وضعیت دریافت غذایی nutrient های مرتبط با سلامت استخوان در جمعیت بالای ۵۰ سال ایران براساس نتایج مطالعه IMOS

دکتر کاظم خلجی

مرکز تحقیقات استئوپروز- پژوهشگاه علوم غدد و متابولیسم
دانشگاه علوم پزشکی تهران

Building and Protecting Your Bones: A Multi-Nutrient Approach

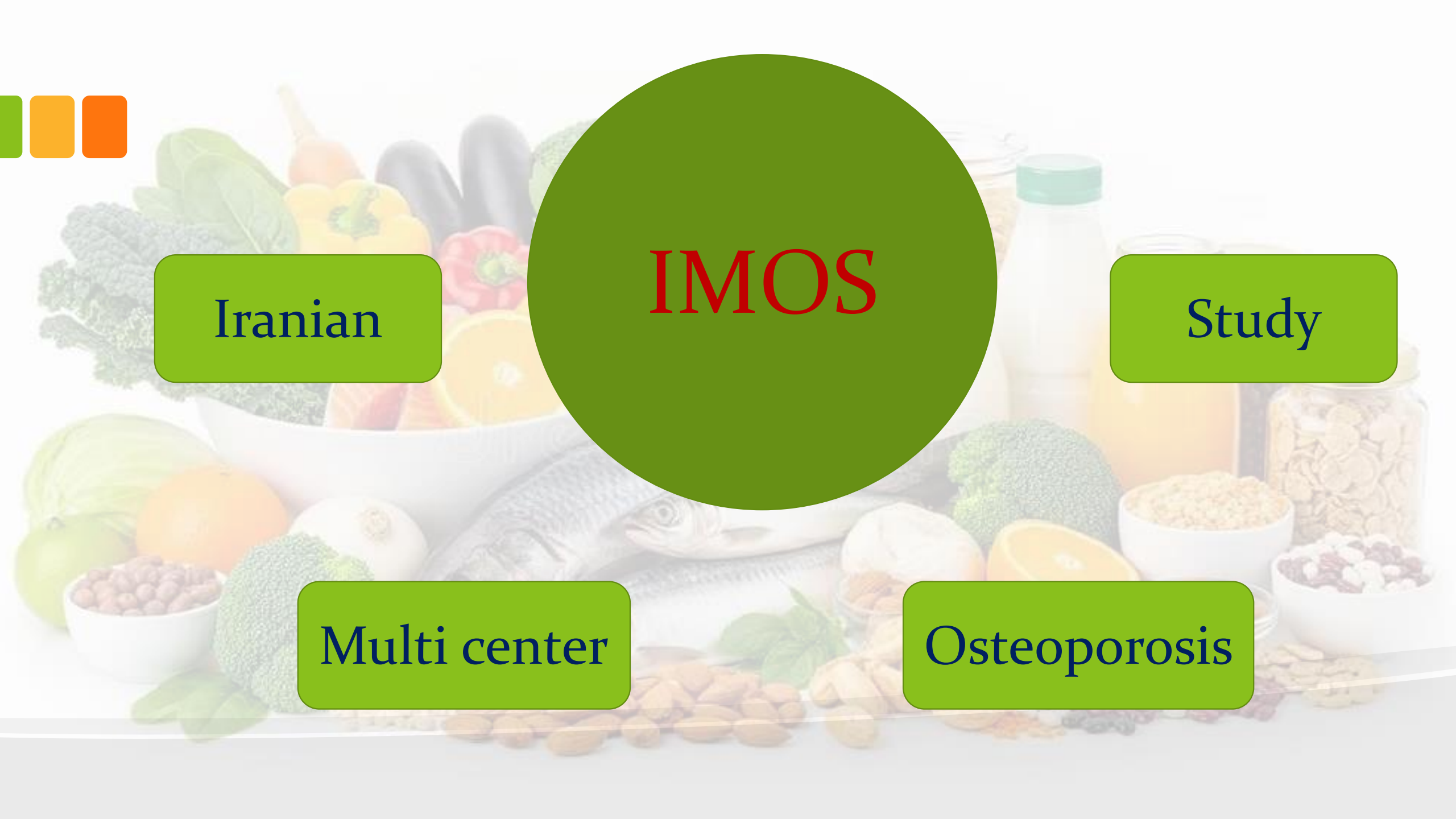
Bone health relies on more than just calcium. A symphony of nutrients works together to build strong bones and prevent osteoporosis.

Nutrient	Primary Role in Bone Health	Importance in Osteoporosis
Calcium	**The Main Mineral:** The primary structural component of bone, providing strength and rigidity. 99% of the body's calcium is in bones.	Inadequate intake forces the body to leach calcium from bones to maintain blood levels, weakening them and accelerating bone loss.
Protein	**The Framework:** Provides the collagen matrix (osteoid) upon which minerals are deposited. Essential for bone structure and strength.	Low protein intake impairs bone building, increases fracture risk, and weakens muscles that support the skeleton.
Vitamin D	Essential for **absorbing calcium**, enabling bone mineralization, **regulating bone remodeling**, and **supporting muscle** function	Inadequate vitamin D, triggers bone resorption to release calcium into blood and accelerate bone loss.
Phosphorus	**Calcium's Partner:** Combines with calcium to form hydroxyapatite crystals, the compound that gives bone its hardness.	**Balance is key.** Both deficiency and excess (common in processed foods) can disrupt bone mineralization and harm bone health.
Zinc	**The Cellular Director:** A critical cofactor for osteoblast (bone-building) activity and collagen synthesis. Also suppresses osteoclast (bone-breakdown) function.	Deficiency leads to reduced bone formation, increased bone resorption, and overall poor bone quality, accelerating the progression of osteoporosis.
Magnesium	**The Regulator:** Required for calcium metabolism and activation of Vitamin D. Helps convert Vitamin D into its active form.	Deficiency impairs Vitamin D function and parathyroid hormone activity, leading to abnormal bone crystal formation and increased fragility.
Potassium	**The Acid Neutralizer:** Promotes an alkaline environment. Counteracts acid loads from the diet that can cause calcium loss in urine.	A diet low in potassium can lead to mild metabolic acidosis, increasing bone resorption (breakdown) to release buffering salts.

The Crucial "Helper" Nutrients for Bone Metabolism

Bone health is a team effort. A balanced diet rich in all these components—from dairy and leafy greens to nuts, seeds, and lean proteins—is fundamental for building strong bones and preventing osteoporosis.

