

Rates of breastfeeding or chestfeeding and influencing factors among transgender and gender-diverse parents: a cross sectional study



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Summary

Background Breastfeeding is essential for the growth and development of all infants. Despite the large transgender and gender-diverse population size, there is no comprehensive research of breastfeeding or chestfeeding practices in this group. This study was designed aimed to investigate the status of breastfeeding or chestfeeding practices in transgender and gender-diverse parents and to explore the possible influencing factors.

Methods A cross-sectional study was conducted between January 27 2022 and February 15 2022 online in China. A representative sample of 647 transgender and gender-diverse parents was enrolled. Validated questionnaires were used to investigate breastfeeding or chestfeeding practices and its associated factors, including physical factors, psychological factors and socio-environmental factors.

Findings The exclusive breastfeeding or chestfeeding rate was 33.5% (214) and only 41.3% (244) of infants could be continuously fed until 6 months. Accepting hormone therapy after having this child (adjusted odds ratio (AOR) = 1.664, 95% confidential interval (CI) = 1.014~2.738) and receiving feeding education (AOR = 2.161, 95% CI = 1.363~3.508) were associated with a higher exclusive breastfeeding or chestfeeding rate, while higher gender dysphoria scores (37–47: AOR = 0.549, 95% CI = 0.364~0.827; >47: AOR = 0.474, 95% CI = 0.286~0.778), experiencing family violence (15–35: AOR = 0.388, 95% CI = 0.257~0.583; >35: AOR = 0.335; 95% CI = 0.203~0.545), experiencing partner violence (≥30: AOR = 0.541, 95% CI = 0.334~0.867), using artificial insemination (AOR = 0.269, 95% CI = 0.12~0.541), or surrogacy (AOR = 0.406, 95% CI = 0.199~0.776) and being discriminated against during seeking of childbearing health care (AOR = 0.402, 95% CI = 0.28~0.576), are significantly associated with a lower exclusive breastfeeding or chestfeeding rate. Participants who had feeding education were more likely to feed their child with human milk as the first food intake (AOR = 1.644, 95% CI = 1.015~2.632), while those who had suffered from family violence (>35: AOR = 0.47; 95% CI = 0.259~0.84), discrimination (AOR = 0.457, 95% CI = 0.284~0.721) and chose artificial insemination (AOR = 0.304, 95% CI = 0.168~0.56) or surrogacy (AOR = 0.264, 95% CI = 0.144~0.489), were less likely to give their child human milk as first food intake. Besides, discrimination is also related to a shorter breastfeeding or chestfeeding duration (AOR = 0.535, 95% CI = 0.375~0.761).

Interpretation Breastfeeding or chestfeeding are neglected health problems in the transgender and gender-diverse population and many socio-demographic factors, transgender and gender-diverse-related factors, and family environment are correlated with it. Better social and family support is necessary to improve breastfeeding or chestfeeding practices.

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Abbreviations: AOR, Adjusted odds ratio; BCF, Breastfeeding or chestfeeding; BCFP, Breastfeeding or chestfeeding practice; EBCF, Exclusive breastfeeding or chestfeeding; FFI, First food intake; GD, Gender dysphoria; LGBT, Lesbian, gay, bisexual, and transgender; LGBTQ, Lesbian, gay, bisexual, transgender, and queer; OR, Odds ratio; TGD, Transgender and gender diverse; TM, Transgender man; TW, Transgender woman; WHO, World Health Organization; UNICEF, United Nations Children's Fund

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Research in context

Evidence before this study

We searched articles in PubMed up to January 5, 2023, using the terms (“transgender” OR “gender incongruence”) AND (“breastfeeding” OR “chestfeeding” OR “parenthood”). To our knowledge, no quantitative research has been conducted to evaluate breastfeeding or chestfeeding status or the influencing factors of breastfeeding or chestfeeding practices in the transgender and gender-diverse population.

Added value of this study

To the best of our knowledge, this large-scale survey is the first to investigate breastfeeding or chestfeeding practices among transgender and gender-diverse populations, and fills a research gap in these practices among transgender and

gender-diverse parents. Compared to the cisgender population, transgender and gender-diverse parents showed a lower exclusive breastfeeding or chestfeeding rate and a shorter breastfeeding or chestfeeding duration.

Implications of all the available evidence

Having received hormone therapy before having a child, higher gender dysphoria level, experiencing family and partner violence, having a child with artificial insemination and surrogacy, no feeding education, and experiencing discrimination during health seeking are associated with poor breastfeeding or chestfeeding practices. It is crucial to help to build a better family and social environment for transgender people to improve breastfeeding or chestfeeding practices.

Introduction

The importance of breastfeeding is widely recognised. Breastfeeding significantly reduces the risk of infectious diseases and infant mortality and could bring a lifelong benefit.^{1,2} The recommendations of the World Health Organization (WHO) and the United Nations Children’s Fund (UNICEF) advocate that breastfeeding should begin within 1 h after delivery³; infants should be exclusively breastfed in the first six months of life and should be continuously breastfed until two years of age or older.⁴ However, according to the data released recently, by 2020, only approximately 44% of infants under six months worldwide got exclusive breastfeeding, which is still lower than the goal of 50% by 2030.^{5,6}

With the increasing acceptance of gender and sexual minorities, family composition has changed. A new group of parents, consisting of lesbian, gay, bisexual, transgender, and queer (LGBTQ), has gradually emerged in society.⁷ “Transgender” is an umbrella term that refers to individuals whose gender identity is inconsistent with their gender assigned at birth, including transgender men (TM, female to male), transgender women (TW, male to female), “gender-diverse” is a wide-ranging inclusive term for describing individuals with identities outside or beyond the gender binary,⁸ including non-binary individuals, gender mobility, and genderqueer individuals. In the United States, approximately 18.8% of transgender and gender-diverse (TGD) individuals are parents.⁹ A study in Belgium reported 21.6% of transgender respondents had current/future parental intentions, and 31.9% had met parental desires.¹⁰ There are few relevant studies in China. It is estimated that approximately 0.3% of the population in the Asian Pacific region are TGD,¹¹ 4 million TGD individuals live in Mainland China. According to the above studies, about 20%–30% TGD

individuals might have children, which is a number that cannot be ignored.

