	21.9 [17.7 – 29.5]	0.52
Hemoglobin (g/dL)	12.4 [11.4 – 14.0]	12.2 [11.0 – 13.1]	0.26
<b>Dietary intake *</b>			
Energy (kcal/kg/day)	27.7 [ 25.2 – 31.6]	26.5 [23.9 – 31.7]	0.40
Protein (g/day)	67.7 [57.7 – 84.0]	55.4 [41.6 – 66.0]	< 0.01
Protein (g/kg/day)	1.0 [0.9 – 1.3]	1.0 [0.8 – 1.2]	0.14
Iron (mg/day)	7.8 [6.0 – 9.3]	6.3 [4.9 – 9.0]	0.03
Iron (mg/1000kcal/day)	4.4 ± 1.2	4.5 ± 1.4	0.78
Vitamin C (mg/day)	117.1 [46.9 – 217.2]	120.0 [57.4 – 202.6]	0.86
Vitamin C (mg/1000kcal/day)	60.8 [24.3 – 117.9]	81.9 [40.2 – 130.9]	0.25

BMI: body mass index; DM: diabetes mellitus; eGFR: glomerular filtration rate estimated by CKD-EPI equation \* Values not adjusted by within-person variation. Values expressed as mean ± SD and median [interquartile range], as appropriate. Comparison between the gender performed by t student or Mann-Whitney test.

Figure 2: Prevalence of inadequacy of iron (%), according to IOM and RDA approach.