Nutrient	Primary Role in Bone Health	Importance in Osteoporosis
Vitamin K	**The Activation Key:** Activates osteocalcin, a protein that binds calcium to the bone matrix. It's essential for proper mineralization.	Low Vitamin K status leads to under-carboxylated osteocalcin, which cannot bind calcium effectively, resulting in poorer bone quality and higher fracture risk.
Manganese	**The Enzyme Cofactor:** Essential for the function of enzymes involved in synthesizing key components of the bone matrix (proteoglycans).	Deficiency can lead to impaired synthesis of the bone organic matrix, resulting in defective mineralization and increased susceptibility to damage.
Copper	**The Cross-Linker:** Critical for enzymes (e.g., lysyl oxidase) that form cross-links in collagen and elastin, providing tensile strength and stability.	Copper deficiency results in poorly cross-linked collagen, leading to fragile bones that are less resistant to stress and more prone to fractures.

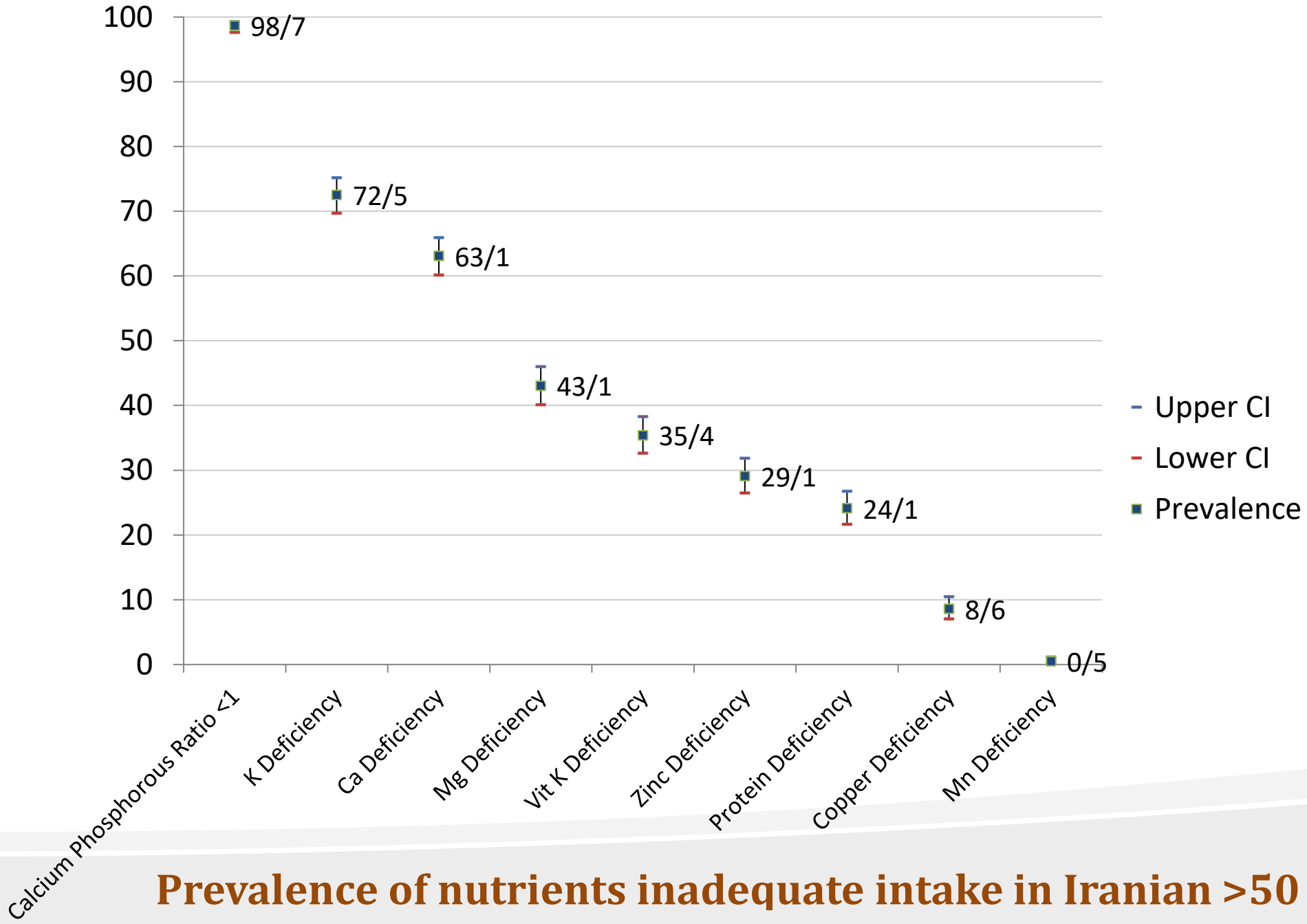

IMOS
Iranian
Study
Multi center
Osteoporosis

Recommended Dietary Allowance (RDA)

RDA is the average daily dietary intake level that is sufficient to meet the nutrient requirement of nearly all healthy individuals in a particular life-stage and gender group.