A wide range of historical, socioeconomic, cultural, and personal factors can influence breastfeeding practices.³ Breastfeeding practices might be more complex for TGDs who choose parenthood. Previous studies have demonstrated that TGD individuals may face special barriers related to their ability to provide breast milk to infants, such as discriminatory policies,¹² regulations restricting donor milk, or anatomical/functional restrictions.¹³ Because the family development of TGD couples can take many forms, including adoption and assisted reproductive technology,^{14–16} infants from these families may face the risk of health differences from birth in the form of reduced access to breast milk.¹⁷ In addition, it should not be assumed that all TGD parents are willing to breastfeed, and many individuals do not want to use their bodies this way.¹⁸ The word “breast” may cause discomfort to TM. They are more comfortable with the word “chestfeeding” than with the word “lactation” or “breastfeeding”.¹⁹ Therefore, in the following article, we use “breastfeeding or chestfeeding (BCF)” instead of “breastfeeding” in transgender-related expressions. In this study, BCF refers to feeding infants with human milk, including feeding human milk via chest, breast, or bottle.

The studies on the breastfeeding or chestfeeding practice (BCFPs) of TGD parents are extremely limited. Many previous studies use the term “lesbian, gay, bisexual and transgender (LGBT)” but seldom refer to “T”.¹⁷ All existing literature comprises qualitative studies or case reports,^{20–22} and most are from a nursing perspective.^{19,23} To the best of our knowledge, no quantitative research has been conducted to evaluate BCFPs in the TGD population. Therefore, we conducted a large-scale cross-sectional study on BCFPs of TGD parents

living in China, explored its associated factors, and put forward possible suggestions for promoting BCF.

Methods

Participants

This study used a cross-sectional design, and was conducted between January 27 2022 and February 15 2022 online in China. All participants were recruited via a sampling strategy that combined convenience, respondent-driven, and snowball sampling, which have proven effective in recruiting gender and sexual minorities.^{24–26} First, we distributed an online survey of the TGD community on the social media platform. We also invited the initial participants to distribute the questionnaire to their TGD and gender-diverse friends and acquaintances (TGD parents who from same family was avoided to invite via a notice showed in invitation letter). Before participating, all the participants needed to sign an informed consent form, which introduced the purpose of the study and their right to withdraw, the survey began after they choose “agree”. All questionnaires were anonymous. The inclusion criteria were (1) assigned gender that did not coincide with self-identified gender, (2) having or used to have at least one child in a biological or legal sense, and (3) currently living in China and can read Chinese. The participants who met the inclusion criteria received a reward (10–15 RMB) after completing the survey. To ensure the survey quality, three attention-check questions were used. If the participants selected wrong options in either of these questions, it indicated a poor quality of data and was excluded from this study.

After excluding participants who did not have child, or whose gender identity was the same as their assigned gender, we reached a total of 742 participants who met the inclusion criteria, and data from 95 answers were excluded because the incorrect answers were shown in the attention-check questions. The sample source included all provinces in mainland China. The study was conducted in accordance with the Helsinki Declaration and was approved by the Ethics Committee of Tsinghua University (NO 20210161).

Data collection

The e-questionnaire was administered using the Wenjuanxing e-questionnaire platform (Wenjuanxing Tech Co., Ltd., Changsha, China), which is the largest e-questionnaire platform in China. A preliminary questionnaire was developed by consulting relevant studies and experts in related fields. Before the actual survey, we ran focus groups to test all the questions included in this questionnaire. Participants included experts involved in this phase, including experienced maternal and child health professionals and researchers, and experts with research experience related to TGD population. TGD volunteers were also invited to ensure

the questions were understandable and effective. The questionnaire consists of four parts: sociodemographic characteristics, TGD-related factors, family social environment factors, and BCFPs. As for questions involving children, if the participant had more than one child, the answers were based on the latest situation. We also investigated participants' sex and gender, by asking them “What is your gender assigned at birth?” and “What is your gender identity now?”

For TGD-related characteristics and family social environment, answers to questions such as, “Have you come out before having this child?”; “Have you been discriminated against during seeking of childbearing (such as health providers didn't respect my gender identity, showed prejudice, etc.)?”; “Have you ever received feeding-related education?” were collected. The participants who were biological parents of their children were asked by “Have you had hormone therapy before having this child?—A. Yes; B. After lactation (feeding your child with your own human milk) or never”. The sources of human milk were also been investigated by a multiple choices question “What are the sources of human milk your child fed with?”. Gender dysphoria (GD), family violence, and partner violence were also accessed. GD was measured using a scale adapted from the four dimensions of gender incongruence in adolescents and adults criteria in the International Classification of Diseases 11th Revision (ICD-11),²⁷ consisting of 12 items, and response options using a Likert scale ranging from 1 (completely disagree) to 5 (completely agree). The total score was summed for the 12 items, with a higher score indicating a higher GD level. This scale have been shown to have good reliability in a test sample of 30 volunteers, the Cronbach's alpha was 0.910. Family violence was defined as violence ever received from parents or guardians, it was measured using a 5-point scale ranging from 1 (never) to 5 (always) with 15 items, where a higher total score indicates more severe violence. Another scale was used to evaluate intimate partner violence experienced by participants, which consisted of 13 items, using a 5-point Likert scale ranging from 1 (never) to 5 (always). The scales of family violence and partner violence were applied in 2017 Chinese Transgender Population General Health Survey,^{28–30} and have been shown to have good reliability in previous research populations, the Cronbach's alpha of these two scales was 0.923, 0.907, respectively. The contents of the three scales are shown in the Appendix files. In our final sample, Cronbach's alpha of these scales was 0.888, 0.967 and 0.964, respectively.

With regard to BCFPs, the feeding method in the first six months, the infant's first food intake (FFI), and BCF duration were investigated. The question “What is the feeding method of your child in the first six months?” was asked and “exclusive breastfeeding or

chestfeeding (EBCF)” defines as only human milk feeding (occasional water is allowed), while, “mixed and artificial feeding” defines as infants once feeding with dairy formula or other milk substitutes. Another question, “What did your child have as his/her first food after birth?” was asked. If the participant’s child was adopted, the question was skipped. Additionally, the question “How long did you feed your child with human milk?” was used to determine the exact BCF duration.

