



Can Breastfeeding Protect Babies From Asthma?

New results and current research from the CHILD Study

Meghan Azad, PhD

Children's Hospital Research Institute of Manitoba
Department of Pediatrics & Child Health, University of Manitoba
Canadian Healthy Infant Longitudinal Development (CHILD) Study



meghan.azad@umanitoba.ca

www.azadlab.ca

[@MeghanAzad](https://twitter.com/MeghanAzad)

Manitoba Breastfeeding Rounds – June 2017

Eur Respir J 2017; 49: 1602019

ORIGINAL ARTICLE
ASTHMA



EDITORIAL
ASTHMA

Breastfeeding, maternal asthma and wheezing in the first year of life: a longitudinal birth cohort study

Meghan B. Azad^{1,2}, Lorena Vehling^{1,3}, Zihang Lu⁴, David Dai⁵, Padmaja Subbarao⁴, Allan B. Becker^{1,2}, Prushkumar J. Mandhane⁶, Stuart E. Turvey⁷, Diana L. Lefebvre⁵ and Malcolm R. Sears^{5,8} and the CHILD Study Investigators

Affiliations: ¹Dept of Pediatrics and Child Health, University of Manitoba, Winnipeg, MB, Canada. ²Children's Hospital Research Institute of Manitoba, Winnipeg, MB, Canada. ³Dept of Community Health Sciences, University of Manitoba, Winnipeg, MB, Canada. ⁴Dept of Pediatrics and Physiology, Hospital for Sick Children, University of Toronto, Toronto, ON, Canada. ⁵Dept of Medicine, McMaster University, Hamilton, ON, Canada. ⁶Dept of Pediatrics, University of Alberta, Edmonton, AB, Canada. ⁷Dept of Pediatrics, Child and Family Research Institute and BC Children's Hospital, University of British Columbia, Vancouver, BC, Canada. ⁸Canadian Healthy Infant Longitudinal Development Study (investigators listed in acknowledgements).

Correspondence: Meghan Azad, Children's Hospital Research Institute of Manitoba, 501G - 715 McDermot Avenue, Winnipeg, Manitoba, Canada R3E 3P4. E-mail: meghan.azad@umanitoba.ca

[@ERSpublications](https://twitter.com/ERSpublications)

When mums with asthma #breastfeed longer, their babies are less likely to wheeze
<http://ow.ly/KWEK3089ZEn>

Cite this article as: Azad MB, Vehling L, Lu Z, et al. Breastfeeding, maternal asthma and wheezing in the first year of life: a longitudinal birth cohort study. *Eur Respir J* 2017; 49: 1602019 [<https://doi.org/10.1183/13993003.02019-2016>].

Formula one: best is no formula

Andrew Bush^{1,2} and Adnan Custovic²

Affiliations: ¹Royal Brompton Hospital, London, UK. ²Imperial College, London, UK.

Correspondence: Andrew Bush, Dept of Paediatric Respiratory Medicine, Royal Brompton Harefield NHS Foundation Trust, Sydney Street, London SW3 6NP, UK. E-mail: a.bush@rbth.nhs.uk

personalized medicine

*“Human breastmilk is not only a perfectly adapted nutritional supply for the infant, but probably the most specific **personalized medicine** that he or she is likely to receive, given at a time when gene expression is being **fine tuned for life.**”*

Victora et al.
The Lancet Breastfeeding
Series (2016)



gairdner

LES PRIX CANADA GAIRDNER AWARDS

CESAR VICTORA, WINNER OF THE JOHN DIRKS CANADA GAIRDNER GLOBAL HEALTH AWARD

In a Brazilian town, this researcher upended conventional wisdom on breastfeeding

by Stephanie Nolen

There is a joke in the city of Pelotas, in the far south of Brazil: the average family, they say, is comprised of a mother, a father, two children – and a public health researcher. Pelotas' population is often called the world's most examined, because of a study that began in 1982, when researchers set out to track every one of the 6,011 babies born there that year. New cohorts have been enrolled every 11 years – for a total of nearly 30,000 participants – but the first group, now well into their 30s, is still regularly being visited by a field worker toting questionnaires.



Objectives

- Review previous research on the association of **breastfeeding and asthma** development
- Understand how breastfeeding **mode, duration, and exclusivity** modify the health effects of breastfeeding
- Identify **bioactive components** of human milk and describe their potential role in asthma development.
- Discuss opportunities for **healthcare providers** to support breastfeeding





Developmental Origins of...

Allergies



1 in 4 Canadians have seasonal allergies

1 in 13 have food allergies

Canadian Allergy, Asthma and Immunology Foundation & 2013 SCAALAR survey

Asthma



1 in 6 Canadian children have asthma

Public Health Agency of Canada (2007). Life and breath: Respiratory disease in Canada.

Obesity



1 in 3 Canadian children are overweight

Overweight and obesity in children and adolescents: Results from the 2009 to 2011 Canadian Health Measures Survey

RESEARCH LETTER

JAMA Pediatrics

Wheezing Patterns in Early Childhood and the Risk of Respiratory and Allergic Disease in Adolescence

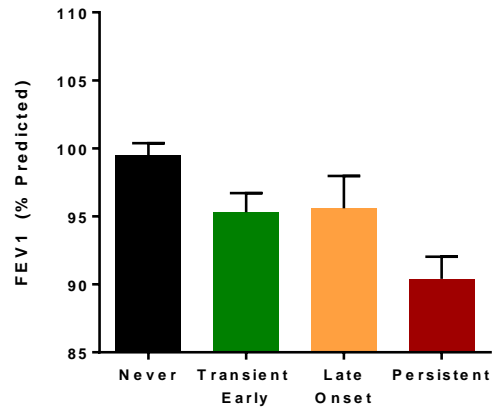
Meghan B. Azad, PhD
 Moira Chan-Yeung, MB
 Edmond S. Chan, MD
 Amy M. Dytneriski, RNBN
 Anita L. Kozyrskyj, PhD
 Clare Ramsey, MD
 Allan B. Becker, MD

Author Affiliations: Department of Pediatrics and Child Health, University of Manitoba, Winnipeg, Manitoba, Canada (Azad, Dytneriski, Becker); Department of Community Health Sciences, University of Manitoba, Winnipeg, Manitoba, Canada (Azad, Dytneriski, Ramsey, Becker); Children's Hospital Research Institute of Manitoba, Winnipeg, Manitoba, Canada (Azad, Dytneriski, Becker); Department of Medicine, University of British Columbia, Vancouver, British

(Feb 2016)

Canadian Asthma Primary Prevention Study (CAPPS)

- 545 high-risk infants born in 1995 (Manitoba & BC)
- Prenatal randomization to multifaceted intervention
- Clinical follow up: 1, 2, 7, 15 years (N=326)



Wheezing Risk Factors

- **More Wheeze:**
 - Boys
 - Winnipeg
 - Early atopy
- **Less Wheeze:**
 - Intervention Group
 - **Exclusive breastfeeding >4m**


... HOW?


(Azad et al. JAMA Pediatrics 2016)

	N	Preschool Wheeze Phenotype (%)				p
		Never	Transient Early	Late Onset	Persistent	
Sex						
Girls	220	56.8	26.8	6.8	9.6	0.05
Boys	239	45.6	28.9	9.6	15.9	
City						
Vancouver	225	63.1	20.0	7.6	9.3	<0.001
Winnipeg	234	39.3	35.5	9.0	16.2	
Study Group						
Control	215	47.4	26.5	9.3	16.7	0.09
Intervention	244	54.1	29.1	7.4	9.4	
Maternal Atopy						
No	99	57.6	27.3	6.1	9.1	0.36
Yes	360	49.2	28.1	8.9	13.9	
Maternal Education						
< Postsecondary	103	38.8	35.0	10.7	15.5	0.05
≥ Postsecondary	356	54.5	25.8	7.6	12.1	
Household Pets						
No	301	51.2	29.6	8.0	11.3	0.45
Yes	158	50.6	24.7	8.9	15.8	
Household Smokers						
No	357	53.2	26.6	8.7	11.5	0.16
Yes	102	43.1	32.4	6.9	17.7	
Exclusive Breastfeeding						
< 4 months	289	46.4	29.8	8.3	15.6	0.03
≥ 4 months	169	59.2	24.3	8.3	8.3	
Atopy by 2 years						
No	333	54.4	29.1	7.2	9.3	0.002
Yes	116	43.1	24.1	11.2	21.6	

The Canadian Healthy Infant Longitudinal Development (CHILD) Study


How do genes and the environment influence child health and development?






