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Special Report

Recommendations for India-specific multiple micronutrient supplement through expert consultation

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***Background & objectives*: Reducing maternal anaemia and enhancing feto-maternal health to achieve desired birth outcomes is a major health concern in India. Micronutrient deficiencies during pregnancy may impact fetal growth and neonatal outcomes. There is increasing interest in using multiple micronutrient supplement (MMS) during pregnancy. However, the World Health Organization (WHO) recommends use of MMS containing Iron and Folic Acid (IFA) in the context of "rigorous research". Against this backdrop, an Indian Council of Medical Research (ICMR)-led MMS design expert group met over six months to review the evidence and decide on the formulation of an India-specific MMS supplement for pregnant mothers for potential use in a research setting.**

***Methods*: The India-MMS design expert group conducted a series of meetings to assess the available evidence regarding the prevalence of micronutrient deficiencies in pregnant women in India, the health benefits of supplementing with different micronutrients during pregnancy, as well as nutrient interactions within the MMS formulation. Based on these considerations, the expert group reached a consensus on the composition of the MMS tailored for pregnant women in India.**

***Results*: The India-specific MMS formulation includes five minerals and 10 vitamins, similar to the United Nations International Multiple Micronutrient Antenatal Preparation (UNIMMAP) composition. However, the quantities of all vitamins and minerals except Zinc, Vitamin E, and Vitamin B6 differ.**

***Interpretation & conclusions*: This report provides an overview of the process adopted, the evidence evaluated, and the conclusions from the expert working group meetings to finalize an MMS supplement in pregnancy for the Indian context to be used in a research setting.**

Key words Multiple micronutrient supplements - micronutrient deficiency - maternal health - neonatal outcomes - maternal anaemia

Routine antenatal iron-folic acid (IFA) supplementation, containing 30-60 mg of elemental iron and 400 µg of folic acid, is recommended by the World Health Organization (WHO) to prevent maternal anaemia in pregnant women. According to the WHO, 60 mg of iron is preferred in settings where anaemia is a major health problem[1]. India started IFA supplementation (containing 60 mg of elemental iron and 500 µg of folic acid) to all pregnant women as a component of antenatal care in 1973[2], which evolved over the years to the present-day Anaemia *Mukt* (free) Bharat programme[3]. Anaemia during pregnancy has deleterious consequences for maternal and fetal/infant outcomes, including increased risk of postpartum haemorrhage, preeclampsia, preterm birth, low birth weight, small-for-gestational-age, stillbirth, and neonatal and perinatal death[4]. Interventions to reduce maternal anaemia and improving feto-maternal health and birth outcomes remain an important public health priority in India. Widely prevalent micronutrient deficiencies during pregnancy may affect fetal growth, birth and neonatal outcomes. Therefore, antenatal micronutrient supplementation has been speculated as a potential intervention for better birth outcomes and child survival. The national programmes in India, to date, have relied heavily on IFA supplementation for pregnant mothers and other age groups[2,3]. The United Nations International Multiple Micronutrient Antenatal Preparation (UNIMMAP) was developed in 1999 in response to the recognized need for improved antenatal care and addressing maternal nutritional deficiencies through comprehensive micronutrient supplementation during pregnancy[5]. Experts debate the suitability of a globally standardized multiple micronutrient supplement (MMS) like UNIMMAP, as different population groups have varying nutrient deficiencies due to differences in dietary patterns. Recognizing the need for an India-specific MMS, especially for pregnant women, the Indian Council of Medical Research (ICMR)-led India-MMS design expert group finalized the composition of an India-Multiple Micronutrient Supplement (India-MMS) after a series of meetings over six months. This composition is contextualized to local needs based on available evidence. This document delineates the systematic process adopted to arrive at the formulation of India-MMS.