Statistical analysis

R version 4.1.3 was used for data analysis. After normality test (using Shapiro–Wilk test) and Homogeneity of variance test (using Bartlett test), unpaired t-test and nonparametric test (Kruskal Wallis test) were used to compare different continuous variables among the different BCFPs. The scores of GD, family violence, and partner violence were divided into 3 levels according to their quartiles. Chi-square and Fisher’s exact tests were used to examine differences in categorical variables among the different BCFPs. Logistic regression analysis with and without adjusting confounders was applied to explore the association between different factors and BCFPs. Variables that were significantly associated with BCFPs in bivariate analyses were added into adjusted regression models as covariates. We also did a subgroup analysis in different gender identity groups (TW and TM) and different children age groups (<6 years and >6 years). All comparisons were bilateral, with $p < 0.05$ considered statistically significant.

Role of the funding source

There was no funding source for this study. RC and AZ had full access to all of the data in the study and take responsibility for the integrity of the data and the accuracy of the data analysis.

Results

BCFPs of participants with different sociodemographic characteristics

Data of 647 responses were used in this study. The average age of the participants was 30.8 years. Among them, 361 (55.8%) self-identified as TW, 231 (35.7%) self-identified as TM, and 55 (8.5%) identified themselves as other (genderqueer or non-binary). Approximately one-third (214, 33.5%) of the participants chose EBCF. The FFI of most (478, 80.2%) infants was human milk, and more than half (347, 58.7%) of the participants breastfed or chestfed their children for less than six months. When being asked about the sources of human milk, 530 (82.8%) participants chose “myself or my partner”, 89 (13.7%) participants chose “donated human milk”, 100 (15.5%) participants chose “not sure because the child was adopted or surrogated”, 42 (6.5%) participants chose “totally artificial feeding”. Most participants (534, 82.5%) only have one child, so the

number of previous children was not included in final statistical analysis.

Table 1 shows the differences of sociodemographic characteristics among parents with different BCFPs. The EBCF in TGD parents who are TW ($p = 0.003$), with younger age ($p = 0.026$), were not from extended family ($p < 0.001$), or with a middle family income was worse ($p = 0.004$). Children older than 6 years more accepted human milk as their FFI ($p = 0.0028$). The parents with lower income ($p = 0.0024$) or had a child younger than 6 years old ($p = 0.0401$) had a shorter BCF duration.

TGD-related and family environment characteristics of participants and their association with BCFPs

As Table 2 shows, EBCF among participants who had hormone therapy before having this child ($p = 0.0165$), with a higher GD score ($p < 0.001$), with a higher family ($p < 0.001$) or partner violence score ($p = 0.00194$), did not choose traditional sexual intercourse ($p < 0.001$), had not received feeding-related education ($p < 0.001$), or had experienced discrimination during seeking of childbearing health care ($p < 0.001$) was worse. More infants of participants who chose traditional sexual intercourse ($p < 0.001$), with a lower family ($p = 0.0139$) or partner violence score ($p = 0.042$), had received feeding-related education ($p = 0.007$), or had not experienced discrimination during seeking of childbearing health care ($p < 0.001$) accepted human milk as their FFI. Participants who had experienced discrimination during seeking of childbearing health care had a shorter BCF duration ($p < 0.001$).

Multivariable logistic regression models of BCFPs TGD-related characteristics, and family environment

In the multivariate analysis, family type, average family annual income, gender identity, and child’s age were adjusted as confounders. The results are showed in Table 3 and Fig. 1.

For models of feeding methods in the first six months, compared with participants who take hormone therapy before pregnancy, those who received hormone therapy after BCF period or have never received it were more likely to choose EBCF ($p = 0.044$). Compared with those with a GD score of 37 or less, participants with a higher GD score were less likely to choose EBCF ($p = 0.004, 0.003$, respectively). Participants whose family violence score was between 15 and 35 or higher were less likely to choose EBCF (both $p < 0.001$). Compared with children born of traditional sexual intercourse, babies born through assisted reproductive technology or surrogacy had significantly poorer EBCF ($p < 0.001, 0.009$, respectively). Parents with feeding related education were more likely to choose EBCF ($p = 0.001$). Participants who had experienced discrimination while seeking childbearing health care were less likely to choose EBCF ($p < 0.001$).

Variables	Coding	Feeding method in six months (n = 639)			First food (n = 596)			Chestfeeding duration (n = 591)			Overall (N = 647)
		Mixed/artificial feeding (N = 425)	Exclusive chestfeeding (N = 214)	p	Formula/glucose solution (N = 118)	Human milk (N = 478)	p	>6 months (N = 244)	≤6 months (N = 347)	p	
Demographic variables											
Age											
Mean (SD)		30.3 ± 5.12	31.9 ± 7.35	0.026	31.5 (8.51)	30.7 (5.21)	0.893	30.8 (5.14)	31.0 (6.67)	0.523	30.8 (5.98)
Median [25th–75th]		29.0 [27.0–34.0]	30.0 [27.0–35.0]		30.0 [27.0–35.0]	30.0 [27.0–35.0]		30.0 [27.0–35.0]	29.0 [27.0, 35.0]		30.0 [27.0, 35.0]
Education level											
Middle/high/technology/vocational school	1	64 (58.2%)	46 (41.8%)	0.113	24 (23.3%)	79 (76.7%)	0.599	35 (34.7%)	66 (65.3%)	0.238	110 (17.0%)
College/University (undergraduate)	2	324 (67.9%)	153 (32.1%)		84 (18.9%)	360 (81.1%)		185 (42.0%)	255 (58.0%)		485 (75.0%)
Postgraduate (Master/Ph.D.)	3	37 (71.2%)	15 (28.8%)		10 (20.4%)	39 (79.6%)		24 (48.0%)	26 (52.0%)		52 (8.0%)
Family type											
Extended family	1	161 (60.8%)	104 (39.2%)	<0.001	51 (20.2%)	201 (79.8%)	0.209	97 (39.6%)	148 (60.4%)	0.353	268 (41.4%)
Nuclear family	2	154 (64.7%)	84 (35.3%)		37 (16.7%)	185 (83.3%)		90 (40.7%)	131 (59.3%)		242 (37.4%)
Adoptive/reconstituted family	3	63 (79.7%)	16 (20.3%)		20 (28.2%)	51 (71.8%)		29 (40.3%)	43 (59.7%)		79 (12.2%)
Single parent or other	4	47 (82.5%)	10 (17.5%)		10 (19.6%)	41 (80.4%)		28 (52.8%)	25 (47.2%)		58 (9.0%)
Average family annual income											
<50 k	1	90 (66.7%)	45 (33.3%)	0.00425	27 (20.8%)	103 (79.2%)	0.951	46 (36.2%)	81 (63.8%)	0.0024	139 (21.6%)
50–100 k	2	100 (70.4%)	42 (29.6%)		25 (19.5%)	103 (80.5%)		52 (38.8%)	82 (61.2%)		144 (22.4%)
100–200 k	3	138 (73.0%)	51 (27.0%)		35 (20.3%)	137 (79.7%)		59 (35.3%)	108 (64.7%)		190 (29.5%)
≥200 k	4	95 (55.9%)	75 (44.1%)		30 (18.3%)	134 (81.7%)		86 (53.8%)	74 (46.3%)		171 (26.6%)
Child's age											
0–6 years	1	364 (67.7%)	174 (32.3%)	0.211	88 (17.6%)	412 (82.4%)	0.00277	197 (39.4%)	303 (60.6%)	0.0401	542 (84.0%)
>6 years	2	60 (60.6%)	39 (39.4%)		30 (31.6%)	65 (68.4%)		46 (51.7%)	43 (48.3%)		103 (16.0%)