\$30M Invested
500,000 Samples:
 Blood, Urine, **Stool**,
 Nasal Swabs, Dust,
Breast Milk

200,000 Questionnaires
3600 Families
40+ Researchers
20+ Disciplines
5(+) Years Follow-Up
93% Retention





www.canadianchildstudy.ca



CHILD Study

HELP CHILDREN GROW UP HEALTHY



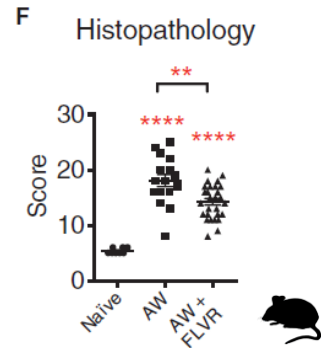
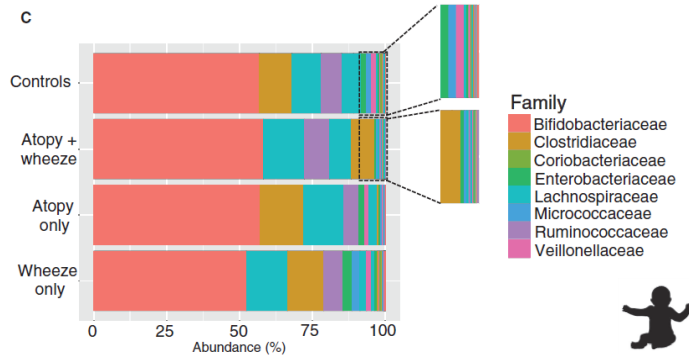


ASTHMA

Early infancy microbial and metabolic alterations affect risk of childhood asthma

Marie-Claire Arrieta,^{1,2*} Leah T. Stiemsma,^{2,3,*} Pedro A. Dimitriu,² Lisa Thorson,¹ Shannon Russell,^{1,2} Sophie Yurist-Doutsch,^{1,2} Boris Kuzeljevic,³ Matthew J. Gold,⁴ Heidi M. Britton,¹ Diana L. Lefebvre,⁵ Padmaja Subbarao,^{6,7} Pius Mandhane,^{8,9} Allan Becker,¹⁰ Kelly M. McNagny,⁴ Malcolm R. Sears,⁵ Tobias Kollmann,^{3,11} the CHILD Study Investigators,[†] William W. Mohn,² Stuart E. Turvey,^{3,11†§} B. Brett Finlay^{1,2,12†§§}

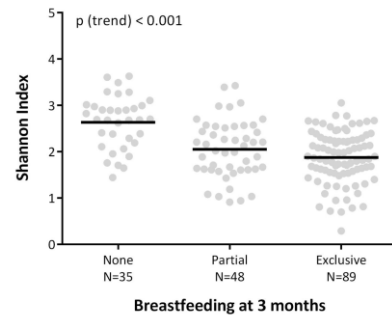
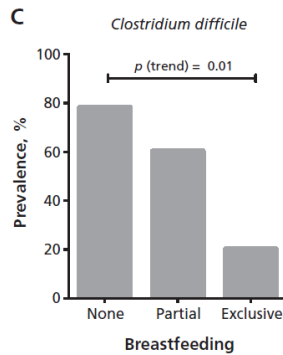
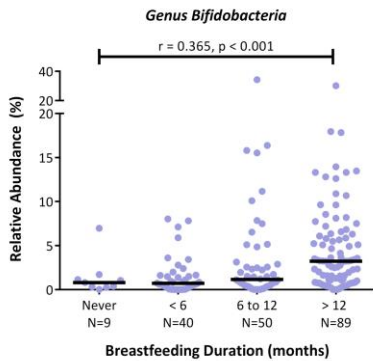
“Infants at risk of asthma exhibited transient gut microbial dysbiosis during the **first 100 days of life.**”



Impact of maternal intrapartum antibiotics, method of birth and breastfeeding on gut microbiota during the first year of life: a prospective cohort study

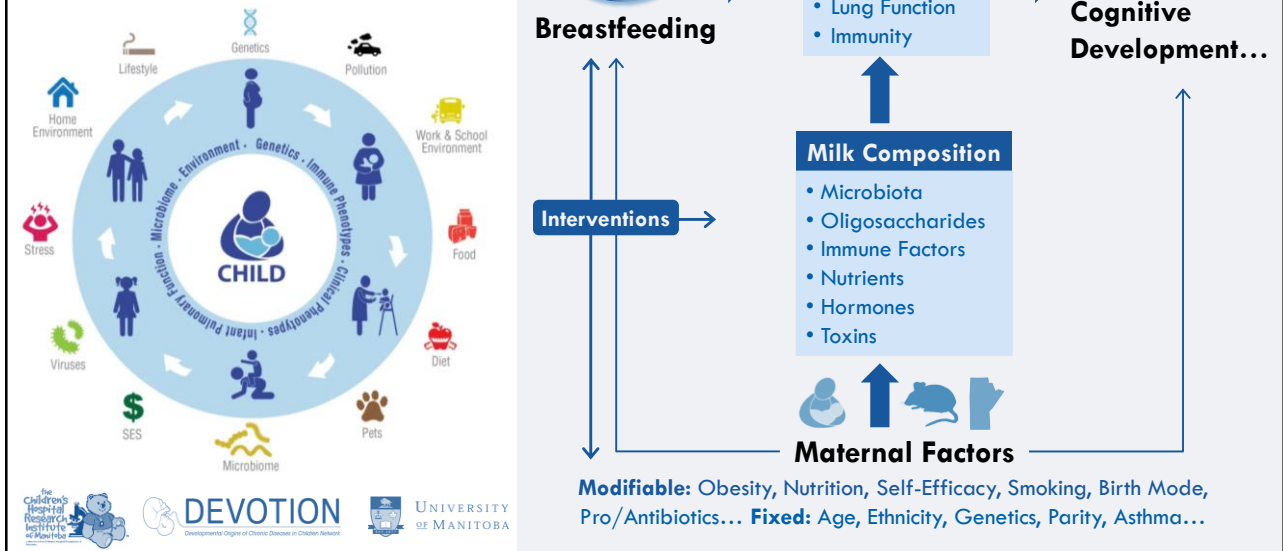
MB Azad,^{a,b} T Konya,^c RR Persaud,^d DS Guttman,^e RS Chari,^f CJ Field,^g MR Sears,^h PJ Mandhane,^a SE Turvey,ⁱ P Subbarao,^j AB Becker,^b JA Scott,^c AL Kozyrskyj,^a the CHILD Study Investigators[†]

Breastfeeding favours:
↑ *Bifidobacteria*, ↓ *Clostridium difficile*, ↓ ↑ Diversity...



Developmental Origins of CHILD HEALTH & Disease

Meghan Azad, PhD



Research Questions



1) **DOES** breastfeeding protect against asthma?

▣ *Optimal dose, duration...?*

2) **HOW** does breastfeeding protect against disease?

▣ *Milk bioactives? Epigenetics? Self regulation? Physical exercise? Psychosocial effects?*

3) Why do effects **VARY** between mothers? studies?

▣ *Variation in milk? Feeding modes? Definitions? Analyses?*

4) How can we **SUPPORT** mothers to achieve their breastfeeding goals?

