

**Population-wide Breast Screening for Breast Health
Submission from the Hong Kong Breast Cancer Foundation
(for Chief Executive's 2019 Policy Address)**

I. Purpose

1. This Submission sets out further evidence to support the implementation of population-wide breast cancer screening in Hong Kong as we, the Hong Kong Breast Cancer Foundation (HKBCF), previously proposed in our Submission for the Chief Executive's 2018 Policy Address.

II. Summary of 2018 Submission

2. Our Submission last year highlighted a number of figures to illustrate that the local breast cancer situation was worsening. Further to our Submission, the Hong Kong Cancer Registry (HKCaR) of the Hospital Authority updated their collection of local cancer statistics for 2016. According to HKCaR, the number of new local breast cancer cases exceeded 4,000 for the first time in history. The lifetime risk of developing breast cancer has also increased from one in 16 women to one in 15 women, indicating a rise in the risk of women having breast cancer locally. In addition, 702 women died of breast cancer in 2016, making breast cancer the third most common cause of cancer deaths among women in Hong Kong.¹

3. Our Submission last year revisited a total of eight, i.e. the only eight, randomised controlled trials (RCTs) done in the 70s and 80s when population-wide breast screening had not yet been universally recognised. Our meta-analysis of most of the RCTs conducted in five places, viz. Canada,² Scotland,³ Sweden,⁴ the United

¹ Hong Kong Cancer Stats 2016. Hong Kong Cancer Registry, Hospital Authority. <http://www3.ha.org.hk/cancereg/#>. Published 2019. Accessed 23 September 2019.

² Miller AB, Baines CJ, To T, *et al.*, Canadian National Breast Screening Study: 1. Breast cancer detection and death rates among women aged 40 to 49 years. *CMAJ* 1992;147:1459-76.

³ Alexander FE, Anderson TJ, Brown HK, *et al.* 14 years of follow-up from the Edinburgh randomized trial of breast-cancer screening. *Lancet* 1999;353:1903-8.

⁴ Tabar L, Fagerberg G, Chen HH, *et al.* Efficacy of breast cancer screening by age. New results from the Swedish Two-County Trial. *Cancer* 1995;75:2507-17.

Kingdom (UK)⁵ and the United States (US)⁶, concluded that breast screening in general could lead to reduction in both breast cancer mortality and advanced breast cancer cases.

4. More recent evidence from countries/places with population-wide breast screening programmes showed similar positive results. For instance, a study found that for every three cases of pre-invasive breast cancer successfully detected in the UK, on average, one case of invasive breast cancer could be prevented from happening in a three yearly screening round.⁷ That is to say, the finding indicated a healthy trend of shifting to early stage breast cancer cases and a reduction in advanced stage breast cancer cases at the same time, following the implementation of population-wide breast screening.

5. Another success story is Taiwan. The population-wide screening programme in Taiwan is of significant relevance to Hong Kong, as the population of the two places are predominantly of Chinese ethnicity. In particular, the findings of a major study conducted between 1999 and 2009 covering 1.43 million asymptomatic women showed that universal biennial mammography screening, compared with annual clinical breast examination, was associated with a 41% mortality reduction and a 30% reduction of stage II+ breast cancer.⁸

6. In the face of the increasing threat of breast cancer, we recommended in our previous Submission that the Government should adopt a three-phase approach in implementing population-wide breast screening: firstly, put in place a screening programme for high risk women as soon as possible, as per current government strategy; secondly, implement a district-based pilot scheme for average risk women to better assess the feasibility of the programme; and thirdly, adopt a population-

⁵ Moss SM, Cuckle H, Evans A, *et al.* Trial Management Group. Effect of mammographic screening from age 40 years on breast cancer mortality at 10 years' follow-up: a randomised controlled trial. *Lancet* 2006;368:2053-60.

⁶ Shapiro S, Venet, W, Strax P, *et al.* Ten-to fourteen-year effect of screening on breast cancer mortality. *J Natl Cancer Inst* 1982;69(2):349-55.

