2020 Dietary Guidelines Advisory Committee:
DRAFT - Part D. Chapter 4: Duration, Frequency, and Volume of Exclusive Human Milk and/or Infant Formula Consumption

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This chapter includes questions examined by the Birth to 24 Months Subcommittee

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LIST OF QUESTIONS

1. What is the relationship between the duration, frequency, and volume of exclusive human milk and/or infant formula consumption and **overweight and obesity**?
2. What is the relationship between the duration, frequency, and volume of exclusive human milk and/or infant formula consumption and **long-term health outcomes**?
3. What is the relationship between the duration, frequency, and volume of exclusive human milk and/or infant formula consumption and **nutrient status**?
4. What is the relationship between the duration, frequency, and volume of exclusive human milk and/or infant formula consumption and **food allergies and atopic allergic diseases**?

BREADTH OF TOPICS

	OWOB	Food allergies & atopic allergic diseases				Long-term health		Nutrient status					
Duration/ frequency/ volume of human milk/ infant formula ↓	OW, OB	Food allergy	Atopic dermatitis	Allergic rhinitis	Asthma	CVD, intermed. outcomes	T1D, T2D, intermed. outcomes	Iron	Zinc	Iodine	B12	D	Fatty acids
Ever vs never	●	●	●	●	●	●	●	●	●	●	●	●	●
Duration of any human milk	●	●	●	●	●	●	●	●	●	●	●	●	●
Duration of exclusive human milk	●	●	●	●	●	●	●	●	●	●	●	●	●
Intensity of human milk in mixed-feeding	●	●	●	●	●	●	●	●	●	●	●	●	●
Breast vs bottle	●	●	●	●	●								
"Topping up"	●												

Part D. Chapter 4:

Duration, Frequency, and Volume of Exclusive Human Milk and/or Infant Formula Feeding

2020 Dietary Guidelines Advisory Committee: *Meeting on Draft Report*

METHODOLOGY

- The questions on overweight/obesity and nutrient status were answered using new NESR systematic reviews.
- The questions on long-term health and food allergies/atopic diseases were answered using existing NESR systematic reviews from the Pregnancy and Birth to 24 Months Project, published in 2019.

Final protocols and draft conclusion statements available at DietaryGuidelines.gov

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REVIEW OF THE SCIENCE

- Over 200 articles were included in the NESR systematic reviews (over 150 from the existing reviews and over 60 from the new reviews).
- Conclusion statements were graded from Moderate to Grade Not Assignable.
- Most evidence compared infants who ever consumed human milk with infants who never consumed human milk, or infants who consumed human milk for different durations.
- Most evidence measured outcomes during childhood.
- Most evidence consisted of observational studies, with the notable exception of a cluster RCT (Promotion of Breastfeeding Intervention Trial) that provided evidence for overweight/obesity, atopic disease, and long-term health outcomes.
- Human milk consumption was sometimes associated with a beneficial outcome (e.g., overweight/obesity, asthma, type 1 diabetes) and was sometimes not associated with an outcome (e.g., atopic dermatitis). In no case was consuming human milk associated with an adverse outcome.

DISCUSSION
Key Findings

Ever (vs. never) being fed human milk was related to lower risk of:

- **Overweight or obesity**
- **Type 1 diabetes**
- **Asthma**

A longer duration of human milk feeding was related to lower risk of:

- **Type 1 diabetes**
- **Asthma**

A longer duration of exclusive human milk feeding was related to lower risk of:

- **Type 1 diabetes**

DISCUSSION
Overweight and obesity (1 of 3)

- Ever vs never fed human milk: causality difficult to determine because of the risk of confounding in observational studies, and the limitations of the sibling-pair studies.
- Other systematic reviews and meta-analyses have generally come to similar conclusions.
  - A systematic review of systematic reviews (Patro-Gołąb 2016 – *Obes Rev)* concluded that breastfeeding is consistently associated with a reduction in the odds of overweight or obesity in childhood and adulthood, by about 13% in high-quality studies, but residual confounding could not be ruled out.
  - The same review stated that "there are some indications that breastfeeding of very short duration has a lesser protective effect than breastfeeding of longer duration on the later risk of overweight and obesity, although residential confounding cannot be excluded."