Table 1: The differences of socio-demographic characteristics among parents with different BCFPs.

Variables	Coding	Feeding methods in six months (n = 638)			Child's first food (n = 596)			Chestfeeding duration (n = 591)			Overall (N = 647)
		Mixed/artificial feeding (N = 425)	Exclusive chestfeeding (N = 214)	p	Formula/glucose solution (N = 118)	Human milk (N = 478)	p	>6 months (N = 244)	≤6 months (N = 347)	p	
Transgender related characteristics											
Gender identity											
TW	1	254 (71.3%)	102 (28.7%)	0.003	68 (20.4%)	265 (79.6%)	0.95	132 (40.0%)	198 (60.0%)	0.861	361 (55.8%)
TM	2	132 (57.9%)	96 (42.1%)		42 (19.8%)	170 (80.2%)		86 (41.1%)	123 (58.9%)		231 (35.7%)
Other	3	39 (70.9%)	16 (29.1%)		8 (15.7%)	43 (84.3%)		26 (50.0%)	26 (50.0%)		55 (8.5%)
Time of coming out											
Before the coming of this child	1	230 (63.2%)	134 (36.8%)	0.0813	65 (19.5%)	269 (80.5%)	0.756	140 (42.3%)	191 (57.7%)	0.415	366 (56.6%)
After the coming of this child	2	124 (72.9%)	46 (27.1%)		35 (21.6%)	127 (78.4%)		61 (37.2%)	103 (62.8%)		170 (26.3%)
Not yet	3	71 (67.6%)	34 (32.4%)		18 (18.0%)	82 (82.0%)		43 (44.8%)	53 (55.2%)		111 (17.2%)
Hormonotherapy											
Before having this child	1	116 (64.8%)	63 (35.2%)	0.0165	30 (17.0%)	146 (83.0%)	0.299	68 (40.0%)	102 (60.0%)	0.635	179 (27.7%)
After having this child	2	69 (50.7%)	67 (49.3%)		16 (12.1%)	116 (87.9%)		56 (43.4%)	73 (56.6%)		138 (21.3%)
Gender dysphoria											
≤37	1	88 (51.8%)	82 (48.2%)	<0.001	28 (17.0%)	137 (83.0%)	0.458	68 (43.0%)	90 (57.0%)	0.531	173 (26.7%)
37-47	2	213 (69.8%)	92 (30.2%)		57 (20.0%)	228 (80.0%)		111 (38.9%)	174 (61.1%)		308 (47.6%)
>47	3	124 (75.6%)	40 (24.4%)		33 (22.6%)	113 (77.4%)		65 (43.9%)	83 (56.1%)		166 (25.7%)
Family environment											
Family violence											
≤15	1	96 (49.0%)	100 (51.0%)	<0.001	27 (14.8%)	155 (85.2%)	0.0139	81 (43.8%)	104 (56.2%)	0.702	200 (30.9%)
15-35	2	208 (73.5%)	75 (26.5%)		50 (18.9%)	215 (81.1%)		103 (39.9%)	155 (60.1%)		285 (44.0%)
>35	3	121 (75.6%)	39 (24.4%)		41 (27.5%)	108 (72.5%)		60 (40.5%)	88 (59.4%)		162 (25.0%)
Partner violence											
≤13	1	134 (58.0%)	97 (42.0%)	0.00194	35 (16.7%)	174 (83.3%)	0.042	85 (40.5%)	125 (59.5%)	0.944	233 (36.0%)
13-30	2	175 (69.7%)	76 (30.3%)		43 (18.1%)	195 (81.9%)		98 (42.1%)	135 (57.9%)		255 (39.4%)
≥30	3	116 (73.9%)	41 (26.1%)		40 (26.8%)	109 (73.2%)		61 (41.2%)	87 (58.8%)		159 (24.6%)
Family formation method											
Traditional sexual intercourse	1	288 (60.9%)	185 (39.1%)	<0.001	69 (14.8%)	397 (85.2%)	<0.001	189 (42.1%)	260 (57.9%)	0.517	475 (73.4%)
Artificial insemination	2	59 (86.8%)	9 (13.2%)		24 (36.4%)	42 (63.6%)		21 (32.8%)	43 (67.2%)		69 (10.7%)
Surrogacy	3	52 (80.0%)	13 (20.0%)		25 (39.1%)	39 (60.9%)		25 (44.6%)	31 (55.4%)		65 (10.0%)
Adoption or other	4	26 (78.8%)	7 (21.2%)		0 (0%)	0 (0%)		9 (40.9%)	13 (59.1%)		38 (5.9%)
Have received feeding-related education											
No	0	116 (79.5%)	30 (20.5%)	<0.001	39 (28.3%)	99 (71.7%)	0.007	61 (46.9%)	69 (53.1%)	0.168	151 (23.3%)
Yes	1	309 (62.7%)	184 (37.3%)		79 (17.2%)	379 (82.8%)		183 (39.7%)	278 (60.3%)		496 (76.7%)
Have experienced discrimination during seeking of childbearing health care											
No	0	146 (54.1%)	124 (45.9%)	<0.001	34 (13.3%)	221 (86.7%)	<0.001	127 (49.8%)	128 (50.2%)	<0.001	276 (42.7%)
Yes	1	279 (75.6%)	90 (24.4%)		84 (24.6%)	257 (75.4%)		117 (34.8%)	219 (65.2%)		371 (57.3%)
Primary caregiver											
Parents	1	319 (64.8%)	173 (35.2%)	0.115	84 (18.4%)	373 (81.6%)	0.285	179 (39.7%)	272 (60.3%)	0.107	498 (78.2%)
Grandparents	2	100 (72.5%)	38 (27.5%)		32 (24.6%)	98 (75.4%)		58 (44.6%)	72 (55.4%)		139 (21.8%)

Table 2: Bivariate analyses of correlates with feeding method in six months, child's first food, and BCF duration among transgender.

