

# We are IntechOpen, the world's leading publisher of Open Access books Built by scientists, for scientists

5,800

Open access books available

142,000

International authors and editors

180M

Downloads

Our authors are among the

154

Countries delivered to

TOP 1%

most cited scientists

12.2%

Contributors from top 500 universities



WEB OF SCIENCE™

Selection of our books indexed in the Book Citation Index  
in Web of Science™ Core Collection (BKCI)

Interested in publishing with us?  
Contact [book.department@intechopen.com](mailto:book.department@intechopen.com)

Numbers displayed above are based on latest data collected.  
For more information visit [www.intechopen.com](http://www.intechopen.com)



## Chapter

# Breastfeeding during COVID Pandemic

*Ka-Huen Yip, Mei-Kuen Chow, Yuk-Chiu Yip  
and Wai-King Tsui*

## Abstract

As new mothers are understandably concerned about COVID-19 and its high rate of infection, they are often unsure if they should breastfeed their infants. In general, hospitals do not allow direct breastfeeding by mothers with an active infection of SARS-CoV-2. Some neonatal units in Hong Kong maintain safe practices by isolating infants and mothers for at least 7 to 14 days, even if the infant remains SARS-CoV-2 negative. During isolation, mothers encourage the expression of milk to maintain milk duct patency and to prepare for lactation when they and their infants are discharged. Infants are fed formula milk by cup feeding with added supplements based on the recommended daily feeding volume for neonates and their appetite during hospitalization. At present, data that indicates COVID-19 could be transmitted from mother to infant postnatally through breastfeeding are insufficient. Major organizations recommend that mothers should breastfeed exclusively for the first 6 months, and thereafter continue to provide their infants with breast milk up until the age of two or beyond. With new findings arising from research, updated information is important to reassure mothers that breastfeeding at home during the COVID-19 pandemic is safe and recommended for both the mother and the infant.

**Keywords:** breastfeeding, COVID-19, mothers, mother to child, SARS-cov-2

## 1. Introduction

The Coronavirus disease (COVID-19) pandemic persisted for over 24 months, following its initial onset in late 2019. It transformed the everyday lives of people worldwide, specifically as they now had to adopt defensive behaviors and habits to prevent the spread of the infection [1, 2]. According to the World Health Organization (WHO), by April 2022, over 492 million cases of COVID-19 were confirmed globally with over 6 million deaths [3]. Worldwide, various preventive and control measures were implemented. In Hong Kong, measures included compulsory quarantine of people entering the city, mandatory use of face masks in public places and on public transport, social distancing in restaurants, cinemas, and all other areas accessible to the public [4, 5].

However, a potentially negative impact on the emergent parent-infant relationship has resulted from these preventative and restrictive measures. Mobile phones of

many new parents in the rapidly changing and health-threatening COVID-19 pandemic were flooded with mixed information from various online media and health organizations [5]. This information did not always align but often even contradicted each other. It is well known that breastfeeding is best for newborn infants [6]. As new mothers are concerned about the spread of COVID-19, they remain at home and refrain from taking their infants outside. They have many queries around the care practices they should follow when it comes to their infants during the pandemic. These parents are often equally worried about if they should still breastfeed their infants. Regular updates on the correct caring guidelines and support from the community is required to reassure new mothers regarding the safety of breastfeeding [7].

COVID-19 is a life-threatening and contagious disease. At present, data that indicates that COVID-19 could be vertically transmitted from mother to infant in utero or postnatally through direct respiratory inhalation or breastfeeding are insufficient [8]. These concerns led to anecdotal reports in international news and social media posts of mothers giving birth without a partner or support of a doula that sometimes suggested that breastfeeding is unsafe [9, 10]. In contrast, breastfeeding was promoted in Hong Kong [11, 12]. Appropriate promotions like these and the spread of updated information are particularly helpful to new mothers and their families. It not only enhances their understanding of the various care components but also reassures mothers that breastfeeding at home during the COVID-19 pandemic is safe and beneficial for both the mother and the infant. Breast milk is considered to be the ultimate mixture when it comes to ensuring the strength of a newborn's immunity.

## **2. Infant feeding policy and practice**

Breast milk is ideal food for newborns. It is safe, convenient and provides the most important nutrients and energy for newborns. It also contains antibodies that come from the mother which help prevent illnesses in infants and assists in protecting them from contracting childhood illnesses. Breastmilk promotes the development of sensory and cognitive skills, as well as a strong immune system that protects against chronic or infectious diseases in the infant [13–15]. Exclusively breastfeeding reduces the risk of infant mortality due to common childhood illnesses such as diarrhea or pneumonia, and helps them recover faster [16].