⁷ Duffy SW, Dibden A, Michalopoulos D, *et al.*, Screen detection of ductal carcinoma in situ and subsequent incidence of invasive interval breast cancers: a retrospective population-based study. *Lancet Oncol.* 2016;17(1):109-14. doi: 10.1016/S1470-2045(15)00446-5.

⁸ Yen AM, Tsau HS, Fann JC, *et al.*, Population-Based Breast Cancer Screening with Risk-Based and Universal Mammography Screening Compared With Clinical Breast Examination: A Propensity Score Analysis of 1 429 890 Taiwanese Women. *JAMA Oncol.* 2016;2(7):915-21. doi: 10.1001/jamaoncol.2016.0447.

wide screening in the mid to long term, based on the experience of the first two phases.

III. Chronological Study on Local Breast Cancer Trends over a 12-year Period

7. On 19 September 2019, the Hong Kong Breast Cancer Registry (HKBCR) of the HKBCF released Hong Kong's first chronological study on local breast cancer trends in cancer detection and treatment pattern over a 12-year period. The data of 18,438 breast cancer patients registered with the HKBCR were grouped into four cohorts according to their year of diagnosis (2006-2008, 2009-2011, 2012-2014 and 2015-2017). The study concluded that while breast cancer treatment improved in breadth and depth over time, detection and diagnosis of breast cancer in Hong Kong stagnated, if not worsened.

A. Local Treatment Pattern in line with Latest Developments

8. According to the study, treatment pattern changed substantially throughout the study period. For instance, the usage of anti-HER2 breast cancer targeted therapy increased over time in all breast cancer stages. The rise was particularly significant among stage IV patients, whose uptake rate of anti-HER2 targeted therapy increased substantially from 39% in the 2006-2008 cohort to 100% in the 2015-2017 cohort.

9. Neoadjuvant chemotherapy can reduce tumour size and, in some cases, increase the chance of preserving the breasts. If breast tumours are too large to be removed through surgery, neoadjuvant chemotherapy can also help reduce tumour size and make surgery possible. The chronological study found that the percentage of patients undergoing neoadjuvant chemotherapy increased almost threefold from 5% in the 2006-2008 cohort to 14% in the 2015-2017 cohort. The increase was equally significant among stage III patients: in the 2006-2008 cohort, patients who received neoadjuvant chemotherapy accounted for only 17% of all patients undergoing chemotherapy; the number doubled to 33% in the 2015-2017 cohort.

10. When evaluating the improvements in treatment options, uptake rate of chemotherapy is an important indicator as it has the gravest side effects among all breast cancer treatments. If patients can avoid chemotherapy, their quality of life will not be as affected. Due to the advancements in genomic profiling and growing understanding of the varied benefits of chemotherapy for different breast cancer biological subtypes, the respective percentages of stage I and II patients having to undergo chemotherapy dropped significantly (stage I: from 44% in the 2006-2008 cohort to 32% in the 2015-2017 cohort; stage IIA: from 85% in the 2006-2008 cohort to 71% in the 2015-2017 cohort). In other words, more early stage breast cancer patients can avoid chemotherapy and, more importantly, the distress caused by its side effects.

11. In addition, the study showed that more patients underwent breast conserving surgery and sentinel node biopsy instead of mastectomy and axillary lymph node dissection. Breast conserving surgery refers to an operation that aims to remove breast cancer tumours while sparing most of the breast. Sentinel node biopsy is used to determine whether cancer has spread beyond a primary tumour into the lymphatic system. While conventional axillary surgery may cause lymphoedema and numbness in the arms by removing the entire axillary lymph node, sentinel node biopsy allows the doctor to know in advance whether breast cancer cells have spread and thus determine whether removing additional lymph nodes is unnecessary. Of note, the proportion of patients undergoing breast conserving surgery rose from 33% to 37%, and the increase among stage I patients was from 46% to 52%. The proportion of patients receiving sentinel lymph biopsy increased considerably, especially among patients with early stage breast cancer (stage I: from 65% to 94%; stage II: from 41% to 62%). With such treatment options becoming more common, more breast cancer patients can maintain their quality of life even when going through the treatment.⁹