Furthermore, it was more likely that participants with a higher family violence score ($p = 0.012$), and who chose assisted reproductive technology ($p < 0.001$) and surrogacy ($p < 0.001$) and who were discriminated during seeking childbearing health care ($p < 0.001$) were less likely to choose human milk as the FFI for their child. Meanwhile, children of parents with

feeding-related education were more likely to have breast milk as their FFI ($p = 0.04$). For feeding duration, participants who experienced discrimination were more likely to have shorter BCF duration ($p < 0.001$).

Supplementary Fig. S1 showed a directed acyclic graph based on literature review, the results of bivariate analyses, and the results of pathway analyses,

	EBCF in six months		First food was human milk		BCF duration >6 months	
	OR (95% CI)	AOR ^a (95% CI)	OR (95% CI)	AOR ^a (95% CI)	OR (95%CI)	AOR ^a (95% CI)
Time of coming out						
Before the coming of this child	1.00 (Ref)	1.00 (Ref)	1.00 (Ref)	1.00 (Ref)	1.00 (Ref)	1.00 (Ref)
After the coming of this child	0.637 (0.424~0.945)*	0.652 (0.426~0.989)*	0.877 (0.555~1.402)	0.876 (0.54~1.437)	0.808 (0.548~1.184)	0.789 (0.525~1.179)
Not yet	0.822 (0.514~1.295)	0.873 (0.532~1.415)	1.101 (0.629~2.007)	1.181 (0.658~2.207)	1.107 (0.698~1.747)	1.088 (0.671~1.757)
Hormonotherapy						
Before having child	1.00 (Ref)	1.00 (Ref)	1.00 (Ref)	1.00 (Ref)	1.00 (Ref)	1.00 (Ref)
After having child or never	1.788 (1.136~2.825)*	1.664 (1.014~2.738)*	1.49 (0.784~2.923)	1.54 (0.779~3.147)	1.151 (0.723~1.831)	1.161 (0.702~1.918)
Gender dysphoria						
≤37	1.00 (Ref)	1.00 (Ref)	1.00 (Ref)	1.00 (Ref)	1.00 (Ref)	1.00 (Ref)
37-47	0.464 (0.314~0.682)***	0.549 (0.364~0.827)**	0.818 (0.491~1.337)	0.762 (0.444~1.284)	0.844 (0.569~1.254)	0.832 (0.547~1.267)
>47	0.346 (0.216~0.549)***	0.474 (0.286~0.778)**	0.7 (0.397~1.226)	0.681 (0.366~1.259)	1.036 (0.659~1.63)	1.003 (0.613~1.643)
Family violence						
≤15	1.00 (Ref)	1.00 (Ref)	1.00 (Ref)	1.00 (Ref)	1.00 (Ref)	1.00 (Ref)
15-35	0.346 (0.235~0.507)***	0.388 (0.257~0.583)***	0.749 (0.444~1.24)	0.783 (0.452~1.334)	0.853 (0.582~1.252)	0.8 (0.532~1.201)
>35	0.309 (0.194~0.486)***	0.335 (0.203~0.545)***	0.459 (0.264~0.787)**	0.47 (0.259~0.84)*	0.875 (0.564~1.356)	0.874 (0.546~1.395)
Partner violence						
≤13	1.00 (Ref)	1.00 (Ref)	1.00 (Ref)	1.00 (Ref)	1.00 (Ref)	1.00 (Ref)
13-30	0.6 (0.411~0.872)	0.724 (0.487~1.074)	0.912 (0.556~1.488)	0.942 (0.562~1.568)	1.068 (0.731~1.561)	1.037 (0.697~1.543)
≥30	0.488 (0.312~0.755)*	0.541 (0.334~0.867)*	0.548 (0.327~0.915)*	0.579 (0.332~1.005)	1.031 (0.671~1.581)	1 (0.631~1.58)
Family formation method						
Traditional sexual intercourse	1.00 (Ref)	1.00 (Ref)	1.00 (Ref)	1.00 (Ref)	1.00 (Ref)	1.00 (Ref)
Artificial insemination	0.237 (0.108~0.467)***	0.269 (0.12~0.541)***	0.304 (0.174~0.539)***	0.304 (0.168~0.56)***	0.672 (0.38~1.157)	0.632 (0.349~1.115)
Surrogacy	0.389 (0.198~0.713)**	0.406 (0.199~0.776)**	0.271 (0.155~0.48)***	0.264 (0.144~0.489)***	1.109 (0.63~1.937)	0.89 (0.486~1.613)
Adoption or other	0.419 (0.165~0.936)*	0.414 (0.146~1.008)				1.044 (0.39~2.72)
Have received feeding-related education						
No	1.00 (Ref)	1.00 (Ref)	1.00 (Ref)	1.00 (Ref)	1.00 (Ref)	1.00 (Ref)
Yes	2.302 (1.499~3.63)***	2.161 (1.363~3.508)**	1.89 (1.206~2.931)**	1.644 (1.015~2.632)*	0.745 (0.503~1.103)	0.816 (0.537~1.245)
Have experienced discrimination during seeking of childbearing health care						
No	1.00 (Ref)	1.00 (Ref)	1.00 (Ref)	1.00 (Ref)	1.00 (Ref)	1.00 (Ref)
Yes	0.38 (0.27~0.531)***	0.402 (0.28~0.576)***	0.471 (0.301~0.723)***	0.457 (0.284~0.721)***	0.538 (0.386~0.75)***	0.535 (0.375~0.761)***
Primary caregiver						
Parents	1.00 (Ref)	1.00 (Ref)	1.00 (Ref)	1.00 (Ref)	1.00 (Ref)	1.00 (Ref)
Grandparents	0.701 (0.458~1.055)	0.784 (0.501~1.21)	0.69 (0.437~1.108)	0.654 (0.405~1.071)	1.224 (0.824~1.814)	1.233 (0.815~1.861)

AOR, adjusted odds ratio; CI, confidence interval; Ref, reference group; EBCF, exclusive breastfeeding or chestfeeding; BCF, breastfeeding or chestfeeding. An adjusted odds ratio of 1.00 is the reference. Asterisk(s) denotes significant results (*p < 0.05; **p < 0.01; ***p < 0.001). ^aOdds ratios are adjusted for socio-demographic variables which had a significant bivariate association with BCF choices. (Age, family annual income, gender identity, family type, and child's age).