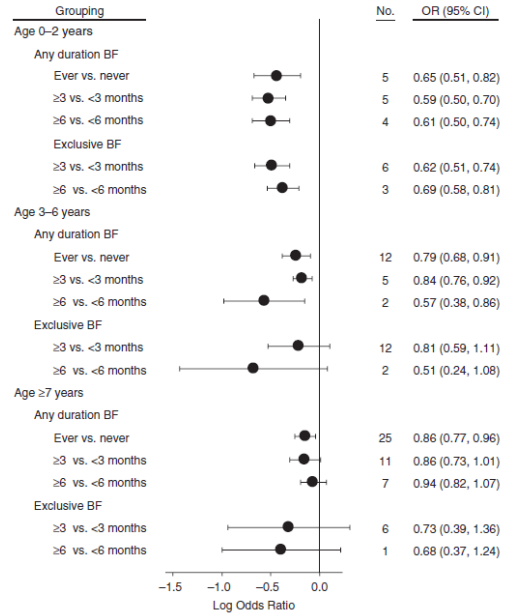
Breastfeeding & Asthma

~30% reduced risk of "asthma" before 6 years
117 Studies

Inconsistent Evidence

Limitations of previous studies:

- ▣ Defining breastfeeding
- ▣ Defining asthma
- ▣ High drop out rates
- ▣ Short follow up
- ▣ Confounding factors



(Dogaru et al. AJE 2013)

Child Nutrition 3 Months

1. Did you breastfeed your child for any duration (more than a few days) since birth? Yes No, go to 1.1

1.1 If yes, are you currently breastfeeding your child (whether or not feedings are supplemented)? Yes No, go to 2

2. When breastfeeding since birth, did you use a breast pump to express the milk? Yes No, go to Q4 N/A, go to Q4

3. On average, how many servings of breast milk expressed with a pump did the last two weeks? servings

4. If you are not currently breastfeeding, how old was your child when you started giving him/her any type of infant formula? weeks old

5. Are you currently giving your child any infant formula? Yes No, go to formula? weeks old

5.1 How old was your child when you started giving him/her any type of infant formula? weeks old

5.2 What brand of formula do you most regularly use?

6. If you are not currently giving your child formula, how old was s/he when you started giving him/her any type of infant formula? weeks old

Child Nutrition 3 Months

7. Are you giving your child any vitamins or supplements? Yes No, go to Q8

7.1 If Yes, which are given? (Check all that apply)

8. Are you currently giving your child regular cow's milk? Yes No, go to Q9

8.1 What type of cow's milk do you give your child? Pasteurized milk Unpasteurized milk

8.2 How much fat does this cow's milk contain? No fat (Skim) 1% fat 2% fat 3.25% fat (Homo) >10% fat (Cream)

9. Do you give your child any Soy milk (e.g., So Good, So Nice, SILK)? Yes No

10. Do you give your child any other type of milk? Yes No, go to Q11

10.1 If Yes, what type of other milk do you feed your child? Rice milk Almond milk Goat milk Other

10.2 If Other, specify: _____

11. Do you give your child any juices? Yes No

12. Since birth, how often did you feed your child with the following?

12.1 Glass bottle: Never Rarely Occasionally

12.2 Hard plastic bottle/sippy cup: Never Rarely Occasionally

12.3 Bottle with soft plastic bottle liner: Never Rarely Occasionally

12.4 Nursing with nipple shields: Never Rarely Occasionally

12.5 Other type of container: Never Rarely Occasionally

12.5a Specify type of Other container: _____

Child Nutrition 3 Months

13. Do you give your child any solid food? Yes No, go to Q15

14. Indicate which foods you have fed your child and at what age you INTRODUCED this food type to your child. (Check only one answer per line.)

14.1 Prepared baby food (commercial; ready-made): Not given < 1 month 1 - 2 months 3 months > 3 months

14.2 Prepared baby food (home-made): Not given < 1 month 1 - 2 months 3 months > 3 months

14.3 Infant cereals (e.g., rice, oats, barley): Not given < 1 month 1 - 2 months 3 months > 3 months

14.4 Probiotics (e.g., yogurt): Not given < 1 month 1 - 2 months 3 months > 3 months

14.5 Are you feeding your child any food not listed above? Yes No

14.5a If Yes, specify those other foods: _____

15. How often do you use plastic bowls/plates/cups for your child's food or drinks? Never Rarely Occasionally Regularly Always

16. How often do you feed your child with plastic utensils? Never Rarely Occasionally Regularly Always

17. What type of containers do you STORE your child's milk, formula, food or other drinks in? (Check all that apply.)

17.1 If Other, specify: _____

18. What container do you HEAT your child's milk, formula, food or other drinks in? (Select the material(s) of the container(s) that come in contact with the food/drinks as they are being heated. Check all that apply.)

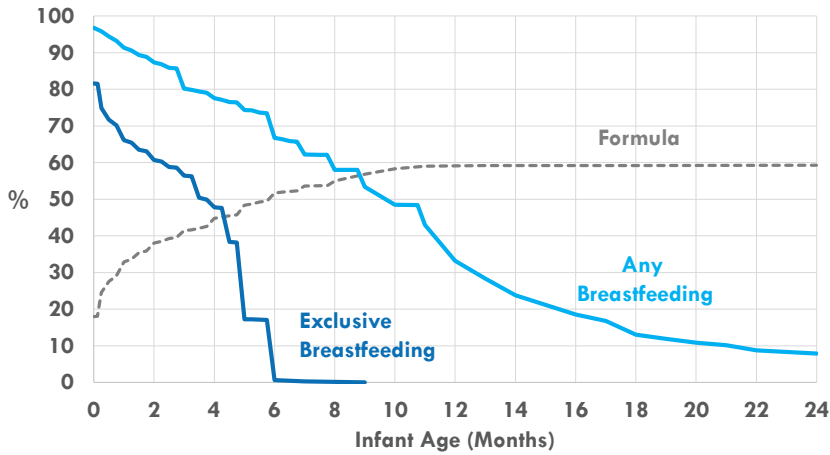
18.1 If Other, specify: _____

19. How did you complete this questionnaire? By myself With an interviewer

20. What is TODAY'S DATE? | Y | R | 2 | 0 | | M | | D | |

Birth, 3, 6, 12, 18, 24 Months

Breastfeeding in the CHILD Study



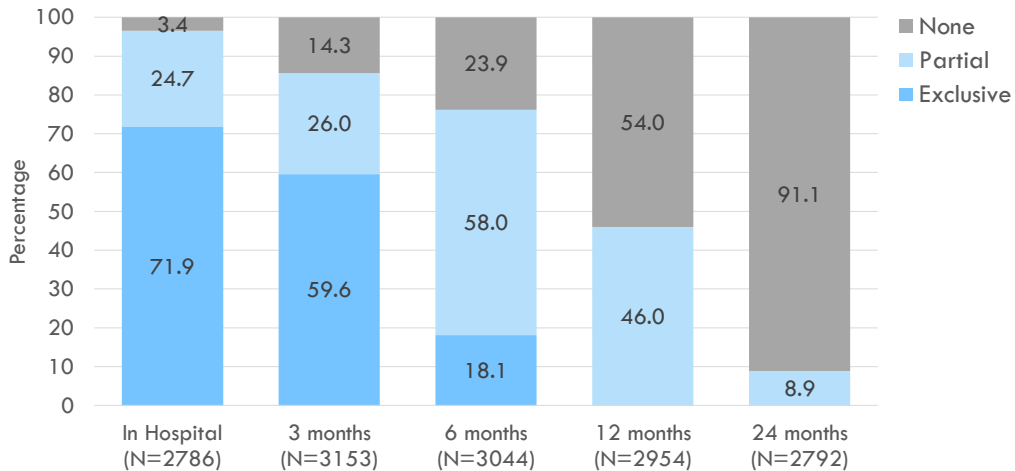
N=3139 (Formula), 3159 (Any BF), 3057 (Exclusive BF)



World Health Organization
 Recommends:
Exclusive BF to 6 mos
Continued BF to 2 yrs+

(Vehling, Azad et al. Unpublished)

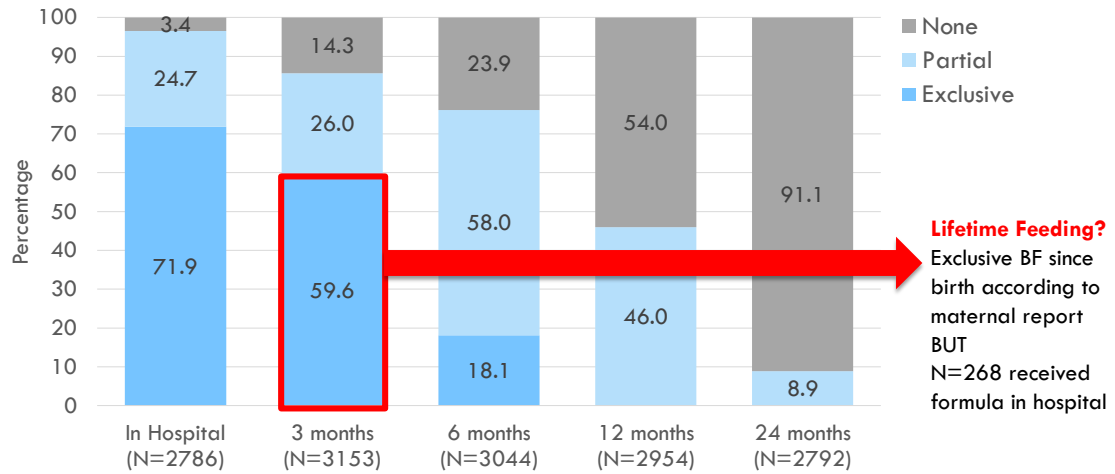
Breastfeeding in the CHILD Study



(Vehling, Azad et al. Unpublished)



