

# ADDRESSING GLOBAL CALCIUM DEFICIENCY

## GLOBAL CALCIUM DEFICIENCY AND CONSEQUENCES

An estimated 3.5 billion people do not consume enough calcium in their diets and approximately 90% of these people are in Africa and Asia.<sup>1</sup> The daily recommendations for calcium vary by age and stage of the life course but an intake between 800 mg and 1300 mg of calcium is ideal for children and adults.<sup>2</sup> The risk of inadequate calcium intake is particularly high in adolescents, postmenopausal women, women with amenorrhea, women involved in high-performance athletics, individuals with lactose intolerance or cow's milk allergy, and people who maintain a vegan diet.<sup>3</sup> Early-stage calcium deficiency may cause no symptoms, but without treatment, it can become life threatening. Long-term diets low in calcium have negative consequences on bone health, such as osteoporosis in adults and rickets in children.<sup>4</sup> A low consumption of calcium also contributes to poor pregnancy outcomes and cardiovascular diseases.

## INTERVENTIONS TO IMPROVE CALCIUM INTAKE

Depending on the local context, calcium intake can be improved through the use of single or multiple interventions.

### Increased consumption of naturally calcium-rich foods

The safest and easiest way to treat or prevent calcium deficiency is to add more calcium to the diet. Food-based approaches may be particularly effective for reaching especially vulnerable populations, including women entering pregnancy with low calcium intake, children who may suffer



from rickets during rapid growth, and older adults at risk of fractures.<sup>5</sup> Dairy products are some of the richest sources of calcium, but calcium is also abundant in some plant-based foods, such as leafy green vegetables. In plant-based sources of calcium, the bioavailability should be considered because many of these foods contain anti-nutrients that prevent the body from using calcium in foods.<sup>6</sup> Some food processing techniques, such as fermentation or parboiling rice, can make the calcium more bioavailable or increase the calcium in the food. However, foods that are rich in calcium, such as dairy, tend to be less available and less affordable in low-income settings.

The promotion of calcium-rich foods can also be achieved through public policy and education. Commodity-specific (e.g. dairy) vouchers or cash transfers, can be used to help make food more affordable, and have been especially effective in

increasing uptake of nutritious foods.<sup>7</sup> Additionally, agriculture subsidies aimed at increasing production can be used to increase food availability, or the supply chain could be improved to reduce waste. A public education program highlighting the health benefits of calcium can also contribute to increasing awareness. These can be implemented through public health campaigns, marketing efforts, or nutrition counseling.

## Fortification

Fortification can also be used alongside dietary diversification, if good, affordable, and acceptable calcium food sources can be identified. Twenty-eight countries currently have policies allowing or mandating the fortification of staple foods with calcium, including rice, maize and wheat flour.<sup>5</sup> Given the challenges with meeting calcium needs through the diet alone, staple food fortification is a cost-effective method to improve calcium intake in a population with minimal behavior change required.<sup>8</sup> Calcium can be added on to an existing fortification program, and it will not interfere with other micronutrients.

When designing an intervention for calcium, it is crucial to consider the food systems within which

they are embedded, as well as the preferences of consumers, the organoleptic properties of calcium rich or fortified foods, and issues of bioavailability.<sup>5</sup> Supplementation with calcium in those who are most in need may still be required, particularly as fortification may take time to implement and for those who may be missed by these interventions. The consumption of fortified foods may reduce the recommended supplementation dose of calcium for pregnant women if the intake of calcium from fortified foods increases.<sup>4</sup>

## Supplementation

In people who do not get enough calcium from their diet, calcium supplementation can also be considered both a safe and effective for reducing the risk of fractures.<sup>5</sup> Beyond bone health, calcium supplementation may help reduce blood pressure, cholesterol levels and recurrent colorectal tumors. However, calcium supplementation can be an inefficient way to address insufficient calcium intakes affecting the whole or a significant proportion of the population.<sup>4</sup> It is therefore likely necessary to employ other strategies to increase calcium intake in areas where consumptions are low.

### CALCIUM IN PREGNANCY

Many women in low- and middle-income countries have sub-optimal calcium intakes during pregnancy, which is linked to an increased risk of hypertensive disorders during pregnancy, including preeclampsia (a potentially life-threatening condition). Hypertensive disorders during pregnancy are among the leading causes of maternal death worldwide, causing approximately 29,000 maternal deaths each year.<sup>9</sup> Calcium supplementation during pregnancy reduces the risk of hypertensive disorders and associated complications, including preeclampsia, maternal morbidity and

preterm birth. Thus, in populations with low dietary calcium intake, calcium supplementation is currently recommended for pregnant women at 1.5-2 g/day (3-4 pills of 500mg of elemental calcium) but current ongoing trials are testing the efficacy of a simplified supplementation regimen providing a single daily pill containing 500mg of calcium.

To maximize calcium supplementation programs during pregnancy, timely and effective prenatal care with a supply of free supplements, high-quality counseling by care providers, and simple home-based reminders are among the most effective strategies to reach especially vulnerable pregnant women.

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