Table 3: Multivariable logistic regression models of BCFs, and transgender related characteristics and family environment.

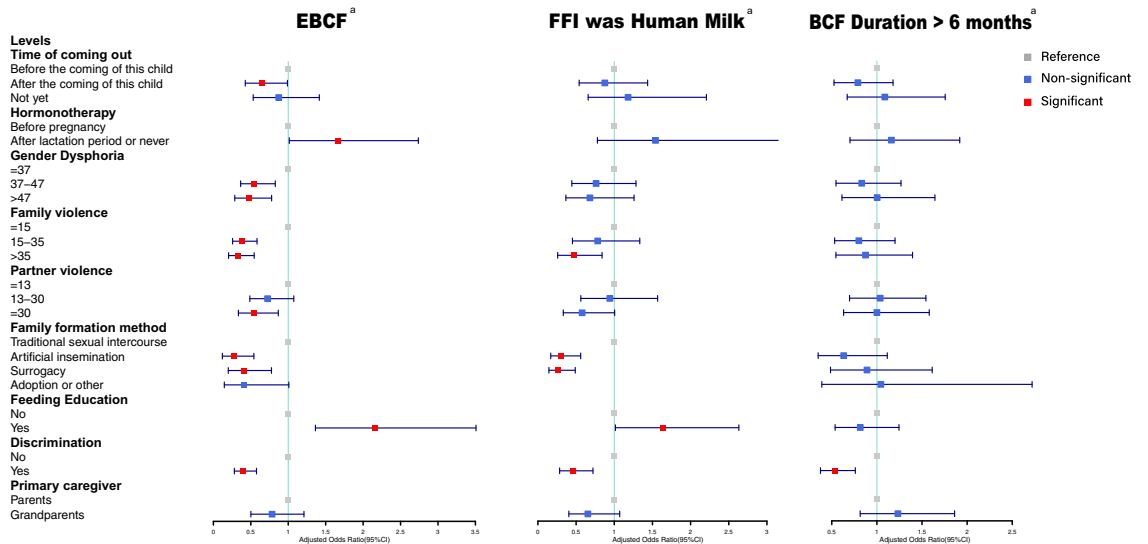


Fig. 1: Forest plot of multivariable logistic regression models of BCFPs, and transgender-related characteristics and family environment. ^aOdds ratios are adjusted for socio-demographic variables which had a significant bivariate association with BCF choices (Age, family annual income, gender identity, family type, and child's age).

demonstrated the relationships among covariate, exposures and outcomes in this study. It was created using DAGitty version 3.0.

Subgroup analysis

Multivariate logistic regression results for different gender identities are shown in [Supplementary Tables S1 and S2](#), and [Fig. 2](#). We only did the analysis in TW and TM because the sample size of other gender identities is limited. The association of hormone therapy and

artificial insemination on EBCF was significant only in TW, whereas the association of GD and feeding education on EBCF was significant only in TM. Regarding the effects on FFI, association of feeding education and primary caregiver were found only in TM, whereas the associations of family violence, partner violence, and discrimination were significant only in TW. In addition, the discrimination was found significant associated with BCF duration in TW. The associations between primary caregiver and BCFPs were not found, whereas other

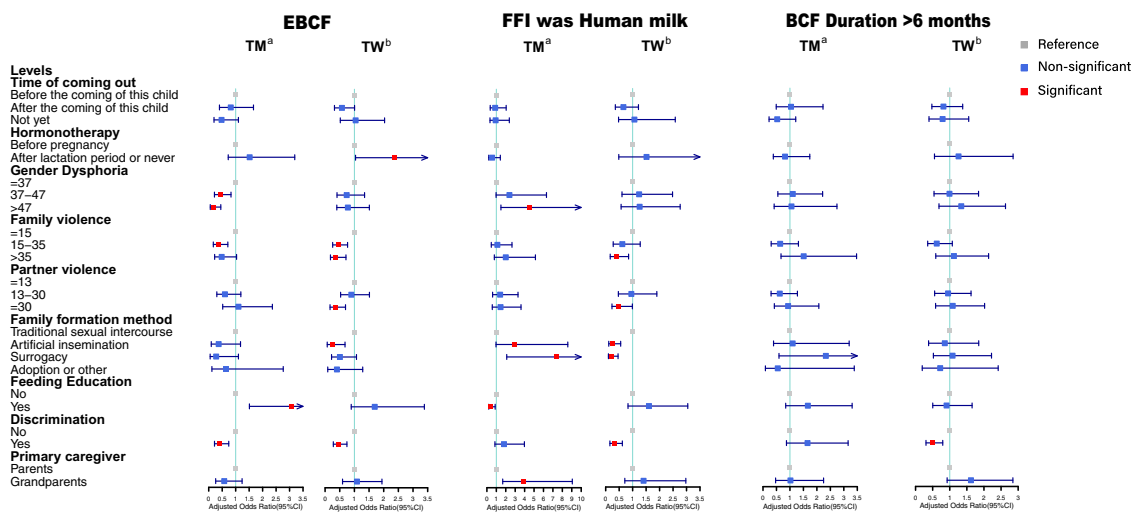


Fig. 2: Forest plot of multivariable logistic regression models of BCFPs, and transgender-related characteristics and family environment in different gender groups. ^aOdds ratios are adjusted for age, education level, family type, and family income. ^bOdds ratios are adjusted for family type and family income.

significant associations on BCFPs were consistent with those in all participants.

Supplementary Tables S3 and S4, and Fig. 3 show the multivariable logistic regression results for different age groups of children. The cut point for age was 6 years because it is a cutpoint of preschool and school child. Most children begin to primary school at 6 years in China, and their feeding patterns might change (from eating at home to eating at school). Fig. 3 displays the results of the adjusted logistic regression model. The participants were divided into two groups, those with children aged six years or younger (0–6 years old group) and those with children aged older than six years (>6 y group). Many associations were only significant in the 0–6 years age group, including the associations of hormone therapy, gender dysphoria, and family violence on EBCF, and the associations of discrimination on EBCF, first food for infants, and BCF duration. Furthermore, although an association between family formation method and BCFPs was found in both groups, the effects of surrogacy on EBCF and first food were significant only in the 0–6 years age group. The associations of hormone therapy and gender dysphoria on BCF duration were found in the >6 years age group only, while these effects were not found in the 0–6 years age group and total groups. Other significant effects on BCFPs were consistent with those observed in all the participants.

