

TORONTO PUBLIC HEALTH

Infant Feeding Surveillance Project



Technical Report

January 12, 2018

416.338.7600 | toronto.ca/health

 **TORONTO** Public Health

Table of Contents

Executive Summary.....	3
Introduction	3
Methodology.....	3
Results.....	3
Discussion.....	3
Introduction	5
Methodology.....	5
Sampling Frame and Eligibility	5
Sample Size and Sampling.....	6
Survey Instrument.....	6
Interviewer Training.....	7
Data Collection.....	7
Confidentiality and Storage	8
Data Analysis.....	8
Data on Feeding at Entry to Service.....	9
Results.....	9
Survey Participation	9
Survey Sample Characteristics	10
Survey Representativeness	12
Breastfeeding Initiation	12
Feeding at Entry to Service	12
Breastfeeding Duration.....	13
Discussion and Implications.....	16
Feeding at Entry to Service	16
Breastfeeding Duration.....	17
Socio-demographic and Birth History Stratification	17
Study Strengths, Limitations, and Lessons Learned.....	19
Strengths	19
Limitations.....	19
Lessons Learned	20
Recommendations	20

Final Thoughts.....	21
PHN Interviewers	21
IFSP Workgroup	22
References	23
Appendix A: Questionnaire	24
Appendix B: Introductory Letter	32
Appendix C: Comparison of Survey Respondents to Live Births in 2016, Toronto	33
Appendix D: Comparison of Respondents to Non-Respondents, Toronto, 2016	33

Executive Summary

Introduction

Toronto Public Health (TPH) is committed to the protection, promotion, and support of breastfeeding and informed decision making related to infant feeding. TPH demonstrates this commitment through the programs and services that it offers and through its maintenance of Baby Friendly Initiative (BFI) designation. TPH first achieved BFI designation in 2013 and is committed to re-designation in 2018. One component of the re-assessment process for the BFI designation is the collection of infant feeding data.

Methodology

In 2017, TPH conducted a retrospective cross-sectional telephone survey to collect data about how Toronto infants were fed during the first six months of their lives. The purpose of the Infant Feeding Surveillance Project (IFSP) was to: fulfill requirements for BFI re-designation; inform future infant feeding monitoring and surveillance projects; and guide service delivery and program planning.

Analysis focused on descriptive statistics for the following core breastfeeding indicators: **breastfeeding initiation**, where the mother reported providing or attempting to provide breast milk to their baby at least once; **any breastfeeding**, where the baby was receiving breast milk at a given time point, either exclusively or in addition to other liquids or solid foods; and, **exclusive breastfeeding**, where the baby was receiving only breast milk and had never been fed any liquid or food other than breast milk.

Rates of breastfeeding at entry to service were calculated using data from the Better Outcomes Registry & Network (BORN) Information System, a provincial registry of pregnancies and births in Ontario.

Results

The majority of mothers in the study reported having fed or attempted to feed their infant breast milk; the breastfeeding initiation rate was 97.9%.

According to BORN data, 95.1% of Toronto infants were receiving any breast milk and 59.7% were exclusively breastfeeding at entry to service.

The IFSP survey found that, at two months of age, 88.1% of babies were receiving any breast milk, 34.5% were exclusively breastfeeding. At four months of age, 79.9% of babies were receiving any breast milk, 28.2% were exclusively breastfeeding. At six months of age, 75.2% of babies were still receiving any breast milk. The exclusive breastfeeding rate at six months was 13.7^a%.

Discussion

Breastfeeding initiation and any breastfeeding rates were relatively high, while exclusive breastfeeding rates were significantly lower. Though the breastfeeding rates in Toronto were comparable to other health units, there is opportunity to increase breastfeeding duration rates, specifically exclusive breastfeeding.

Differences in breastfeeding rates were observed when data was stratified by maternal sociodemographic characteristics. Babies were less likely to exclusively breastfeed at various time points if their mother was a first-time mother, was single, had a lower household income, did not have a post-secondary degree or diploma, or was born outside of Canada. Similarly, any breastfeeding rates were lower where mothers were single, had a lower household income, or did not have a post-secondary degree or diploma; however, no difference was seen in the any breastfeeding rate by immigrant status

^a The 5.5 month time point was used for reporting the exclusive breastfeeding rate at six months.

or parity. TPH has a number of programs and services in place to reach these priority populations and is committed to continuing this work.

The Infant Feeding Surveillance Project provided valuable information to support TPH's journey to BFI re-designation, guide TPH program planning and service delivery, and inform future infant feeding surveillance efforts.

Introduction

With over 30,000 births to Toronto residents in 2016, Toronto Public Health (TPH) recognizes that successful breastfeeding practices are an integral part of child growth and development and has created breastfeeding programs and services to fulfill the Ontario Public Health Standards (OPHS) mandate (1). The OPHS direct Public Health Units (PHUs) to form partnerships within their communities and collaboratively work towards increasing the rate of exclusive breastfeeding until six months, with continued breastfeeding until 24 months and beyond (2). TPH's breastfeeding programs and services consider the impact of the determinants of health and identify and work with local priority populations on the achievement of intended health outcomes.

TPH has demonstrated an organizational commitment to the protection, promotion and support of breastfeeding and informed decision making related to infant feeding, and remains dedicated to maintaining Baby Friendly Initiative (BFI) designation. The BFI is an international program initiated by the World Health Organization (WHO) and The United Nations Children's Fund (UNICEF) that sets the standards that hospitals and community health services must meet to protect, promote, and support breastfeeding. TPH first achieved BFI designation in 2013 and is committed to re-designation in 2018.

An important component of BFI re-designation is infant feeding data collection in the year prior. TPH has recently completed the Infant Feeding Surveillance Project (IFSP) to gather breastfeeding duration and exclusivity data. The purpose of the IFSP was to: fulfill requirements for BFI re-designation; inform future infant feeding monitoring and surveillance projects; and guide service delivery and program planning. The following report documents the IFSP.

Methodology

The IFSP was a retrospective cross-sectional telephone survey of mothers at approximately six months postpartum. The survey was implemented in two phases: Phase 1, in October 2016, to pretest the questionnaire and the web-based data collection system (BFI Online), and Phase 2, in spring 2017, to collect infant feeding data from a random sample of eligible mothers in Toronto.

Sampling Frame and Eligibility

The Healthy Babies Healthy Children (HBHC) Integrated Services for Children Information System (ISCIS) provided the sampling frame for the IFSP. Potentially eligible mothers were identified through the HBHC Screens captured in ISCIS. The HBHC Screen is a mandatory component of the HBHC Program that screens (with consent) all families for risk factors associated with child development or parenting. Using ISCIS as the sampling frame offered two advantages: (1) the database captures over 80% of the births to Toronto women, and (2) the client records in this database already include some of the key information related to birth outcomes (e.g., parity, birth weight) allowing these questions to be eliminated from the survey.

Mothers were selected for inclusion in the sampling frame if they were Toronto residents, gave birth at a Toronto birthing hospital between July 1st and November 30th 2016, and had consented to sharing their HBHC Screen with TPH. Table 1 presents the exclusion criteria applied to the sampling frame and the rationale for exclusion. To accommodate lag time in entering the HBHC Screens into ISCIS, the sampling frame was compiled once a month for each monthly birth cohort (e.g., the sampling frame for July births was compiled in November 2016, and August births in December).

Table 1. IFSP Sample Exclusion Criteria and Rationale for Exclusion

Exclusion Criteria	Rationale
<ul style="list-style-type: none"> Babies that were apprehended by child protective services Babies born to a surrogate mother or adopted 	Infant feeding decision for these babies would be influenced by their living arrangement and their biological mother would not know how these babies were fed in the first six months of their lives.
<ul style="list-style-type: none"> Stillborn babies / neonatal loss 	It would be inappropriate to conduct the survey with these parents.
<ul style="list-style-type: none"> Babies born outside of Toronto, at home, or at the Toronto Birthing Centre 	Exclusion is due to technical limitation with data extraction from ISCIS. A small number of babies are expected to fall under this category.
<ul style="list-style-type: none"> Babies whose HBHC Screen was missing a telephone number or had an incomplete telephone number 	Inability to reach these families by telephone.

Eligibility for survey participation was confirmed by Public Health Nurse (PHN) interviewers at time of telephone contact. Mothers were eligible if they were living with their baby in Toronto at the time of survey administration. If the baby was hospitalized or a neonatal loss was reported at time of contact, the mother was deemed ineligible.

Sample Size and Sampling

A minimum sample size of 1,074 eligible and consenting mothers was determined necessary to provide reliable estimates for the required breastfeeding indicators. The sample size calculation assumed an expected frequency of 7% for the indicator *exclusive breastfeeding at 6 months*, a precision of 1.5%, a confidence level of 95%, and a design effect of 1. Assuming a survey response rate of 41%, it was determined that approximately 2,620 potentially eligible mothers would need to be contacted to yield the minimum sample size. Both the expected frequency and survey response rate were based on results from a similar telephone survey project titled *Feeding Your Baby Study* conducted by TPH in 2012.

Systematic random sampling was applied to select approximately 524 potentially eligible mothers from the sampling frame each month in November 2016 (for babies born in July 2016) through March 2017 (for babies born in November 2016). To ensure a representative distribution by maternal age and geography, the sampling frame was sorted in order by mother's age at delivery (first order) and residential postal code (second order) before sampling. Sample selection was performed in IBM SPSS Statistics version 23. The survey sample was then imported into BFI Online to establish the call list for data collection.