B. Stagnation in Breast Cancer Detection and Diagnosis

12. The aforementioned findings made it clear that the latest advancements of treating breast cancer in Hong Kong have brought local treatment standards in line

⁹ Hong Kong Breast Cancer Registry Bulletin Issue 10: Chronological changes in risk exposures, detection and treatment pattern for breast cancer patients in Hong Kong over a 12-year period, published by Hong Kong Breast Cancer Foundation in September 2019.

with those of more developed countries/places. On the contrary, local breast cancer detection and diagnosis failed to catch up with the positive developments elsewhere, with the local situation worsening over time since 2006, if not earlier.

13. Stage II breast cancer, in particular, remained to be the most common cancer stage in Hong Kong (with the proportion fluctuating between 34.0% and 39.4% over the past decade)¹⁰, compared to stage I being the most common cancer stage found in countries/places with population-wide breast cancer screening in place. The latest findings from the HKCaR showed that one-fifth to one-quarter (ranged from 21.1% to 24.4% in the past decade) of local breast cancer cases were diagnosed at an advanced stage (stage III and IV). While breast cancer diagnosed at stage I has an over 90% five-year survival rate, the survival rate for subsequent cancer stages drops sharply from 70% for stage II to 15% for stage IV.

14. The predicament was due partly to the current stagnation in breast cancer detection. Breast cancer tends to be higher in stage and lower in survival rate when diagnosed symptomatically. Mammography screening is the most effective detection method thus far to diagnose breast cancer at an asymptomatic stage. However, only about 10% of local patients were found to have been detected by mammography screening at an asymptomatic stage.¹¹ In fact, according to past research reports published by the HKBCR, the primary method of first breast cancer detection was self-detection by chance throughout the last decade (with the proportion fluctuating between 81% and 86%).

15. The findings of the chronological study only reflected the situation up to 2017. Two years on in 2019, the problems with breast cancer are still not met with any counter-measures by the Government. Hong Kong is falling behind in breast cancer screening policy when compared to other Asian countries/places. Japan, Taiwan, Singapore, and South Korea, just to name a few, commenced their population-wide screening programme in 1987, 1999, 2002, and 2004 respectively. Without the Government taking the lead and immediate concrete actions, there could hardly be

¹⁰ Hong Kong Cancer Stats 2016. Hong Kong Cancer Registry, Hospital Authority. <http://www3.ha.org.hk/cancereg/#>. Published 2019. Accessed 23 September 2019.

¹¹ Hong Kong Breast Cancer Registry Report No. 11, published in 2019, Hong Kong Breast Cancer Foundation.

any drastic improvements in breast cancer detection and diagnosis taking place in Hong Kong.

IV. Additional Studies on the Impact of Population-wide Screening

16. While the RCTs examined in our previous Submission in 2018 might be less relevant to the current situation given the passage of time, there are more recent studies conducted in Canada, Norway, US, and Sweden which provide evidence that population-wide breast screening reduce breast cancer mortality.

A. Canada

17. Among the eight RCTs referred to in our previous Submission, the Canadian National Breast Screening Study was the only RCT known for concluding that annual mammography screening among women aged 40 to 59 did not result in breast cancer mortality reduction beyond that of physical examination alone or usual care in the community. However, a much more up-to-date study in 2014 was conducted to evaluate the effects of population-wide screening programme in different provinces and found instead a substantial reduction in breast cancer mortality for women 40 to 74 of age associated with the programme. For instance, the study found that participation in a provincial breast screening programme was associated with an average 40% reduction in breast cancer death rates than expected in all provinces (ranging from 27% to 59% among the provinces).¹²