Constitution of expert committee: An expert committee comprising 15 members with expertise in pharmacology, gynaecology, paediatrics, physiology, epidemiology, food technology, and nutrition was formed to meticulously examine evidence and propose a tailored composition for an MMS specific to pregnant Indian women. The committee convened four meetings, with the first coordination meeting held on April 27, 2023, at ICMR, New Delhi, the focus of which was on reviewing the evolution, efficacy, and rationale for using UNIMMAP in low- and middle-income countries (LMICs). The meeting also delved into global evidence on MMS and analyzed data regarding micronutrient status during pregnancy in India and other LMICs. Two additional meetings took place on June 19 and September 6, 2023. During these sessions, the committee examined matters related to micronutrient deficiencies, recommended dietary allowances, and interactions among constituents for the formulation of the India-specific MMS. In the fourth and final consultation on September 6, 2023, the committee finalized the dosage of various vitamins and minerals in the India-specific MMS. This ensured a well-informed and evidence-based approach in determining the optimal composition for the India-specific MMS formulation. The issues discussed and considered by the expert group and the justification for the inclusion and the dosages of various micronutrients are detailed below.

Multiple micronutrient supplementations during pregnancy: Micronutrient deficiencies are common among women of reproductive age, particularly in LMIC where dietary diversity is often lacking[6]. There is limited evidence, primarily from small-scale studies[7], on the prevalence of micronutrient deficiencies in India during pregnancy. Over time, there has been increasing advocacy for incorporating MMS in place of IFA in routine antenatal care, especially in LMICs[8-10]. United Nations International Children's Emergency Fund (UNICEF), the United Nations (UN), and WHO collaboratively developed an MMS for pregnant women named UNIMMAP, which contains 10 vitamins and five minerals details of which are available in the public domain[11]. Research suggests that MMS may mitigate the risk of adverse pregnancy outcomes such as low birth weight, small for gestational age, stillbirth, and preterm birth, particularly among anaemic and underweight women. However, little to no effect on mortality outcomes, including maternal, neonatal, perinatal, and infant mortality, and on maternal anaemia or haemoglobin status was reported[10,12-15]. However, WHO has taken a cautious stance on this matter, changing its recommendation from "not recommended" in the year 2016 to "recommended in the context of rigorous research"[16] in the year 2020. Thus, the transition from IFA to MMS requires weighing the risks of supplementary nutrition in the daily routine of pregnant women. Given the growing attention towards investigating the potential benefits of MMS on birth outcomes and maternal anaemia, there is a need to develop a tailored MMS supplement for Indian women. This would allow researchers to primarily test its possible efficacy in future studies conducted in India.

Need for a separate country-specific MMS formulation: Opinions differ on the uniform acceptability and utility of a globally standardized MMS composition like UNIMMAP, because patterns of nutrient deficiencies vary in different population groups[17] due to inherent differences in nutrient intakes and the nutritional requirements[18]. Moreover, the nutritional needs of Indian pregnant women differ due to variations in gestational weight gain. Studies have indicated that gestational weight gain (GWG) tends to be lower than the recommended guidelines in Indian women[19,20]. While the Institute of Medicine (IOM) 2009[21] suggests a GWG of 11.5-16 kg for women with a body mass index (BMI) between 18.5-22.9 kg/m^2 (Asian category), a systematic review[20] on Indian pregnant women found an average GWG of 10.08 kg. Globally, the pooled mean GWG is reported at 13.4 kg, with Asian populations averaging 11.4 kg[22]. A recent publication from the Garbh-Ini cohort[19] found that Indian women's GWG fell significantly below the INTERGROWTH-21st reference[23], with around 26 per cent below the 10th centile at 18-20 wk of gestation, increasing to 45 per cent at delivery. Therefore, a careful examination of specific micronutrient deficiencies prevalent in Indian pregnant women is required to contextualize the MMS and maximize the expected benefits, particularly in improving maternal and birth outcomes. The UNIMMAP composition is based on the US population's recommended dietary allowances (RDA); some differences are observed between these and ICMR-National Institute of Nutrition (ICMR-NIN), Hyderabad RDA for pregnant women[18]. The experts opined that a suitable formulation should be designed after a comprehensive mapping of nutritional deficiencies based on available dietary intake and biochemical nutritional deficiency data in pregnant women from India.

Evidence presented on micronutrient deficiency status in India: Data from national surveys and independent studies on pregnant Indian women (published and unpublished, including personal communication) were reviewed to gauge micronutrient deficiencies based on biomarkers (Table I-IV[7,24-44] and Figure[45]). The review was broadened to include studies from India and adjacent South Asian countries due to a paucity of data on some micronutrient deficiencies. Additionally, available data on the dietary intake of micronutrients during pregnancy in Indian women was compiled and evaluated (Table V)[46,47]. Other studies on the dietary intake of pregnant women revealed dietary inadequacies in terms of diet diversification and optimal intake of nutrient-rich foods, especially for iron and calcium[48,49].