Survey Instrument

The 26-item telephone survey was adapted from the retrospective 6-month single time point questionnaire developed by the Locally Driven Collaborative Project (LDCP) Breastfeeding Surveillance Team (3).

The questionnaire ([Appendix A](#)) was comprised of three sections:

- administrative questions to verify participant eligibility and birth outcomes (e.g., baby's date of birth, parity)
- core questions about infant feeding practices (e.g., initiation of breastfeeding, introduction of solids and other liquids)

- questions about the mother's socio-demographic characteristics (e.g., years lived in Canada, education, and marital status)

The final version of the English questionnaire was translated into traditional Chinese. Both versions of the questionnaire were programmed into BFI Online to be administered by PHN interviewers over telephone. Quality assurance was conducted to ensure that skip patterns were set up correctly, there were no spelling or grammatical errors, the questionnaire displayed correctly in Chinese, and all survey variables exported in a way that was conducive to data analysis.

Interviewer Training

A team of seven PHNs were recruited to conduct telephone interviews for the IFSP. PHN interviewers received one full-day training in October 2016, before the start of Phase 1 of the project. Key elements of the training were: the study's objectives and methods, project team and PHN roles and responsibilities, scheduling/signing up for call slots, and the use of BFI Online for call list management and survey completion. A refresher training video was created to review key features of BFI Online; PHN interviewers were asked to review the video before the start of full-scale data collection in January 2017. To support the day-to-day work of data collection, a BFI Online manual and a PHN Interviewer Training Guideline were distributed to PHN interviewers for quick reference.

Data Collection

The survey was pilot tested with a sample of 32 eligible and consenting mothers in October 2016 (Phase 1 of the project). Minor revisions were made to the survey instrument, primarily to enhance clarity and logical flow. Data from the pilot were excluded from the final analysis.

The revised survey was implemented for Phase 2 of the project. Data collection began on January 9, 2017 with a projected completion date of June 30, 2017.

An introductory letter ([Appendix B](#)) was sent to mothers in the survey sample approximately one to three weeks before the first telephone call attempt. The letter briefly explained the purpose of the survey, what to expect during the call, and the importance of participation. Mothers who indicated on the HBHC Screen that they preferred to receive service in one of the six most common non-English languages received the letter in both English and their preferred language. The letter was translated into the following six languages: Arabic, Chinese (simplified), Spanish (Latin American), Tamil, Urdu, and Vietnamese.

PHN interviewers attempted to contact the sample of potentially eligible mothers when their babies turned six months old; a maximum of six call attempts were made. Consent for survey participation was obtained and eligibility was confirmed at time of telephone contact. For mothers who gave birth to multiples, one survey was completed for each baby as per recommendations from the Breastfeeding Committee for Canada (BCC), the national authority for BFI designation in Canada, as babies may have different feeding histories.

Survey responses were entered in real-time into BFI Online by PHN interviewers. BFI Online is a commercial web-based service developed by Ericsson Analytics (Ericsson Analytics, North Bay, Ontario, www.bfi-online.ca) to support client list management and data collection for infant feeding surveillance.

Interpretation service was offered to participants who preferred to complete the survey in a non-English language. One PHN interviewer was fluent in both Mandarin and Cantonese, and was able to administer the Chinese version of the survey in these two languages when requested by participants.

Confidentiality and Storage

At all points during active data collection for the IFSP, survey data were stored centrally and securely with a local third party hosting service contracted by Ericsson Analytics to host BFI Online. Data were transferred between BFI Online and the third party hosting service using 256-bit SSL secure connection. PHN interviewers had independent, password protected user accounts to access BFI Online.

All data exported from BFI Online were stored centrally on an encrypted drive located on TPH's computer network. This drive was only accessible to a limited number of authorized users. Upon completion of data collection, all data were removed from BFI Online. Following data analysis and reporting, data were anonymized and all identifying data were deleted from TPH's computer network.

Data Analysis

There were two sets of data exported from BFI Online: call log data, which provided information about contact history (e.g., date of contact and outcome), and survey response data. These data were exported every two weeks and analyzed by members on the project team to monitor data collection progress.

Upon completing data collection, the final datasets were exported from BFI Online. Data cleaning and analysis was conducted by the Data Analyst and Epidemiologist on the project team using IBM SPSS Statistics version 23, SAS version 9.3, and StataMP 15. Data were analyzed separately by these two individuals and results were checked against one another for quality assurance purposes.

The socio-demographic makeup of the survey respondents were descriptively analyzed. Data were extracted from the BORN information system to compare the survey respondents to mothers giving birth in 2016 overall. Non-respondents were compared to respondents using chi-square tests and t-tests for some key demographic information.

Observations with missing information were excluded from the denominator throughout the analysis, except where more than five percent had missing information. Where more than five percent were missing information, these records were included in the denominator and a missing category is included.

Analysis focused on descriptive statistics for the following core breastfeeding indicators^b:

- **Breastfeeding Initiation Rate** is the proportion of babies who attempted to, or did receive, any amount of human milk at any point following birth, even if only for a short time.
- **Any Breastfeeding Rate** is the proportion of babies at a certain time point who were receiving human milk with or without other liquids or solid foods. Any breastfeeding includes both exclusive and non-exclusive breastfeeding.
- **Exclusive Breastfeeding Rate** is the proportion of babies at a certain time point who were receiving human milk and had never received formula or other liquids^c, and had not been introduced to solid foods. If the infant was fed any human milk substitute, solid, or other liquid at any previous time point, they would not be categorized as exclusively breastfeeding regardless if they were no longer receiving complementary foods at the time of the telephone call.

^b Core indicator definitions come from the Infant Feeding Surveillance Knowledge Translation Project (4)

^c Other liquids do not include oral rehydration solutions, vitamins, medicines, or minerals.

Any and exclusive breastfeeding rates were calculated for two, four, and six months postpartum. The five and a half month time point was used for reporting the exclusive breastfeeding rate at six months as per a consult with the BCC and direction from the LDCP Knowledge Translation Project (4).

Indicators were reported for Toronto overall and stratified by sociodemographic and birth history characteristics to enhance understanding of disparities in infant feeding practices. Significant differences were evaluated using overlapping 95% confidence intervals (95% CI). Although this method is conservative ($\alpha < 0.01$) and most appropriate when comparing mutually exclusive groups, it was chosen as an objective means of making conclusions on population-based data. Multiple comparisons performed in the analysis were not adjusted for when choosing the level of significance to test.

The following three rules were used to determine if survey stratification data were of a high enough quality to release: a minimum size of 30 for the denominator, a minimum size of five for the numerator, and coefficient of variance (CV), an estimate of survey variability, of 25 or less. The CV requirement applied to both the estimate and the complement estimate. Where an estimate did not meet one of these requirements, the data were suppressed.

Data on Feeding at Entry to Service

Feeding at entry to service is what an infant is being fed when they leave hospital or midwife practice group and enter public health or community service. Any and exclusive breastfeeding rates at entry to service were calculated using data from the Better Outcomes Registry & Network (BORN) Information System, a provincial registry of pregnancies and births in Ontario.

BORN contains birth data from midwife practice groups in addition to hospital births. The same exclusion criteria were not applied when calculating the entry to service rates as were applied to the survey sample. Due to limitations of the *feeding at discharge* variable in BORN and upon guidance from the Association of Public Health Epidemiologists in Ontario, the *feeding at hospital or MPG* variable was used (5). Feeding data for the 2016 calendar year were extracted on July 21, 2017 for live births to mothers residing in Toronto.

All infants with missing feeding information were excluded from the analysis of feeding at entry to service. BORN is missing feeding information for two hospital NICUs within Toronto. Therefore, breastfeeding rates at entry to service may be over-estimated as there is higher proportion of missing feeding information for infants who are born preterm, have low birth weight, and for multiple births.

Data on feeding at entry to service was stratified by certain socio-demographic and birth history characteristics. Where greater than 30% of observations in a group had missing feeding information, data were suppressed according to BORN reporting guidelines. This was the case for multiple births, babies who were admitted to the NICU, low birth weight babies, and preterm babies.

Results

Survey Participation

The survey response rate was higher than expected and the target sample size was reached ahead of schedule. Therefore, data collection ended on May 5 instead of the projected date of June 30th.

Potentially eligible mothers who gave birth in November 2016 were not contacted for the survey and their data was never imported into BFI online even though the sample was selected. The final datasets exported from BFI Online included only mothers who gave birth between July 1 and October 31, 2016.

Between January 9 and May 5, 2017, PHN interviewers attempted to contact the mothers of 2,059 babies and completed 1,092 surveys. Table 2 presents the call disposition status for all active survey sample records in BFI Online. The survey response rate was calculated using three different methods, and ranged from 53% to 61%.

- The most conservative method calculated response rate as the number of completed surveys (C) divided by the total number of potentially eligible participants ($1,092 / 2,059 * 100\%$), which yielded an estimate of 53%.
- Excluding ineligible participants (I) yielded a response rate of 54% ($1,092 / (2,059 - 61) * 100\%$)
- The least conservative method assumed that potential participants with incorrect phone numbers (W) were ineligible for survey participation and excluded all these participants as well as those who were deemed ineligible at contact (I). By this method, the response rate was 61% ($1,092 / (2,059 - 201 - 61) * 100\%$).

