

1 **Supplementary materials- Comparing the cost-benefit of**
2 **breast cancer screening programs in rural and urban areas**
3 **across four economic zones in China: a Markov modeling**
4 **analysis**

5 **Contents**

6	Supplementary materials- Comparing the cost-benefit of breast cancer	
7	screening programs in rural and urban areas across four economic zones in	
8	China: a Markov modeling analysis	1
9	Appendix Table 1. Consolidated Health Economic Evaluation Reporting	
10	Standards (CHEERS) checklist	2
11	Appendix Figure 1. Choices and results for both organized breast cancer	
12	screening and opportunistic case detection	6
13	Appendix Figure 2. The incidence of breast cancer in China	6
14	Appendix Table 2. Transition rate used in Markov model	7
15	Appendix Table 3. Age-specific progression and mortality rate of breast	
16	cancer	8
17	Appendix Table 4-1. Cost of screening (USD) (Eastern China)	9
18	Appendix Table 4-2. Cost of screening (USD) (Central China)	10
19	Appendix Table 4-3. Cost of screening (USD) (Western China)	11
20	Appendix Table 4-4. Cost of screening (USD) (Northeastern China)	12
21	Provincial medical service price	13
22	Appendix Table 5. Cost of treatment (USD)	14
23	Appendix Table 6. Utility score (QALYs)	15
24	Appendix Table 7. Sensitivity and specificity of screening methods	16
25	Appendix Table 8. Symptoms without screening and attendance rate of	
26	screening	17
27	Appendix Figure 3. Natural mortality rate used in Markov model	18
28	Appendix Table 9. GDP used in eight settings	19
29	Appendix Table 10. One-way sensitivity analysis	20
30	Appendix Table 11. Probabilistic sensitivity analysis	22
31	References	23

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34 **Appendix Table 1. Consolidated Health Economic Evaluation Reporting Standards**
35 **(CHEERS) checklist**

Section	Item No	Recommendation	Reported on page No/line No
Title and Abstract			
Title	1	Identify the study as an economic evaluation or use more specific terms such as "cost-effectiveness analysis", and describe the interventions compared.	Page 1
Abstract	2	Provide a structured summary of objectives, perspective, setting, methods (including study design and inputs), results (including base case and uncertainty analyses), and conclusions.	Page 1
Introduction			
Background and objectives	3	Provide an explicit statement of the broader context for the study. Present the study question and its relevance for health policy or practice decisions.	Page 2
Methods			
Target population and subgroups	4	Describe characteristics of the base case population and subgroups analyzed, including why they were chosen.	Page 4
Setting and location	5	State relevant aspects of the system(s) in which the decision(s) need(s) to be made.	Page 4
Study perspective	6	Describe the perspective of the study and relate this to the costs being evaluated.	Page 5
Comparators	7	Describe the interventions or strategies being compared and state why they were chosen.	Page 4
Time horizon	8	State the time horizon(s) over which costs and consequences are being evaluated and say why appropriate.	Page 3
Discount rate	9	Report the choice of discount rate(s) used for costs and outcomes and say why appropriate.	Page 6
Choice of health outcomes	10	Describe what outcomes were used as the measure(s) of benefit in the evaluation and their relevance for the type of analysis performed.	Page 6
Measurement of effectiveness	11a	<i>Single study-based estimates:</i> Describe fully the design features of the single effectiveness study and why the single study was a sufficient source of clinical effectiveness data.	Page 6
	11b	<i>Synthesis-based estimates:</i> Describe fully the methods used for identification of included studies and synthesis of	None defined