Breastfeeding reduces waste and the need for other resources like bottles and formula. In addition to being more environmentally friendly, this also aids families who struggle financially. They can now distribute these savings to other areas of family life. Specially for the mother reduces the risk of breast and ovarian cancer. The WHO recommends starting to breastfeed as early as 1 h after birth [17].

### **2.1 Feeding policy**

In Hong Kong, most of the hospitals would recommend that all normal or low-risk infants be exposed to skin-to-skin contact on the mother's chest immediately after birth and that feeding should start within 5 min [18]. All mothers are encouraged to hold their infants in a calm environment and try to feed them without rushing the process [19]. If mother and infant cannot initiate feeding after birth, it is re-initiated as soon as the mother and infant's conditions are stabilized or more conducive to it [20]. Early initiation of breastfeeding when both the mother and infant are ready is essential [21]. This critical period has now become a luxury only afforded to the

breastfeeding mother who tested negative for the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), as the health care providers combat the fifth wave of COVID-19. These mothers are lucky to bond with their infant without separation during their postpartum period while they are hospitalized.

If the mother and infant are separated because of special care, the mother should be instructed on how to initiate and how to maintain breastfeeding by manual expression. Generally, this is initiated within 6 h after delivery, then breast milk is expressed every 3–4 h, or obtained using a breast pump at regular intervals (approximately every 3 h after lactating starts). Mothers should be advised to feed their infants with expressed breast milk (if feeding is allowed) and encouraged to breastfeed as soon as the infant's physical condition allows it. During the COVID-19 pandemic, certain arrangements were created to prevent cross-infections. Since breastfeeding constitutes a close contact situation, the likelihood of transmitting the virus may increase substantially when aerosol-generating procedures are performed [22, 23]. Despite this, studies have suggested very low rates of vertical/peripartum transmission [22–24]. In general, hospitals do not allow direct breastfeeding by mothers who test positive or who are considered as active carriers. Discussions with parents about the risks versus the benefits of expressed breast milk are desperately needed. Visitation by parents is generally not allowed if mothers have active or are suspected of being infected with COVID-19 [25–27].

The results of studies indicated that the neonatal units of some public hospitals in Hong Kong, had zero cross-infection between patients and newborns [28–31]. According to these studies, most units in public hospitals perform nasopharyngeal aspirates/throat swabs (NPA/TS) to test for SARS-CoV2 and reverse transcription polymerase chain reaction (RT-PCR) tests at birth, on day 1 and day 2–3 and then again some time approximately before the estimated discharge date or before step-down from designated airborne infection isolation rooms (AIIR) [29]. Most units consult microbiology experts and laboratory results to help with the interpretation of the aforementioned tests [28]. However, some units investigate neonatal antibodies for SARS-CoV-2 on day 0–1 by testing the infants blood and also routinely test PCR anywhere from 1 week and again around the time the infant is a month old to check for any possible cases of late positivity [30, 31].

Some units maintain safe practices by isolating infants and mothers for at least 7 to 14 days, even if the infant remains SARS-CoV-2 negative [32]. There is no consensus regarding the minimum isolation period for infants of recovered mothers and the use of anti-SARS-CoV-2 antibody testing in the management of these infants. During isolation, mothers encourage the expression of milk to maintain mild duct patency and prepare for lactation when they are discharged with their infants [33]. Infants are fed formula milk with cup feeding and supplements based on the recommended daily feeding volume for neonates and their appetite during hospitalization.

Hong Kong is facing a backlash from healthcare professionals and parents after starting ambush-mode lockdowns and separating parents from infant and toddler in a hopeless effort to contain a fifth wave of COVID-19 pandemic in the densely populated city. The general units of public hospitals do not allow direct breastfeeding by active mothers against WHO advice. Discussion with parents regarding risks versus benefits of expressed breast milk (EBM) is required. Active or suspected mothers are recommended not direct breastfeeding. EBM may be considered after careful discussion of risks versus benefits with parents and appropriate precautions made regarding expression, transport, and storage. Recovered mothers not recommended with direct breastfeeding if separation is required but EBM encouraged.



However, it requires to discuss with local infection control teams to ascertain optimal methods of handling EBM such as double bags, and separation of freezer storage.

Health providers should encourage breastfeeding whenever possible, emphasizing the benefits of adequate infant nutrition for all newborns. Skin-to-skin contact, or Kangaroo mother care should be allowed when mothers have no contraindication to care for their infants.

### **3. The background of the infant feeding**

Infant feeding is important for infant survival and healthy growth. The primary infant feeding methods for infants under 6 months of age are breastfeeding and bottle feeding. Breastfeeding is the ideal feeding mode for both mothers and infants.