Table 2. Call attempt outcomes

Call Disposition (code)	Frequency	Definition
Completed survey (C)	1,092	<ul style="list-style-type: none"> • Consented to survey participation and confirmed eligible (i.e., living in Toronto and with baby at time of survey)
Declined (D)	156	<ul style="list-style-type: none"> • Noted in call log as declined / not interested / asked to be removed • Responded "No" to the following questions: <ol style="list-style-type: none"> 1. Is this a good time to talk? 2. May we call you back? 3. Do you wish to participate in this survey
Ineligible (I)	61	<ul style="list-style-type: none"> • Mother disclosed that baby was hospitalized or had passed away • Not living in Toronto and/or not living with baby at the time of survey
Wrong number (W)	201	<ul style="list-style-type: none"> • Coded in call log as wrong number • Noted in call log as number discontinued / cannot receiving incoming calls / number not in service / number not assigned / number not working etc.
Lost to follow-up (L)	549	<ul style="list-style-type: none"> • Call was never answered or line was always busy
TOTAL	2,059	

Note: this table and the response rate calculations are at the baby-level. Where a mother gave birth to multiples, each baby is captured separately.

Survey Sample Characteristics

The survey was completed by 1,072 mothers; 20 of these mothers had given birth to twins and completed a separate survey for each of the babies. Therefore, feeding information was collected on 1,092 babies in total. Table 3 presents the socio-demographic characteristics of the mothers who participated in the survey. This table is at the baby-level, so the 20 mothers who gave birth to twins are represented twice within the table.

Mothers ranged in age from 17 to 48 years of age with a mean age of 32.4 years old. The majority of mothers (87.2%) were aged 25 to 39 years old, 6.8% were over 39 years of age and 6.0% were under 25 years of age.

The majority of mothers were married or in a common-law relationship (87.9%) and had a post-secondary degree or diploma (81.9%). More than half of mothers (59.2%) were born outside of Canada. The most common maternal countries of birth were China, Philippines, and India.

Just under 50% of survey respondents reported that their household income was \$68,000 or more annually while 17.8% did not report their household income. The education level and immigrant status of the respondents who did not report income level (N=194) were compared to those who reported household income (N=898) due to the high proportion of missing income information. Of the respondents who did not provide their household income, 31.9% had not completed a post-secondary education, compared to 15.2% of respondents who provided income information. Additionally, 55.1% of respondents who did not report their income were recent immigrants compared to 29.1% of respondents who reported income information. The differences in education level and immigrant status between those who reported income and those who did not suggest that those with missing income information may have lower income. Thus, the household income in the sample may be lower than reported.

Table 3. Socio-Demographic Characteristics of Survey Respondents, Toronto, 2016

Characteristic	Number (%)
Maternal Age	
<25	66 (6.1)
25-29	213 (19.5)
30-34	455 (41.7)
35-39	284 (26.0)
40+	74 (6.7)
Marital Status	
Married/common-law	955 (87.9)
Divorced/separated/widowed	14 (1.3)
Single	118 (10.9)
Maternal Education	
Less than high school (Grade 9)	13 (1.2)
Some high school (not completed)	16 (1.5)
High school or equivalent	129 (11.9)
Some post-secondary	39 (3.6)
College/university	649 (59.8)
Post-graduate/ Professional degree	240 (22.1)
Household Income before tax	
<\$48,000	269 (24.6)
\$48,000 to < \$68,000	106 (9.7)
\$68,000 or more	523 (47.9)
Missing	194 (17.8)
Immigrant Status	
Canada born	440 (40.8)
Newcomer (10 years or less)	362 (33.5)
Longer-term immigrant	277 (25.7)
Maternal Place of Birth	
Canada	440 (40.8)
Africa	71 (6.6)
Americas (other than Canada)	100 (9.3)

Asia	389 (36.1)
Europe	79 (7.3)

Note: this table is at the baby-level. Where a mother gave birth to multiples, each baby is captured separately. Sub-totals in this table will not add up to the total due to missing information and percentages will not add to 100% due to rounding.

Survey Representativeness

Several socio-demographic and birth history characteristics of the survey respondents were compared to those of all live births in 2016 reported in the BORN information system (Appendix C). Survey respondents were similar in terms of age distribution, geographical area of the city, and birth type when compared to overall births. There was a slight over-representation of first-time mothers in the survey sample.

Differences in characteristics of respondents and non-respondents were also compared (Appendix D). Respondents and non-respondents were similar in terms of gestational period, birth type, and preferred language listed in ISCIS. Respondents were on average one year older than non-respondents. Lower income areas of the city had higher proportion of non-respondents than higher income areas of the city. The northwest service delivery area had higher rates of non-respondents than other areas in the city.

Breastfeeding Initiation

The sample breastfeeding initiation rate, where the mother reported having fed or attempted to feed the infant breast milk at least once, was 97.9% (95% CI: 96.9, 98.6). Due to high sampling variability, the initiation rate was not stratified by any socio-demographic or birth history characteristics.

Feeding at Entry to Service

In 2016, there were 30,675 live births to Toronto mothers reported in BORN. The BORN information system contained data on feeding at entry to service for 77.9% of these infants. Table 4 shows the overall breastfeeding rates at entry to service and stratified by maternal age, parity, and mode of delivery. At entry to service, 95.1% of infants were receiving breast milk, 59.7% were exclusively breastfeeding.

Babies born to younger mothers (under 25 years of age) were less likely to be exclusively breastfeeding at entry to service compared to babies born to mothers aged 25 to 34 years. Additionally, babies born by C-section were less likely to be exclusively breastfeeding at entry to service than babies born vaginally.

Rates of breastfeeding at entry to service should be interpreted with caution as all infants with missing feeding information were excluded from the analysis. BORN is missing information for two hospital NICUs within Toronto. Therefore, breastfeeding rates at entry to service may be slightly over estimated as there is higher proportion of missing feeding information for infants born preterm or low birth weight and for multiple births. Before excluding the missing data from the analysis, the crude rates showed that 74.1% of infants were receiving breast milk, 46.5% were exclusively breastfeeding, 3.8% of infants were not receiving any breast milk, and data was missing for 22.1% of infants.

Table 4. Breastfeeding at Entry to Service, Toronto, 2016

	Any breastfeeding % (95% CI)	Exclusive breastfeeding % (95% CI)
Overall	95.1 (93.9, 96.4)	59.7 (58.8, 60.7)
Maternal Age		
<25	92.5 (88.4, 96.6)	55.1 (51.9, 58.2) ^L
25-34	95.3 (93.8, 96.9)	60.5 (59.2, 61.7)

35+	95.5 (93.2, 97.8)	59.6 (57.8, 61.5)
Parity		
First-time mom	96.2 (94.4, 98.1)	60.0 (58.6, 61.5)
Not first-time mom	94.2 (92.6, 95.9)	59.5 (58.2, 60.8)
Mode of Delivery		
Vaginal	95.9 (94.4, 97.3)	66.1 (64.9, 67.3)
C-Section	93.3 (90.9, 95.6)	43.4 (41.8, 45.0) ^L

^LSignificantly lower rate than the group in the same stratum with the highest rate

Data source: BORN Information System: BORN Ontario, public health cube (2016 calendar year), extracted: July 21, 2017.

Breastfeeding Duration

Table 5 presents the any breastfeeding and exclusive breastfeeding rates at two, four, and six months of age. At two months of age, 88.1% of babies were receiving breast milk, 34.5% were exclusively breastfeeding. At four months of age, 79.9% of babies were receiving breast milk, 28.2% were exclusively breastfeeding. At six months of age, 75.2% of babies were still receiving breast milk. The exclusive breastfeeding rate at six months was 13.7%.

Table 5. Infant Feeding Duration and Exclusivity, Toronto, 2016

Age of infant	Any Breastfeeding % (95% CI)	Exclusive Breastfeeding % (95% CI)
2 months	88.1 (86.0, 89.9)	34.5 (31.7, 37.4)
4 months	79.9 (77.4, 82.2)	28.2 (25.6, 31.0)
6 months*	75.2 (72.6, 77.7)	13.7 (11.7, 15.8)

Data source: 2017 IFSP survey conducted by Toronto Public Health.

*The 5.5 month time point was used for reporting the exclusive breastfeeding rate at six months. The exclusive breastfeeding rate at the six month time point was 7.0% (95% CI: 5.6, 8.6).

Tables 6 and 7 present the any breastfeeding and exclusive breastfeeding rates stratified by various socio-demographic and birth history characteristics, at two, four, and six months post-partum.

The following differences in breastfeeding rates were observed when data were stratified by socio-demographic characteristics:

- Babies born to mothers who were single (never married) had lower rates of any and exclusive breastfeeding at all three time points when compared to babies born to mothers who were married or in a common-law relationship.
- Babies born to mothers without a post-secondary degree or diploma had lower rates of any and exclusive breastfeeding at all three time points when compared to babies born to mothers who had a post-secondary education.
- Babies born to mothers with a lower household income (less than \$48,000 annually) had lower rates of any and exclusive breastfeeding at all three time points compared to babies born to mothers in the highest income group (\$68,000 or more annually). Where income information was missing, lower any and exclusive rates were observed.
- Babies born to mothers who were born outside of Canada had lower rates of exclusive breastfeeding at two and four months. However, no differences were observed in the any breastfeeding rates.
- Babies born to first time mothers were less likely to be exclusively breastfeeding at all three time points. Similar differences were not observed in the any breastfeeding rates.