Justification for the proposed doses of various micronutrients in the India-specific MMS: Recommendations were made regarding each of the micronutrients as listed in the UNIMMAP on whether to include or exclude any of these from the India-MMS formulation. The nutrient requirements for pregnant women are defined using two key metrics: the Estimated Average Requirement (EAR) and the RDA. The EAR represents the average requirement of a population subgroup, while the RDA corresponds to the 97.5th percentile of the requirement. These metrics take into account various factors affecting nutritional needs during pregnancy, including weight gain, higher metabolic demands due to maternal tissue expansion, additional requirements for the growing baby, and nutrient storage requirements for the mother. It is important to note that these levels are applicable to help maintain the balance of nutrients in a "healthy individual" and are not intended for correcting deficiencies over a short period of time. When biomarker inadequacy and intake gaps are lower, it is considered that one EAR of nutrients would be adequate. However, to address higher gaps in intake and prevalence of micronutrient biomarker insufficiency in pregnancy, the micronutrients need to be provided at higher doses, exceeding the requirement for more than 97.5 per cent of the population (RDA)[18,50]. Therefore, 1.5 times the RDA levels may be used for these nutrients. However, it is important to exercise caution to prevent the consumption of excessive amounts of additional nutrients daily that surpass the tolerable upper limit (TUL) of the nutrient. This is crucial as exceeding the TUL may potentially lead to health risks. It is worth noting that the TUL values are established based on long-term intake considerations and are not relevant when intention is to treat in short term. These values hold true for healthy people with good baseline micronutrient status, which is not the case for women residing in LMICs[50]. In view of the

Table I. Prevalence of maternal micronutrient deficiency in pregnancy in India

Analyte	Global clinical cut-off	Prevalence of deficiency during pregnancy (%) (n; cut off)	Authors & year
Vitamin D (ng/ml)	<12 ng/ml	63.5 (n=1931; ~10-25 ng/ml), 74*, 32 (range 34-96%; n=4088)	Bhatnagar *et al*[24], 2019 Taneja *et al*[25], 2020 Jeykumar *et al*[26], 2021
Ferritin (ng/ml)	*(i)* <15 ng/ml *(ii)* Proportion deficient (CRP ≤5 mg/l & Ferritin <15 ng/ml or CRP >5 mg/l & Ferritin <70 ng/ml)	73.4 (n=283), 67.7 (<12 ng/ml) 52.5 (n=1935)**, 52, 31 (ferritin <15 ng/ml; n=1132)	Pathak *et al*[7], 2004 Bhatnagar *et al*[24], 2019 Taneja *et al*[25], 2020 Nair *et al*[27], 2023
Vitamin B12 (pg/ml)	<200 pg/ml	49*, 51, 55 (n=120) 40-70 (n=4000)	Finkelstein *et al*[28], 2017 Taneja *et al*[25], 2020 Barney *et al*[29], 2020 Behere *et al*[30], 2021
Zinc (mcg/dl)	<66 µg/dl	73.5 (<70 µg/dl; n=283), 45.1 (n=1835)** , 35*	Pathak *et al*[31], 2008 Bhatnagar *et al*[24], 2019 Taneja *et al*[25], 2020
Folate (ng/ml)	<4 ng/ml	26.3 (<3 ng/ml; n=283), 24.3 (<3 ng/ml), 20.7(3–5.9 ng/ml; n=584), 4.5 (n=1979)**, 15*	Pathak *et al*[7], 2004 Bhide *et al*[32], 2019 Bhatnagar *et al*[24], 2019 Taneja *et al*[25], 2020
Vitamin B6	<20 nmol/l	10.4 (n=230)	Deepa *et al*[33], 2023
Vitamin B1	Whole-blood Thiamine Diphosphate (ThDp) <74 nmol/l	38.2 (n=492)	Kareem *et al*[34], 2023
Copper	<80 mg/dl	2.7 (n=283)	Pathak *et al*[7], 2004
Iodine	4.67 mIU/l	6.4 (n=283) 14.4 (n=139)	Pathak *et al*[7], 2004 Gopal *et al*[35], 2022
Vitamin A	<20 µg/dl	32.1	Meshram *et al*[36], 2022