Discussion

Using a large-scale cross-sectional survey, this study revealed the BCFPs in TGD parenthood in China, which includes three dimensions: feeding method in the first six months, first food of infants, and BCF duration. Current data showed an alarming fact that only 33.5% of babies in Chinese TGD families are exclusively chest-fed, and less

than 6% of infants could be continuously fed until one year old, which is far lower than the world average (44%) and WHO’s goals (50%) for exclusive breastfeeding.³¹ BCF behaviours in this population are in dire need of improvement. Identifying the factors affecting BCF is the basis for changing the current situation.

First, we found that some of the common social determinants affecting breastfeeding in the cisgender population also influence BCF in the TGD population. Consistent with studies in the cisgender population, participants who grew up in extended or nuclear families were more likely to choose EBCF,³² while participants with a higher annual family income preferred a shorter BCF duration.¹ In addition, some results, which were different from those of the cisgender population were noted, where participants who had a higher family income were more likely to exclusively chest-feed their infants. In previous studies done in cisgender population, breastfeeding was less frequent among rich people in China and other middle-income countries.^{1,33} Children who were older than six years (at the time of this survey) were less likely to be fed human milk as their FFI and with a shorter BCF duration. As for the possible explanation, participants may have recall bias³⁴ when reporting information from six years ago, and previous education on the importance of breast milk as a FFI may not have been sufficient.

In addition to the sociodemographic influencing factors, this study identified some unique factors associated with BCFPs in TGD groups. Compared to those who chose to conceive through traditional sexual intercourse, those who opted for artificial insemination, surrogacy, and adoption were less likely to practice EBCF and feed breastmilk to the new-born as the FFI. These results can be easily explained by the difficulty in accessing breast milk. Although there are no data

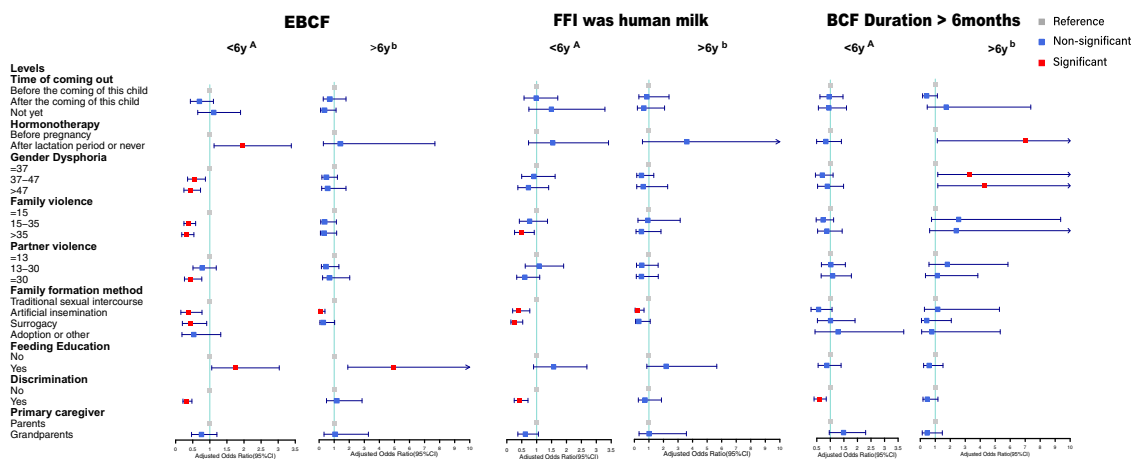


Fig. 3: Forest plot of multivariable logistic regression models of BCFPs, and transgender-related characteristics and family environment in different child’s age groups. ^aOdds ratios are adjusted for age, education level, family type and family income. ^bOdds ratios are adjusted for family type and family income.

among TGD individuals, previous studies have reported that same-sex partners are four times more likely to establish a family through adoption than heterosexual partners.¹³ Another unsurprising factor impairing BCFPs is receiving hormone therapy before the baby born. Testosterone is a key hormone in virilisation therapy that may greatly interfere with hormones necessary for milk production, such as prolactin, insulin, and hydrocortisone.¹⁹ Notably, in a previous study in China, approximately 79.4% of TGD individuals expressed a desire for sex-affirming hormonal therapy.^{35,36} However, hormone medications are often hard to come by, and more than half of transgender individuals use hormone medications without professional medical guidance,³⁵ which can have unknown effects on their lactation and reproductive function. We once expected the effect of hormone therapy on BCF to be predominant in TM; however, this association was observed only in TW. This phenomenon may partly be explained by the fact that most TW undergoing hormone therapy earlier might be less likely to choose traditional sexual intercourse for having babies, for both physiological and psychological reasons. They usually choose artificial insemination, surrogacy, and adoption as methods to have babies.³⁷ Further research is needed to verify the different effects of hormonotherapy on TW and TM populations, and investigate the possible explanations. To minimize the negative impact of hormonotherapy on BCFPs in TGD populations, we advocate for an operational framework for medical professionals to reduce unsafe and informally hormonotherapy, and provide professional medical guidance to transgender people, such as assessing their fertility intentions prior to their choice of hormone therapy or sex reassignment surgery, and professional advice and medical care for TGD people with BCF needs.

In addition to physiological causes, psychological factors may contribute to unsatisfactory BCFPs. We observed that a higher GD score and an early time of coming out were associated with a reduced BCF rate. There was collinearity between these two factors and we could have a reasonable hypothesis that GD that occurred in a younger age impelled individuals to use hormone therapy early, which might lead to a series of consequences that result in BCF failure. Besides, other factors associated with GD might impact an individual's ability to lactate, or perception of human milk in choice of feeding, therefore probably cause poor BCFPs, too. Such as body-image dissatisfaction, anxiety, depression, use of psychotropic medications, and eating disorders such as anorexia nervosa, and so on.²² In the stratified analysis, we found that TM with more severe GD were less likely to choose EBCF. This finding may be because TM with severe GD would resist using their chest to feed infants, and they may resort to chest binding, hormonotherapy, or masculinising chest surgery to handle their dysphoria,³⁷ all of which may affect BCF

function.³⁸ Further qualitative studies are required to validate these associations and explore other underlying causes.