		clinical effectiveness data.	
Measurement and valuation of preference-based outcomes	12	If applicable, describe the population and methods used to elicit preferences for outcomes.	Page 2
Estimating resources and costs	13a	<i>Single study-based economic evaluation:</i> Describe approaches used to estimate resource use associated with the alternative interventions. Describe primary or secondary re- search methods for valuing each resource item in terms of its unit cost. Describe any adjustments made to approximate to opportunity costs.	None defined
	13b	<i>Model-based economic evaluation:</i> Describe approaches and data sources used to estimate resource use associated with model health states. Describe primary or secondary research methods for valuing each resource item in terms of its unit cost. Describe any adjustments made to approximate to opportunity costs.	Page 5
Currency, price date, and conversion	14	Report the dates of the estimated resource quantities and unit costs. Describe methods for adjusting estimated unit costs to the year of reported costs if necessary. Describe methods for converting costs into a common currency base and the ex- change rate.	Page 5
Choice of model	15	Describe and give reasons for the specific type of decision-analytical model used. Providing a figure to show model structure is strongly recommended.	Page 3 Figure 1-2 & Appendix Figure 1
Assumptions	16	Describe all structural or other assumptions underpinning the decision-analytical model.	Page 3
Analytical methods	17	Describe all analytical methods supporting the evaluation. This could include methods for dealing with skewed, missing, or censored data; extrapolation methods; methods for pooling data; approaches to validate or make adjustments (such as half cycle corrections) to a model; and methods for handling population heterogeneity and uncertainty.	None defined
Results			
Study parameters	18	Report the values, ranges, references, and, if used, probability distributions for all parameters. Report reasons	Page 5-6

		or sources for distributions used to represent uncertainty where appropriate. Providing a table to show the input values is strongly recommended.	Supplement Table 6-19
Incremental costs and outcomes	19	For each intervention, report mean values for the main categories of estimated costs and outcomes of interest, as well as mean differences between the comparator groups. If applicable, report incremental cost-effectiveness ratios.	Page 9 & Table 1
Characterizing uncertainty	20a	<i>Single study-based economic evaluation:</i> Describe the effects of sampling uncertainty for the estimated incremental cost and incremental effectiveness parameters, together with the impact of methodological assumptions (such as discount rate, study perspective).	Page 13 & Appendix pp20-22
	20b	<i>Model-based economic evaluation:</i> Describe the effects on the results of uncertainty for all input parameters, and uncertainty related to the structure of the model and assumptions.	Page 13 & Appendix pp20-22
Characterizing heterogeneity	21	If applicable, report differences in costs, outcomes, or cost-effectiveness that can be explained by variations between subgroups of patients with different baseline characteristics or other observed variability in effects that are not reducible by more information.	Page 13 & Appendix pp20-22
Discussion			
Study findings, limitations, generalizability, and current knowledge	22	Summarize key study findings and describe how they support the conclusions reached. Discuss limitations and the generalizability of the findings and how the findings fit with current knowledge.	Page 13
Other			
Source of funding	23	Describe how the study was funded and the role of the funder in the identification, design, conduct, and reporting of the analysis. Describe other non-monetary sources of support.	Page 17
Conflicts of interest	24	Describe any potential for conflict of interest of study contributors in accordance with journal policy. In the absence of a journal policy, we recommend authors comply with International Committee of Medical Journal Editors recommendations.	Page 17

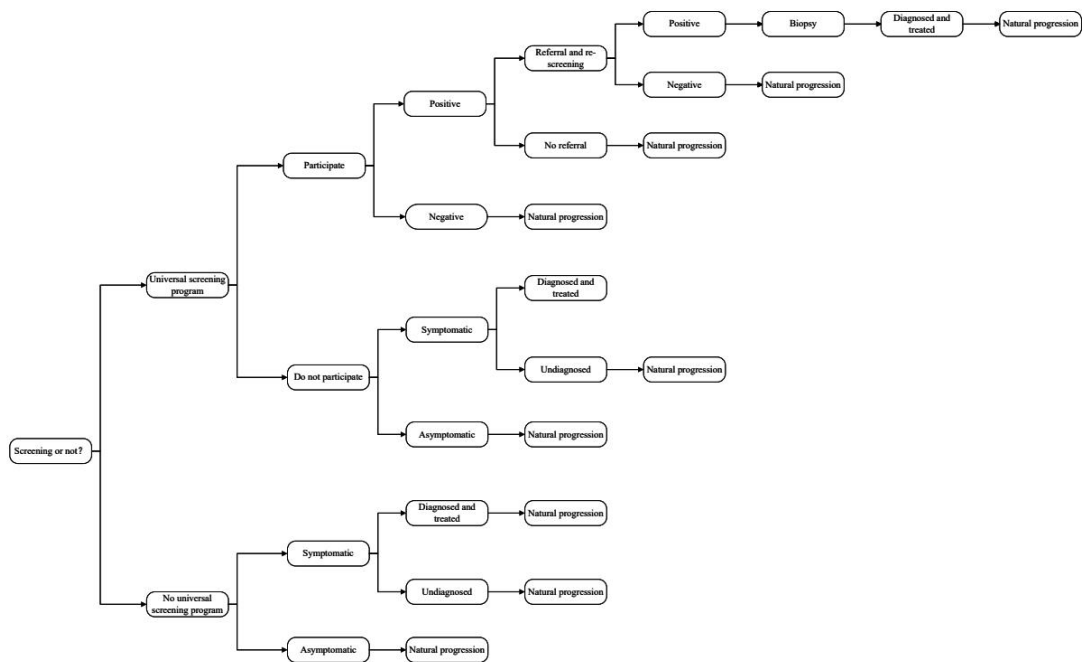
36 For consistency, the CHEERS Statement checklist format is based on the format of the CONSORT
37 statement checklist.