Similarly, differences in breastfeeding rates were observed when data were stratified by birth history characteristics:

- Babies born by C-section had lower rates of any and exclusive breastfeeding at all three time points when compared to babies born vaginally.
- Where labour and delivery complications were reported, babies had lower rates of any and exclusive breastfeeding at all three time points compared to babies that did not have reported labour and delivery complications.
- Preterm babies were less likely to receive breast milk at four and six months compared to term babies.
- Low birth weight babies were less likely to receive breast milk at six months compared to healthy birth weight babies.
- Multiple birth babies were less likely to receive breast milk at four months compared to singletons.
- Where NICU or hospital admission was reported, babies had lower rates of exclusive breastfeeding at two and four months compared to babies that did not have reported NICU or hospital admission.
- Due to small numerator data, exclusive breastfeeding indicators were not stratified by birth weight, birth type, or gestation.

Table 6. Any Breastfeeding by Socio-demographic and Birth History Characteristics, Toronto, 2016

	Any Breastfeeding by Age of Infant % (95% CI)		
Characteristic	2 months	4 months	6 months
Overall	88.1 (86.0, 89.9)	79.9 (77.4, 82.2)	75.2 (72.6, 77.7)
Maternal Age			
<25	S	72.3 (60.2, 81.8)	66.2 (53.9, 76.6)
25 to 34	88.8 (86.1, 90.9)	81.1 (78.0, 83.9)	77.2 (73.9, 80.2)
35+	86.8 (82.9, 90.0)	79.0 (74.5, 82.9)	73.1 (68.3, 77.5)
Marital status*			
Married/Common-Law	90.2 (88.2, 92.0)	82.3 (79.7, 84.6)	77.6 (74.9, 80.2)
Single (never married)	72.9 (64.2, 80.1) ^L	62.7 (53.7, 71.0) ^L	56.8 (47.7, 65.4) ^L
Education level			
High school or less	73.0 (66.3, 78.7) ^L	61.7 (54.7, 68.3) ^L	56.1 (49.1, 62.9) ^L
College or university	91.4 (89.4, 93.1)	83.9 (81.3, 86.2)	79.4 (76.6, 81.9)
Income**			
<\$48,000	82.8 (77.8, 86.9) ^L	71.3 (65.6, 76.4) ^L	64.2 (58.3, 69.7) ^L
\$48,000 to < \$68,000	S	81.1 (72.5, 87.5)	77.4 (68.4, 84.4)
\$68,000 or more	92.9 (90.4, 94.8)	86.8 (83.6, 89.4)	83.1 (79.7, 86.1)
Missing	82.4 (76.3, 87.1) ^L	72.5 (65.8, 78.4) ^L	67.9 (61.0, 74.1) ^L
Immigrant status			
Canada born	88.6 (85.2, 91.3)	82.4 (78.6, 85.7)	77.9 (73.7, 81.5)
Newcomer (10 years or less)	87.5 (83.7, 90.6)	77.6 (73.0, 81.6)	72.6 (67.7, 76.9)
Longer-term immigrant	88.5 (84.11, 91.7)	80.1 (75.0, 84.4)	75.5 (70.0, 80.2)
Parity			
Not first-time mom	86.7 (83.5, 89.4)	78.2 (74.4, 81.6)	73.7 (69.6, 77.3)
First-time mom	89.1 (86.2, 91.4)	81.1 (77.7, 84.1)	76.4 (72.7, 79.7)
Mode of Delivery			

Vaginal	91.6 (89.4, 93.5)	84.0 (81.1, 86.5)	79.1 (76.0, 81.9)
C-Section	81.1 (76.7, 84.8) ^L	72.1 (67.2, 76.4) ^L	67.7 (62.7, 72.3) ^L
Labour/Delivery Complications			
Yes	83.2 (78.4, 87.0) ^L	72.9 (67.4, 77.7) ^L	68.4 (62.8, 73.5) ^L
No	89.9 (87.6, 91.8)	82.5 (79.7, 85.0)	78.1 (75.1, 80.9)
Gestation			
Full-term	88.7 (86.6, 90.5)	80.8 (78.3, 83.2)	76.7 (74.0, 79.2)
Preterm (under 37 weeks)	80.8 (70.5, 88.1)	68.0 (56.8, 77.3) ^L	56.4 (45.3, 67.0) ^L
Baby's birth weight*			
Low birth weight (<2,500 g)	S	70.5 (59.5, 79.6)	59.0 (47.8, 69.3) ^L
Healthy birth weight (2,500 to 4,500 g)	88.7 (86.6, 90.6)	80.8 (78.2, 83.1)	76.6 (73.9, 79.2)
Birth type			
Singleton births	88.7 (86.6, 90.4)	80.6 (78.0, 82.8)	75.8 (73.1, 78.3)
Multiple births	S	62.5 (46.8, 76.0) ^L	60.0 (44.3, 73.9)
NICU/Hospital Admission			
No	88.8 (86.6, 90.7)	80.5 (77.8, 82.9)	75.8 (73.0, 78.4)
Yes	82.7 (75.5, 88.2)	75.5 (67.7, 82.0)	70.5 (62.4, 77.5)

^L Significantly lower rate than the group in the same stratum with the highest rate.

S Extremely high sampling variability. Estimate suppressed.

Data source: 2017 IFSP survey conducted by Toronto Public Health.

*Due to small denominator data, the stratum for divorced, separated, and widowed mothers and the stratum for high birth weight babies (>4,500g) could not be reported; these records are excluded from the marital status and birth weight stratification respectively.

Table 7. Exclusive Breastfeeding by Socio-demographic and Birth History Characteristics, Toronto, 2016

Characteristic	Exclusive Breastfeeding by Age of Infant % (95% CI)		
	2 months	4 months	6 months*
Overall	34.5 (31.7, 37.4)	28.2 (25.6, 31.0)	13.7 (11.7, 15.8)
Mom's age			
<25	27.3 (17.9, 39.2) ^C	21.2 (13.0, 32.7) ^C	S
25 to 34	34.5 (31.0, 38.2)	28.6 (25.3, 32.2)	13.6 (2.3, 15.1)
35+	35.9 (31.0, 41.0)	28.8 (24.1, 33.7)	15.1 (11.2, 16.5)
Marital status**			
Married/Common-Law	35.85 (32.9, 39.0)	29.7 (26.9, 32.7)	14.9 (12.8, 17.3)
Single (never married)	22.22 (15.6, 30.7) ^{C, L}	17.0 (11.2, 24.8) ^{C, L}	S
Education level			
High school or less	26.0 (20.4, 32.6) ^L	15.7 (11.3, 21.5) ^L	7.6 (4.6, 12.3) ^{C, L}
College or university	36.4 (33.3, 39.6)	31.0 (28.1, 34.1)	15.1 (12.9, 17.6)
Income***			
<\$48,000	24.3 (19.5, 29.8) ^L	16.0 (12.1, 20.9) ^L	7.4 (4.8, 11.3) ^{C, L}
\$48,000 to < \$68,000	29.3 (21.4, 38.6)	24.5 (17.3, 33.6) ^C	S
\$68,000 or more	42.5 (38.3, 46.8)	36.6 (32.6, 40.8)	18.4 (15.3, 22.0)
Missing	29.9 (23.9, 36.7) ^L	24.7 (19.2, 31.3) ^L	11.3 (7.6, 16.6) ^C
Immigrant status			
Canada born	42.5 (38.0, 47.2)	34.6 (30.2, 39.1)	16.4 (13.2, 20.1)
Newcomer (10 years or less)	29.6 (25.1, 34.5) ^L	23.8 (19.7, 28.4) ^L	11.9 (8.9, 15.6)

Longer-term immigrant	28.7 (23.7, 34.4) ^L	24.6 (19.9, 30.1) ^L	12.0 (8.6, 16.4)
Parity			
Not first-time mom	41.6 (37.4, 45.9)	33.7 (29.7, 37.9)	17.8 (14.7, 21.4)
First-time mom	28.4 (24.8, 32.2) ^L	23.5 (20.2, 27.2) ^L	10.2 (8.0, 13.0) ^L
Mode of Delivery			
Vaginal	39.9 (36.3, 43.5)	32.9 (29.5, 36.4)	16.0 (13.5, 18.8)
C-Section	24.2 (20.1, 28.9) ^L	19.2 (15.5, 23.6) ^L	9.1 (6.5, 12.5) ^{C, L}
Labour/Delivery Complications			
Yes	25.8 (21.1, 31.1) ^L	20.3 (16.0, 25.3) ^L	8.9 (6.2, 12.8) ^{C, L}
No	38.2 (34.8, 41.7)	31.5 (28.3, 34.9)	15.5 (13.1, 18.2)
NICU/Hospital Admission			
No	36.1 (33.1, 39.2)	29.5 (26.7, 32.5)	14.3 (12.2, 16.7)
Yes	23.2 (17.0, 30.9) ^L	19.0 (13.4, 26.3) ^{C, L}	S

^L Significantly lower rate than the group in the same stratum with the highest rate.

S Extremely high sampling variability. Estimate suppressed.

^C Moderately high sampling variability, interpret with caution.

Data source: 2017 IFSP survey conducted by Toronto Public Health.

*The 5.5 month time point was used for reporting the exclusive breastfeeding rate at six months. The exclusive breastfeeding rate at the six month time point was 7.0% (95% CI: 5.6, 8.6).