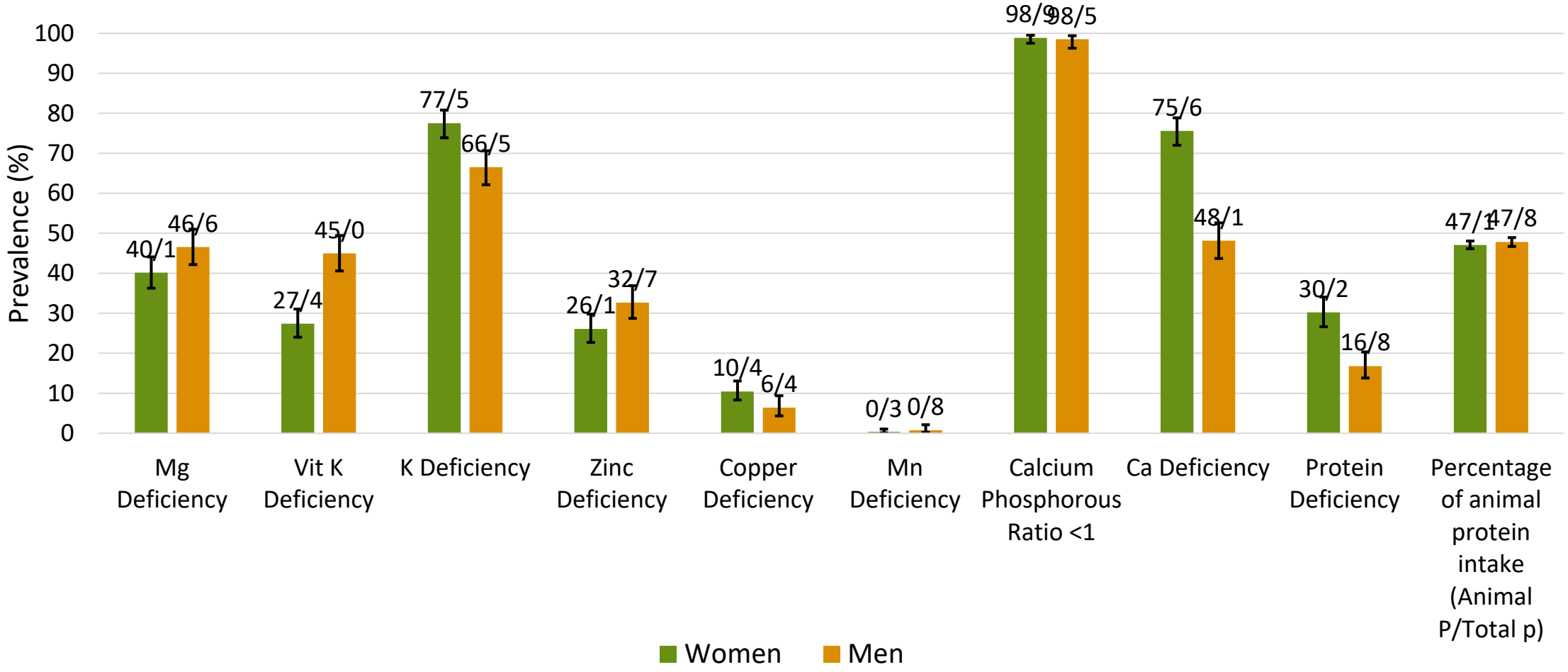
Nutrient	Men	Women
Calcium (mg/day)	<1000 for under 70 years old <1200 for over 70	<1200
Protein (gr/kg/day)	<0.8	<0.8
Zinc (mg/day)	<11	<8
Magnesium (mg/day)	<420	<320
Potassium (mg/day)	<4700	<4700
Vitamin K (µg/day)	<120	<90
Copper (µg/day)	<900	<900
Manganese (mg/day)	<2.3	<1.8
Calcium/Phosphorous Ratio	<1	<1

Reference: Dietary Reference Intakes for Calcium, Phosphorus, Magnesium, Vitamin D, and Fluoride (1997); Dietary Reference Intakes for Vitamin A, Vitamin K, Arsenic, Boron, Chromium, Copper, Iodine, Iron, Manganese, Molybdenum, Nickel, Silicon, Vanadium, and Zinc (2001); Dietary Reference Intakes for Energy, Carbohydrate, Fiber, Fat, Fatty Acids, Cholesterol, Protein and Amino Acids (2002); Dietary Reference Intakes for Water, Potassium, Chloride, and Sulfate (2004), available at www.nap.edu.