**GARBH-INI[24] (Group for Advanced Research on Birth Outcomes- DBT India Initiative) a pregnancy cohort was initiated from May 2015, where pregnant women were enrolled (within 20 wk of gestation) and followed till delivery. This data is from ~2000 participants (at <20 wk of gestation) and enrolled between May 2015- July 2018.
*WINGS study[25] has enrolled nearly 13,500 married women aged 18 to 30 yr. The women were randomized to receive either the pre and peri-conception intervention package or routine care (first randomization). Interventions will be delivered until women confirmed to be pregnant or completed 18 months of follow up. After pregnancy women were again randomized (second randomization) to receive pregnancy and early childhood interventions or routine care. The data shown from the study designs in the table is unpublished (obtained through personal communication).

points examined above, the experts decided that for micronutrients with a high prevalence of deficiency (above 30%), the supplemental dose of 1.5 times the RDA should be used in the Indian formulation of MMS. Since deficiencies of iron, folate, vitamin D, and vitamin B12 are widespread with higher than 30 per cent prevalence, a dose equivalent to 1.5 times the RDA is included in the proposed formulation. For nutrients where the prevalence of deficiency is less than 30 per cent, it was decided to use a dose equivalent to one EAR, which refers to the average requirement for pregnant women. For copper, selenium, and vitamin E, a dose equal to Adequate Intake (AI) is recommended since EAR values are not available for these nutrients. The committee decided that a micronutrient from the UNIMMAP list will be excluded from the Indian MMS formulation only in case of demonstrated harmful effects of that particular nutrient. It was also decided that if there is a known interaction between certain micronutrients, their proportions in the MMS formulation will be suitably modified to achieve a favourable impact. In addition, the expert committee discussed the inclusion of iron salt in the supplement. Given the similar iron content and relative bioavailability as ferrous sulphate and the expert committee recommended including ferrous fumarate in the India-specific MMS[51] due to its better sensory properties. The final proposed India-specific MMS supplement is outlined in Table VI.

Table II. Micronutrient status at 35-37 wk of gestation (WINGS study[25])

Micronutrient	Pre-conception & pregnancy (Group A) n=248	Pre-conception only (Group B) n=247	Pregnancy only (Group C) n=250	Routine care (Group D) n=250
Vitamin A, mg/l				
Mean (±SD)	0.48 (0.21)	0.39 (0.18)	0.48 (0.22)	0.36 (0.2)
Proportion deficient (%) (<0.196 mg/l)	12 (5.8)	23 (11.2)	13 (6)	44 (20.7)
Vitamin D-3 (ng/ml)				
Mean (SD)	17.0 (9.7)	8.8 (6.5)	18.7 (11.5)	9.8 (7.7)
Proportion deficient (<12 ng/ml)	89 (35.9)	196 (79.4)	89 (35.6)	189 (75.6)
Vitamin B12 (pg/ml)				
Mean (SD)	236.7 (153.6)	212.6 (175.5)	248.9 (232)	218.4 (214.5)
Proportion deficient (%) (<203 pg/ml)	127 (51.2)	158 (64.0)	140 (56)	158 (63.2)
Zinc (µg/dl)				
Mean (SD)	92.9 (84)	96.2 (67.5)	90.1 (67.1)	88.4 (72)
Proportion deficient (%) (<66 µg/dl)	126 (50.8)	100 (40.5)	114 (45.8)	124 (49.6)
Ferritin (ng/mL)				
Mean (SD)	46.0 (52.5)	30.5 (35.2)	50.1 (65.9)	29.8 (33.5)
Proportion deficient (%) (CRP ≤5 mg/l & Ferritin <15 ng/ml or CRP >5 mg/l & Ferritin <70 ng/ml)	90 (36.3)	121 (49)	94 (37.6)	125 (50)
Folate (ng/ml)				
Mean (SD)	11.8 (5.9)	8.1 (5.8)	12.4 (5.9)	7.8 (5.6)
Proportion deficient (<4 ng/ml)	38 (15.3)	82 (33.2)	29 (11.6)	81 (32.4)
Selenium (ug/l)				
Mean (SD)	123.8 (18.5)	121.9 (18.1)	126.5 (17)	122.9 (18.3)
Proportion deficient (%) (<85 ug/l)	1(0.4)	4 (1.7)	1 (0.4)	3 (1.3)