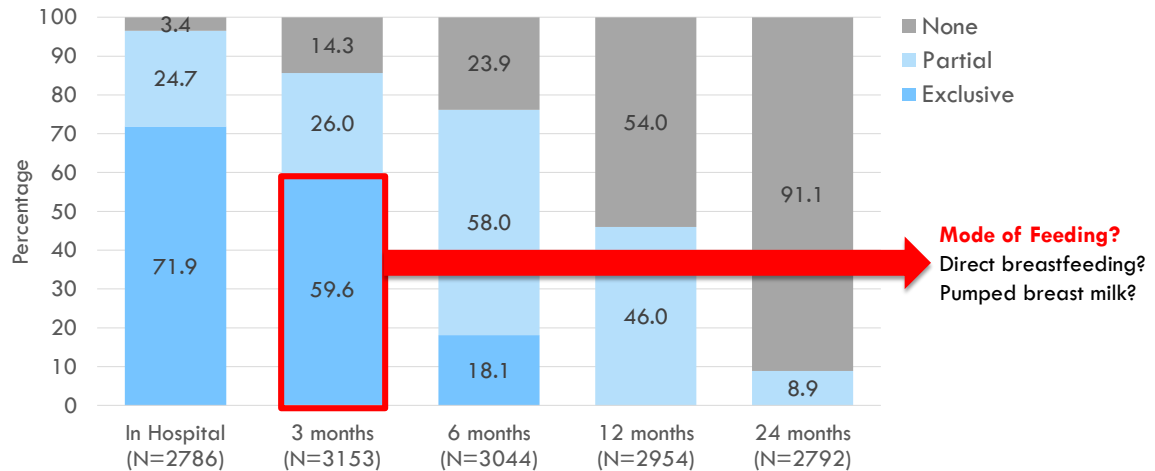
Breastfeeding in the CHILD Study



(Vehling, Azad et al. Unpublished)



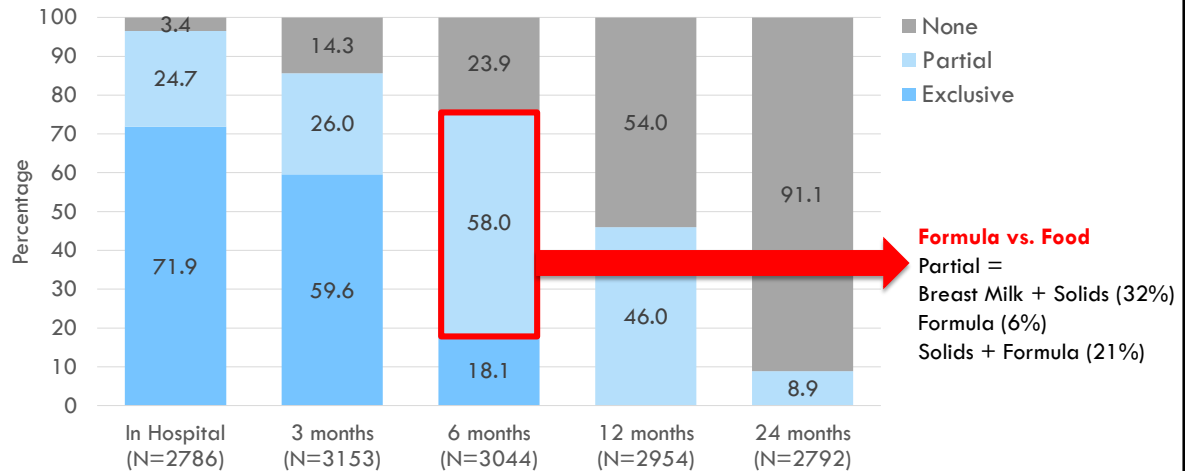
Breastfeeding in the CHILD Study



(Vehling, Azad et al. Unpublished)



Breastfeeding in the CHILD Study



(Vehling, Azad et al. Unpublished)

Eur Respir J 2017; 49: 1602019

Breastfeeding, maternal asthma and wheezing in the first year of life: a longitudinal birth cohort study

Meghan B. Azad^{1,2}, Lorena Vehling^{1,3}, Zihang Lu⁴, David Dai⁵, Padmaja Subbarao⁴, Allan B. Becker^{1,2}, Piuskumar J. Mandhane⁶, Stuart E. Turvey⁷, Diana L. Lefebvre⁵ and Malcolm R. Sears^{5,8} and the CHILD Study Investigators



N=2773 Canadian infants from the CHILD Study

- 21% of mothers had asthma
- 46% breastfed >12 months
- 21% of infants wheezed in 1st year

Less Breastfeeding & More Infant Wheezing:

- Smokers (mother or others in household)
- Lower maternal education
- Young mothers (<25 years)
- Lower gestational age (<37 weeks)



Analysis controlled for these confounders

Eur Respir J 2017; 49: 1602019

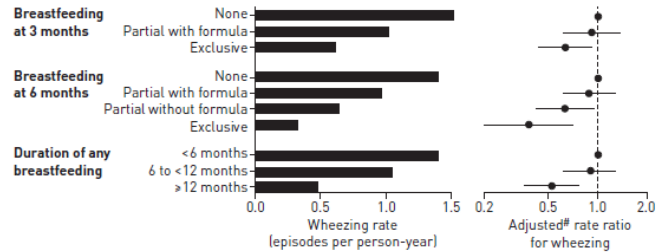
Breastfeeding, maternal asthma and wheezing in the first year of life: a longitudinal birth cohort study

Meghan B. Azad^{1,2}, Lorena Vehling^{1,3}, Zihang Lu⁴, David Dai⁵, Padmaja Subbarao⁴, Allan B. Becker^{1,2}, Piushkumar J. Mandhane⁶, Stuart E. Turvey⁷, Diana L. Lefebvre⁸ and Malcolm R. Sears^{5,8} and the CHILD Study Investigators

Among infants born to mothers with asthma, breastfeeding associated with **significantly reduced risk of infant wheezing**, after controlling for maternal smoking, education, age, etc.

DOSE EFFECTS: stronger association with longer / more exclusive breastfeeding:
 - **62%** reduced risk with 6 months exclusive BF
 - **37%** with partial BF (without formula)

a) Infants with maternal asthma (n=589)



b) Infants without maternal asthma (n=2184)

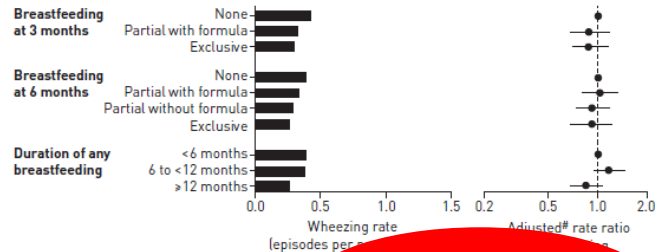


FIGURE 1 Breastfeeding and wheezing rates in the first year of life in the CHILD Study, for all infants born to mothers with (a) and without (b) maternal asthma (n=2184). Among infants born to mothers with asthma, wheezing rates were significantly lower with increasing breastfeeding exclusivity and duration. Adjusted rate ratios were also significantly lower with increasing breastfeeding exclusivity and duration, after controlling for maternal age, postsecondary education, ethnicity, smoking, and other factors.

Asthma?
Ages 3 & 5 years

Eur Respir J 2017; 49: 1700105

EDITORIAL
ASTHMA

Formula one: best is no formula

Andrew Bush^{1,2} and Anđan Custovic²

Affiliations: ¹Royal Brompton Hospital, London, UK. ²Imperial College, London, UK.

Correspondence: Andrew Bush, Dept of Paediatric Respiratory Medicine, Royal Brompton Harefield NHS Foundation Trust, Sydney Street, London SW3 6NP, UK. E-mail: a.bush@rbht.nhs.uk

“We are facing an **Armageddon** of COPD death...”

“The **public health implications** are stark.