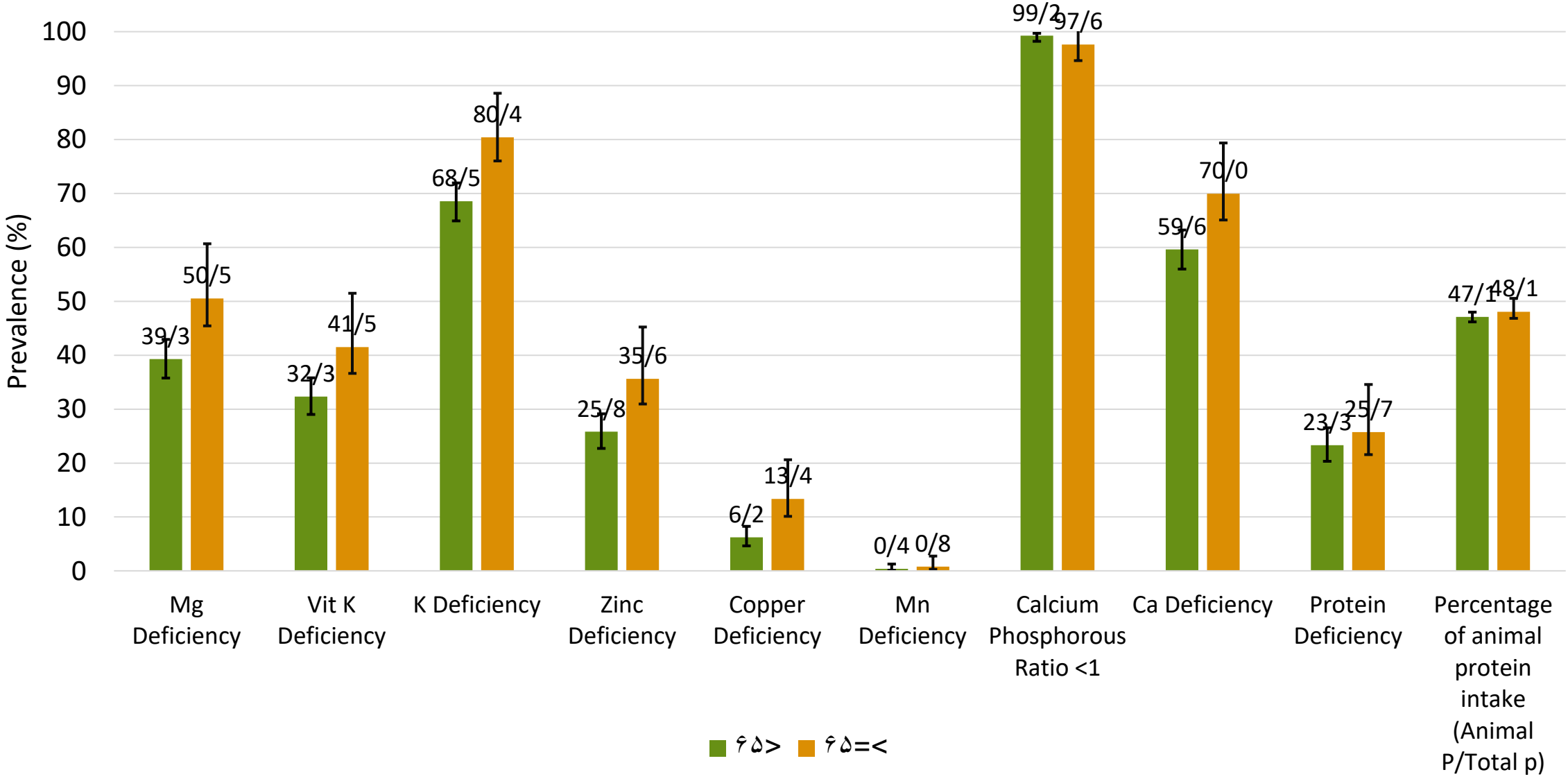


Prevalence of nutrients inadequate intake in Iranian >50

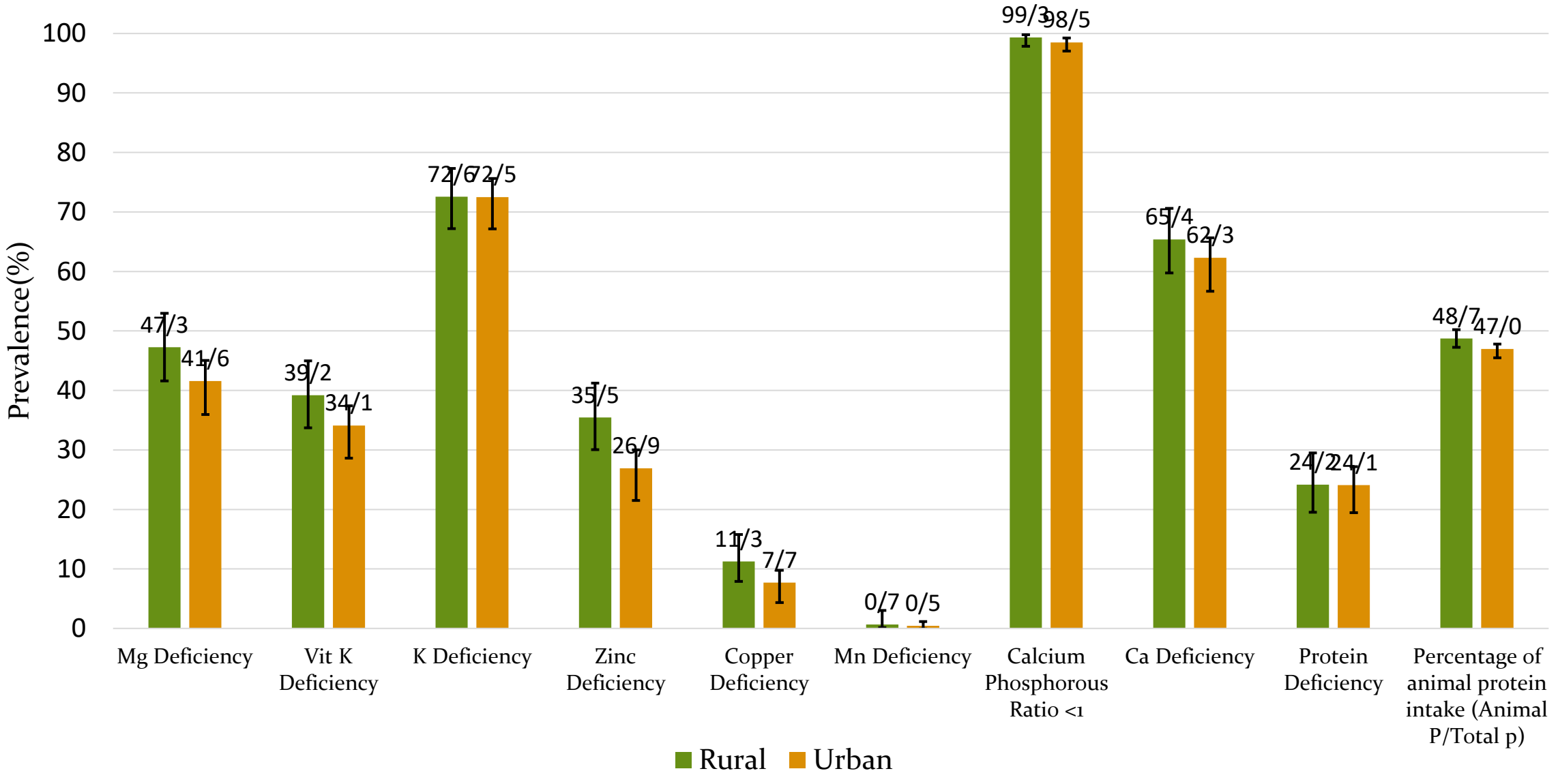
Prevalence of Nutrients Inadequate Intake, by sex



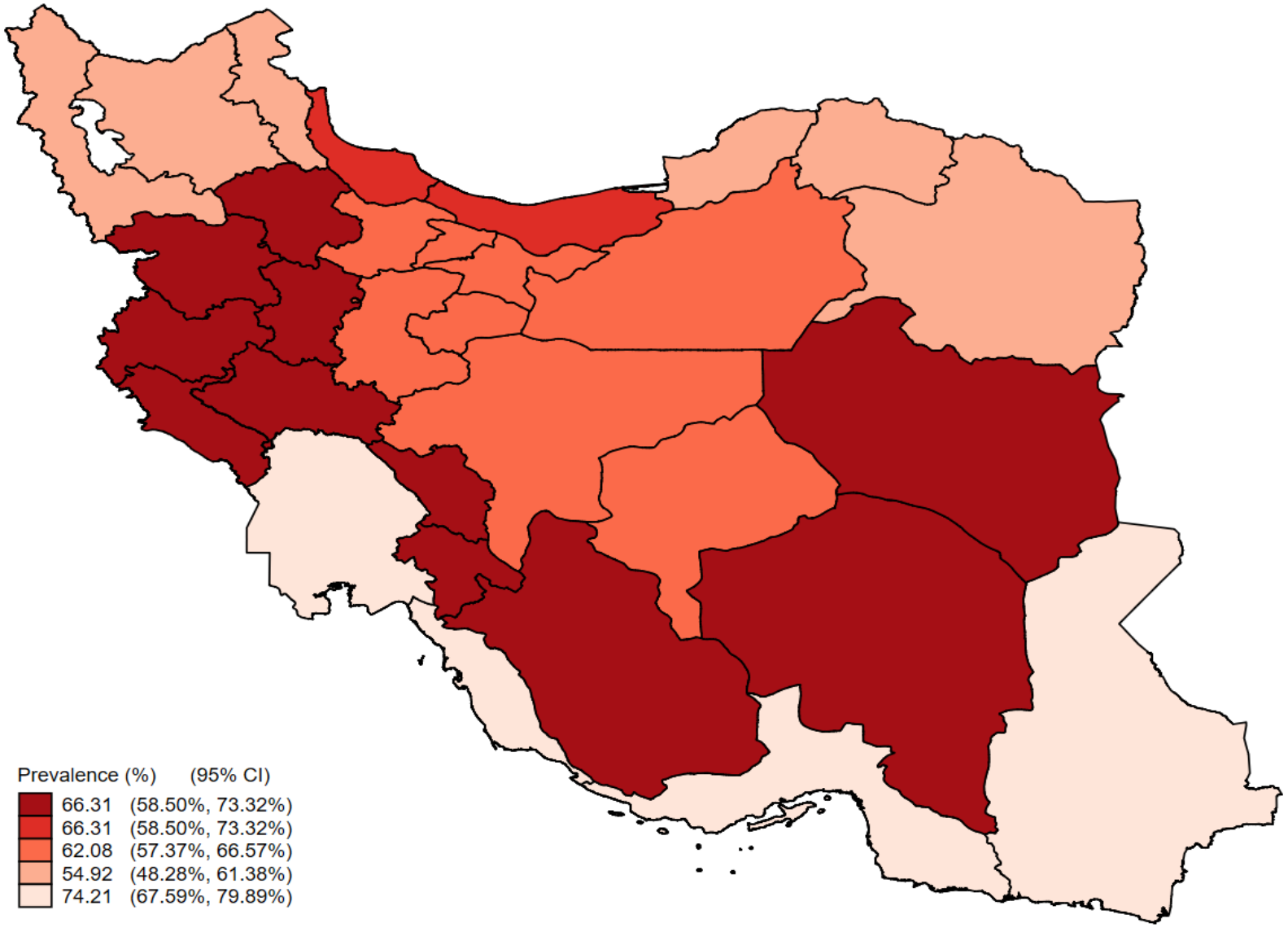
Prevalence of Nutrients Inadequate Intake, by age groups