Although the above factors cannot be fully modified, some strategies can be applied to promote BCF. For example, carefully assessing the fertility intentions of TGD individuals, providing professional guidance before they request hormonal therapy, and allowing TGD parents to access donated human milk from milk banks. It should be noted that although milk banks in China are booming, there are still strict restrictions on the use of donated breast milk because of the limited amount of donations. Currently, only hospitalised infants can use breast milk from the milk bank.³⁹ It is necessary to strengthen the construction of breast milk banks, encourage breast milk donation, and extend the adaptation to more minority populations.

Besides individual factors, social and environmental factors were also investigated and showed a crucial role in BCFP. Prospective cohort studies have suggested that childhood abuse and intimate partner violence can contribute to poor breastfeeding outcomes in the cisgender population.³² TGD individuals are more likely to be exposed to violence. Traditional values of the Chinese family unit may result in the exclusion and violence of TGD individuals, and notions such as observance of "rules of nature" and perpetuation of blood for families make gender and sexual minorities a disgrace to the family.⁴⁰ According to one study, 92.8% of transgender youth in China have experienced parental abuse or neglect because of their gender identity.³⁰ For partner violence, transgender individuals are more likely to experience partner violence than cisgender individuals.⁴¹ Our study found that there was a relationship between violence and poor EBCF, and it was more significant among TW. This may be because gender non-conforming behaviours in men are less tolerant than in women, and TM is more often subjected to verbal and physical abuse.²⁹ Therefore, we strongly advocate that family support is particularly important for improving BCFPs in TGD populations.

Another notable finding of this study is that less childcare education and discrimination while seeking childbearing health care were the independent factors of unsatisfactory BCFPs. Previous studies on cisgender population found that 86% of hospitals provided parents with BCF education.⁴² The proportion of TGD parents who had received feeding education was lower, and in the current study, only 57.3% of the participants reported that they had received relevant education. This may be attributed to the health and healthcare disparities present in the health system. Gender and sexual minorities are considered medically vulnerable and marginalised.⁴³ Health disparities are often the result of persistent unjust and discriminatory practices that increase the risk of poor health in vulnerable populations.⁴⁴ In addition, the certain health knowledge and

skills are needed to be developed for promoting BCF in TGD parents.

With limited education, the discrimination in seeking healthcare was observed and it was associated with all aspects of BCFPs. Discrimination is a term frequently mentioned in TGD-related literature. In the United States, the National Transgender Discrimination Survey found that 19% of the respondents were denied medical care because of their gender identity, and 28% of the respondents delayed healthcare because of fear of discrimination.⁴⁵ And according to cognitive behavioural theory, prejudice and disrespect of TGD individuals by healthcare workers may constitute an aversive stimulus, making them less likely to seek professional help when they struggle with BCF.⁴⁶ Several previous studies have advised healthcare providers to eliminate discrimination among TGD patients.^{38,47} For example, asking and respecting patients' preferred titles and terms and using the language patients use for their own body are widely considered to be the foundation of respectful provider-patient interactions.⁴⁸

In the current study, another stratified analysis was conducted according to children's age to minimise the potential recall bias and explore the trends of BCF behaviour changes. Among TGD parents whose children were older than six years, hormone therapy, gender dysphoria, family violence, and discrimination were no longer significantly associated with EBCF. This may be due to fewer participants with children older than six years (103, 15.9%). This phenomenon can be partly explained by the fact that participants with older children may be older as well and use less Internet and social media platforms. In addition, this phenomenon hints that in recent years, there may have been an increase in having children in the TGD group. However, the rate of EBCF in the >6 years old group was 39.4%, while in the 0–6 years old group was 32.3%. The EBCF rate even declined over time, which indicates that the BCFPs in TGD parents need urgent attention and improvement.

To the best of our knowledge, this large-scale survey is the first to investigate BCFPs among TGD populations. Multiple factors associated with BCFPs, including individual physical and psychological factors and social environment support, were explored. However, this study has several limitations. First, because of the nature of the cross-sectional design, causality could not be fully examined; in particular, the assessment of GD, family violence and partner violence were based on the general situation. Although individuals may experience violence multiple times in their lifetime,⁴¹ the causality between violence and BCFPs can be complex. Second, regarding sampling methods, the current strategy is the most effective way to enrol a gender and sexual minority, however, it may introduce selection bias, non-response bias and other unknown biases, collecting data by e-questionnaires can also cause

self-report bias. Some TGD parents who are at an elder age or in rural areas without access to the internet or the TGD community, might not be included in the study. Third, we did not ask the specific BCF duration in the questionnaire. The answers of this question were designed as options. Finally, TGD families can be complex, and factors such as sexual orientation, marital status, BCF knowledge, and perceptions may also contribute to their practices. Unfortunately, these factors were not involved, and the interpretation of the results was restricted. Subsequent qualitative and quantitative studies in different cultural contexts are required to understand the BCF issues of TGD populations and seek solutions.

This study showed an unsatisfactory EBCF practice and short duration of BCF in Chinese TGD families. In addition to the common social determinants leading to BCF failure, certain influencing factors were observed in this population, including physical restriction, poor family environment, lack of feeding education, and discrimination while seeking healthcare. This study strongly advocated an overall effort to improve BCF in the TGD population, including: (1) improving the accessibility of human milk, (2) providing family support during BCF, (3) developing specific education strategies for BCF, and (4) eliminating discrimination in seeking healthcare. Most importantly, more studies are required to understand the challenges of BCF faced by gender and sexual minorities and provide essential support and solutions.

Contributors

RC and AZ had full access to all of the data in the study and take responsibility for the integrity of the data and the accuracy of the data analysis. All authors participated in the study concept and design. HY carried out the data collection, data analysis and interpretation as well as writing the first draft of the manuscript. AZ, RC and HY verified the underlying data. All authors were involved in the discussion and revised the manuscript. AZ and RC contributed the administrative, technical, or material support. All authors approved the final version, had access to the data, contributed to writing and editing the manuscript and accept responsibility to submit the final version for publication.

Data sharing statement

The data that support the findings of this study are available on request from the corresponding authors. The data are not publicly available due to privacy or ethical restrictions.

Declaration of interests

None reported.

Acknowledgments

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Appendix A. Supplementary data

Supplementary data related to this article can be found at <https://doi.org/10.1016/j.eclinm.2023.101847>.

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