SD, standard deviation. *Source*: ref 25

Iron at 40 mg/day was considered adequate for the prevention of anaemia. This dose is lower than that used in the IFA tablet (60 mg/day) because the MMS contains other nutrients, including vitamin C, vitamin A, vitamin B12, and riboflavin, which are known to increase the absorption and utilization of iron[52,53]. Moreover, lower iron content may improve the compliance due to fewer side effects[15,54].

The committee deliberated on the optimal dosage and form of vitamin D for supplementation. Given the widespread vitamin D deficiency in Indian women, a dosage of 1.5 times the RDA, equivalent to 900 International Units (IU), was initially considered for the India-specific MMS. However, it was noted that pregnant women already receive 250 IU of vitamin D3 twice daily and calcium supplements from the 14th week of pregnancy until six months postpartum, following current guidelines. Consequently, the decision was made to modify the vitamin D dosage in the India-specific MMS to 400 IU. This adjustment ensures that the total dose of vitamin D from both the MMS and the calcium and vitamin D3 supplementation will add up to approximately 900 IU, 1.5 times the RDA and well below the TUL of 4000 IU. Additionally, the committee considered an unpublished study conducted at St. John's Research Institute, Bengaluru, Karnataka, which found that over 70 per cent of women exhibited a vitamin D deficiency, and supplementation of up to 800 IU per day had no adverse effects on the participants (through personal communication). Further, concerning chemical form, experts advocated for the inclusion of vitamin D3 (Cholecalciferol) due to evidence supporting its superior effectiveness in raising serum 25(OH)D levels compared to equimolar vitamin D2 (Ergocalciferol)[26,55,56].

Table III. Prevalence of six preventable micronutrient deficiencies in general population in India[6]

Micronutrients	Age group	Prevalence (95 % CI)	Micronutrients	Age group	Prevalence (95 % CI)
Vitamin A	Pooled	19 (9, 29)	Iodine	Pooled	17 (7, 26)
	<18 yr (n=3384)	19 (10,28)		<18 yr (n=2067)	11 (5,17)
	>18 yr (n=165224)	13 (0, 30)		>18 yr (n= 3545)	12 (6, 17)
	Non-specific (n=735)	28 (0, 59)		Non-specific (n=6682)	59 (0, 100)
Vitamin D	Pooled	61 (56, 65)	Folate	Pooled	37 (27, 46)
	<18 yr (n=10969)	60 (51,69)		<18 yr (n=2689)	39 (22, 57)
	>18 yr (n= 11755)	60 (53, 67)		>18 yr (n=949)	41 (24, 58)
	Non-specific (n=56786)	63 (55, 70)		Non-specific (n=84)	25 (12, 38)
Iron	Pooled	54 (49,59)	Vitamin B12	Pooled	53 (41, 64)
	<18 yr (10541)	55 (42,68)		<18 yr (n=2542)	57 (25, 89)
	Adults (148339)	53 (42,65)		>18 yr (n=4008)	48 (35, 62)
	Pregnant women (n=449215)	61 (50,72)		Non-specific (n=235)	68 (38, 98)
	Non-specific (n=225442)	49 (39,59)			

*Non-specific, no age group specified; CI, confidence interval. *Source*: ref 6

Table IV. Indian studies on prevalence of vitamin B12, Iron and folate deficiency during pregnancy