Breastfeeding provides health benefits to both mothers and infants [34, 35]. Major organizations recommend that mothers should breastfeed exclusively for the first 6 months, and thereafter continue to provide their infants with breast milk for up to 2 years of age or beyond [17, 36–38]. According to the WHO, optimal breastfeeding is critical and could save the lives of over 820,000 infants and children under the age of 5 years annually [39].

Breastfeeding has important short- and long-term benefits for both infants and mothers [40, 41]. In addition to health benefits, breastfeeding is the most ecologically sustainable way to feed infants and provides substantial cost savings to families [42]. Global public health recommendations stated that infants should be exclusively breastfed for the first 6 months of life to achieve optimal growth, development, and health [43]. Thereafter, it is a norm to meet the evolving nutritional requirements of this vulnerable group for their well-being and provide nutritionally adequate and safe complementary foods while breastfeeding for up to 2 years of age or beyond [44]. Exclusive breastfeeding from birth is possible, except for a limited special healthcare needs situation [45].

Despite this recommendation, breastfeeding rates vary widely; in the United Kingdom, the exclusively breastfed at 1 week of age is 46%, and at <1% at 6 months [46].

In Australia, the National Infant Feeding Survey, a large-scale data result indicated that breastfeeding was initiated for 96% of children aged 0–2 years and approximately 69% of infants were still receiving breast milk at 4 months of age in 2010. However, only 39% were exclusively breastfed for 3 months, and only 15% were exclusively breastfed to five completed months of age [47].

In Hong Kong, although the Department of Health introduced supportive breastfeeding initiatives that led to an increase in breastfeeding mothers in 2019 (up to 87.2% of mothers) [48], many mothers give up the practice within just a few months [49].

The main reason these women were eager to discontinue breastfeeding in the first 3 months after birth were work responsibilities [50]. Maternity leave in the city usually lasts for 10 weeks [51] and flexible working arrangements are difficult to negotiate with many employers.

Since 2015, the Hong Kong government has been trying to fight discrimination. Food and Health Bureau (FHB) encouraged government and private facilities to implement “breastfeeding-friendly workplace” policies and measures to facilitate new mothers to continue breastfeeding after return to work [52]. Moreover, Professor

Sophia Chan Siu-chee (Secretary for FHB, HKSAR) issued regulations for employers who wish to create a breastfeeding-friendly workplace in Hong Kong [53].

#### **4. Pregnancy and breastfeeding during the COVID-19 pandemic**

COVID-19 is an infectious disease that was declared a public health emergency of international concern by the WHO [54]. Their main concern is whether breastfeeding by mothers infected with COVID-19 is safe, and whether the virus or antibodies can be transmitted from mother to baby through milk [55].

Pregnant and/or breastfeeding women have not been included in studies to determine how well COVID-19 vaccines work or how safe they are [56]. Especially in Hong Kong, up till now, there are no study conducted based on the pregnancy women and breastfeeding issues.

Only based on other similar infectious diseases, we believe the risks that come with vaccination will probably be low [56]. Therefore, while we wait for more information, each mother and the health professional should discuss what choice fits their situation best. As for breastfeeding, little or none of these vaccine components would ever reach the milk compartment, or even be transferred into human milk. Even if they were the infant would simply digest them like any other protein, that the present group of vaccines is probably going to be quite safe for breastfeeding mothers [57]. The infant may even gain a small amount of maternal IgG in the breastmilk, which may even be beneficial [57, 58].

In before, breastfeeding by mothers infected with SARS-CoV-2 is highly recommended for infants if the health of the mother and infant allow for it. Direct breastfeeding and preservation of appropriate protective measures should be encouraged [59]. If the mother's health condition does not allow direct breastfeeding, infants should be fed pumped breast milk or donor milk.

Emerging data indicate that people with comorbidities and those aged over 60 years have an increased risk of severe respiratory disease and death [60]. Pregnant women do not appear to be adversely affected. Pregnant women with severe respiratory infections, such as pneumonia, are usually associated with adverse health outcomes for both women and babies, consisting of eclampsia, increased intensity of maternal mortality, and preterm birth [61].

Findings from Italy demonstrated women's expectations and concerns regarding childbirth before and after the onset of the pandemic. Women were more concerned about the health of others than their own; they had a history of psychological distress that was significantly more overwhelmed by the pandemic; expressions of emotions and psychological constructs around childbirth dramatically changed before and after the onset of COVID-19 [62].

Before the pandemic, most women associated the fear of childbirth with constructs related to physical pain, the commitment of childbirth, the emotion of finally being able to meet the child (joy, happiness, serenity), and a sense of impatience was more closely related to stress and anxiety in this situation [62, 63]. This phenomenon is well known by women and healthcare professionals, such as midwives, worldwide and is considered part of the early physiological anxiety that allows women to prepare for the moment of childbirth in the best possible way [64]. During the pandemic, the change in response was startling: fear no longer correlated with anticipation, impatience, joy, and encounter, but with sadness, loneliness, inability, a sense of isolation, and confinement [62].