38 The ISPOR CHEERS Task Force Report provides examples and further discussion of the 24-item
39 CHEERS Checklist and the CHEERS Statement. It may be accessed via the Value in Health link or via the ISPOR
40 Health Economic Evaluation Publication Guidelines – CHEERS: Good Reporting Practices
41 webpage: <http://www.ispor.org/TaskForces/EconomicPubGuidelines.asp>

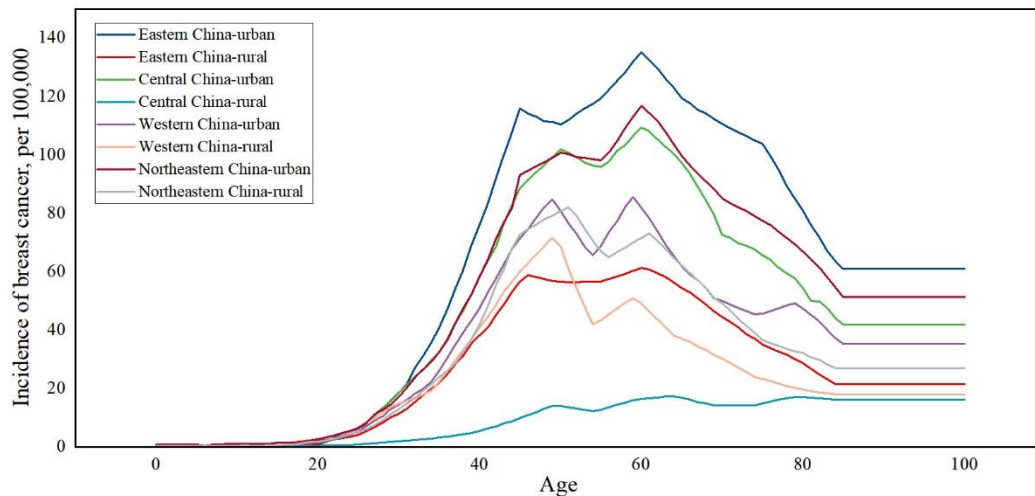
42 The citation for the CHEERS Task Force Report is:

43 Husereau D, Drummond M, Petrou S, et al. Consolidated health economic evaluation reporting standards
44 (CHEERS)—Explanation and elaboration: A report of the ISPOR health economic evaluations publication guidelines
45 good reporting practices task force. Value Health 2013;16:231-50[1].

46



Appendix Figure 1. Choices and results for both organized breast cancer screening and opportunistic case detection



Appendix Figure 2. The incidence of breast cancer in China

Note: The incidence of breast cancer in the eight settings was collected from the China Cancer Registry Annual Report 2021[5]. However, this report did not include data on the incidence in northeastern China. Published literature indicated that the incidence in northeastern China closely resembled that of the entire country, so we used the national incidence as a substitute.