**Due to small denominator data, the stratum for divorced, separated, and widowed mothers could not be reported; these records are excluded from the marital status stratification.

Discussion and Implications

The following section discusses the IFSP findings in relation to BFI re-designation criteria and TPH's programs and services. Future surveillance considerations and implications for decisions regarding future infant feeding programming supports are identified.

Feeding at Entry to Service

While the majority (95.1%) of infants born to Toronto mothers were receiving any breast milk at entry to service in 2016, only 59.7% were exclusively breastfeeding. These rates may be slightly over-estimated for Toronto as BORN is missing feeding information for two hospital NICUs within Toronto. This missing NICU data results in higher proportion of missing feeding information for infants born preterm or low birth weight and for multiple births. Though this is below the BFI designation criteria of 75% or higher exclusive breastfeeding at entry to service, recent data shows that only three of Ontario's 36 PHUs exceeded this threshold in 2015 (6).

In 2015, Toronto had the fourth highest rate for any breastfeeding at entry to service of the 36 health units in Ontario, but the seventh lowest for exclusive breastfeeding (6). This data shows that the any breastfeeding rate in hospital/at midwife practice group is good, however there is opportunity for improvement to encourage exclusive breastfeeding in hospitals or in midwife practice groups early on, particularly if supplementation is not medically indicated.

Prenatal programming and hospital/TPH partnerships to support breastfeeding initiation at birth will provide ongoing opportunities to increase this rate. An example of current hospital/TPH partnerships is TPH's Hospital Liaison PHN Team. Hospital Liaison PHNs work with internal and external partners to build relationships, provide staff education, training and outreach to hospitals and midwife agencies. Through the provision and support of consistent messaging about the importance of initiation and continuation of exclusive breastfeeding, the Hospital Liaison PHN Team contributes to the improvement

of exclusive breastfeeding rates at entry to service. This partnership supports hospitals and midwives to build capacity around shared health priorities and infant feeding practices (7).

Breastfeeding Duration

The IFSP showed that the majority of Toronto infants were still receiving any breast milk at two (88.1%), four (79.9%), and six (75.2%) months. A 2015 study in the Region of Peel found similar rates at two (87.2%) and four (74.2%) months postpartum and a slightly lower rate at six months (63.9%) (8).

Toronto's breastfeeding rates were also similar to rates reported in a 2014 Halton Region study and are slightly higher than rates reported by Ottawa in 2015 (9; 10). The exclusive breastfeeding rates in Toronto were comparable to rates reported by both Peel and Ottawa in 2015 (8; 10). A 2014 study from Halton Region found higher exclusive breastfeeding rates than Toronto at all three time points (9).

While the majority of infants were still receiving any breast milk at six months of age, only 13.7%^d were exclusively breastfeeding at this time point. The study identified a substantial drop in the exclusive breastfeeding rate between four and six months. This drop warrants a closer examination of contributing factors for this finding as the WHO/UNICEF recommend exclusive breastfeeding to six months. A better understanding of contributing factors will inform decisions regarding TPH's programs, services, and strategies offered to influence the exclusive rates in the first six months postpartum.

TPH has a number of infant feeding programs and services to support families postpartum. These include: TPH Intake (i.e. information and counselling via telephone, email and online e-chat), blogs, postpartum telephone assessment and counselling, home visiting, TPH-run and partnership breastfeeding clinics, breastfeeding support programs, Early Years parenting programs, and print and web-based resources. The BFI criteria indicate that if a 75% exclusive breastfeeding rate is not met at hospital discharge, the any breastfeeding rate must be 75% and show increasing rates for three years. Additionally, the criteria states that TPH establish breastfeeding rates and trends over time requiring additional data collection points (11). As per BFI criteria, TPH is committed to ongoing infant feeding data collection in order to establish breastfeeding rates and trends over time. The 2017 IFSP findings showed room for improvement in breastfeeding rates in the early postpartum period (i.e. zero to six months), indicating that ongoing data collection would benefit from surveillance focused on the earlier time points postnatally (i.e. two, four and six months) to establish year over year rates and trends, versus later postpartum time points (i.e. 12, 18 and 24 months).

Socio-demographic and Birth History Stratification

Differences in breastfeeding rates were observed when data was stratified by maternal socio-demographic characteristics. Babies were less likely to exclusively breastfeed at various time points if their mother was a first-time mother, was single, had a lower household income, did not have a post-secondary degree or diploma, or was born outside of Canada. Similar differences were seen for the any breastfeeding rates comparing education, marital status, and income; however, no difference was seen in the any breastfeeding rate by immigrant status or parity. In 2015, Ottawa found similar trends by parity and education. They reported that first time mothers were less likely to be exclusively breastfeeding at two weeks post-partum and that education was a strong predictor of exclusive breastfeeding at six months among first-time mothers (10).

^d The 5.5 month time point was used for reporting the exclusive breastfeeding rate at six months. The exclusive breastfeeding rate at the six month time point was 7.0% (95% CI: 5.6, 8.6). The rate at six months (7.0%) was used for comparison to reports from other public health units.

When data were stratified by birth history characteristics, lower rates of any breastfeeding were observed at various time points when the baby was born low birth weight, pre-term, or by C-section, where there were labour and delivery complications, and in multiple births. Where data could be stratified, similar differences were seen for the exclusive breastfeeding rates. Stratification of exclusive breastfeeding rates by some characteristics was not possible due to small sample size and high sampling variability. Some differences in breastfeeding rates by birth history characteristic may be due to medically necessary supplementation with formula for some infants. For example, infants who had been admitted to hospital at least once since birth or who had stayed in the NICU were less likely to be exclusively breastfeeding at two and four months of age. Other studies have also found lower exclusive breastfeeding rates for babies born by C-section compared to babies born vaginally (10; 8).

The BFI criteria require that designated agencies demonstrate population health principles and population health surveillance including monitoring shifts in overall breastfeeding rates and identifying disparities between populations based on socio-demographic characteristics such as ethnicity, socioeconomic status, education, geography, and age (11). TPH has demonstrated population health principles in the infant feeding programs and services described above. Disparities identified in this study highlight the importance of continuing to focus public health programming on priority populations.

Toronto is a large and diverse city with approximately 30,000 births each year. Vital statistics data from 2011 show that 18% of Toronto babies were born to mothers who were single (never married) and that 61% of babies were born to mothers who were born outside of Canada (12). From 2011 to 2013, females in lower income areas of the city had higher birth rates compared to those in higher income areas (13). These demographics highlight that many babies in Toronto are born to mothers who may experience barriers to breastfeeding. Given the findings of this study and the diversity of Toronto, there is an opportunity to increase breastfeeding duration and exclusivity rates though working with priority populations.

PHUs are responsible for planning and delivering programs and services that address health needs as well as the contexts in which these needs occur (2). As such, TPH addresses the social determinants of health through a health equity lens in the planning and delivering of infant feeding programs, services, and strategies. TPH participates in partnerships to serve priority populations (e.g., the Canada Prenatal Nutrition Programs) and integrates a health equity approach in all community engagement activities related to breastfeeding and in the development of all breastfeeding and infant feeding program materials and resources. In particular, TPH has established a BFI Outreach Sub Committee which explores strategies to reach sub-populations that are less likely to breastfeed. Specific outreach efforts are made to reach younger women and new immigrants and their support networks. TPH also has access to interpreter services and has translated various parent resources into commonly requested languages. Our community partners are also often able to assist with interpreter services when providing community programs.

Regardless of the efforts TPH makes to identify and serve priority populations, disparities continue to exist with regard to breastfeeding. Ongoing data collection that seeks to identify and better understand the populations with lower rates of breastfeeding are critical. Future infant feeding data collection projects will benefit from the collection of sociodemographic and birth history data. Findings from analysis of this data will contribute to evidence-based decisions regarding services and enhance an equity-based approach to program planning.

Criteria for BFI designated community agencies state that they must demonstrate collaboration with partners to assess and understand the cultural norms and conditions within the community affecting breastfeeding rates and disparities (14). In addition to those mentioned above, TPH has collaboratively partnered to assess and better understand populations in Toronto. For example, TPH spearheaded the creation of the Toronto Breastfeeding/BFI Network. This network has representation from various birthing hospitals, midwifery collectives, and community agencies in Toronto. One of the goals of this network is to support a culture that promotes breastfeeding in Toronto. In addition, TPH was a member of the LDCP on infant feeding from 2012 to 2015. This project brought together PHUs to work collaboratively to develop standardized tools and methods for collecting infant feeding surveillance data that would enable PHUs to have locally useful and externally comparable data. TPH is also actively engaged at provincially through the BFI strategy and Provincial Infant Feeding.

Study Strengths, Limitations, and Lessons Learned

The IFSP had a number of strengths and limitations which are important to consider when identifying lessons learned.

Strengths

Utilizing PHNs was advantageous given the expert interpersonal and communication skills needed to discuss health related issues. PHNs were able to communicate with sensitivity to the diverse families in Toronto. These skills contributed to improved telephone communication, including facilitating telephone access for families through use of interpreters. PHN skills may have contributed to improving survey response and uptake, and are an important consideration in similar future data collection studies.

Another strength of the IFSP was having Surveillance and Epidemiology Unit staff on the project team. The Epidemiologist role was invaluable for project design and plan, survey and data collection methods, epidemiological methods for analysis, data management, quality assurance, and report writing. The Data Analyst role was critical to the project team for consultation, data analysis, and analytic support.