The COVID-19 pandemic resulted in lockdowns in some countries such as the United Kingdom and the United States, and the resulting social distancing measures led to a decrease in breastfeeding support systems available to women [19, 65]. Some hospitals separate mothers and babies in hospitals, while decreasing face-to-face professional support. Peer support for mothers and their babies was also removed. Meanwhile, new families were confined to their homes, separated from families, and any other support networks. Therefore, breastfeeding is best supported by practices that keep the mother and baby together, high-quality professional and peer-to-peer support, positive maternal well-being, and understanding the impact of the pandemic on the ability to breastfeed [19, 66]. Despite, 27% of mothers hoping to have support, they instead faced many barriers stemming from lockdown and associated measures, resulting in some discontinuing breastfeeding before they were actually ready. The influence of the lockdown and other factors impacted their decision to continue or to stop breastfeeding, including low socioeconomic status, living atmospheres, and ethnic differences. Healthcare professionals need to be vigorous in their endeavors to understand and provide support to these vulnerable women, who may be grieving the loss of their ability to breastfeed and who are affected by their negative experiences. It is important to learn from women with positive experiences of caring for their infants during the pandemic to demonstrate what would be considered better support if a similar crisis occurs.

## **5. Conclusion**

Breast milk is an ideal food source for newborns. Breastmilk promotes sensory and cognitive development and protects defenseless infants against any chronic or infectious diseases due to the antibodies present in it. Exclusively breastfeeding reduces infant mortality related to common childhood illnesses, such as diarrhea or pneumonia, and helps hasten their recovery during an illness. The COVID-19 pandemic raised issues regarding the safety of breastfeeding. Mothers with active, suspected, or past COVID-19 results must follow certain precautions and guidelines to prevent cross-infections, since breastfeeding constitutes a close contact situation. In general, hospitals do not allow mothers with an active infection with SARS-CoV-2 to directly breastfeed their babies. Some neonatal units in Hong Kong enforce safe practices by isolating infants and mothers for at least 7 to 14 days, even if the infant remains SARS-CoV-2 negative. If the mother and infant are separated due to their need for special care, the mother should be encouraged to express milk to maintain milk duct patency and to prepare her for lactation when they are discharged with their infants. During isolation, infants are cup fed formula milk with additional supplements based on the recommended daily feeding volume and requirements for neonates and their appetite during hospitalization. Regular updates on the correct caring guidelines and support from the community is required to reassure new mothers regarding the feasibility of direct breastfeeding during and following the pandemic. Major organizations recommend that mothers should breastfeed exclusively for the first 6 months, and thereafter continue to provide their infants with breast milk until they are 2 years old or beyond.

## **Acknowledgements**

This research was funded by the Institute Development Grant (IDG) [Reference no.: IDG210201] of Caritas Institute of Higher Education.

## **Conflict of interest**

The authors declare that there are no conflicts of interest.

## **Notes/thanks/other declarations**

None.


## **Author details**

Ka-Huen Yip\*, Mei-Kuen Chow, Yuk-Chiu Yip and Wai-King Tsui  
School of Health Sciences, Caritas Institute of Higher Education, Hong Kong, China

\*Address all correspondence to: [khyip@cihe.edu.hk](mailto:khyip@cihe.edu.hk)

## **IntechOpen**

---

© 2022 The Author(s). Licensee IntechOpen. This chapter is distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/3.0>), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited. 