Appendix Table 2. Transition rate used in Markov model

Parameters	Base-case	Ranges for sensitivity analysis	Distribution for sensitivity analysis	References
Ratio of DCIS incidence to invasive breast cancer incidence	12.00%	9.60%-14.40%	Beta (263.88, 1935.12)	Sun L et al. (2018)[2]
RR of invasive cancer from DCIS	202.00%	161.60%-242.40%	Uniform (1.61, 2.42)	
From Stage I (age-specific) To Stage II To BC-related death	Age-specific	Appendix Table 2		Huang Y et al. (2020)[3]
From Stage II (age-specific) To Stage III To BC-related death				
From Stage III (age-specific) To Stage IV To BC-related death				
From Stage IV to BC-related death (age-specific)				
From Remission Stage I To Local recurrence	1.00%	0.80%-1.20%	Beta (296.99, 29402.01)	Nguyen C P et al. (2018)[4]
To Distant recurrence	0.00%	0.00%-0.00%	Beta (300.00, 18749399.00)	
From Remission Stage II/III To Local recurrence	1.80%	1.44%-2.16%	Beta (294.58, 16071.08)	
To Distant recurrence	2.40%	1.92%-2.88%	Beta (292.78, 11906.22)	
From Local recurrence Stage To Distant recurrence	6.20%	4.96%-7.44%	Beta (281.34, 4256.37)	
To BC-related death	1.30%	1.04%-1.56%	Beta (296.09, 22479.84)	
From Distant recurrence to BC-related death	38.60%	30.88%-46.32%	Beta (183.81, 292.39)	

Note: DCIS: Ductal Carcinoma In Situ, RR: risk ratio, BC: breast cancer.

Appendix Table 3. Age-specific progression and mortality rate of breast cancer

Age	From Stage I to Stage II	From Stage II to Stage III	From Stage III to Stage IV	From Stage I to BC-related deaths	From Stage II to BC-related deaths	From Stage III to BC-related deaths	From Stage IV to BC-related deaths
<30	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
30-34	78.61%	32.33%	25.13%	0.04%	0.05%	0.05%	18.35%
35-39	79.86%	33.66%	25.37%	0.06%	0.06%	0.06%	30.41%
40-44	79.09%	34.56%	22.45%	0.08%	0.09%	0.09%	31.80%
45-49	82.29%	36.73%	25.16%	0.15%	0.16%	0.16%	25.69%
50-54	83.75%	35.15%	24.76%	0.22%	0.24%	0.24%	26.05%
55-59	83.75%	38.77%	25.78%	0.36%	0.39%	0.39%	19.87%
60-64	79.18%	34.63%	25.13%	0.67%	0.69%	0.69%	12.00%
65-69	81.36%	33.08%	24.38%	1.14%	1.16%	1.16%	10.86%
70-74	78.09%	33.26%	23.87%	1.98%	2.01%	2.01%	10.88%
75+	77.33%	31.34%	30.34%	3.60%	3.63%	3.63%	10.31%

Appendix Table 4-1. Cost of screening (USD) (Eastern China)

Parameters	Base-case	Ranges for sensitivity analysis	Distribution for sensitivity analysis	References
Eastern China-urban				
BSE	0.75	0.60-0.90	Gamma (300.00, 0.00)	Calculation Provincial medical service price
CBE	4.71	3.77-5.65	Gamma (300.00, 0.02)	
MAM	24.43	19.54-29.32	Gamma (300.00, 0.08)	
NIO	76.13	60.90-91.36	Gamma (300.00, 0.25)	
MRI	14.77	11.82-17.72	Gamma (300.00, 0.05)	
CTL	54.39	43.51-65.27	Gamma (300.00, 0.18)	
BM	9.47	7.58-11.37	Gamma (300.00, 0.03)	
CD	18.81	15.05-22.58	Gamma (300.00, 0.06)	
Biopsy	15.41	12.33-18.50	Gamma (300.00, 0.05)	
Eastern China-rural				
BSE	0.70	0.56-0.83	Gamma (300.00, 0.00)	Calculation Provincial medical service price
CBE	4.35	3.48-5.21	Gamma (300.00, 0.01)	
MAM	19.52	15.62-23.43	Gamma (300.00, 0.07)	
NIO	73.75	59.00-88.50	Gamma (300.00, 0.25)	
MRI	13.89	11.11-16.67	Gamma (300.00, 0.05)	
CTL	52.20	41.76-62.64	Gamma (300.00, 0.17)	
BM	8.85	7.08-10.62	Gamma (300.00, 0.03)	
CD	17.53	14.02-21.04	Gamma (300.00, 0.06)	
Biopsy	13.78	11.02-16.54	Gamma (300.00, 0.05)	

Note: BSE: breast cancer self-examination, CBE: Clinician breast cancer examination, MAM: mammography, NIO: near-infrared optical mammography, MRI: Magnetic resonance imaging, CTL: Computed Tomography Laser Mammography, BM: B-Mode, CD: Color Doppler.