The extent of use of formula feeds described in this study is nothing short of a **disgrace**.

Although it is clear that there are some women who cannot breast feed for the best of medical reasons... there is **no reason at all** why more than half these mothers did not breast feed for more than a year.

Women with asthma need to **understand the benefits to their child of avoiding formula**.

Would it be too radical to suggest formula milk should be made **prescription only** for children of asthmatic mothers? Perhaps, but something needs to be done; and that effectively and soon.”

Research Questions



1) **DOES** breastfeeding protect against asthma?

- *Optimal dose, duration...?*

2) **HOW** does breastfeeding protect against disease?

- **Milk bioactives?** *Epigenetics? Self regulation? **Physical exercise?** Psychosocial effects?*

3) Why do effects **VARY** between mothers? studies?

- *Variation in milk? Feeding modes? Definitions? Analyses?*

4) How can we **SUPPORT** mothers to achieve their breastfeeding goals?

Physical Exercise: Breast vs. Bottle

- ↓ Rate of swallowing, interruption of breathing
- ↑ Negative pressure (98 mmHg; 3x higher)
- ↑ Sucking exercise (8 min; 2x longer)
- ↑ Ventilator efforts
- ↑ Lung capacity

Mizuno et al. *Pediatr Res* 2006
 Miller et al. *Pediatr Res* 1995
 Goldfield et al. *Pediatr Res* 2006
 Koenig et al. *J Appl Physiol* 1990
 Ogbuanau et al. *Paediatrics* 2009





Breast milk supplies more than just nutrition for babies.

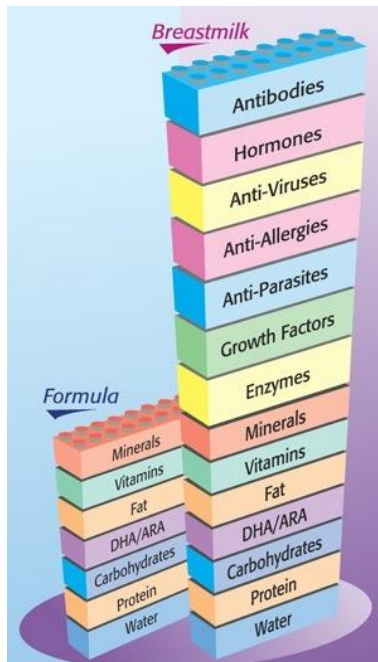
“Milk is really a genius fluid that was outrageously understudied. If we can identify components of human breast milk that are important, then we can understand the wisdom of milk—and take advantage of them.”

David Mills, UC Davis

Nature's first functional food
Breast milk feeds helpful microbes, fights harmful ones, provides immunity, and jump-starts a newborn's life

ing explored once again. So have focused on making bet microbiome fostered by milk have documented how hu more than feed a newborn's bacteria. Mother's milk als

SCIENCE 15 AUGUST 2014 • VOL 345 ISSUE 6198



DID YOU EVER WONDER WHAT'S IN... ?

BREASTMILK

MINERALS
Calcium
Copper
Iron
Magnesium
Phosphorus
Potassium
Sodium
Zinc

VITAMINS
Vitamin A
Vitamin B1
Vitamin B2
Vitamin B6
Vitamin B12
Vitamin C
Vitamin E
Vitamin K

PROBIOTICS
Lactobacillus
Bifidobacterium
Streptococcus
Enterococcus
Clostridium

ENZYMES
Lactase
Amylase
Lipase
Gastric acid

ANTIBODIES
IgA
IgG
IgM

HORMONES
Cortisol
Thyroxine
Insulin
Leptin
Adiponectin
Interleukin-6
Interleukin-10
Interleukin-17
Interleukin-22
Interleukin-26
Interleukin-27
Interleukin-28
Interleukin-29
Interleukin-30
Interleukin-31
Interleukin-32
Interleukin-33
Interleukin-34
Interleukin-35
Interleukin-36
Interleukin-37
Interleukin-38
Interleukin-39
Interleukin-40
Interleukin-41
Interleukin-42
Interleukin-43
Interleukin-44
Interleukin-45
Interleukin-46
Interleukin-47
Interleukin-48
Interleukin-49
Interleukin-50

FORMULA

MINERALS
Calcium
Copper
Iron
Magnesium
Phosphorus
Potassium
Sodium
Zinc

VITAMINS
Vitamin A
Vitamin B1
Vitamin B2
Vitamin B6
Vitamin B12
Vitamin C
Vitamin E
Vitamin K

PROBIOTICS
Lactobacillus
Bifidobacterium
Streptococcus
Enterococcus
Clostridium

ENZYMES
Lactase
Amylase
Lipase
Gastric acid

ANTIBODIES
IgA
IgG
IgM

HORMONES
Cortisol
Thyroxine
Insulin
Leptin
Adiponectin
Interleukin-6
Interleukin-10
Interleukin-17
Interleukin-22
Interleukin-26
Interleukin-27
Interleukin-28
Interleukin-29
Interleukin-30
Interleukin-31
Interleukin-32
Interleukin-33
Interleukin-34
Interleukin-35
Interleukin-36
Interleukin-37
Interleukin-38
Interleukin-39
Interleukin-40
Interleukin-41
Interleukin-42
Interleukin-43
Interleukin-44
Interleukin-45
Interleukin-46
Interleukin-47
Interleukin-48
Interleukin-49
Interleukin-50

PLUS:

Milk Bioactives

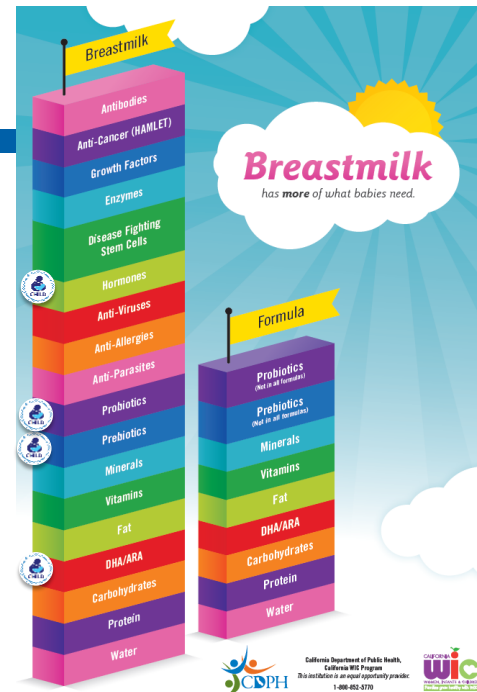


CHILD Breast Milk (N~2800):

- 1 sample per mother
- Mix of fore + hind milk, multiple feeds
- Median lactation = 16 weeks (IQR 14-19)

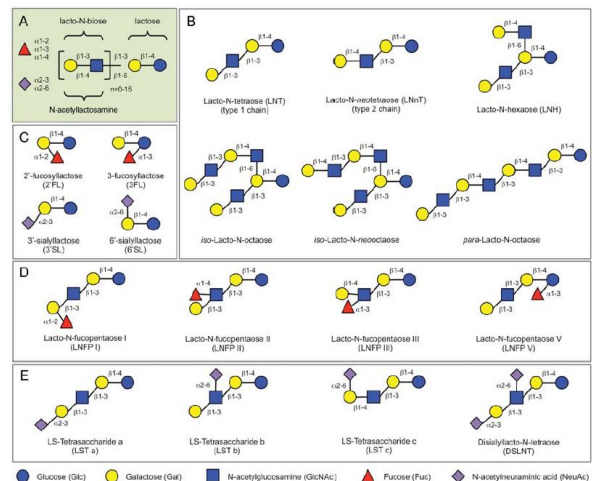
Representative Subset (N=430):

- **Fatty Acids** (C. Field, U. Alberta)
- **Endocrine Hormones** (C. Field, U. Alberta)
- **Microbiota** (E. Khafipour, U. Manitoba)
- **Oligosaccharides** (L. Bode, UC San Diego)
- **Wish list:** Toxins/Chemicals, Food antigens, Artificial Sweeteners, Cytokines...