Utilizing an adapted version of the LDCP 6-month single time point questionnaire allowed for the use of validated questions and will facilitate future comparability of data across health units in Ontario. The use of BFI Online for real-time data entry eliminated data entry errors, allowed for regular checks of response rates and number of surveys completed, and allowed for easier data analysis upon study completion.

Limitations

Not all births to mothers residing in Toronto are captured in ISCIS. Some mothers do not consent to share their HBHC results with TPH, so would not be included in the sampling frame. It is possible that the births that are not captured in ISCIS are systematically different from those captured resulting in selection bias. Additionally, births occurring at home, at the Toronto Birth Centre, and out of region were excluded from the sampling frame.

Some stratification could not be performed due to small sample sizes in some subgroups. Additionally, the sample size of the study was calculated in order to have enough power to determine the exclusive breastfeeding rate at six months, but may be too small to determine statistically different rates between subgroups in the stratified analysis.

The results from this study could not be directly compared to previous breastfeeding studies in Toronto due to methodological differences. For example, the 2010 report *Breastfeeding in Toronto: Promoting*

Supportive Environments limited the sample to singleton, first born infants and excluded infants if they were born preterm or low birth weight.

The survey did not include questions about reasons that mothers stopped breastfeeding or introduced complementary foods. Additionally, no data was collected about facilitators or barriers to breastfeeding.

Some infants who received liquids for medical purposes (e.g., sugar water for pain during needles) may have accidentally been miscoded due to confusion with the question.

Many (17.8%) of survey participants did not provide their income category. After the first income question, a second income question was asked to divide the respondents into smaller income groups. Some participants who answered the first income question did not answer the second so no analysis on the smaller income groups was able to be performed. Additionally, question 41, “how many people does this income support?” was asked only to the participants who answered both income questions, resulting in a very low response rate for that question. In the future, a question such as this should not be connected to the income question and may also need to be re-worded as the interviewers noted some confusion with this question, especially among people whose first language was not English.

Lessons Learned

The following were identified by the PHN interviewers post IFSP data collection:

- Develop a broad communication plan to inform all staff of the ongoing data collection to increase awareness regarding methods and purpose of survey administration.
- Provide a list of current community resources for the PHN interviewers to access as needed during survey administration.
- There was significant value to have Quality Improvement Specialist support to the PHN interviewers for real-time strategy modification and support during survey implementation.
- Training documents (i.e. BFI Online Manual & PHN Interviewer Guidelines) proved to be valuable and were accessed regularly throughout survey implementation.

Recommendations

The IFSP reported a number of strengths and identified opportunities for improvement in future data collection. The following recommendations are intended to inform future infant feeding monitoring and surveillance projects and guide service delivery and program planning.

Future infant feeding monitoring and surveillance:

1. Explore options for systematic ongoing surveillance and monitoring of Toronto breastfeeding rates to establish trends over time and facilitate compliance with BFI designation criteria.
2. Utilize consistent data collection methodology to ensure comparability of future breastfeeding and infant feeding surveillance data. Consistent methodology allows for rigour in findings and comparisons year over year.
3. Collect sociodemographic and birth history data when implementing subsequent breastfeeding data collection studies. Findings from analysis of this data contribute to evidence-based decisions regarding services and enhance an equity-based approach to program planning.
4. Use BFI Online software program for future infant feeding data collection due to the ease of use and functionality to support the IFSP.

5. Identify Infant Feeding Surveillance needs on yearly service plans to facilitate early linkages and support from internal TPH directorates (i.e. Performance and Standards, Surveillance and Epidemiology Unit) where needed. This aids in sufficient resource allocation from the directorate to comprehensively support Infant Feeding Surveillance projects. Partnership, consultation, and guidance from internal TPH directorates enhances quality and rigour in research project design and implementation.
6. Use PHN interviewers and mail an advance letter to potential participants for future breast and infant feeding surveillance projects. IFSP response rates may be attributed to project methodology and survey administrator skill set.

Breastfeeding Initiation and Entry to Service:

7. Provide ongoing opportunities to support breastfeeding initiation and exclusive breastfeeding at entry to service through prenatal programming.
8. Continue to support and partner with Toronto birthing hospitals and midwife practice groups to encourage exclusive breastfeeding early on if supplementation is not medically indicated.

Breastfeeding Duration:

9. Further examine factors contributing to the substantial drop in the exclusive breastfeeding rate between four and six months identified by the IFSP.
10. Focus surveillance efforts on the earlier time points postnatally (i.e. two, four, and six months) rather than later time points given the rates identified by the IFSP.

Final Thoughts

TPH is committed to the protection, promotion, and support of breastfeeding and informed decision making regarding infant feeding. This commitment is displayed by TPH's attainment of BFI-designation and current pursuit of re-designation as well as through the programs, services, and strategies it offers to prenatal, postpartum, and parenting families.

The IFSP found that while breastfeeding initiation and any breastfeeding rates are relatively high, exclusive breastfeeding rates are significantly lower with less than 14% of babies being breastfed exclusively at six months. Additionally, the IFSP identified disparities in breastfeeding rates by various sociodemographic characteristics of mothers such as age, household income, and immigrant status. TPH has a number of strategies, programs, and collaborative partnerships in place to reach these priority populations and is committed to continuing this work. Ongoing data collection to understand breastfeeding rates and trends over time is valuable and essential. Ongoing support for the promotion of breastfeeding in the early postpartum period demonstrates TPH's commitment to achieving the goal of exclusive breastfeeding to six months and the goal of maintaining BFI designation.

In conclusion, the IFSP provided valuable information to support TPH's journey to BFI re-designation, guide TPH program planning and service delivery, and inform future infant feeding surveillance efforts.

PHN Interviewers

A sincere thank you to the following PHN interviewers whose expertise, knowledge, and skill contributed to project success:

- Kathy Jacyniak

- Jennifer Lalich
- Kate McNabb
- Kate Scrafield
- Linda Shaw-Gamble
- Angella Taylor
- Maria Tse

IFSP Workgroup

- Natalie Bourdages, Health Promotion Specialist
- Sarah Collier, Epidemiologist
- Kathy Jacyniak, Public Health Nurse
- Jill Mather, Health Promotion Specialist
- Kelsie Near, Epidemiologist
- Lynn Walker, Manager
- Charles Yim, Data Analyst
- Carmen Yue, Quality Improvement Specialist

For further information related to this report, please contact:

- Denise Oliver, Associate Director, Toronto Public Health - Child Health & Development, Reproductive & Infant Health: Denise.Oliver@toronto.ca (416-338-8709)
- Lynn Walker, Manager, Toronto Public Health - Child Health & Development, Reproductive & Infant Health: Lynn.Walker@toronto.ca (416-338-7955)

References

1. Better Outcomes Registry & Network Ontario, Public Health Cube. *BORN Information System*. [Online] 2016 calendar year. Accessed July 21, 2017.
2. Ministry of Health and Long Term Care. (2017). *Ontario Public Health Standards*. Toronto: Queens Printer for Ontario.
3. Haile R., Procter TD., Alton GD., et al. on behalf of LDCP Breastfeeding Surveillance Project Team. (2015) *Infant Feeding Surveillance Pilot Study: Final Report and Recommendations*. Woodstock, ON. Retrieved from https://www.publichealthontario.ca/en/eRepository/LDCP_Breastfeeding_Project_Final_Report_2015.pdf.
4. te Nyenhuis E., Deming J., Dupuis S., Fuller E., Harris A., White D., Yue C. & Folkema A. (2017). *Infant Feeding Surveillance Knowledge Translation Project: Summary Report of Public Health Unit Use of the 6-Month Retrospective Single Time Point Questionnaire*. Newmarket, ON. Retrieved from <https://www.publichealthontario.ca/en/ServicesAndTools/Documents/LDCP/Breastfeeding%20KE%20deliverable%20-%20Final%20Report%20and%20guidance%20docs.pdf>.
5. Association of Public Health Epidemiologists in Ontario. (2017). *Core Indicators, Infant Feeding*. Retrieved from <http://www.apheo.ca/>.
6. Public Health Ontario. (2017). *Snapshots: Infants fed breast milk only, Infants fed breast milk substitute*. Toronto, ON: Ontario Agency for Health Protection and Promotion. Retrieved from publichealthontario.ca/en/DataAndAnalytics/Snapshots/Pages/Maternal-health.aspx.
7. Rootman, I., Dupere, S., Pederson, A. & O'Neill, M. (2012). *Health Promotion in Canada 3rd Edition*. Toronto ON: Canadian Scholars' Press Inc.
8. Lam, A. & Bodolai, P. (2015). *Region of Peel Infant Feeding Survey*. Retrieved from <https://www.peelregion.ca/health/resources/pdf/PIFS-report-sept-2016.pdf>.
9. Halton Region Health Department. (2014). *Infant Feeding in Halton*. Oakville, ON. Retrieved from <http://www.halton.ca/cms/One.aspx?portalId=8310&pageId=127658>.
10. Ottawa Public Health. (2015). *Infant Feeding in Ottawa 2012 to 2014*. Ottawa, ON. Retrieved from https://www.ottawapublichealth.ca/en/reports-research-and-statistics/resources/Documents/infant_feeding_2015_en.pdf.
11. Breastfeeding Committee for Canada. (2012). *Breastfeeding Definition and Data Collection Periods*. Retrieved from http://www.breastfeedingcanada.ca/documents/BCC_BFI_Breastfeeding_Definitions_and_Data_Collection_English.pdf.
12. Ontario Ministry of Health and Long-Term Care, IntelliHEALTH ONTARIO. (2011). *Vital Statistics, Live Births*. Accessed May 1, 2017.
13. Toronto Public Health. (2016). *Health Status Indicator: Pregnancy*. Retrieved from <https://www.toronto.ca/community-people/health-wellness-care/health-inspections-monitoring/comprehensive-surveillance-indicators/>.
14. The Breastfeeding Committee for Canada. (2017). *The BFI 10 Steps and WHO Code Outcome Indicators for Hospitals and Community Health Services*. Drayton Valley, AB: Author.