Author	Region & sample size	Time point	Prevalence of deficiency during pregnancy
Pathak *et al*[37]	Haryana (rural – north India) n=283	≥28 wk pregnancy	74% had B12 deficiency 68% had Iron deficiency 26% had folate deficiency 16% had concomitant deficiencies of iron, folate, & vitamin B12
Krishnaveni *et al*[38]	Mysore (south India) n=774	30 wk gestation	43% B12 deficiency 4% Folate deficiency
Yajnik *et al*[39]	Pune (rural – west India) n=600	18 & 28 wk pregnancy	60% B12 deficiency (in 18 wk) 70% had B12 deficiency (in 28 wk) 1% had folate deficiency
Katre *et al*[40]	Pune (rural & urban) n=163	17 wk pregnancy	80% rural women had B12 deficiency 65% urban women had B12 deficiency
Finkelstein *et al*[28] Samuel *et al*[41]	Bengaluru n=366	≤14 wk of gestation & in 2nd & 3rd trimester	51% had B12 deficiency 22% had low erythrocyte folate
Gadgil *et al* [42]	Pune (hospital based) n=50	36 wk of gestation	35% women had B12 deficiency 82% had high folate concentration (above the range of 3–12 ng/ml)
Wadhwani *et al*[43]	Pune (hospital based sample) n=109, a longitudinal study	At 16-20 wk pregnancy, at 28-30 wk & at the time of labour	22, 32 & 42%, respectively had B12 deficiency at the 3time points (<150 pg/ml) 47, 56 & 62%, respectively had folate deficiency at 3 time points (<10 ng/ml)
Kaushal *et al*[44]	Himachal Pradesh cross-sectional hospital-based study n=172	antenatal women attending the outpatient	49% had Vitamin B12 deficiency 34% had Folate deficiency 50% had Iron deficiency

Interactions of two micronutrients, vitamin C and zinc, with iron were discussed. Experts considered whether increasing the dose of vitamin C to 120 mg (1.5 times the RDA) is needed to enhance iron bioavailability and, secondly, an appropriate dose of zinc to maintain the optimal iron-zinc ratio. It was recommended that a dose of ascorbic acid equivalent to the EAR (65 mg) be used, as the purpose here is to provide vitamin C to

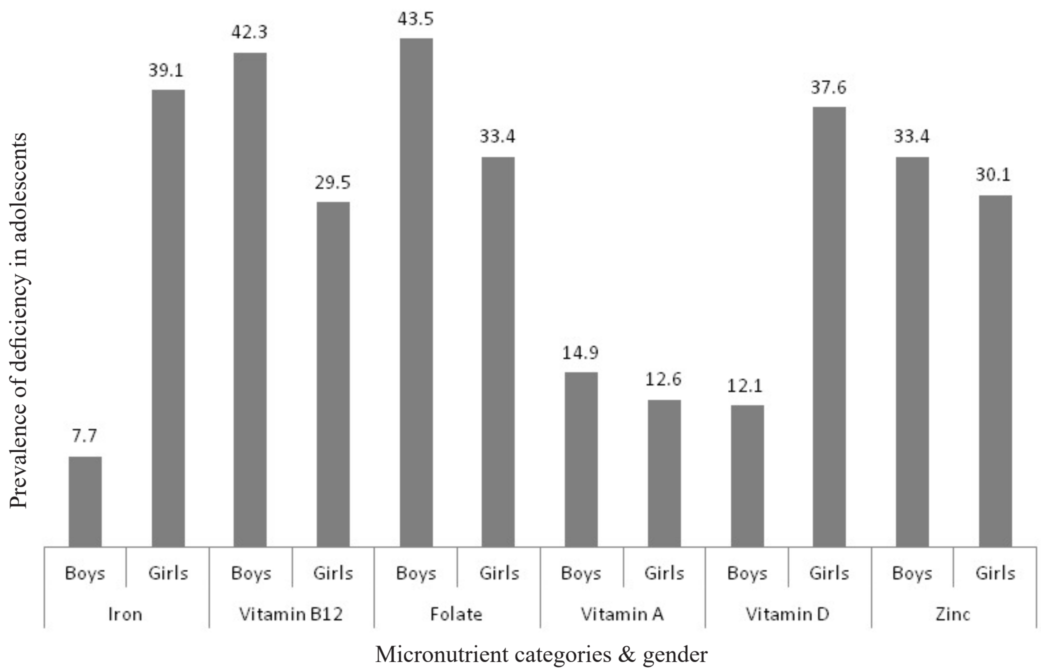

Figure. Prevalence of micronutrient deficiencies in adolescents (15-19 yr)[45]. The graph shows gender wise deficiency on x-axis across micronutrients on y-axis. *Source*: This figure represents data as provided by the CNNS 2016-2018 report[45].