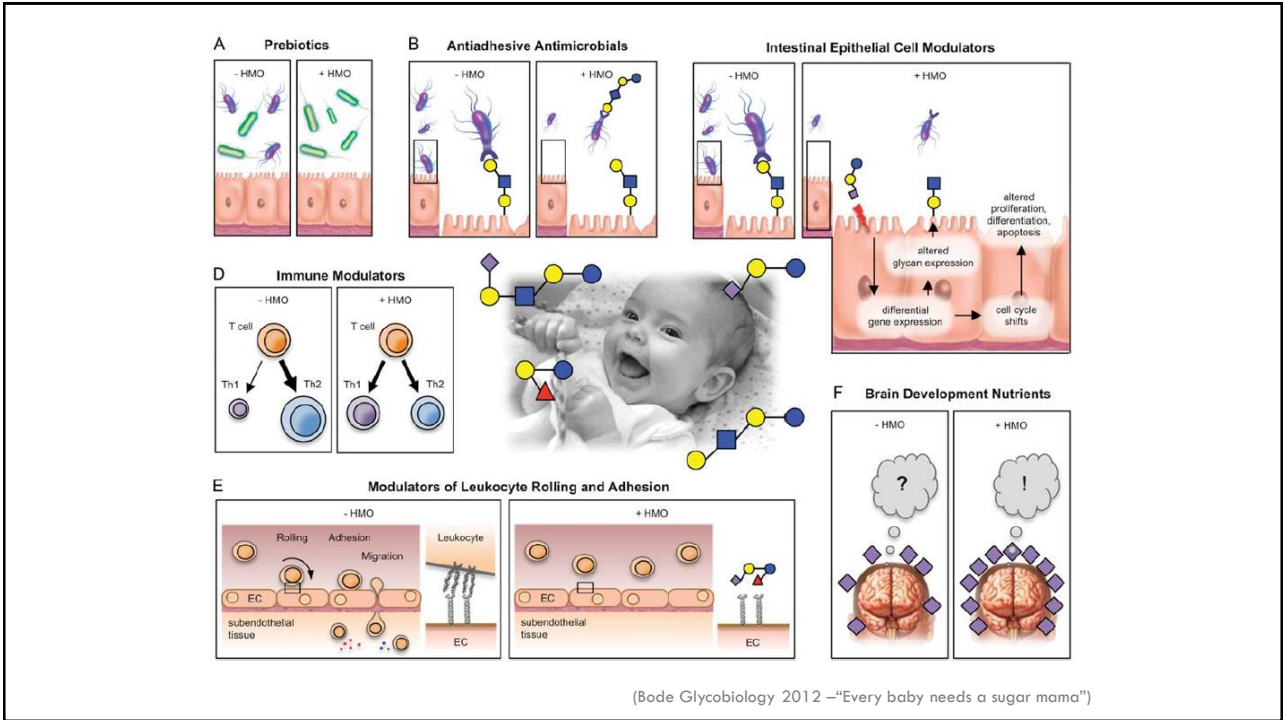


Human Milk Oligosaccharides (HMOs)

- Non-digestible carbohydrates
- Structurally diverse
Cows: ~40 vs. Humans: >100
- Highly variable between mothers
- Small studies (N<50):
 - Possible associations with HIV transmission, allergy, infant adiposity
 - Maternal determinants (besides genetics) **unknown**



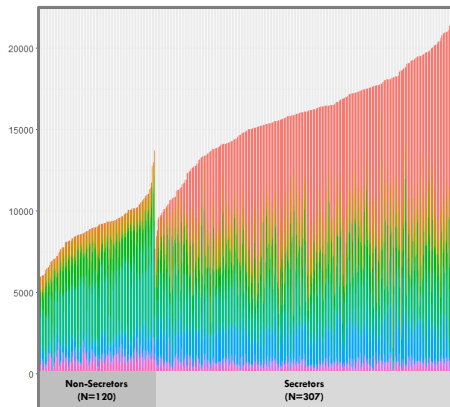
(Bode Glycobiology 2012 –“Every baby needs a sugar mama”)



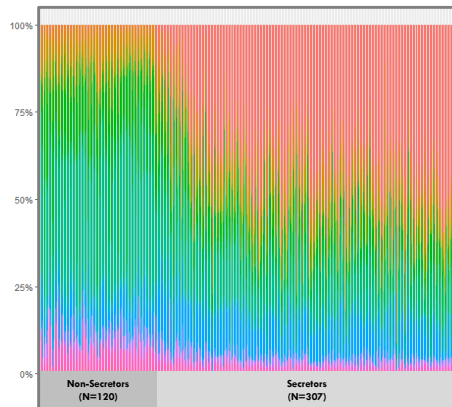
HMOs in the CHILD Cohort



Absolute HMO Concentration (nmol/mL)



Relative HMO Composition (%)

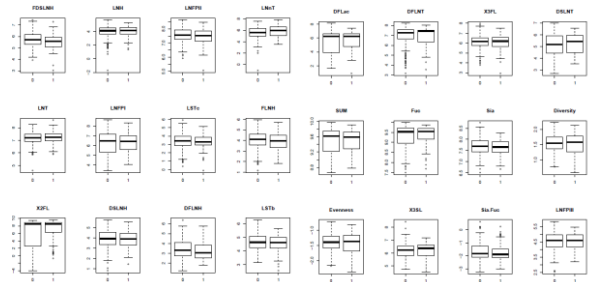
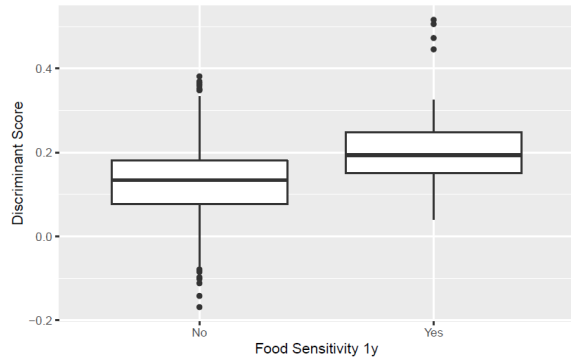


HMO:

- 2_FL
- 3FL
- LNT
- 3_SL
- DFLac
- 6_SL
- LNT
- LNFP_I
- LNFP_II
- LNFP_III
- LSTb
- LSTc
- DFLNT
- LNH
- DSLNT
- FLNH
- DFLNH
- FDSLNH
- DSLNH

(Azad, Bode, Robertson, et al. Unpublished)

HMOs & Allergy?



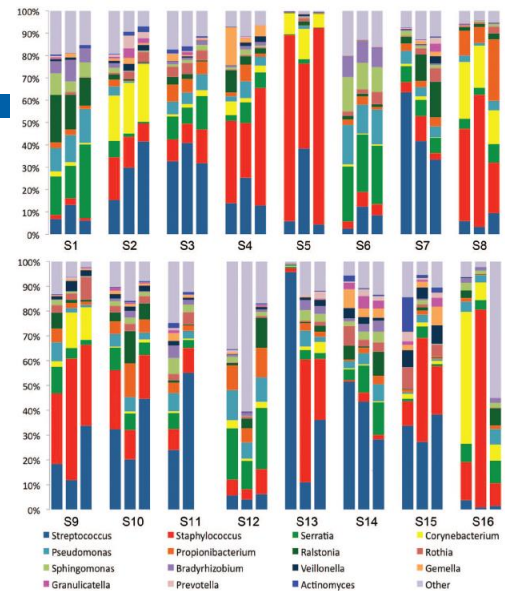
While no single HMO predicts food sensitization, the **overall HMO profile** is significantly associated with food sensitization.