Appendix A: Questionnaire

Introduction and consent

Hello, my name is _____ and I'm calling from Toronto Public Health. May I speak with [mother's first name] please?

***Interviewer Note:** If the call is not answered directly by the mother, introduce yourself again when she comes to the phone.*

We are conducting a short survey to learn more about how and what mothers are feeding their babies in the first six months of life. That may include breastfeeding and/or formula feeding. This information will help us improve our services for mothers and babies. We sent you an invitation letter about this survey several weeks ago.

I am calling today to give you more information about the survey and to complete the survey with you if you agree to participate. The survey takes about 10 minutes. Is this a good time to talk?

***Interviewer note:** response is captured in question Ad intro*

Consent

The survey will ask questions about how you feed your baby and some questions about you and your family. If you gave birth to more than one baby, a survey will be completed for each baby.

You can choose not to answer questions or stop the survey at any time. To protect your privacy, all survey responses will be stored securely. Your name will not be used in the reporting of survey results. We will not share your information with anyone who are not part of the Project Team, except when required by law to report situations where children may be at risk of harm. If you are currently receiving service from Toronto Public Health, your service provider will not know if you completed the survey.

It is your choice to take part in the survey or not. You can still receive our services and come to our programs no matter what you decide.

By taking part in the survey, you will help us provide better programs and services to families. Do you wish to participate in this survey?

***Interviewer note:** response is captured in question Ad_Q01*

Question Code	Question	Response Options	Go To
Ad_intro	Is this a good time to talk?	Yes	Ad_Q01
		No	Ad_Q02
Ad_Q01	Do you wish to participate in this survey?	Yes	Ad_Q03
		No	Ad_Q02
Ad_Q02	May we call you back at a later time to conduct the survey?	Yes	Ad_Q02a
		No	X_Q46R
Ad_Q02a	Is there a time of day and/or day of the week that is better for us to try and call you?	<i>Interviewer: note call back date and time in call log</i>	END

Eligibility

Before getting to the survey, I need to ask a few brief questions to be sure you qualify.

Question Code	Question	Response Options	Go To
Ad_Q03	Is your baby currently living with you?	Yes	Ad_Q04
		No	X_Q46NE
Ad_Q04	Are you currently living in Toronto?	Yes	Ad_Q05
		No	X_Q46NE

Questions for all mothers

Question Code	Question	Response Options	Go To
Ad_Q05	Can you confirm that your baby was born on (read birthdate)?	Yes – birthdate is correct No record birthdate in text box	BH_Q01
BH_Q01	On this date, did you give birth to one baby or multiple babies? <i>If participant gave birth to multiples - Interviewer note: Just want to let you know that we will be completing one survey for each baby. Let's start with [Twin A] / [Triplet A].</i>	Single Multiples	BH_Q02
BH_Q02	Is this your first baby? <i>Interviewer Note: If participant gave birth to multiples, ask: Are they your first babies?</i>	Yes No Don't know/Can't recall Refused	Hosp_Q01
Hosp_Q01	Not counting the birth, has your baby stayed in a hospital overnight since he/she was born? <i>Interviewer Note: By this we mean if your baby had remained in hospital after you went home or had been readmitted to the hospital. This does not include the first 48 hours following birth or any time spent in the Emergency Department.</i>	Yes No Don't know/Can't recall Refused	IF_Q07
IF_Q07	In the past week, what have you fed your baby? By this, we mean what milk? <i>Interviewer Note: read descriptions if clarification is required.</i> Breast milk only: Baby is breastfeeding or receiving expressed breast milk but <u>NOT</u> currently receiving any infant formula. Combination of breast milk and formula: Baby is breastfeeding or receiving expressed breast milk <u>AND</u> is currently receiving infant formula. Formula only: Baby is receiving infant formula but <u>NOT</u> currently breastfeeding or receiving expressed breast milk.	Breast milk only	IF_Q08
		Formula only	IF_Q09
		Combination of breast milk and formula	IF_Q13
		No breast milk nor formula	IF_Q09
		Don't know/Can't recall	
		Refused	

Questions for mothers who are only feeding with breast milk

Question Code	Question	Response Options	Go To
IF_Q08	Since birth, including any time spent in hospital, has your baby ever been given any formula?	Yes	IF_Q13
		No	IF_Q24
		Don't know/Can't recall	
		Refused	

Questions about providing breast milk

Question Code	Question	Response Options	Go To
IF_Q09	Since birth, have you attempted to breastfeed or provide breast milk to your baby, even if only once?	Yes	IF_Q10
		No	IF_Q24
		Don't know/Can't recall	IF_Q13
		Refused	
IF_Q10	How old was your baby when you stopped breastfeeding? (do not read options)	Less than 0.5 months	IF_Q13
		0.5 months to less than 1 month	
		1 month to less than 1.5 months	
		1.5 months to less than 2 months	
		2 months to less than 2.5 months	
		2.5 months to less than 3 months	
		3 months to less than 3.5 months	
		3.5 months to less than 4 months	
		4 months to less than 4.5 months	
		4.5 months to less than 5 months	
		5 months to less than 5.5 months	
		5.5 months to less than 6 months	
		6 months to less than 6.5 months	
		6.5 months to less than 7 months	
		Don't know/Can't recall	
		Refused	

Questions about providing formula

Question Code	Question	Response Options	Go To
IF_Q13	Was your baby given formula in hospital?	Yes	IF_Q14
		No	
		Don't know/Can't recall	
		Refused	
IF_Q14	How old was your baby when they were first given formula?	Less than 0.5 months	IF_Q24
		0.5 months to less than 1 month	
		1 month to less than 1.5 months	
		1.5 months to less than 2 months	
		2 months to less than 2.5 months	
		2.5 months to less than 3 months	

		3 months to less than 3.5 months	
		3.5 months to less than 4 months	
		4 months to less than 4.5 months	
		4.5 months to less than 5 months	
		5 months to less than 5.5 months	
		5.5 months to less than 6 months	
		6 months to less than 6.5 months	
		6.5 months to less than 7 months	
		Don't know/Can't recall	
		Refused	

Questions about the introduction to liquids other than breast milk or formula and solids

Question Code	Question	Response Options	Go To
IF_Q24	<p>Since birth, has your baby ever been given any liquids other than breast milk or formula, such as water, sugar water or juice? Other liquids do not include vitamins or medications.</p> <p><i>Interviewer Note: If only vitamin drops or medications have been given to your baby, answer 'no' to this question.</i></p>	Yes	IF_Q26
		No	IF_Q27
		Don't know/can't recall	
		Refused	
IF_Q26	How old was your baby the first time they were given liquids other than breast milk or formula? (do not read options)	Less than 0.5 months 0.5 months to less than 1 month 1 month to less than 1.5 months 1.5 months to less than 2 months 2 months to less than 2.5 months 2.5 months to less than 3 months 3 months to less than 3.5 months 3.5 months to less than 4 months 4 months to less than 4.5 months 4.5 months to less than 5 months 5 months to less than 5.5 months 5.5 months to less than 6 months 6 months to less than 6.5 months 6.5 months to less than 7 months Don't know/can't recall Refused	IF_Q27
IF_Q27	Since birth, has your baby ever been given any solid food such as meat, chicken, cereal, vegetables, or fruit?	Yes	IF_Q28
		No	SD_Q33
		Don't know/can't recall	
		Refused	
IF_Q28		Less than 0.5 months	SD_Q33
		0.5 months to less than 1 month	
		1 month to less than 1.5 months	

	How old was your baby the first time they were given any solid food, such as meat, chicken, cereal, vegetables, or fruit? (do not read options)	1.5 months to less than 2 months	
		2 months to less than 2.5 months	
		2.5 months to less than 3 months	
		3 months to less than 3.5 months	
		3.5 months to less than 4 months	
		4 months to less than 4.5 months	
		4.5 months to less than 5 months	
		5 months to less than 5.5 months	
		5.5 months to less than 6 months	
		6 months to less than 6.5 months	
		6.5 months to less than 7 months	
		Don't know/can't recall	
		Refused	

Questions for all mothers (maternal history and demographics)

We have now finished all the questions about how you feed your baby. The next set of questions are about you and your family. To begin...