DISCUSSION
Overweight and obesity (2 of 3)

Potential biological mechanisms

- Rapid weight gain during infancy consistently related to subsequent risk of overweight or obesity
  - Rapid weight gain more likely among formula-fed infants
- Infant self-regulation of energy intake may differ between breast- and formula-fed infants
- Higher protein intake among formula-fed infants drives hormonal differences that may stimulate greater weight gain and fat deposition
  - RCTs of reduced-protein formulas: less rapid infant weight gain and reduced obesity at school age
  - Precise mechanisms not yet clear

DISCUSSION
Overweight and obesity (3 of 3)

Potential biological mechanisms, continued

- Concentrations of free amino acids in human milk vs formula also may be important
  - Free glutamate (high in human milk) is a key signal for satiation.
  - Experimental study (formula with higher free glutamate content vs. standard infant formula) reported a significant difference in early rapid weight gain (Mennella 2018 – *Am J Clin Nutr*).
- Overfeeding of formula-fed infants also a possibility
  - Feeding by bottle may make it more difficult for the infant to communicate satiety signals, and the caregiver may urge the infant to finish the bottle so as to avoid wastage.
  - Differences in the dyadic approach of caregivers and infants during feeding may have longer term implications for programming of appetite regulation.

DISCUSSION
Type 1 diabetes mellitus

- Although the prevalence of type 1 diabetes is low, small increases in the risk of type 1 diabetes may have public health implications.
- The autoimmune destruction of insulin-producing beta cells in the pancreas that results in type 1 diabetes occurs in genetically susceptible individuals, but is likely triggered by environmental agents early in life.
- Potential biological mechanisms for the protective effect of breastfeeding: differences in composition of human milk vs. infant formula
  - Biologically active components in human milk may play a role in:
    - reducing gut permeability and early enterovirus infections
    - promoting a healthier infant gut microbiota

DISCUSSION
Asthma

The conclusion that human milk is related to reduced risk of asthma is supported by previous meta-analyses.

- Odds ratio for breastfeeding: 0.70 (95% CI: 0.60, 0.81) (Gdalevich 2001 – *J Pediatr*)
  - OR=0.52 (95% CI: 0.35, 0.79) in children with atopic first-degree relatives
  - OR=0.99 (95% CI: 0.48, 2.03) in those without a family history

Potential biological mechanisms

- Breastfeeding associated with reduced number of respiratory tract infections in infancy
- Exclusive breastfeeding may be beneficial for lung function
  - Infants exclusively breastfed for 4 months or more had better lung function at 8 years (measured by peak expiratory flow) than those breastfed less than 4 months.
- Breastfeeding may mediate these effects through protecting the lungs from viral infections or by promoting maturation of the infant immune system and microbiome

DISCUSSION

Scope of reviews

- Reviews limited to selected outcomes: overweight/obesity, long-term health, nutrient status, and atopic or allergic diseases in the offspring
- Not included:
  - Child infectious diseases (e.g., gastrointestinal, respiratory and ear infections), cancer, mortality, or development
  - Maternal outcomes related to initiation or duration of lactation, including reduced risk of:
    - breast, ovarian, and endometrial cancers
    - hypertension and cardiovascular disease
    - non-alcoholic fatty liver disease
    - type 2 diabetes mellitus
- Feeding recommendations should take into account all outcomes.