## References

- [1] Kickbusch I, Leung GM, Bhutta ZA, Matsoso MP, Ihekweazu C, Abbasi K. Covid-19: How a virus is turning the world upside down. *BMJ*. 2020;**369**:m1336. DOI: 10.1136/bmj.m1336
- [2] Lades LK, Laffan K, Daly M, Delaney L. Daily emotional well-being during the COVID-19 pandemic. *British Journal of Health Psychology*. 2020;**25**(4):902-911. DOI: 10.1111/bjhp.12450
- [3] World Health Organization. WHO Coronavirus (COVID-19) Dashboard [Internet]. 2022. Available from: <https://covid19.who.int/> [Accessed: April 7, 2022]
- [4] Family Health Services, Department of Health. Health advice on Coronavirus Disease (COVID-19). The Government of the Hong Kong Special Administrative Region [Internet]. 2021. Available from: <https://www.fhs.gov.hk/english/news/nCov2019/> [Accessed: March 11, 2022]
- [5] Food and Health Bureau. The Government of the Hong Kong Special Administrative Region. Prevention and control of novel coronavirus infection in Hong Kong [Internet]. 2020. Available from: <https://www.legco.gov.hk/yr19-20/english/counmtg/papers/cm20200219p-e.pdf> [Accessed: March 11, 2022]
- [6] McFadden A, Gavine A, Renfrew MJ, Wade A, Buchanan P, Taylor JL, et al. Support for healthy breastfeeding mothers with healthy term babies. *Cochrane Database Sys Rev*. 2017;**2**(2):CD001141. DOI: 10.1002/14651858.CD001141.pub5
- [7] Gavine A, Mcfadden A, Macgillivray S, Renfrew MJ. Evidence reviews for the ten steps to successful breastfeeding initiative. *JHV*. 2017;**5**(8):378-380. DOI: 10.12968/johv.2017.5.8.378
- [8] Juan J, Gil MM, Rong Z, Zhang Y, Yang H, Poon LC. Effects of coronavirus disease 2019 (COVID-19) on maternal, perinatal and neonatal outcomes: Systematic review. *Ultrasound in Obstetrics & Gynecology*. 2020;**56**:15-27. DOI: 10.1002/uog.22088
- [9] The Guardian. ‘There are more births in the car park’: A midwife’s experience of the Covid-19 crisis [Internet]. 2020. Available from: <https://www.theguardian.com/society/2020/jun/04/more-births-car-park-midwives-experience-covid-19-crisis> [Accessed: March 11, 2022]
- [10] Pramono A, Dahlen H, Desborough J, Smith JP. Separating mothers with COVID-19 from their newborns does more harm than good. *The Conversation*. 2020. Available from: <https://theconversation.com/separating-mothers-with-covid-19-from-their-newborns-does-more-harm-than-good-141291> [Accessed: March 11, 2022]
- [11] The Government of the Hong Kong Special Administrative Region. World Breastfeeding Week promotes collaboration in support of breastfeeding [Internet]. 2021. Available from: <https://www.info.gov.hk/gia/general/202108/03/P2021080200536.htm> [Accessed: March 11, 2022]
- [12] UNICEF UK. UNICEF UK Baby Friendly Initiative Statement on Infant Feeding during the Coronavirus (COVID-19) Outbreak [Internet]. 2021. Available from: <https://www.unicef.org.uk/babyfriendly/wp-content/uploads/>

sites/2/2020/04/Unicef-UK-Baby-Friendly-Initiative-statement-on-infant-feeding-during-the-Covid-19-outbreak.pdf [Accessed: March 11, 2022]

[13] Davidson EL, Ollerton RL. Partner behaviours improving breastfeeding outcomes: An integrative review. *Women and Birth*. 2020;**33**(1):e15-e23. DOI: 10.1016/j.wombi.2019.05.010

[14] Duijts L, Jaddoe VWV, Hofman A, Moll HA. Prolonged and exclusive breastfeeding reduces the risk of infectious diseases in infancy. *Pediatrics*. 2010;**126**(1):e18-e25. DOI: 10.1542/peds.2008-3256

[15] Mututho LN, Kiboi WK, Mucheru PK. Factors associated with exclusive breastfeeding in Kenya: A systematic review. *International Journal of Community Medicine and Public Health*. 2017;**4**(12):4358-4362. DOI: 10.18203/2394-6040.ijcmph.20175305

[16] World Health Organization. Newsroom, Fact sheets, Detail [Internet]. 2018. Available from: <https://www.who.int/news-room/fact-sheets/detail/diarrhoea> [Accessed: March 11, 2022]

[17] World Health Organization. Breastfeeding [Internet]. 2022. Available from: <https://www.who.int/health-topics/breastfeeding> [Accessed: March 11, 2022]

[18] Tarrant M, Fong DYT, Wu KM, Lee ILY, Wong EMY, Sham A, et al. Breastfeeding and weaning practices among Hong Kong mothers: A prospective study. *BMC Pregnancy and Childbirth*. 2010;**10**:27. DOI: 10.1186/1471-2393-10-27

[19] Brown A, Shenker N. Experiences of breastfeeding during COVID-19: Lessons for future practical and emotional

support. *Maternal & Child Nutrition*. 2021;**17**(1):e13088. DOI: 10.1111/mcn.13088

[20] Tran HT, Nguyen TT, Mathisen R. The use of human donor milk. *BMJ*. 2020;**371**:m4243. DOI: 10.1136/bmj.m4243

[21] Davie P, Chilcot J, Chang YS, Norton S, Hughes LD, Bick D. Effectiveness of social-psychological interventions at promoting breastfeeding initiation, duration and exclusivity: A systematic review and meta-analysis. *Health Psychology Review*. 2020;**14**(4):449-485. DOI: 10.1080/17437199.2019.1630293