Question Code	Question	Response Options	Go To
SD_Q33	Please confirm your birthdate. Were you born on (read birthdate)? <i>Interviewer Note: If birthdate is missing or birthdate is incorrect, ask: What is your birthdate?</i>	Yes – birthdate is correct No. Record birthdate here. Don't know/Can't recall Refused	SD_Q38
SD_Q38	What is your marital status?	Married/common-law Divorced/separated Single Widowed Other [Please specify] Don't know/Can't recall Refused	SD_Q39
SD_Q39	What is your highest level of education?	Less than high school (Gr. 9) Some high school (not completed) High school or equivalent Some post-secondary College/university Post-graduate/Professional degree (e.g., MD, doctor of Pharmacy) Other [Please specify] Don't know/Can't recall Refused	SD_Q40Inc1
	We are now going to ask about your total family income before taxes last year. We don't need	Less than \$48,000 \$48,000 or more but less than \$68,000	SD_Q40Inc2 SD_Q40Inc3

Question Code	Question	Response Options	Go To
SD_Q40Inc1	<p>the exact income, but just the income category that it falls under.</p> <p>Could you please tell me if your total family income before taxes last year was</p> <p>1. Less than \$48,000</p> <p>2. \$48,000 or more but less than \$68,000</p> <p>3. \$68,000 or more?</p> <p><i>Interviewer, if required: Income can come from many sources such as from work, investments, employment insurance, child support or child tax benefit, and rental income.</i></p>	\$68,000 or more	SD_Q40Inc4
		Don't know/Can't recall	SD_Q42
		Refused	
SD_Q40Inc2	<p>Please stop me when I have read the income category that applies to your household. Was it...</p> <p>1. Less than \$34,000</p> <p>2. \$34,000 or more but less than \$42,000</p> <p>3. \$42,000 or more but less than \$48,000</p>	Less than \$34,000	SD_Q41
		\$34,000 or more but less than \$42,000	
		\$42,000 or more but less than \$48,000	
		Don't know/Can't recall	SD_Q42
SD_Q40Inc3	<p>Please stop me when I have read the category that applies to your household. Was it...</p> <p>1. \$48,000 or more but less than \$54,000</p> <p>2. \$54,000 or more but less than \$59,000</p> <p>2. \$59,000 or more but less than \$64,000</p> <p>3. \$64,000 or more but less than \$68,000</p>	\$48,000 or more but less than \$54,000	SD_Q41
		\$54,000 or more but less than \$59,000	
		\$59,000 or more but less than \$64,000	
		\$64,000 or more but less than \$68,000	
		Don't know/Can't recall	SD_Q42
		Refused	
SD_Q40Inc4	<p>Please stop me when I have read the category that applies to your household. Was it...</p> <p>1. \$68,000 or more but less than \$72,000</p> <p>2. \$72,000 or more but less than \$76,000</p> <p>3. \$76,000 or more</p>	\$68,000 or more but less than \$72,000	SD_Q41
		\$72,000 or more but less than \$76,000	
		\$76,000 or more	
		Don't know/Can't recall	SD_Q42
		Refused	

Question Code	Question	Response Options	Go To
SD_Q41	Including this baby, how many people does this income support? <i>Interviewer Note: If mother gave birth to multiples, ask "Including these babies..."</i>	<text box>	SD_Q42
SD_Q42	Were you born in Canada?	Yes	X_Q46F
		No	SD_Q42a
		Don't know/Can't recall	X_Q46F
		Refused	
SD_Q42a	What is your country of birth?	China	SD_Q43
		France	
		Germany	
		Greece	
		Guyana	
		Hong Kong	
		Hungary	
		India	
		Italy	
		Jamaica	
		Netherlands / Holland	
		Philippines	
		Poland	
		Portugal	
		Sri Lanka	
		United Kingdom (England)	
		United States	
		Viet Nam	
		Other [Please specify]	
		Don't know/Can't recall	
		Refused	
SD_Q43	What year did you arrive in Canada?	<text box>	X_Q46F
		Don't know/Can't recall	SD_Q43ImmC
		Refused	at
SD_Q43ImmCat	Have you been in Canada: 10 years or less, or more than 10 years?	10 years or less	X_Q46F
		More than 10 years	
		Don't know/Can't recall	
		Refused	

Section 11: Interview completion statement

Question Code	Question	Response Options	Go To
---------------	----------	------------------	-------

X_Q46F	These are all of the questions that we have for you today. Thank you for taking the time to answer our survey – we appreciate it. Have a nice day.	END	X_Q47
X_Q46NE	At this time, we are only asking questions to mothers that live in Toronto and have their baby living with them. Thank you for your time. Have a nice day.	END	X_Q47
X_Q46R	Okay, thank you for your time. Have a nice day.	END	X_Q47
X_Q47 (Office Use)	INTERVIEWER: Did you give any health information or make a referral?	Yes	X_Q48
		No	Submit
X_Q48 (Office Use)	INTERVIEWER: Select service. Check all that apply.	<input type="checkbox"/> EY	Submit
		<input type="checkbox"/> HBHC	
		<input type="checkbox"/> RIH	
		<input type="checkbox"/> Early Abilities	
		<input type="checkbox"/> Other TPH (includes THC)	
		<input type="checkbox"/> External	



Carol Timmings, Director (Interim)
Child Health & Development
Chief Nursing Officer

Dr. Barbara Yaffe
(Acting) Medical Officer of Health

Public Health
277 Victoria Street, 5th Floor
Toronto, ON M5B 1W2

Tel: 416-338-7600
www.toronto.ca/health

Date: January 4, 2017

Toronto Public Health is inviting you to take part in a telephone survey. We received your contact information from your midwife or the hospital where you gave birth. At that time you agreed to be contacted by public health. The survey is about how mothers in Toronto are feeding their babies in the first 6 months of life. By sharing your experiences, you will help us improve the services and supports offered to Toronto families.

How to take part in the survey

A Public Health Nurse will call you in the next few weeks. Her call will show up as a local phone number that starts with 416-338-****. She will tell you more about the survey and complete the survey with you. The survey takes about 10 minutes.

Your rights to privacy and participation

The information you give us is stored securely and your privacy is protected. It is your choice to take part in the survey or not. You can still receive our services and come to our programs no matter what you decide.

If you have questions or need a translator, Bell/Video Relay Service or other support to take part in the survey, please contact Carmen Yue at 416-338-8596 or Carmen.Yue@toronto.ca.

How to contact us for other questions

Please call 416-338-7600 and ask to speak with a nurse. This service is available Monday to Friday, 8:30 AM – 4:30 PM. You may also visit our website at <http://www.toronto.ca/health>. If you have any urgent concerns about yourself or your baby, please contact your family doctor, local health clinic, or call Telehealth Ontario 1-866-797-0000 (24 hours/7 days a week).

Thank you in advance for supporting our survey!

Sincerely,

A handwritten signature in black ink, appearing to read "Denise Oliver".

Denise Oliver
Associate Director, Child Health and Development

Appendix C: Comparison of Survey Respondents to Live Births in 2016, Toronto

Characteristic	Survey Respondents (%)	2016 Live Births from BORN (%)
Maternal age group (years)		
Less than 25	6.0	8.3
25 to 29	19.5	21.4
30 to 34	41.7	38.7
35 to 39	26.0	25.2
40 +	6.8	6.3
Child Health and Development Service Delivery Area		
East	13.7	16.2
Northeast	21.1	19.0
Northwest	17.0	17.0
Southeast	11.8	12.6
Southwest	19.9	18.8
West	16.6	16.3
Parity		
First-time mom	53.4	46.9
Not first-time mom	46.6	53.1
Birth type		
Singleton births	96.3	96.6
Multiple births	3.7	3.4

Data source, 2016 Live Births: BORN Information System: BORN Ontario, public health cube (2016 calendar year), extracted: July 21, 2017.

Note: this table is at the baby-level. Where a mother gave birth to multiples, each baby is captured separately. Sub-totals in this table will not add up to the total due to missing information and percentages will not add to 100% due to rounding.

Appendix D: Comparison of Respondents to Non-Respondents, Toronto, 2016

Socio-demographic Characteristics	Respondents % (N=1092)	Non-Respondents* % (N=906)	Percentage Point Difference	P-value
Maternal Age Group (Years)				<0.0001
<25	6.0	12.9	-6.9	
25-29	19.5	22.9	-3.4	
30-34	41.7	34.3	7.4	
35-39	26.0	24.3	1.7	
40+	6.7	5.6	1.1	
Mother's Age (Years)				<0.0001
Mean	32.4	31.3		
Child Health and Development Service Delivery Area				0.0140
East	13.7	15.8	-2.1	
Northeast	20.1	19.7	0.4	
Northwest	17.0	22.0	-5.0	
Southeast	11.8	11.3	0.5	
Southwest	19.9	15.5	4.4	

West	16.6	15.8	0.8	
Low Income Measure Quintile (2014 after tax)				0.0003
1	21.5	24.4	-2.9	
2	18.3	20.7	-2.4	
3	18.1	22.3	-4.2	
4	22.6	18.7	3.9	
5	19.6	13.9	5.7	
Language Preference (according to HBHC Screen)				0.1678
English	86.0	83.8	2.2	
Non-English	14.0	16.2	-2.2	
Gestation				0.2192
Preterm (<37 weeks)	7.2	8.7	-1.5	
Term (37 weeks or more)	92.8	91.3	1.5	
Mode of Delivery				
C-section	33.6	31.9	1.7	0.4075
Vaginal	66.4	68.1	-1.7	

*Non-respondents included wrong numbers (N=201), mothers who declined to participate (N=156), and mothers who were lost to follow-up (N=549). Mothers who were deemed ineligible are not included in the non-respondents.

Note: this table is at the baby-level. Where a mother gave birth to multiples, each baby is captured separately. Sub-totals in this table will not add up to the total due to missing information and percentages will not add to 100% due to rounding.