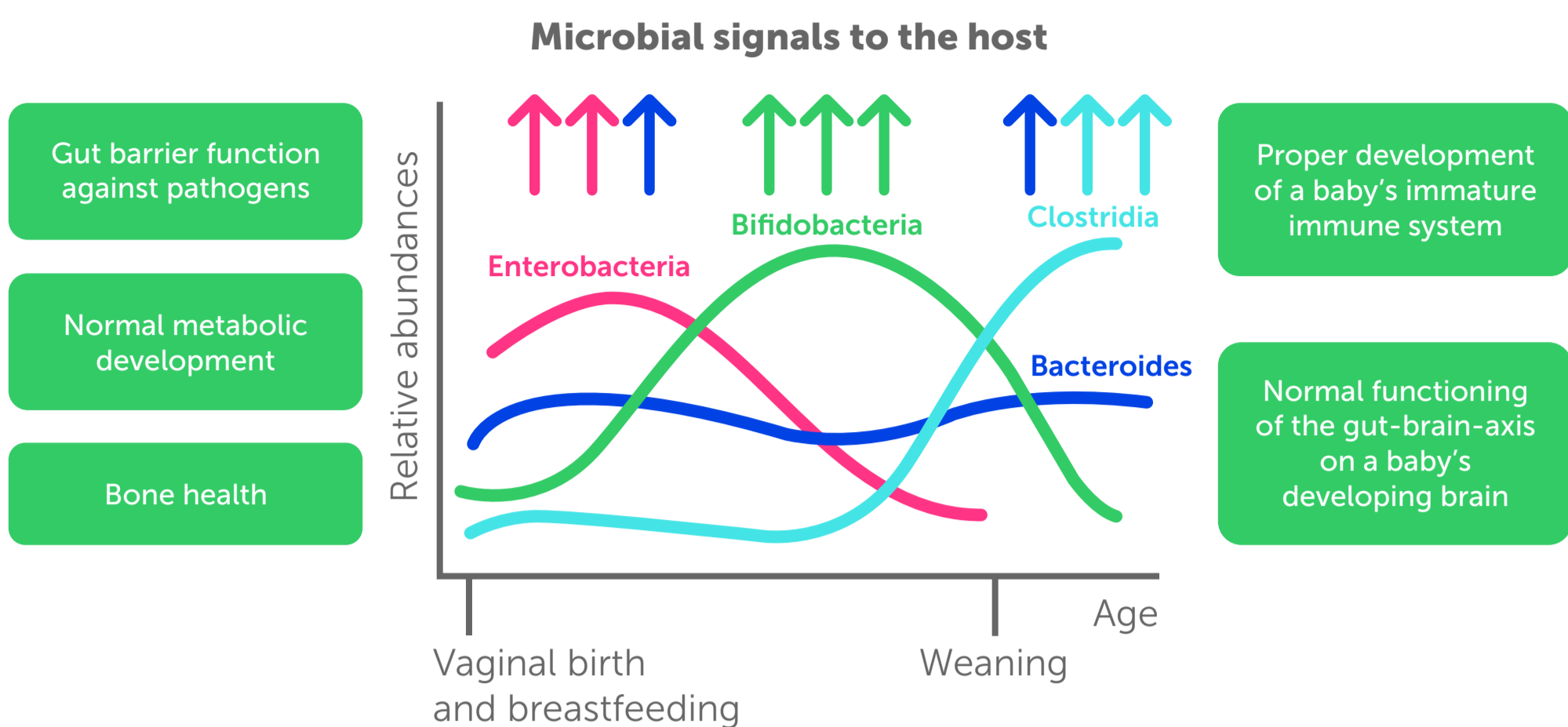


C-Section Birth and the Infant Gut Microbiota: Nutritional Strategies

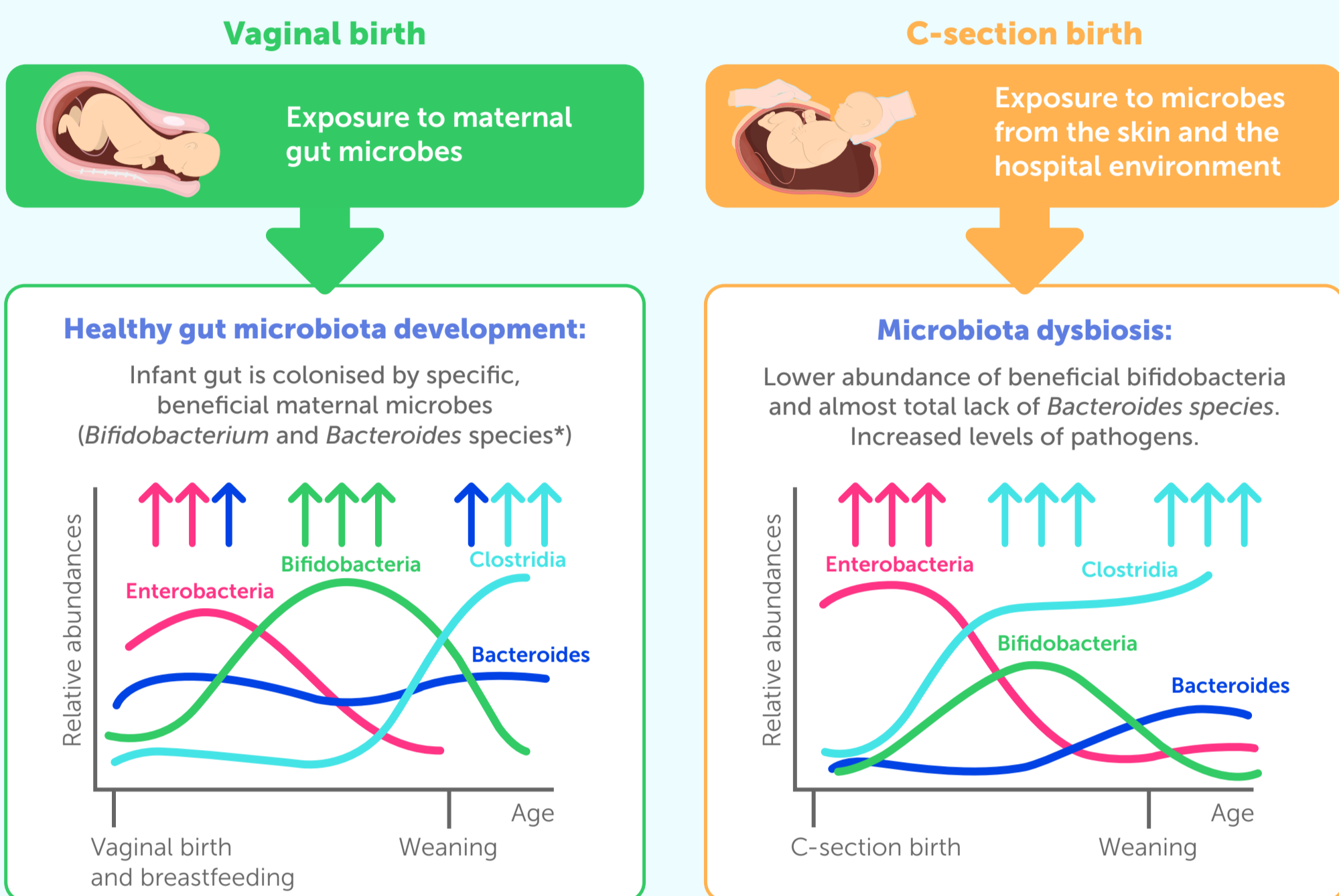
Healthy gut microbiota development after birth – why it is so important?

A healthy gut microbiota development after birth contributes to healthy growth, immediate and long-term health¹⁻⁵



What is the impact of C-section birth on an infant's gut development and health?