71 **Appendix Table 4-2. Cost of screening (USD) (Central China)**

Parameters	Base-case	Ranges for sensitivity analysis	Distribution for sensitivity analysis	References
Central China-urban				
BSE	0.57	0.45-0.68	Gamma (300.00, 0.00)	Calculation
CBE	3.54	2.84-4.25	Gamma (300.00, 0.01)	
MAM	10.87	8.70-13.04	Gamma (300.00, 0.04)	Provincial medical service price
NIO	66.17	52.94-79.41	Gamma (300.00, 0.22)	
MRI	6.47	5.18-7.77	Gamma (300.00, 0.02)	
CTL	18.19	14.56-21.83	Gamma (300.00, 0.06)	
BM	6.47	5.18-7.77	Gamma (300.00, 0.02)	
CD	12.33	9.87-14.80	Gamma (300.00, 0.04)	
Biopsy	22.24	17.79-26.69	Gamma (300.00, 0.07)	
Central China-rural				
BSE	0.37	0.29-0.44	Gamma (300.00, 0.00)	Calculation
CBE	2.30	1.84-2.77	Gamma (300.00, 0.01)	
MAM	9.63	7.70-11.56	Gamma (300.00, 0.03)	Provincial medical service price
NIO	64.93	51.95-77.92	Gamma (300.00, 0.22)	
MRI	5.23	4.19-6.28	Gamma (300.00, 0.02)	
CTL	16.95	13.56-20.35	Gamma (300.00, 0.06)	
BM	5.23	4.19-6.28	Gamma (300.00, 0.02)	
CD	11.09	8.88-13.31	Gamma (300.00, 0.04)	
Biopsy	20.06	16.05-24.07	Gamma (300.00, 0.07)	

72 **Note:** BSE: breast cancer self-examination, CBE: Clinician breast cancer examination, MAM: mammography, NIO:
73 near-infrared optical mammography, MRI: Magnetic resonance imaging, CTL: Computed Tomography Laser
74 Mammography, BM: B-Mode, CD: Color Doppler.

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Appendix Table 4-3. Cost of screening (USD) (Western China)

Parameters	Base-case	Ranges for sensitivity analysis	Distribution for sensitivity analysis	References
Western China-urban				
BSE	0.61	0.49-0.73	Gamma (300.00, 0.00)	Calculation Provincial medical service price
CBE	3.82	3.06-4.59	Gamma (300.00, 0.01)	
MAM	16.07	12.85-19.28	Gamma (300.00, 0.05)	
NIO	66.11	52.89-79.34	Gamma (300.00, 0.22)	
MRI	11.03	8.82-13.23	Gamma (300.00, 0.04)	
CTL	18.18	14.54-21.81	Gamma (300.00, 0.06)	
BM	7.26	5.81-8.72	Gamma (300.00, 0.02)	
CD	15.12	12.10-18.14	Gamma (300.00, 0.05)	
Biopsy	15.81	12.64-18.97	Gamma (300.00, 0.05)	
Western China-rural				
BSE	0.26	0.21-0.32	Gamma (300.00, 0.00)	Calculation Provincial medical service price
CBE	1.65	1.32-1.98	Gamma (300.00, 0.01)	
MAM	11.67	9.33-14.00	Gamma (300.00, 0.04)	
NIO	53.39	42.71-64.07	Gamma (300.00, 0.18)	
MRI	7.51	6.01-9.01	Gamma (300.00, 0.03)	
CTL	11.83	9.46-14.20	Gamma (300.00, 0.04)	
BM	4.43	3.55-5.32	Gamma (300.00, 0.01)	
CD	10.52	8.41-12.62	Gamma (300.00, 0.04)	
Biopsy	11.79	9.43-14.15	Gamma (300.00, 0.04)	

Note: BSE: breast cancer self-examination, CBE: Clinician breast cancer examination, MAM: mammography, NIO: near-infrared optical mammography, MRI: Magnetic resonance imaging, CTL: Computed Tomography Laser Mammography, BM: B-Mode, CD: Color Doppler.