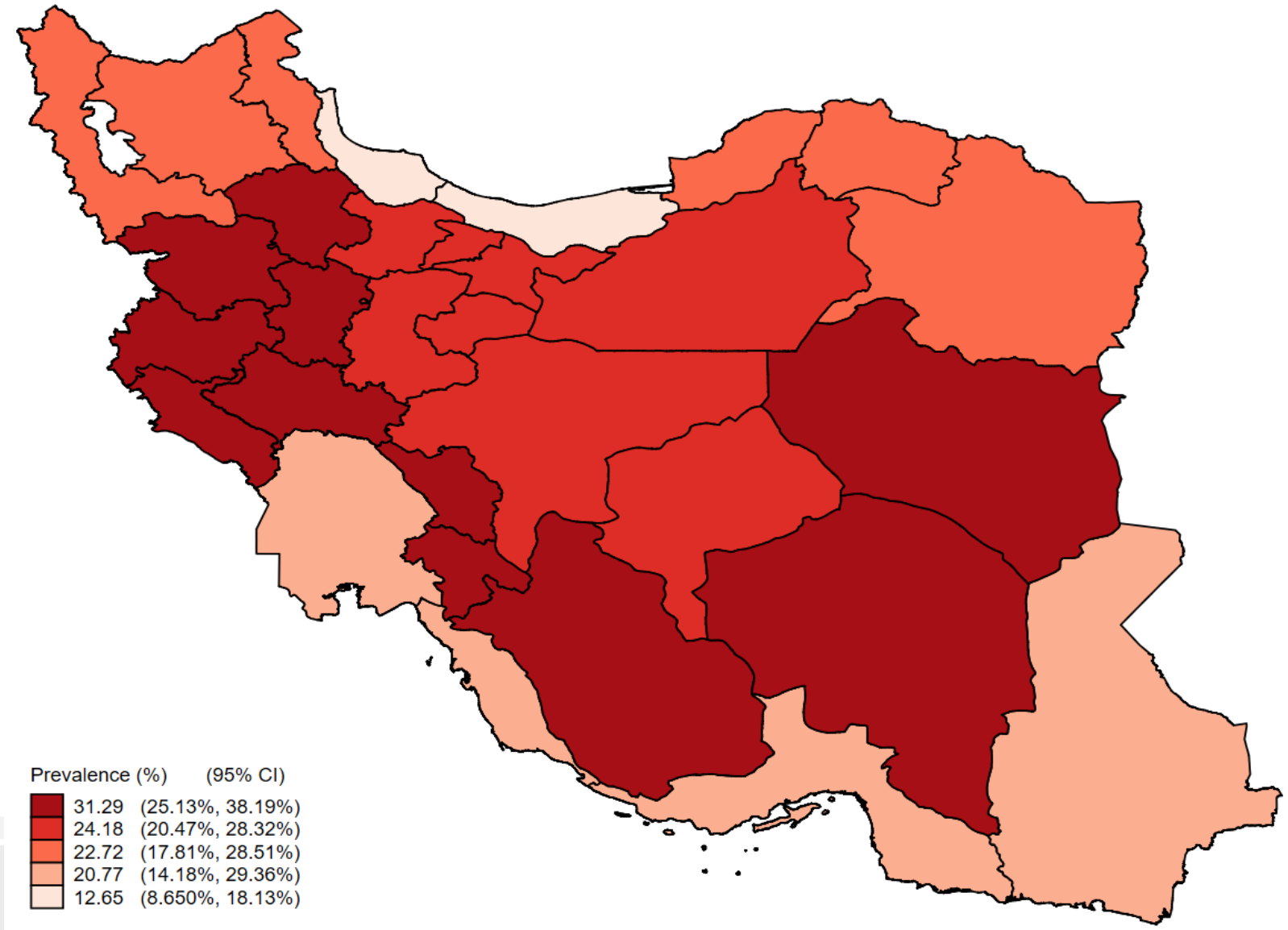
Prevalence of Nutrients Inadequate Intake, by area