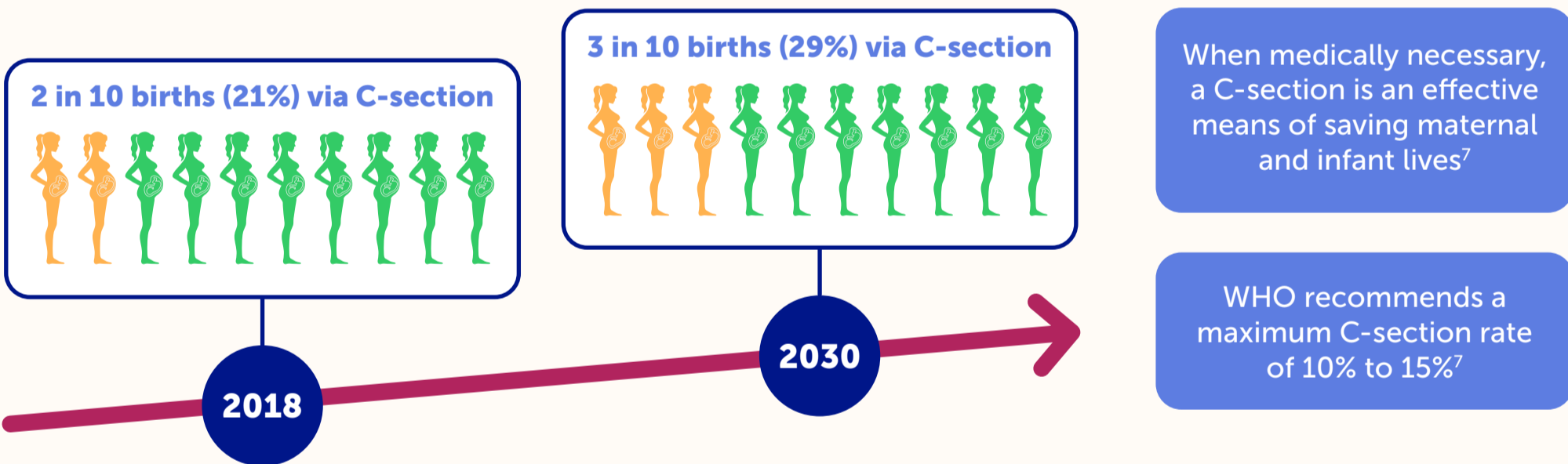
C-section birth is a major disruptor of early gut microbiota development¹



Microbial dysbiosis in early life is associated with gastrointestinal infections and carries long-term health risks, including increased risk of chronic immune diseases, overweight, and may impact neurodevelopment¹⁻⁴

What do we know about C-section rates?

The global C-section rate is higher than recommended and continues to rise⁶



Can nutritional interventions balance a disruptive gut microbiota after C-section in early life?

HMOs, certain prebiotics and probiotics help shift gut microbiota in babies born by C-section closer to that of vaginally born and breastfed infants⁸⁻¹⁰

HMOs

Definition

A group of diverse and complex oligosaccharides in breast milk, supporting gut microbiota and immune health in four major ways^{11,12}

Promote the growth of beneficial bacteria, such as *Bifidobacterium* species

Strengthen gut barrier function

Prevent pathogen adhesion in the gut

Educate the developing immune system

Symbol Key: Pathogen Glycan on cell surface Beneficial bacteria

Adapted from Bode, 2012¹²

A clinical study shows:

Feeding a blend of 5 HMOs (2'FL, DFL, LNT, 3'SL, 6'SL) can⁸:

- ✓ shift the gut microbiota of C-section born infants closer to breastfed and vaginally born infants
- ✓ by increasing beneficial *Bifidobacterium*

Prebiotics

Definition

A substrate selectively utilised by host microorganisms, conferring a demonstrated health benefit¹³

A clinical study shows:

- ✓ Feeding bovine milk-derived oligosaccharides can change gut microbiota of C-section born infants towards the composition observed in vaginally born and breastfed infants⁹

Probiotics

Definition

- Live microorganisms when administered in adequate amounts confer a health benefit on the host¹⁴
- Efficacy of a probiotic is strain specific¹⁴

Several clinical studies show:

- ✓ *Bifidobacterium lactis* helps support a healthy gut microbiota and immune system in formula-fed infants born by C-section¹⁵⁻¹⁷
- ✓ *Lactobacillus reuteri* helps shift overall gut microbiota profile and taxa abundance in C-section born infants towards that of vaginally born infants^{18,19}

C-section birth is a major disruptor of an infant's early gut microbiota development, which can have a negative impact on their health status. Early nutritional interventions with HMOs, certain probiotics and prebiotics can help correct microbial dysbiosis and shift gut microbiota closer to that of vaginally born and breastfed infants.