

NEW THRESHOLDS FOR THE USE OF FERRITIN CONCENTRATIONS TO ASSESS IRON STATUS IN INDIVIDUALS AND POPULATIONS

Iron deficiency and iron overload are common clinical and public health problems. Iron deficiency can result in anaemia, fatigue, lethargy, reduced child development and physical exercise performance, and may suggest serious underlying disease. Iron overload disorders can be either primary or classic haemochromatosis or secondary haemochromatosis and can result in liver, heart and hormonal diseases such as diabetes. In both cases, appropriate detection is essential to help guide clinical and public health solutions. Early diagnosis is required to initiate prompt treatment and to avoid further iron accumulation in the body.

An important and commonly used test for iron status measurement is serum or plasma ferritin. Measurement of ferritin is available in many laboratories and is a standard measure for iron deficiency and as part of the work-up for iron overload. Specific thresholds for ferritin are used to detect iron deficiency and overload in different age groups.

The World Health Organization (WHO) estimates that 42% of children less than 5 years of age and 40% of pregnant women worldwide are anaemic. Iron deficiency, haemoglobinopathies and malaria are considered as the three top causes of anaemia globally.

WHO has updated the specific ferritin thresholds used to diagnose iron deficiency and overload, in individuals with and without underlying medical conditions, using its rigorous methods for evidence-informed guideline development.

The new [WHO Guideline: Use of ferritin concentrations to assess iron status in individuals and populations](#) updates the recommended cut-off values to define iron deficiency and risk of iron overload in apparently healthy and non-healthy individuals by age group (Table 1).

Table 1. Recommended cut-off values to define iron deficiency and risk of iron overload in apparently healthy and non-healthy individuals by age group

	SERUM FERRITIN ($\mu\text{g/L}$) ^{a,b}			
	IRON DEFICIENCY		RISK OF IRON OVERLOAD	
	Apparently healthy individuals ^c	Individuals with infection or inflammation	Apparently healthy individuals	Non-healthy individuals
Infants (0–23 months)	<12	<30	—	—
Preschool children (24–59 months)	<12	<30	—	—
School-age children (5–12 years)	<15	<70	>150 females >200 males	>500 ^d
Adolescents (13–19 years)	<15	<70	>150 females >200 males	>500
Adults (20–59 years)	<15	<70	>150 females >200 males	>500
Older persons (60+ years)	<15	<70	>150 females >200 males	>500
Pregnant women	<15 (first trimester) ^e	—	—	—

^a From previous WHO recommendations and new evidence.

^b Markers of inflammation should be assessed along with the ferritin concentration, and ferritin adjusted as necessary.

^c For the purposes of this guideline, an apparently healthy individual is defined as an individual with physical well-being for their age and physiological status, without detectable diseases or infirmities.

^d In adult, non-healthy populations, a ferritin concentration exceeding 500 µg/L may indicate risk of iron overload or other disease. This cut-off value indicates the need for further clinical and laboratory evaluation to establish the diagnosis and underlying cause of the ferritin levels.

^e There are several physiological changes occurring in pregnancy that may contribute to the variation in thresholds of iron deficiency in pregnancy as defined by serum ferritin, including a physiological rise in acute phase proteins secondary to pregnancy; second trimester plasma volume expansion; and changes in inflammatory measures in the third trimester of pregnancy.



Accurate determination of iron status is crucial for diagnostic and screening purposes in the clinical setting and for guiding public health interventions.

The measurement of iron status in populations helps in determining the prevalence and distribution of iron deficiency and risk of iron overload in the population, guides the selection of appropriate interventions, and aids in monitoring and evaluating the impact and safety of implemented public health programmes.

Initiating iron interventions in populations with a mild, moderate and/or severe prevalence of iron deficiency could help prevent anaemia, as well as adverse consequences of iron deficiency without anaemia. Likewise, identifying the risk of iron overload can help guide policy makers in their prioritization of health policies.

Updated WHO recommendations on the use of ferritin concentrations for monitoring and evaluating iron status at individual level and nutrition interventions at population level aim to help WHO Member States and their partners to make evidence-informed decisions on appropriate actions for reducing iron deficiency, improving the health and quality of life of individuals and populations, and achieving the Sustainable Development Goals.

To access the *WHO Guideline: Use of ferritin concentrations to assess iron status in individuals and populations*, visit:

www.who.int/publications-detail/9789240000124