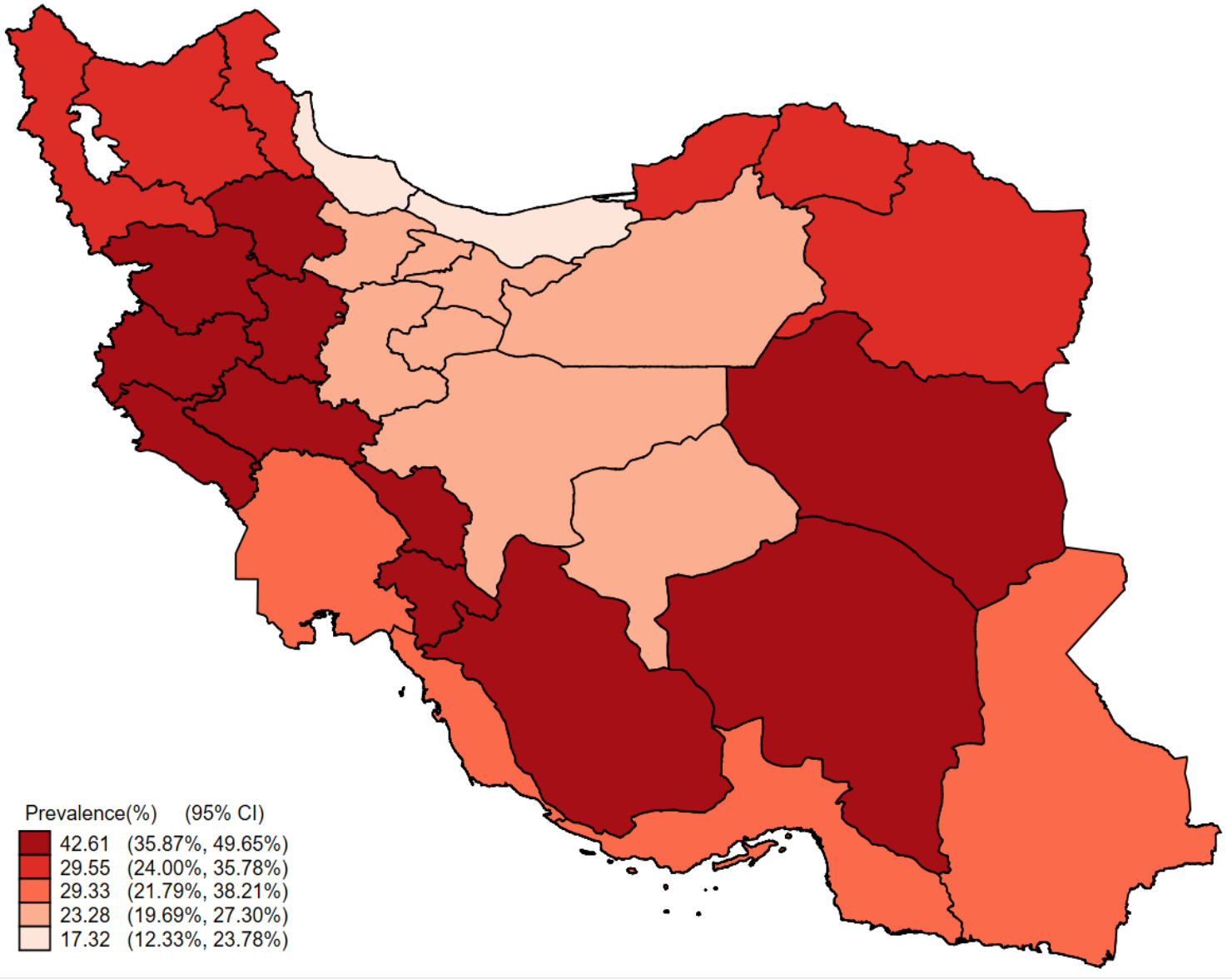
Prevalence of inadequate intake of Calcium, by strata



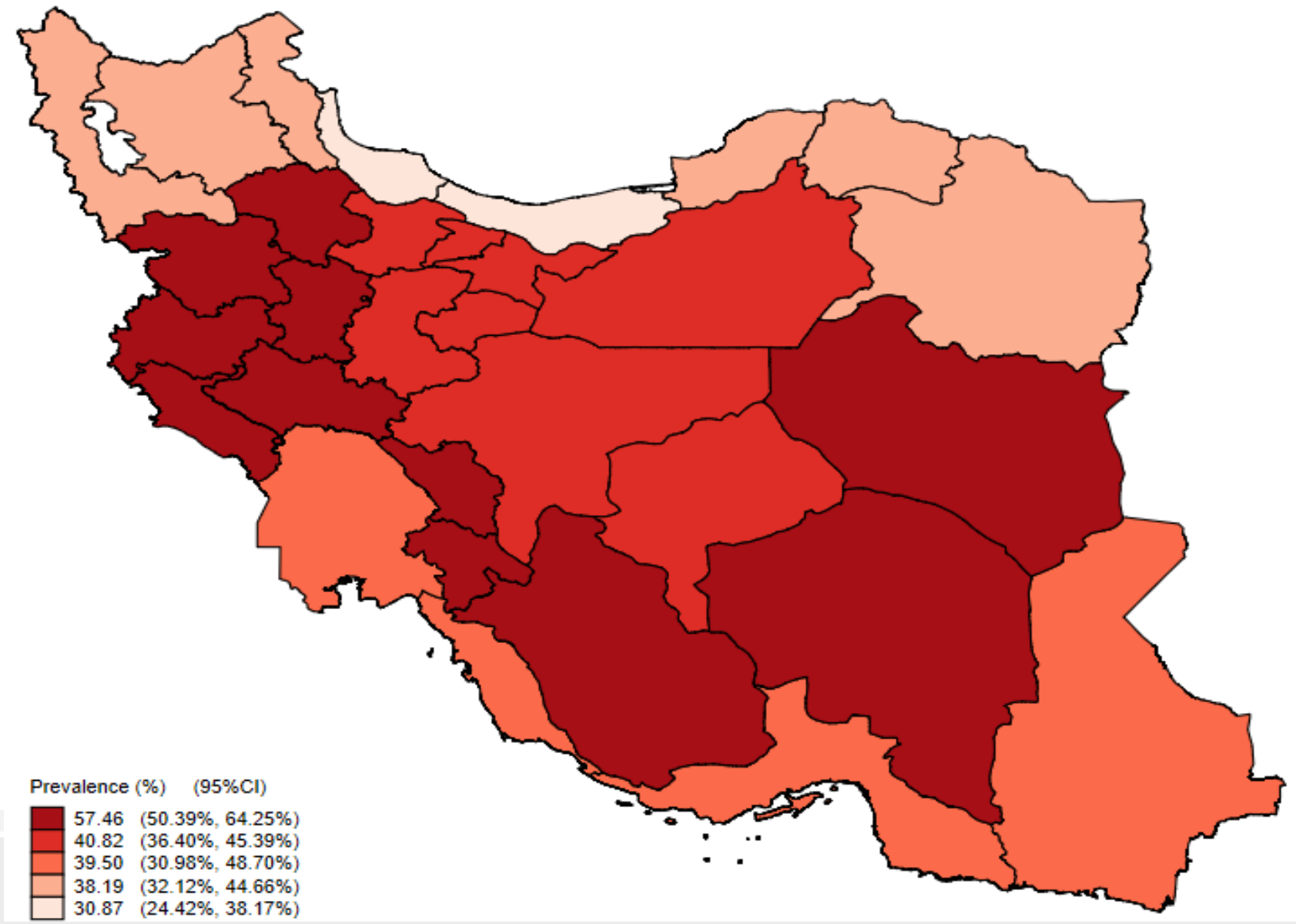
Prevalence of inadequate intake of Protein, by strata