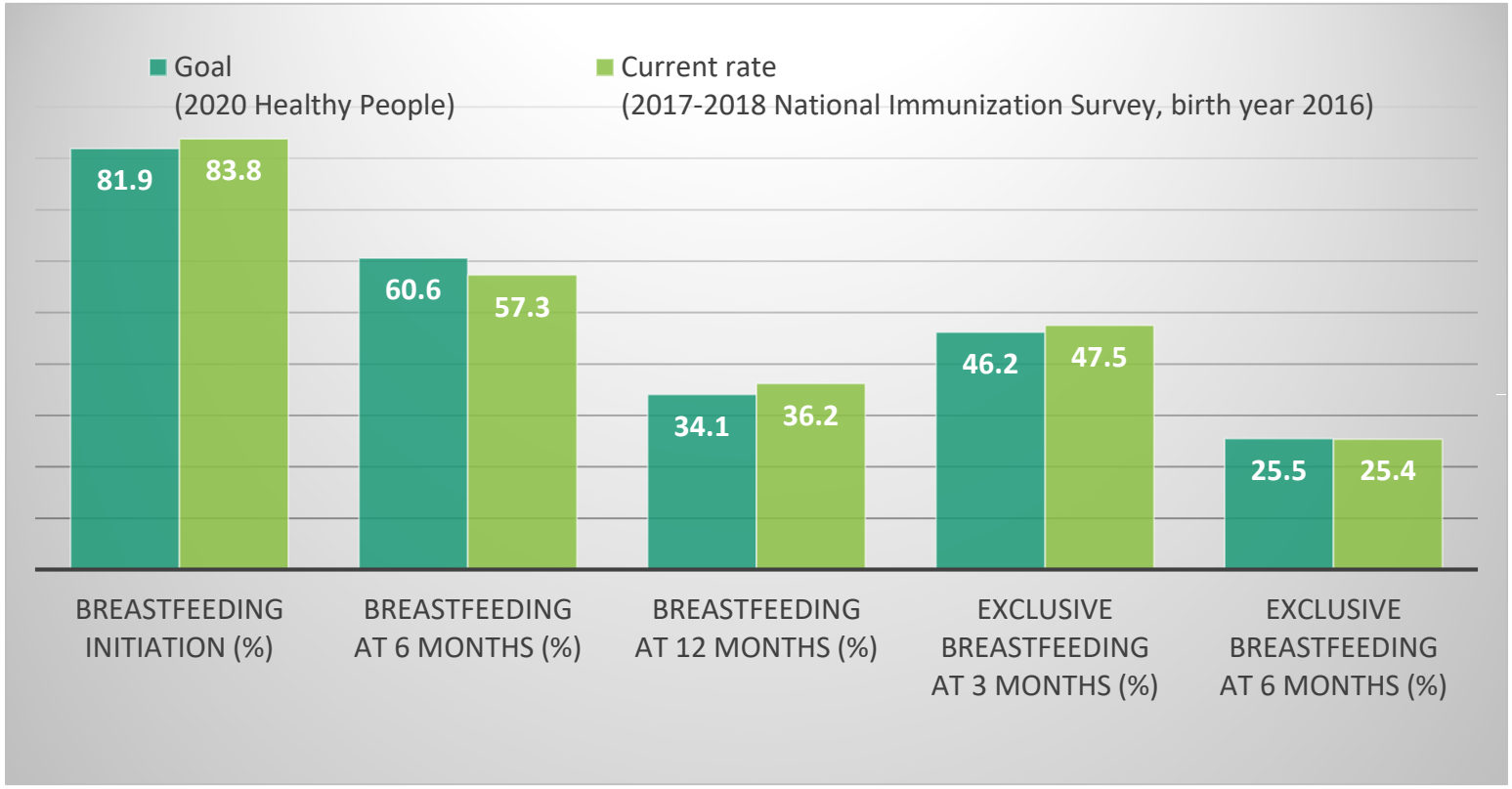
SUMMARY

The evidence is consistent with existing recommendations for breastfeeding in the U.S. and globally, including many other high-income countries, which generally advise:

- Exclusive breastfeeding until about age 6 months
- Continued breastfeeding thereafter, together with appropriate complementary feeding, until at least 12 months (AAP) or 24 months of age (WHO).

However, current breastfeeding rates in the U.S. indicate considerable room for improvement.

BREASTFEEDING RATES IN THE U.S. COMPARED TO 2020 HEALTHY PEOPLE GOALS



These percentages represent national data, and marked disparities in infant feeding exist based on geography, income, education, and race and ethnicity.

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SUMMARY:
Draft Evidence-Based Advice to USDA and HHS

Therefore, the Committee supports the following recommendations:

Encourage exclusive breastfeeding, ideally for the first 6 months of life, with continued breastfeeding through the first year of life or longer as desired by the mother and infant.

Encourage the broader implementation of policies and programs that promote, protect, and support breastfeeding to benefit both the health of the mother and the infant.

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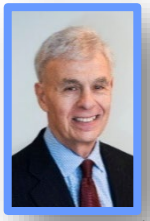

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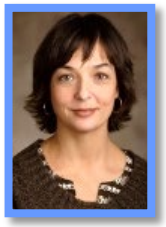

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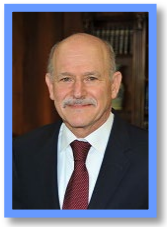

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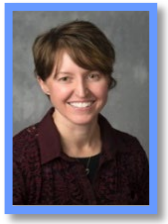

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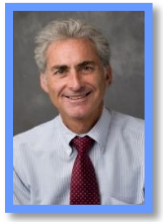

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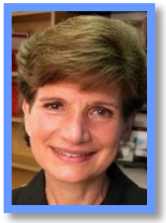

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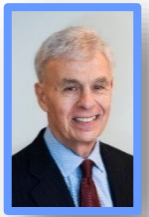

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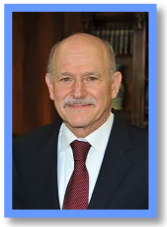

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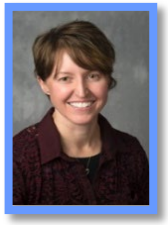

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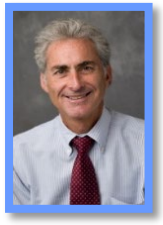

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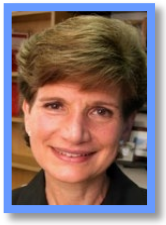

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