[22] Chen H, Guo J, Wang C, Luo F, Yu X, Zhang W, et al. Clinical characteristics and intrauterine vertical transmission potential of COVID-19 infection in nine pregnant women: A retrospective review of medical records. *The Lancet*. 2020;**395**(10226):809-815. DOI: 10.1016/S0140-6736(20)30360-3

[23] Gale C, Quigley MA, Placzek A, Knight M, Ladhani S, Draper ES, et al. Characteristics and outcomes of neonatal SARS-CoV-2 infection in the UK: A prospective national cohort study using active surveillance. *Lancet Child Adolesc Health*. 2020;**5**(2):113-121. DOI: 10.1016/S2352-4642(20)30342-4

[24] Zeng L, Xia S, Yuan W, Yan K, Xiao F, Shao J, et al. Neonatal early-onset infection with SARS-CoV-2 in 33 neonates born to mothers with COVID-19 in Wuhan, China. *JAMA Pediatrics*. 2020;**174**(7):722-725. DOI: 10.1001/jamapediatrics.2020.0878

[25] Amatya S, Corr TE, Gandhi CK, Glass KM, Kresch MJ, Mujisce DJ, et al. Management of newborns exposed to mothers with confirmed or suspected COVID-19. *American Journal of Perinatology*. 2020;**40**(7):987-996. DOI: 10.1038/s41372-020-0695-0

- [26] Chandrasekharan P, Vento M, Trevisanuto D, Partridge E, Underwood MA, Wiedeman J, et al. Neonatal resuscitation and Postresuscitation Care of Infants Born to mothers with suspected or confirmed SARS-CoV-2 infection. *American Journal of Perinatology*. 2020;**37**(8):813-824. DOI: 10.1055/s-0040-1709688
- [27] Kotlar B, Gerson E, Petrillo S, Langer A, Tiemeier H. The impact of the COVID-19 pandemic on maternal and perinatal health: A scoping review. *Reproductive Health*. 2021;**18**(10):1-39. DOI: 10.1186/s12978-021-01070-6
- [28] Leung TF, Ng PC, Cheng FWT, Lyon DJ, So KW, Hon EKL, et al. Infection control for SARS in a tertiary paediatric Centre in Hong Kong. *The Journal of Hospital Infection*. 2004;**56**(3):215-222. DOI: 10.1016/j.jhin.2003.11.004
- [29] Ng PC, So KW, Leung TF, Cheng FWT, Lyon DJ, Wong W, et al. Infection control for SARS in a tertiary neonatal Centre. *Archives of Disease in Childhood. Fetal and Neonatal Edition*. 2003;**88**(5):F405-F409. DOI: 10.1136/fn.88.5.F405
- [30] Ng PC. Infection control measures for COVID-19 in the labour suite and neonatal unit. *Neonatology*. 2020;**117**(2):141-143. DOI: 10.1159/000508002
- [31] Shek CC, Ng PC, Fung GPG, Cheng FWT, Chan PKS, Peiris MJS, et al. Infants born to mothers with severe acute respiratory syndrome. *Pediatrics*. 2003;**112**(4):e254-e254. DOI: 10.1542/peds.112.4.e254
- [32] Salvatore CM, Han JY, Acker KP, Tiwari P, Jin J, Brandler M, et al. Neonatal management and outcomes during the COVID-19 pandemic: An observation cohort study. *The Lancet Child & Adolescent Health*. 2020;**4**(10):721-727. DOI: 10.1016/S2352-4642(20)30235-2
- [33] Centers for Disease Control and Prevention [CDC] Breastfeeding: Supporting evidence for maternity practices in infant nutrition and care (mPINC) [Internet]. Available from: <https://www.cdc.gov/breastfeeding/pdf/mpinc/supporting-evidence-for-mPINC-508.pdf> [Accessed: April 7, 2022]
- [34] Brown A. Breastfeeding as a public health responsibility: A review of the evidence. *Journal of Human Nutrition and Dietetics*. 2017;**30**(6):759-770. DOI: 10.1111/jhn.12496
- [35] Ng CA, Ho JJ, Lee ZH. The effect of rooming-in on duration of breastfeeding: A systematic review of randomised and non-randomised prospective controlled studies. *PLoS One*. 2019;**14**(4):e0215869. DOI: 10.1371/journal.pone.0215869
- [36] Centers for Disease Control and Prevention [CDC] Breastfeeding report card [Internet]. 2021 Available from: <https://www.cdc.gov/breastfeeding/data/reportcard.htm> [Accessed: February 28, 2022]
- [37] US Department of Agriculture; US Department of Health and Human Services. Dietary guidelines for Americans, 2020-2025. 9th ed. 2020 [Internet]. Available from: <https://www.dietaryguidelines.gov/> [Accessed: March 11, 2022]
- [38] World Health Organization. Breastfeeding and COVID-19 [Internet]. 2020. Available from: [https://www.who.int/publications/i/item/WHO-2019-nCoV-Sci\\_Brief-Breastfeeding-2020.1](https://www.who.int/publications/i/item/WHO-2019-nCoV-Sci_Brief-Breastfeeding-2020.1) [Accessed: March 11, 2022]
- [39] World Health Organization. Infant and young child feeding fact sheet