B. Norway

18. In 2015, researchers in Norway conducted an observational cohort study with an incidence-based approach to analyse breast cancer mortality among women who were invited to the country's screening programme and those who were not. After 15 years of follow-up study, breast cancer mortality of the former group was found

¹² Coldman A, Phillips N, Wilson C, Decker K, Chiarelli AM, Brisson J, et al., Pan-Canadian study of mammography screening and mortality from breast cancer. *J Natl Cancer Inst.* 2014;106(11). pii: dju261. doi: 10.1093/jnci/dju261.

to have reduced by 43% when compared to the latter group (after statistical adjustments regarding their respective calendar period, age when recruited to the cohort, years after inclusion in the cohort, and self-selection bias).¹³

C. *United States*

19. In 2019, a research team led by the renowned medical physicist R. Edward Hendrick made use of the age-adjusted female breast cancer mortality rate and population data from the Surveillance, Epidemiology, and End Results (SEER) programme of the National Cancer Institute (NCI). By speculating breast cancer mortality in the hypothetical absence of mammography screening and improved treatment, the study found that the number of women between 40 to 84 years old dying from breast cancer since 1989 could have been higher than the current number by 384,000 to 614,500.¹⁴ That is to say, around 384,000 to 614,500 women could have been dead had there not been mammography screening and improved treatment in place.

20. Another finding was from the Cancer Intervention and Surveillance Network (CISNET) of the NCI. Using six stimulation models,¹⁵ this study compared the separate and combined contribution associated with screening and treatment on US breast cancer mortality rates from 2000 to 2012. Each model simulated mortality rates under four intervention scenarios: first: no screening or treatment (the baseline mortality rate); second: screening alone; third: treatment alone; and fourth: combined screening and treatment. The study confirmed that screening, combined with adjuvant therapy, reduced overall breast cancer mortality rate by 49%. Furthermore, the CISNET attributed 37% of the reduction to the impact of screening

¹³ Hofvind S, Ursin G, Tretli S, Sebuødegård S, Møller B. Breast cancer mortality in participants of the Norwegian Breast Cancer Screening Program. *Cancer*. 2013;119(17):3106-12. doi: 10.1002/cncr.28174.

¹⁴ Hendrick RE, Baker JA, Helvie MA. Breast cancer deaths averted over 3 decades. *Cancer*. 2019;125(9):1482-1488. doi: 10.1002/cncr.31954.

¹⁵ The 6 CISNET models were developed respectively by Dana-Farber Cancer Institute, Erasmus Medical Center, Georgetown University-Albert Einstein College of Medicine, MD Anderson Cancer Center, Stanford University, and University of Wisconsin-Harvard.

and 63% to treatment, though the contribution of screening to breast cancer mortality reduction varied according to breast cancer biological subtype.¹⁶

D. Sweden

21. Published in 2019, a study, which used a novel method to provide a direct measure of the beneficial impact of participating in mammography screening compared with not participating, was conducted in a defined population in Dalarna County of Sweden.¹⁷ By examining the annual incidences of breast cancer that became fatal within 10 or 20 years after breast cancer diagnosis, the study demonstrated that the benefit of therapy is significantly greater for women who participated in mammography screening. The outcome of the study provides reassurance to women and their physicians that participating in regular, high-quality mammography screening is the best way to reduce the risk of a premature death from breast cancer.

V. Significance of Breast Cancer Screening in the light of Treatment Advancements

22. The additional and more recent studies on screening programmes referred to in paragraphs 16 to 21 above showed that while breast cancer patients stand to benefit from advancements in breast cancer treatments, those patients who had participated in mammography screening prior to their diagnosis were shown to have obtained a significantly greater benefit, i.e. lower chance of breast cancer death from than those who had not participated in any such screening programme.

23. Breast screening can help detect cancer early. The significance of breast cancer screening lies in the discovery of the clinical breast cancer stage with which

¹⁶ Plevritis SK, Munoz D, Kurian AW, Stout NK, Alagoz O, Near AM, et al. Association of Screening and Treatment With Breast Cancer Mortality by Molecular Subtype in US Women, 2000-2012. *JAMA*. 2018;319(2):154-164. doi: 10.1001/jama.2017.19130.