N=430 dyads; 19 HMOs
Partial Least Squares Discriminant Analysis (PLS-DA) $P < 0.001$
(robust to leave-one-out cross validation)

(Azad, Sharma, Bode et al. Unpublished)

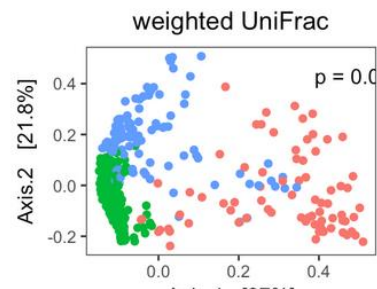
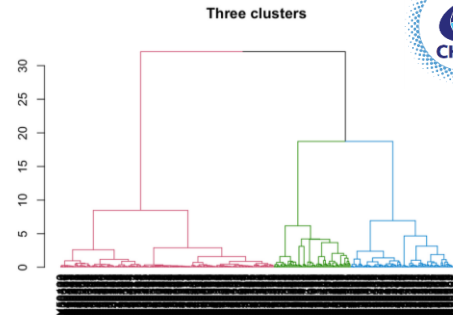
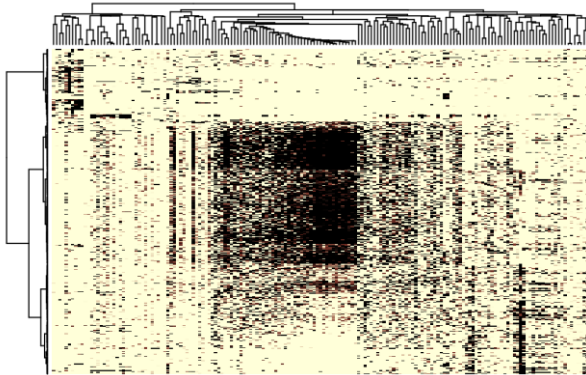
Milk Microbiota

- Human milk is not sterile!
 - ▣ Breastfed infants consume 10^5 – 10^7 bacteria daily.
- Source of gut microbiota
 - ▣ Many health effects...
- A few small studies (N < 30):
 - ▣ Variation by birth mode, obesity, time postpartum, gestational age, genetics, country... ???
 - ▣ **None** examined infant health



(Hunt et al. PLOS One 2011)

Milk Microbiota Clusters?



(Moossavi, Khatami, Zohari et al. Unpublished)

Research Questions

1) **DOES** breastfeeding protect against allergy, asthma, obesity...?

▣ *Optimal dose, duration...?*

2) **HOW** does breastfeeding protect against disease?

▣ *Milk bioactives? Epigenetics? Self regulation? Psychosocial effects?*

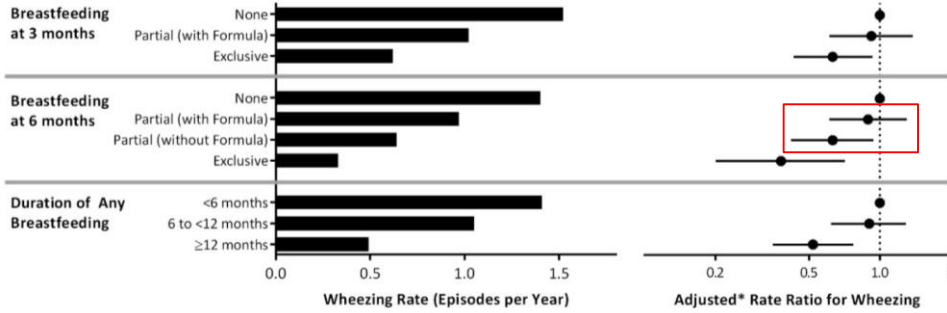
3) Why do effects **VARY** between mothers? studies?

▣ *Variation in Milk Composition? Feeding Modes? Definitions? Analyses?*

4) How can we **SUPPORT** mothers to achieve their breastfeeding goals?



Variation in “Breastfeeding” Definitions

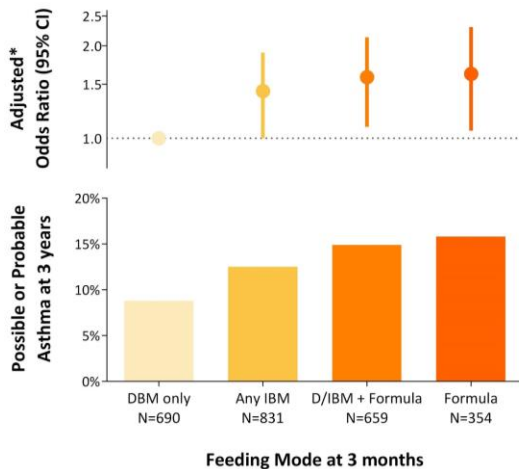


*Adjusted for maternal age, ethnicity, asthma, smoking during pregnancy, postsecondary education; and gestational age.

(Azad et al. *European Respiratory Journal*, 2017)



Variation in Mode of Breastmilk Feeding



DBM = Direct Breast Milk
 IBM = Indirect (pumped) Breast Milk

Compared to direct breastfeeding, **any other mode of infant feeding** was associated with an **increased risk** of possible or probable asthma by 3 years of age.

- Bioactivity of milk?
- Physical lung exercise?
- Skin-to-skin contact?
- Infant → Mother signalling?
- Toxins from plastic bottles?

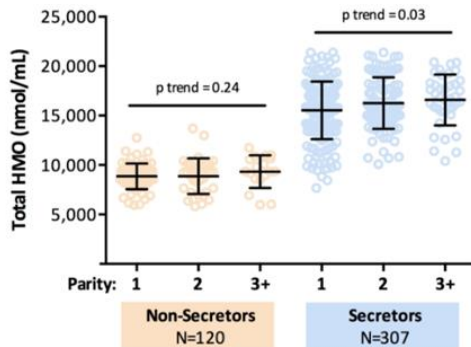
*Adjusted for infant sex, maternal diagnosis of asthma, ethnicity, method of birth, daycare attendance, gestational age and solid food introduction; with multiple imputation of missing data.

(Klopp et al. submitted)

Variation in Milk Oligosaccharides, Fatty Acids...

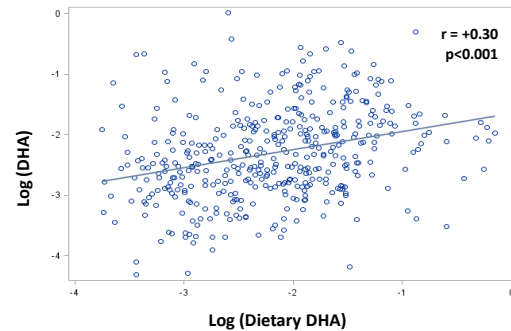


Total HMOs & Parity



(Azad, Robertson, Bode et al. Unpublished)

Maternal DHA Intake & Milk DHA



(Azad, Sinnock et al. Unpublished)

Research Questions



1) **DOES** breastfeeding protect against asthma...?

▣ Optimal dose, duration...?

2) **HOW** does breastfeeding protect against disease?

▣ Milk bioactives? Epigenetics? Self regulation? Physical exercise? Psychosocial effects?

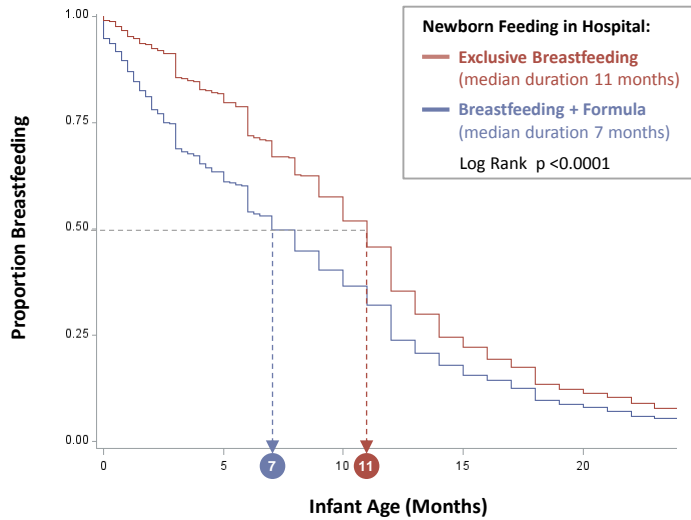
3) Why do effects **VARY** between mothers? studies?

▣ Variation in Milk Composition? Feeding Modes? Definitions? Analyses?

4) How can we **SUPPORT** mothers to achieve their breastfeeding goals?