- [Internet]. 2022. Available from: <https://apps.who.int/nutrition/publications/infantfeeding/en/index.html> [Accessed: March 11, 2022]
- [40] Perrine CG, Scanlon KS, Li R, Odom E, Grummer-Strawn LM. Baby-friendly hospital practices and meeting exclusive breastfeeding intention. *Pediatrics*. 2012;**130**(1):54-60. DOI: 10.1542/peds.2011-3633
- [41] The Government of the Hong Kong Special Administrative Region. Press releases: World Breastfeeding Week 2019 calls for community support for breastfeeding (with photos) [Internet]. 2019. Available from: <https://www.info.gov.hk/gia/general/201907/27/P2019072600650.htm> [Accessed: March 11, 2022]
- [42] Schmied V, Burns E, Sheehan A. Place of sanctuary: An appreciative inquiry approach to discovering how communities support breastfeeding and parenting. *International Breastfeeding Journal*. 2019;**14**(1):1-14. DOI: 10.1186/s13006-019-0219-8
- [43] Smith J, Cattaneo A, Iellamo A, Javanparast S, Atchan M, Gribble K, Hartmann B, Salmon L, Tawia S, Hull N, Linkson M, Blake M, Elliott-Rudder M. Review of effective strategies to promote breastfeeding. The Sax Institute. 2018. Available from: <https://apo.org.au/sites/default/files/resource-files/2018-05/apo-nid182256.pdf> [Accessed: March 11, 2022]
- [44] Greer FR, Sicherer SH, Burks AW. The effects of early nutritional interventions on the development of atopic disease in infants and children: The role of maternal dietary restriction, breastfeeding, hydrolyzed formulas, and timing of introduction of allergenic complementary foods. *Pediatrics*. 2019;**143**(4):1-11. DOI: 10.1542/peds.2019-0281
- [45] Thepha T, Marais D, Bell J, Muangpin S. Perceptions of northeast Thai breastfeeding mothers regarding facilitators and barriers to six-month exclusive breastfeeding: Focus group discussions. *International Breastfeeding Journal*. 2018;**13**(1):1-10. DOI: 10.1186/s13006-018-0148-y
- [46] Fielder C. Determining the influencing factors of a caesarean section birth on breastfeeding. *Evid Based Midwifery*. 2016;**14**(2):57-63
- [47] Australian Institute of Health and Welfare. 2010 Australian National Infant Feeding Survey: Indicator results. Australian Government [Internet]. 2010. Available from: <https://www.aihw.gov.au/getmedia/af2fe025-637e-4c09-ba03-33e69f49aba7/13632.pdf.aspx?inline=true> [Accessed: March 11, 2022]
- [48] Baby Friendly Hospital Initiative Hong Kong Association. World Breastfeeding Week (WBW) [Internet]. 2020. Available from: [https://www.babyfriendly.org.hk/wp-content/uploads/2020/08/2020-WBW-Annual-Survey\\_E\\_Final.pdf](https://www.babyfriendly.org.hk/wp-content/uploads/2020/08/2020-WBW-Annual-Survey_E_Final.pdf) [Accessed: March 11, 2022]
- [49] Bai DL, Fong DYT, Tarrant M. Factors associated with breastfeeding duration and exclusivity in mothers returning to paid employment postpartum. *Maternal and Child Health Journal*. 2015;**19**(5):990-999. DOI: 10.1007/s10995-014-1596-7
- [50] Sun K, Chen M, Yin Y, Wu L, Gao L. Why Chinese mothers stop breastfeeding: Mothers' self-reported reasons for stopping during the first six months. *Journal of Child Health Care*. 2017;**21**(3):353-363. DOI: 10.1177/1367493517719160
- [51] Constable N. Tales of two cities: Legislating pregnancy and marriage