¹⁷ Tabár L, Dean PB, Chen TH, Yen AM, Chen SL, Fann JC, et al. The incidence of fatal breast cancer measures the increased effectiveness of therapy in women participating in mammography screening. *Cancer*. 2019;125(4):515-523. doi: 10.1002/cncr.31840.

a patient is first diagnosed and that stage has a profound impact on the breast cancer patient in terms of mortality and recurrence in the long run. A 2017 report found that breast cancer patients who had minimal node infection (small node-negative cases) were found to have a 13% cumulative risk of distant (metastatic) recurrence, whereas among patients who had tumours of two to five cm in size and four to nine lymph nodes infected, the cumulative risk could be as high as 41%.¹⁸ Furthermore, recurrence and death rates were higher for patients with more advanced stage breast cancer.

24. In summary, these findings indicated one thing: the likelihood of recurrence of and death from breast cancer is critically dependent on the cancer stage a patient is initially diagnosed with. In other words, the earlier the breast cancer stage and the fewer lymph nodes involved, the greater the chance of survival. In this regard, breast cancer screening is the only way to detect breast cancer before the tumour(s) is sufficiently large for a woman or doctor to palpate it.

VI. Conclusion and Recommendations

A. Conclusion

25. In conclusion, the HKBCF submits that:

- a. **Hong Kong's current approach to dealing with breast cancer is paradoxical.** While the latest methods used by other countries/places to treat the disease are readily adopted locally, the population-wide screening programmes of these countries/places to detect the disease early are not. As a result, the most common stage of breast cancer detected locally is stage II, as compared to stage I in countries/places with population-wide screening.

¹⁸ Pan H, Gray R, Braybrooke J, Davies C, Taylor C, McGale P, et al. 20-Year Risks of Breast-Cancer Recurrence after Stopping Endocrine Therapy at 5 Years. *N Engl J Med.* 2017 Nov 9;377(19):1836-1846. doi: 10.1056/NEJMoal701830.

- b. **Early detection helps reduce mortality and recurrence.** Early diagnosis of breast cancer is scientifically proven to have a profound impact on breast cancer mortality and recurrence in the long run. To improve the local breast cancer situation, the current rift between local treatment and screening standards must be effectively addressed.
- c. **Immediate Government policy and actions needed to address the increasing threat of breast cancer.** The breast cancer situation in Hong Kong is on a downward spiral. The Government has already introduced screening programmes for cervical cancer and colorectal cancer. The Government should make population-wide screening possible for women in Hong Kong so as to improve the detection and diagnosis of breast cancer.

B. Recommendations

26. The HKBCF recommends that a population-wide breast screening programme should be planned and implemented in Hong Kong without further delay. Many countries/places have already implemented such programmes with positive results in terms of reduction in both mortality and advanced cancer stages. These countries/places have good experience and methods in dealing with issues of false positive and over-diagnosis which should not be used as reasons for not introducing population-wide screening programmes. Women in Hong Kong, just as any woman the world over, deserve to be informed of the benefits and risks of mammography screening and decide for themselves whether to undergo breast screening.

27. The HKBCF recommends the Government to roll out population-wide breast screening in three phases: firstly, provide screening for high risk women as soon as possible, in accordance with the Government's current policy; secondly, implement in the medium term a pilot scheme for average risk women residing in districts with a lower uptake rate of breast screening, lower level of household income and high rate of advanced stage breast cancer; and thirdly, adopt a population-wide screening programme in the long term based on the experience of the first two phases.

28. The manpower and facilities in the private sector and non-governmental

organisations can be and should be mobilised and deployed in providing screening services. Financial assistance/subsidy should be provided to those women who could not afford the screening services. A co-payment arrangement between the Government and screening service users can also be considered to encourage women to take preventive care for themselves.