Table V. Mean intakes of micronutrients from habitual diets in Indian pregnant women NNMB urban survey 2016[46] and NNMB rural survey 2012[47]

Micronutrients	Urban (n=326)		Rural (n=421)		Nutrient requirement		Gap (urban)		Gap (rural)	
	Median	IQR	Median	IQR	EAR	RDA	EAR-Median (Urban)	RDA - Median (Urban)	EAR-Median	RDA-(Median
Iron, mg	11.3	8.6, 15	11	7.6, 16.4	21	27	9.7	15.7	10	16
Zinc, mg	7	5.5, 9.3	6.8	5.1, 8.9	12	14.5	5	7	5.2	7.7
Calcium, mg	319.8	201.9, 484.3	334	177.6, 456.4	800	1000	480	680	466	666
Vitamin A, µg	105.9	48.9, 214.9	124	61.5, 511.6	406	900	300	794	282	776
Vitamin C, mg	47.3	25.2, 74.3	24.9	12.5, 47.9	65	80	18	33	40.1	55.1
Thiamin, mg (B1)	1	0.8, 1.3	1.1	0.8, 1.5	1.6	2	0.6	1	0.5	0.9
Riboflavin, mg (B2)	0.6	0.5, 0.8	0.7	0.5, 0.9	2.3	2.7	1.7	2.1	1.6	2
Niacin (B3), mg	8.6	6.8, 11	12.9	9, 16.4	14	16	5	7	1.1	3.1
Dietary folate, µg	167	127, 235.3	108.6	72.7, 154.4	288	342	121	175	179.4	233

EAR, estimated average requirement; RDA, recommended dietary allowance; IQR, inter-quartile range

meet physiological requirements. It may also increase iron absorption when combined with iron. Similarly, the proposed dose of 15 mg of zinc (1 RDA) in the MMS formulation would result in an Fe/Zn molar ratio of approximately 3 and would not negatively impact zinc and/or iron absorption based on published studies[57-59].

Prophylaxis and treatment: Experts concluded that for pregnant women, one MMS tablet or capsule can be used as prophylaxis instead of an IFA tablet in a research setting. In cases of mild or moderate anaemia, the MMS will need to be supplemented with an additional IFA tablet.

The widespread prevalence of micronutrient deficiency and the increasing focus on MMS supplementation during pregnancy underscore the critical need for comprehensive research on the possible effects of MMS supplementation on pregnancy outcomes and maternal anaemia. This report details

Table VI. India specific MMS supplement composition

Nutrient	India-MMS	Rationale	UNIMMAP
Iron (mg)	40	1.5 RDA	30
Folate (µg)	500	1.5 RDA	360
Vitamin A (µg)	400	EAR	800
Vitamin C (mg)	65	EAR	70
Vitamin D (IU)	400	1.5 RDA@	200
Thiamine (mg)	1.6	EAR	1.4
Riboflavin (mg)	2.3	EAR	1.4
Niacin (mg)	11	EAR	18
Vitamin B-12 (µg)	4	1.5 RDA	2.6
Zinc (mg)	15	RDA	15
Iodine (µg)	160	EAR	150
Vitamin E (mg)	10	AI	10
Vitamin B-6 (mg)	1.9	EAR	1.9
Copper (mg)	1.7	AI	2
Selenium (µg)	40	AI	65

@1.5 RDA is 900 IU but 500 IU will be available from Calcium tablets. MMS, multiple micronutrient supplements; UNIMMAP, United Nations International Multiple Micronutrient Antenatal Preparation; AI, adequate intake

the methodology and rationale behind formulating an India-specific MMS specifically designed to facilitate research endeavours for pregnancy.

***Disclaimer*:** This guidance from ICMR regarding the composition of MMS for potential research trials in India is not an endorsement or explicit recommendation for its use during pregnancy; rather, it serves as a framework for researchers considering its use in trials within India.

***Declaration*:** Some experts assumed the role of authors due to their extensive involvement and direct contribution to the manuscript's content. While still valuable contributors, others were acknowledged for their significant input without assuming the authorship role. Relevant experts were duly notified regarding the acknowledgement in the manuscript for their consultative role.

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