- among foreign domestic workers in Singapore and Hong Kong. *Journal of Ethnic and Migration Studies*. 2020;**46**(16):3491-3507. DOI: 10.1080/1369183X.2019.1592403
- [52] Equal Opportunities Commission. Let's Build a Breastfeeding-friendly Workplace [Internet]. 2021. Available from: [https://www.eoc.org.hk/eoc/Upload/UserFiles/File/FactSheet/8\\_Leaflet\\_on\\_Breastfeeding\\_Discrimination\\_in\\_the\\_Workplace\\_e.pdf](https://www.eoc.org.hk/eoc/Upload/UserFiles/File/FactSheet/8_Leaflet_on_Breastfeeding_Discrimination_in_the_Workplace_e.pdf) [Accessed: March 11, 2022]
- [53] Chan SSC. Optimising Breastfeeding Practices: A Public health's Perspective [Internet]. 2014. Available from: <https://www3.ha.org.hk/haconvention/hac2014/proceedings/downloads/S2.1.pdf> [Accessed: March 11, 2022]
- [54] World Health Organization. Statement on the second meeting of the International Health Regulations (2005) Emergency Committee regarding the outbreak of novel coronavirus (2019-nCoV) [Internet]. 2022. Available from: [https://www.who.int/news/item/30-01-2020-statement-on-the-second-meeting-of-the-international-health-regulations-\(2005\)-emergency-committee-regarding-the-outbreak-of-novel-coronavirus-\(2019-ncov\)](https://www.who.int/news/item/30-01-2020-statement-on-the-second-meeting-of-the-international-health-regulations-(2005)-emergency-committee-regarding-the-outbreak-of-novel-coronavirus-(2019-ncov)) [Accessed: March 11, 2022]
- [55] Panahi L, Amiri M, Pouy S. Risks of novel coronavirus disease (COVID-19) in pregnancy; a narrative review. *Archives of Emergency Medicine*. 2020;**8**(1):-e34
- [56] Collier AY, McMahan K, Yu J, et al. Immunogenicity of COVID-19 mRNA vaccines in pregnant and lactating women. *Journal of the American Medical Association*. 2021;**325**(23):2370-2380. DOI: 10.1001/jama.2021.7563
- [57] De Rose DU, Salvatori G, Dotta A, Auriti C. SARS-CoV-2 vaccines during pregnancy and breastfeeding: A systematic review of maternal and neonatal outcomes. *Viruses*. 2022;**14**(3):539. DOI: 10.3390/v14030539
- [58] Hale TW. Hale's medications & mothers' milk. In: *A Manual of Lactational Pharmacology*. 19th ed. New York: Springer Publishing Company; 2021
- [59] Pérez-Bermejo M, Peris-Ochando B, Murillo-Llorente MT. COVID-19: Relationship and impact on breastfeeding-a systematic review. *Nutrients*. 2021;**13**(9):2972. DOI: 10.3390/nu13092972
- [60] Onder G, Rezza G, Brusaferro S. Case-fatality rate and characteristics of patients dying in relation to COVID-19 in Italy. *Journal of the American Medical Association*. 2020;**323**(18):1775-1776. DOI: 10.1001/jama.2020.4683
- [61] Chen YH, Keller J, Wang IT, Lin CC, Lin HC. Pneumonia and pregnancy outcomes: A nationwide population-based study. *American Journal of Obstetrics and Gynecology*. 2012;**207**(4):288-2e1. DOI: 10.1016/j.ajog.2012.08.023
- [62] Ravaldi C, Wilson A, Ricca V, Homer C, Vannacci A. Pregnant women voice their concerns and birth expectations during the COVID-19 pandemic in Italy. *Women and Birth*. 2021;**34**(4):335-343. DOI: 10.1016/j.wombi.2020.07.002
- [63] Karavadra B, Stockl A, Prosser-Snelling E, Simpson P, Morris E. Women's perceptions of COVID-19 and their healthcare experiences: A qualitative thematic analysis of national survey of pregnant women in the United Kingdom. *BMC Pregnancy and Childbirth*. 2020;**20**(1):1-8. DOI: 10.1186/s12884-020-03283-2



[64] Shorey S, Chan V. Lessons from past epidemics and pandemics and a way forward for pregnant women, midwives and nurses during COVID-19 and beyond: A meta-synthesis. *Midwifery*. 2020;**90**:102821. DOI: 10.1016/j.midw.2020.102821

[65] Latorre G, Martinelli D, Guida P, Masi E, De Benedictis R, Maggio L. Impact of COVID-19 pandemic lockdown on exclusive breastfeeding in non-infected mothers. *International Breastfeeding Journal*. 2021;**16**(1):1-7. DOI: 10.1186/s130006-021-00382-4

[66] Ingram J, Thomson G, Johnson D, Clarke JL, Trickey H, Hoddinott P, et al. On behalf of the ABA study team. Women's and peer supporters' experiences of an assets-based peer support intervention for increasing breastfeeding initiation and continuation: A qualitative study. *Health Expectations*. 2020;**23**:622-631. DOI: 10.1111/hex.13042