81 **Appendix Table 4-4. Cost of screening (USD) (Northeastern China)**

Parameters	Base-case	Ranges for sensitivity analysis	Distribution for sensitivity analysis	References
Northeastern China-urban				
BSE	0.42	0.33-0.50	Gamma (300.00, 0.00)	Calculation Provincial mdeical service price
CBE	2.59	2.08-3.11	Gamma (300.00, 0.01)	
MAM	16.91	13.53-20.29	Gamma (300.00, 0.06)	
NIO	63.79	51.03-76.55	Gamma (300.00, 0.21)	
MRI	12.51	10.01-15.02	Gamma (300.00, 0.04)	
CTL	40.35	32.28-48.42	Gamma (300.00, 0.13)	
BM	9.58	7.67-11.50	Gamma (300.00, 0.03)	
CD	19.84	15.87-23.81	Gamma (300.00, 0.07)	
Biopsy	19.84	15.87-23.81	Gamma (300.00, 0.07)	
Northeastern China-rural				
BSE	0.35	0.28-0.42	Gamma (300.00, 0.00)	Calculation Provincial mdeical service price
CBE	2.20	1.76-2.63	Gamma (300.00, 0.01)	
MAM	13.92	11.13-16.70	Gamma (300.00, 0.05)	
NIO	60.80	48.64-72.95	Gamma (300.00, 0.20)	
MRI	9.52	7.62-11.42	Gamma (300.00, 0.03)	
CTL	37.36	29.88-44.83	Gamma (300.00, 0.12)	
BM	6.59	5.27-7.91	Gamma (300.00, 0.02)	
CD	16.85	13.48-20.21	Gamma (300.00, 0.06)	
Biopsy	16.85	13.48-20.21	Gamma (300.00, 0.06)	

82 **Note:** BSE: breast cancer self-examination, CBE: Clinician breast cancer examination, MAM: mammography, NIO:

83 near-infrared optical mammography, MRI: Magnetic resonance imaging, CTL: Computed Tomography Laser

84 Mammography, BM: B-Mode, CD: Color Doppler.

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86 **Provincial medical service price**

87 Considering the inclusion of several provinces medical service price, we provided examples of a subset. The sources
88 and retrieval channels for other provinces followed a similar approach.

89 Anhui: <https://www.ah.gov.cn/szf/zfgb/554165031.html>

90 Hunan: http://ybj.hunan.gov.cn/ybj/first113541/firstF/f2113606/202211/t20221110_29122074.html

91 Jiangsu: <https://si12333.cn/policy/mszbr.html>

92 Liaoning: <https://www.ykzxyy.cn/index.php?m=content&c=index&a=show&catid=73&id=1895>

93 Yunnan: <https://ylbz.yn.gov.cn/index.php?s=form&c=yfwxm&m=page>

94 Zhejiang: <https://www.zjhospital.com.cn/Upload/xmlist2023.pdf>

95 Heilongjiang: <http://www.zgyt.gov.cn/web/ytq/ydxx/-/articles/6756242.shtml>

96 Henan: <http://www.hnszsy.cn/detail/4099.html>

97 Gansu: http://www.ningxian.gov.cn/jyj/xxgk/fdzdgknr/ywjj/content_20486

98 Guangxi: <http://ybj.gxzf.gov.cn/xwdt/tzgg/t11063960.shtml>

99 Guizhou:

100 http://www.gzhs.gov.cn/zwfw/bmlqfw/shbz/fwzn/yl_5059753/201601/t20160105_6251198.html

101 Inner Mongolia: http://www.nmgsyy.cn/tmpl/plate_page.html?id=169

102 Ningxia:

103 https://ylbz.nx.gov.cn/zfxgk/fdzdgknr/tzgg/202212/t20221230_3900070.html

104 Qinghai: https://ybj.qinghai.gov.cn/2020-07/17/c_1126250188.htm

105 Shanxi: <http://ybj.shaanxi.gov.cn/xwzx/ybyw/sybd/t/15174.htm>

106 Sichuan: <https://ylbzj.sc.gov.cn/scsybj/nc010416/2023/4/12/8a49d73f67064dc4b94047cd616abb9e.shtml>

107 Xizang: <http://ylbzj.xizang.gov.cn/zwgk/zcwj/202110/P020211029651914105465.pdf>

108 Xinjiang:

109 <http://ylbzj.xinjiang.gov.cn/ylbzj/mlgkjgcn/202011/a1a27295afbe4500b015579d4c96af95.shtml>