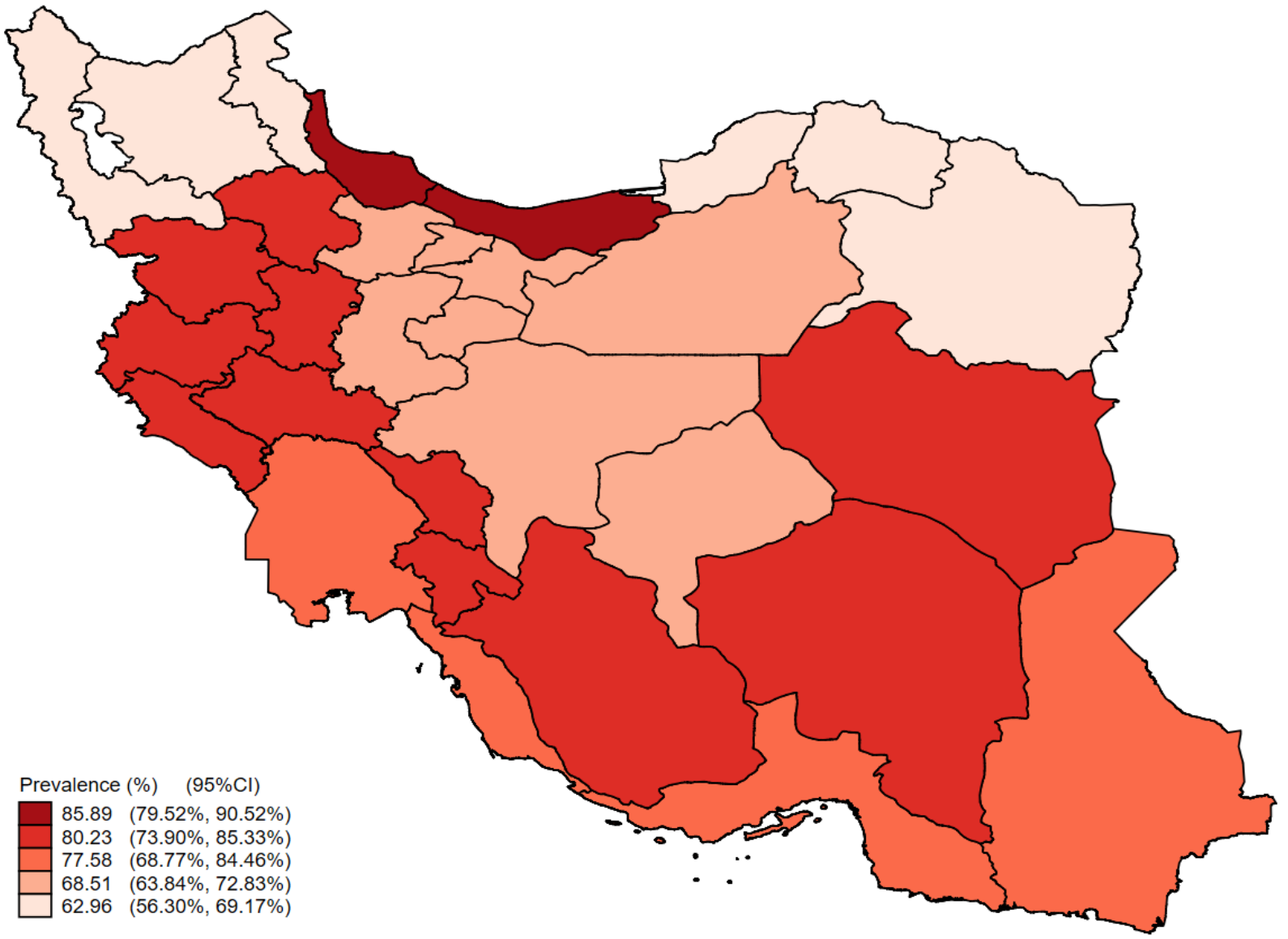
Prevalence of inadequate intake of Zinc, by strata



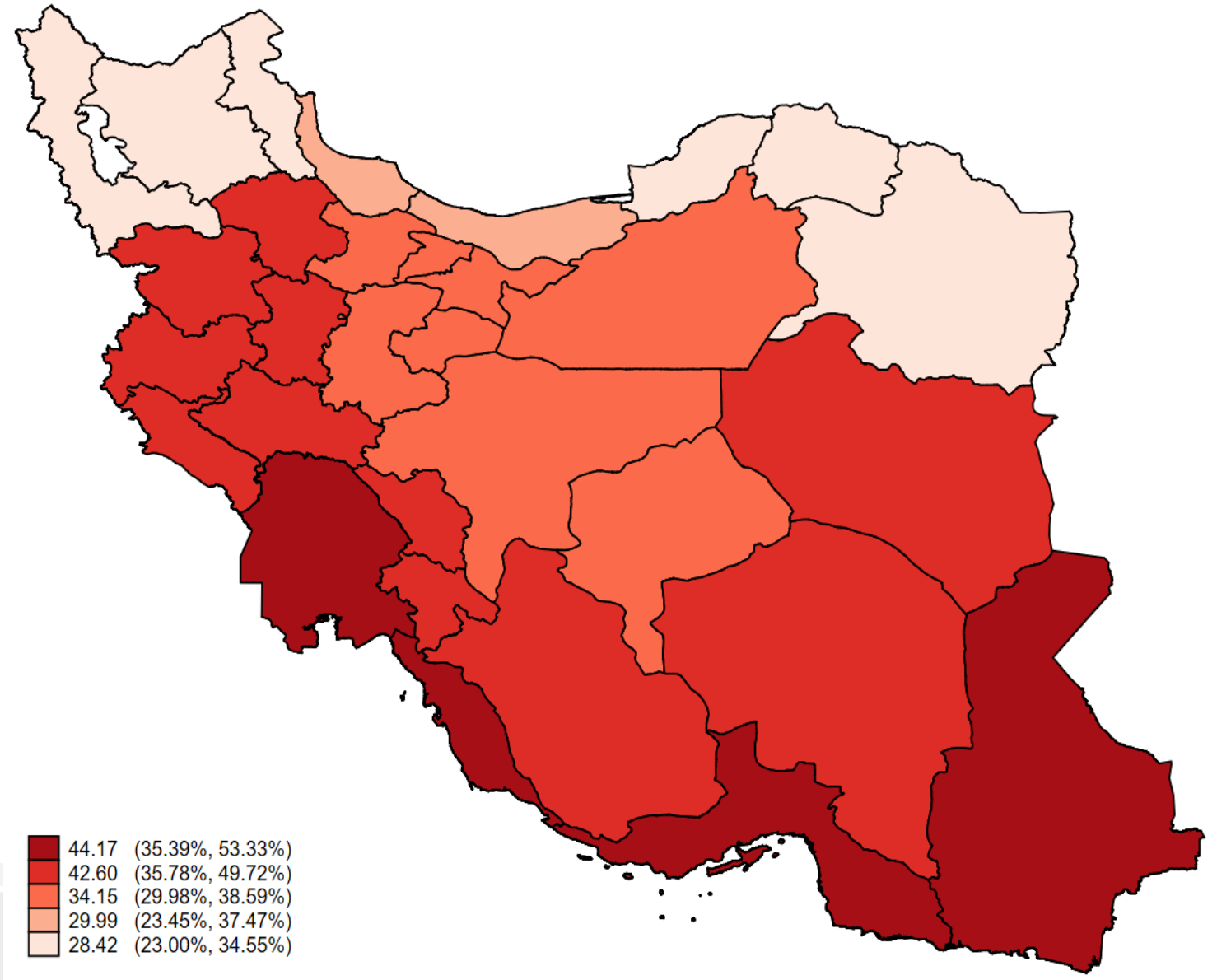
Prevalence of inadequate intake of Mg, by strata