Supporting Breastfeeding



Compared to newborns who received formula supplementation, those who were exclusively breastfed in hospital had a **21% reduced risk** of breastfeeding cessation over time. (HR 0.79; 95%CI: 0.72-0.88)

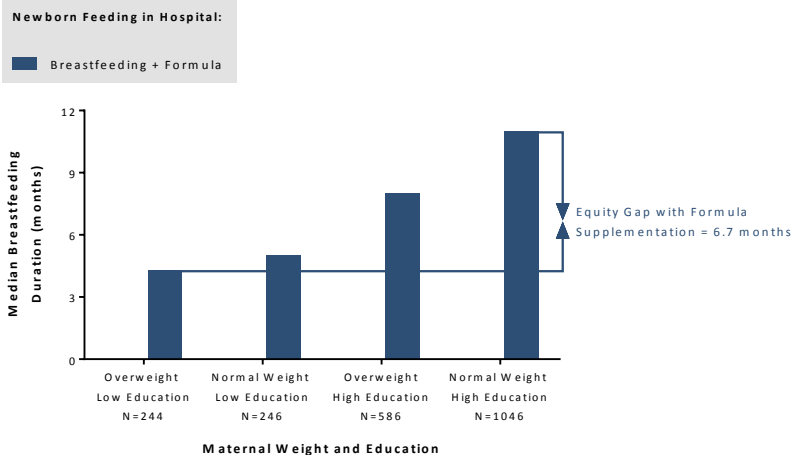


(Vehling et al. Submitted)



Newborn Feeding & Breastfeeding (in)Equity

(Vehling, Azad et al. Submitted)

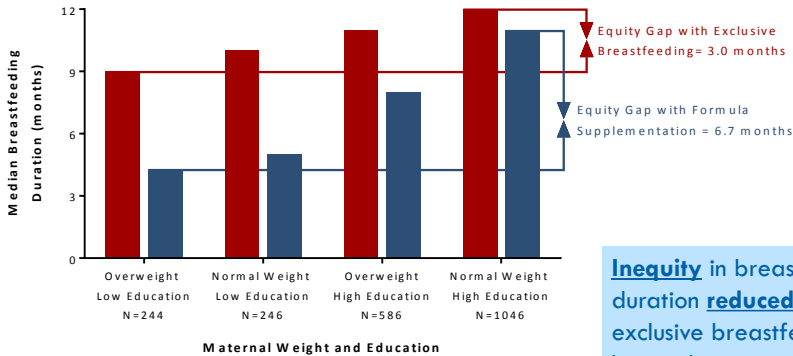




Newborn Feeding & Breastfeeding (in)Equity

(Vehling, Azad et al. Submitted)

Newborn Feeding in Hospital:
 ■ Exclusive Breastfeeding
 ■ Breastfeeding + Formula

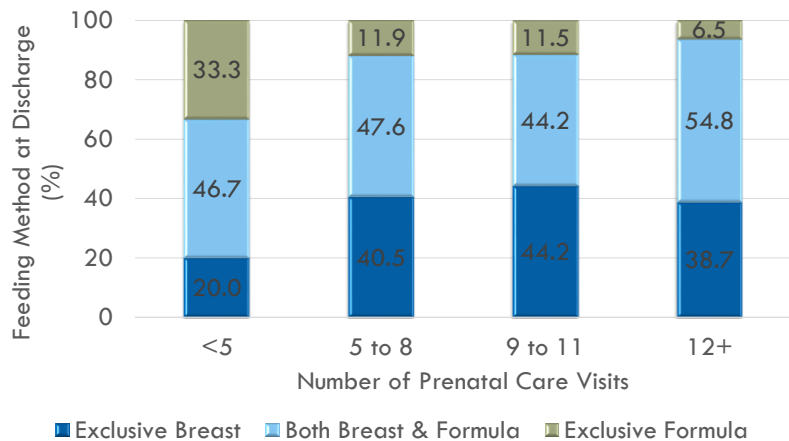


Inequity in breastfeeding duration **reduced by 55%** with exclusive breastfeeding in hospital.

Prenatal Care & Newborn Feeding

Chart review:
 N=147 mother-infant dyads at HSC Winnipeg

Lower breastfeeding rates among women attending <5 prenatal care visits

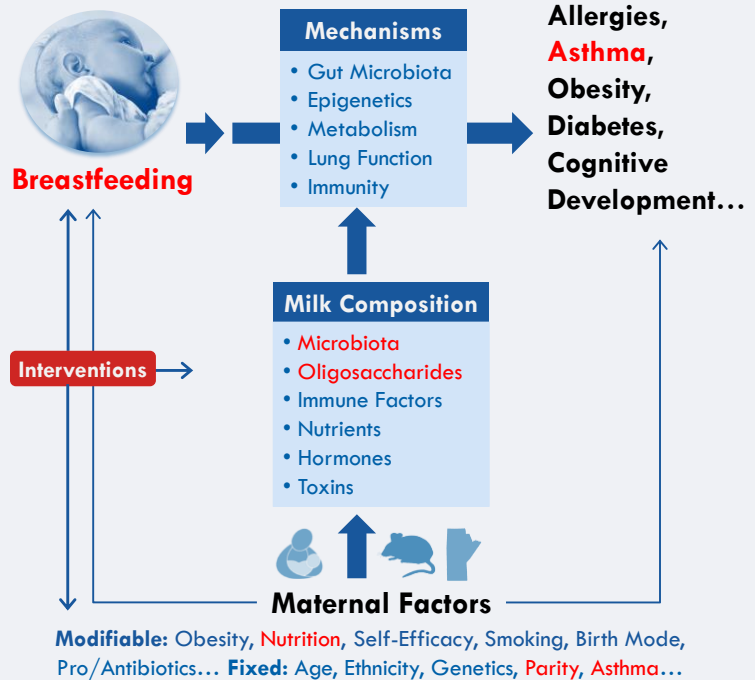


Any Breastfeeding: P-trend = 0.036*
 Any Formula Feeding: P-trend = 0.340

(Coneys, Azad et al. Unpublished)

Developmental Origins of CHILD HEALTH & Disease

Meghan Azad, PhD



Objectives

- Review previous research on the association of **breastfeeding and asthma** development
 - *Protective. Limitations addressed by CHILD study.*
- Understand how breastfeeding **mode, duration, and exclusivity** modify the health effects of breastfeeding
 - *Dose effects. Mode matters. Formula (not food) diminishes benefits.*
- Identify **bioactive components** of human milk and describe their potential role in asthma development.
 - *Nutrients, microbiota, oligosaccharides... Highly variable. Fixed & modifiable factors.*
- Discuss opportunities for **healthcare providers** to support breastfeeding
 - *Prenatal (community) and early postpartum (hospital)*



GOT BREASTMILK?

My mommy makes milk. What's your superpower?

someecards
user card



New Project!



“Breastfeeding is the responsibility of a **society**, not an individual woman.”

– Cesar Victora, Gairdner Laureate



<https://www.unicef.org.uk/babyfriendly/baby-friendly-resources/video/call-to-action-video/>

Breastfeeding Education in Manitoba Schools

A Breastfeeding Information and Activity Kit for Secondary School Teachers



OPHA Breastfeeding Promotion Workgroup

OPHA
Ontario Public Health Association

May 2009

ALABAMA PUBLIC HEALTH

A-Z Index | News/Media | County Health Departments | Certificates, Licenses & Permits | Laws/Regulations | Contact Us

Search keyword... Go

ADPH Home | Download Adobe Reader

SHARE

ADPH Home
Perinatal Home
News and Events
Safe Sleep
Safe Sleep Outreach
Breastfeeding
Educational Resources
Infant Mortality
text4baby
FIMR
Preparing for Disaster
Disaster Preparedness Kit
Physician Information
Regions and Coordinators
RPAC Members
SPAC Members
Partners
Annual Progress Report
Related Links



Mother's Milk Education Package for Grades K-12

This program was adapted from a program developed by the New York Department of Health using a grant from the United States Public Health Service Bureau of Maternal and Infant Health. The guide contains information relevant to the entire K-12 age span as well as activities for each level. It is intended to help students develop a well informed attitude toward breastfeeding while studying other content areas. The lessons are presented in an appealing, easy to use format.

- [Level K](#)
- [Level 1](#)
- [Level 2](#)
- [Level 3](#)
- [Level 4](#)
- [Level 5](#)
- [Level 6](#)
- [Levels 7-8](#)
- [Levels 9-12](#)

Ideas?

meghan.azad@umanitoba.ca

Acknowledgements



www.azadlab.ca @MeghanAzad

Azad Lab

Faisal Atakora, Jana Slaughter, Lorena Vehling,
Michelle La, Kozeta Miliku, Deborah Chan,
Hasantha Sinnock, Annika Klopp, Olivia Coneys

CHILD Study

Manitoba: Allan Becker, Rishma Chooniedass & Team
National: Malcolm Sears, Diana Lefebvre (McMaster) & Team

Collaborators

Atul Sharma, George & Fay Yee Centre for Healthcare Innovation
Ehsan Khafipour, Shirin Moosavi (U. Manitoba)
Catherine Field, Sue Goruck (U. Alberta)
Lars Bode, Bianca Robertson (U. California San Diego)
Nathan Nickel (Manitoba Centre for Health Policy / U. Manitoba)



Questions?