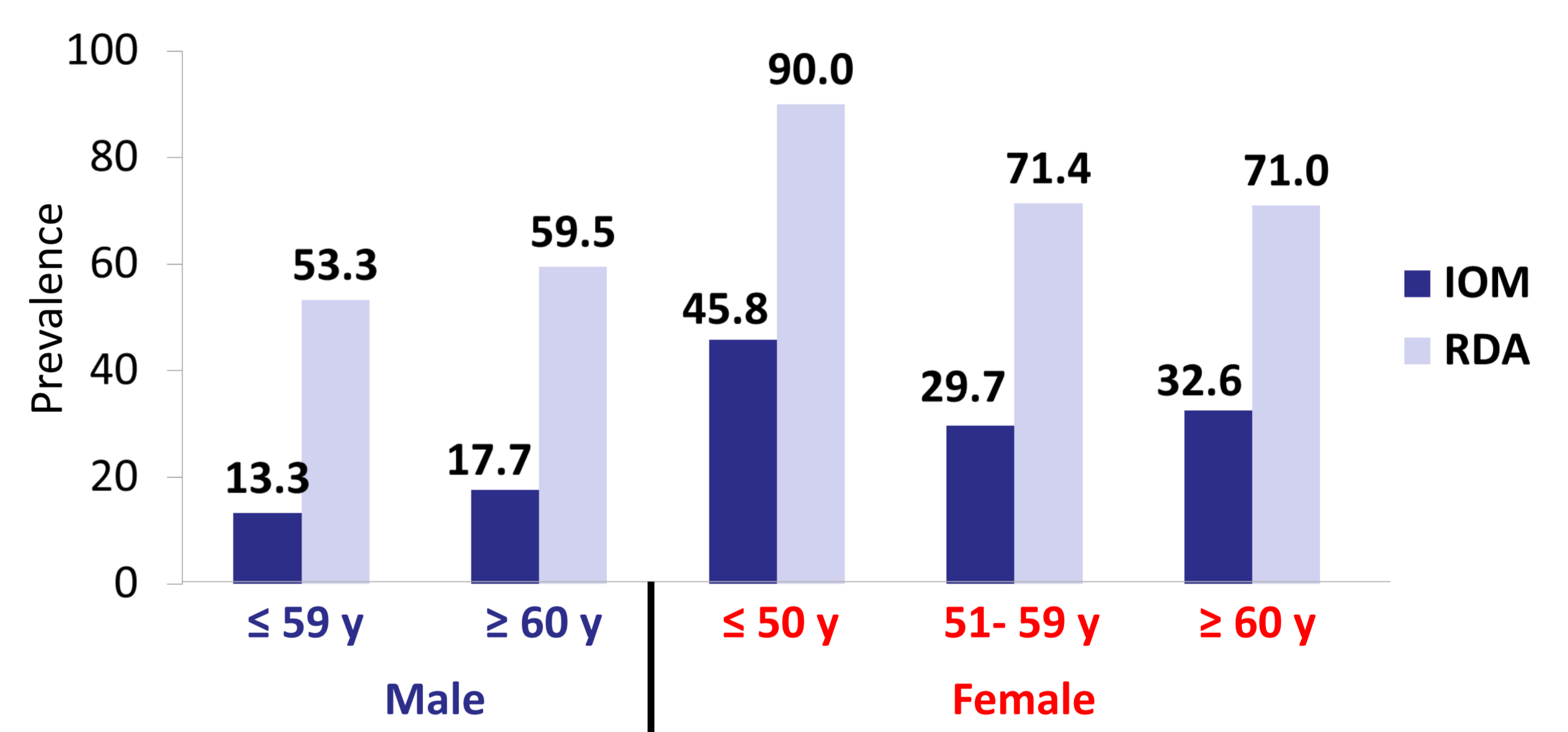
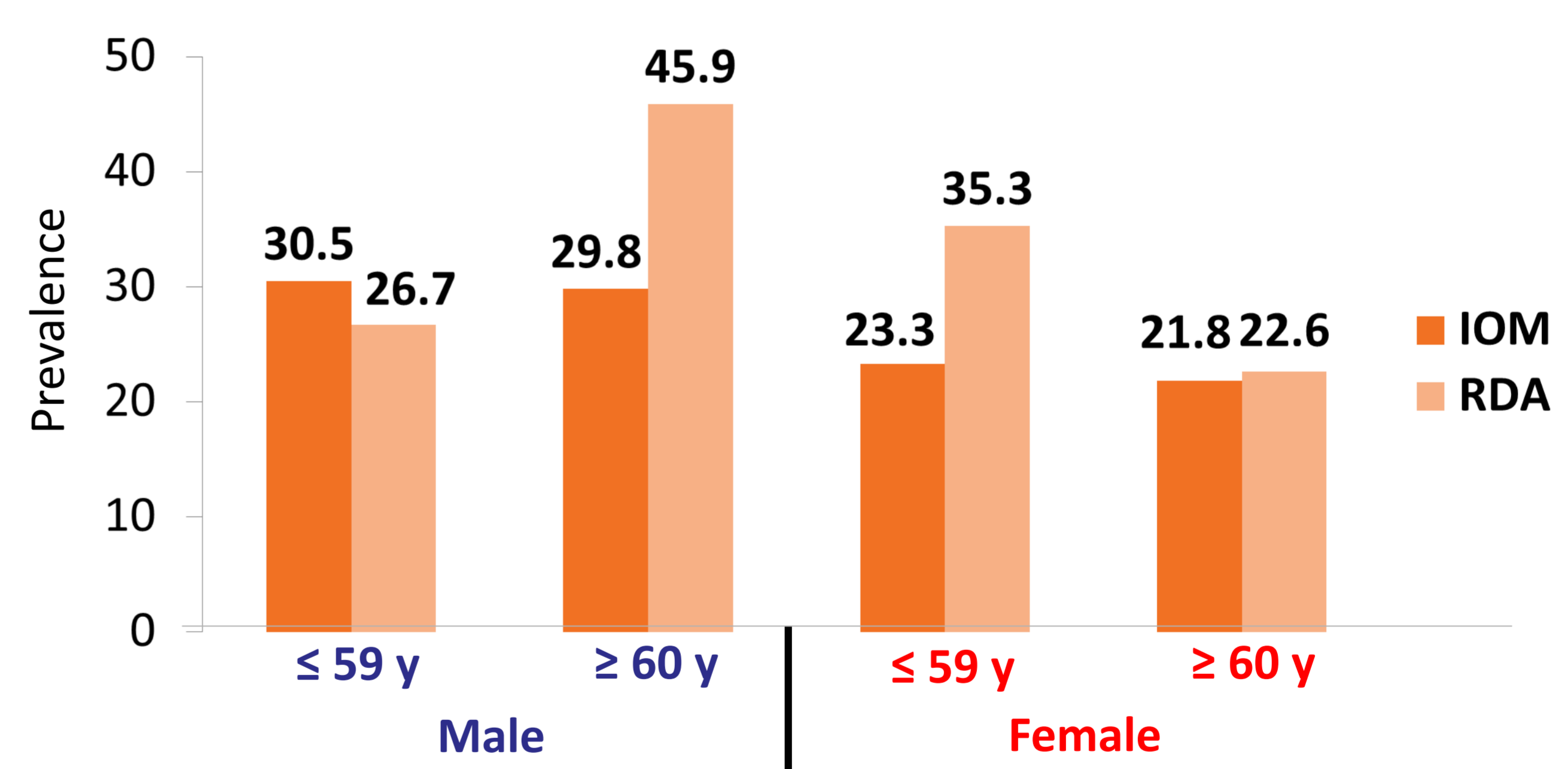


Figure 3: Prevalence of inadequacy of vitamin C (%), according to IOM and RDA approach.



## CONCLUSION

The use of RDA seems to be inappropriate for estimating iron and vitamin C inadequate intake in patients with CKD. The overestimation in the prevalence of inadequacy by RDA may have important implications for dietary planning.

## REFERENCES

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3. Morimoto JM et al. Within-person variance for adjusting nutrient distribution in epidemiological studies. Rev Saude Publica. 2011;45(3):621-5 .