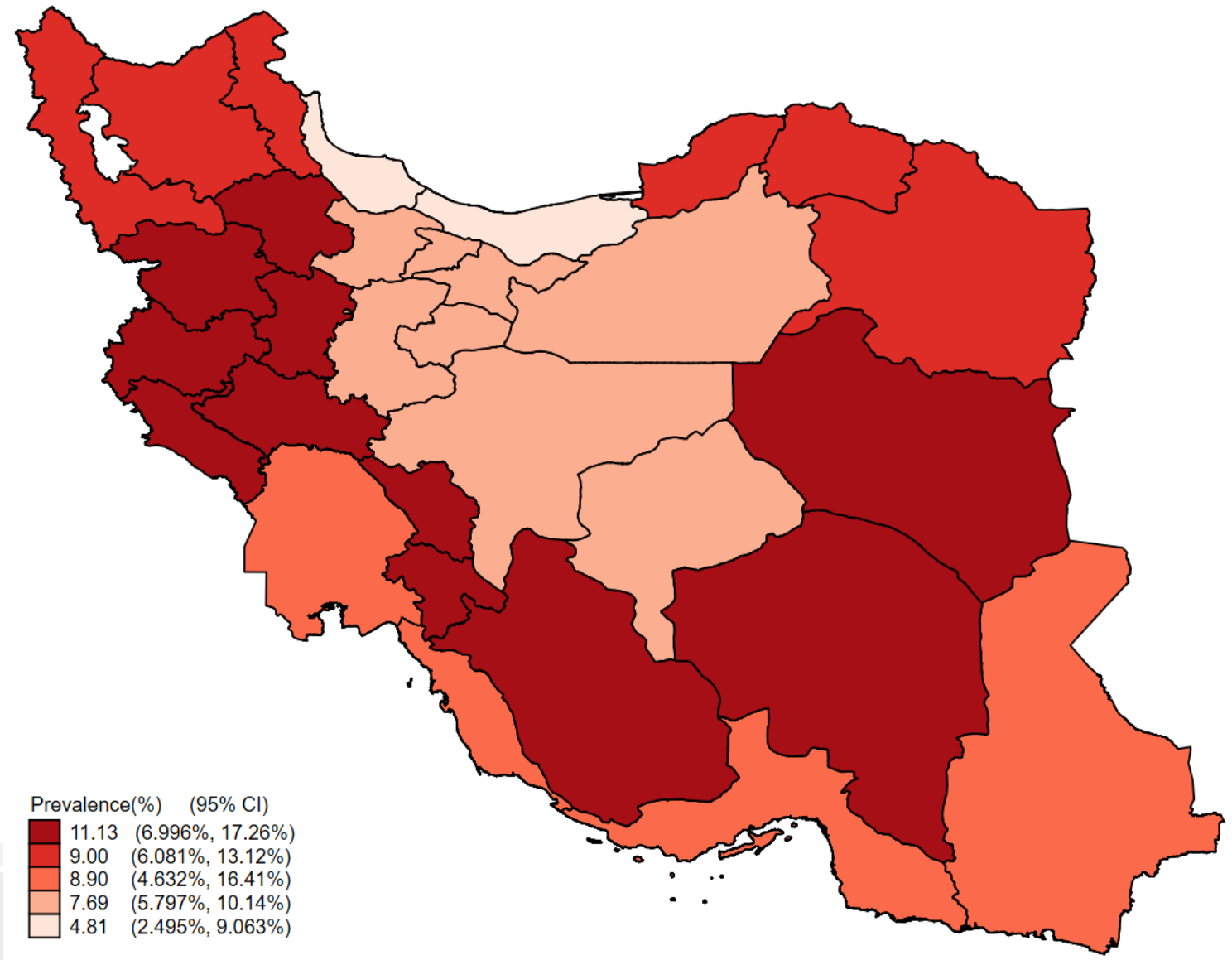
Prevalence of inadequate intake of Potassium, by strata



Prevalence of inadequate intake of Vitamin K, by strata



Prevalence of inadequate intake of Copper, by strata



نتیجه گیری

- یافته های مطالعه IMOS نشان می دهد که شیوع بالای کمبود دریافت غذایی به ویژه کمبود دریافت غذایی کلسیم، پروتئین،روی، پتاسیم و منیزیم و عدم تعادل در دریافت غذایی کلسیم و فسفر، می تواند جمعیت ایران را در معرض خطر بالای ابتلا به پوکی استخوان قرار دهد.
- این نتایج بر ضرورت اجرای برنامه های مداخله ای شامل آموزش های تغذیه ای، غنی سازی مواد غذایی و مکمل یاری هدفمند برای بهبود وضعیت مغذی های مرتبط با سلامت استخوان در جمعیت ایرانی تأکید دارد.

Hippocrates:

"Let food be thy medicine and medicine be thy food.“