110 Yunnan:

111 https://www.yn.gov.cn/ztgg/lqhm/hmzc/yljk/202202/t20220215_236273.html?eqid=e5e675e400042068000000066459b96a

113 Chongqing:

114 https://www.baidu.com/link?url=HZb7_9Xw7AWCc6f1JzzXbQ2Qsp2RF5rncVoiW4Q0MQtlHM-cwUBEPtrVf2ouCN62

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116 **Appendix Table 5. Cost of treatment (USD)**

Parameters	Base-case	Ranges for sensitivity analysis	Distribution for sensitivity analysis	References
Eastern China				
DCIS	5608.33	4486.66-6729.99	Gamma (300.00, 18.69)	Li H et al. (2013)[8]
Stage I (annual)	8295.07	6636.06-9954.08	Gamma (300.00, 27.65)	Liao X Z et al. (2018)[9]
Stage II (annual)	8392.78	6714.22-10071.33	Gamma (300.00, 27.98)	
Stage III (annual)	10581.45	8465.16-12697.75	Gamma (300.00, 35.27)	
Stage IV (annual)	15926.12	12740.90-19111.35	Gamma (300.00, 53.09)	
Central China				
DCIS	4533.94	3627.15-5440.73	Gamma (300.00, 15.11)	Li H et al. (2013)[8]
Stage I (annual)	6705.98	5364.78-8047.17	Gamma (300.00, 22.35)	Liao X Z et al. (2018)[9]
Stage II (annual)	6784.97	5427.98-8141.96	Gamma (300.00, 22.62)	
Stage III (annual)	8554.36	6843.49-10265.23	Gamma (300.00, 28.51)	
Stage IV (annual)	12875.15	10300.12-15450.18	Gamma (300.00, 42.92)	
Western China				
DCIS	5558.36	4446.69-6670.03	Gamma (300.00, 18.53)	Li H et al. (2013)[8]
Stage I (annual)	8221.16	6576.93-9865.39	Gamma (300.00, 27.40)	Liao X Z et al. (2018)[9]
Stage II (annual)	8318.00	6654.40-9981.60	Gamma (300.00, 27.73)	
Stage III (annual)	10487.17	8389.74-12584.61	Gamma (300.00, 34.96)	
Stage IV (annual)	15784.22	12627.37-18941.06	Gamma (300.00, 52.61)	
Northeastern China				
DCIS	2004.12	1603.30-2404.95	Gamma (300.00, 6.68)	Li H et al. (2013)[8]
Stage I (annual)	2964.23	2371.38-3557.07	Gamma (300.00, 9.88)	Liao X Z et al. (2018)[9]
Stage II (annual)	2999.14	2399.31-3598.97	Gamma (300.00, 10.00)	
Stage III (annual)	3781.26	3025.01-4537.51	Gamma (300.00, 12.60)	
Stage IV (annual)	5691.17	4552.93-6829.40	Gamma (300.00, 18.97)	

Note: DCIS: Ductal Carcinoma In Situ.

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119 **Appendix Table 6. Utility score (QALYs)**

Parameters	Base-case	Ranges for sensitivity analysis	Distribution for sensitivity analysis	References
No breast cancer	0.95	0.76-1.00	Beta (59.05, 3.11)	Brazier J et al (2002)[10]
DCIS	0.90	0.72-1.00	Beta (119.10, 13.23)	Trentham-Dietz A et al. (2018)[11]
Stage I	0.73	0.58-0.88	Beta (322.07, 118.52)	XY Wong (2019)[12]
Stage II	0.73	0.58-0.88	Beta (322.07, 118.52)	
Stage III	0.60	0.48-0.72	Beta (480.60, 321.74)	
Stage IV	0.35	0.28-0.42	Beta (777.25, 1430.84)	
Remission	0.82	0.66-0.98	Beta (215.18, 47.23)	Hayman J A et al. (1997)[13]
Local recurrence	0.60	0.48-0.72	Beta (475.80, 313.25)	Lloyd A et al. (2006)[14]
Distant recurrence	0.62	0.50-0.74	Beta (455.38, 279.10)	Lee J H et al. (2002)[15]
Disutility-false positives	0.01	0.01-0.01	Beta (1187.99, 117611.01)	Li L et al (2019)[16]

Note: DCIS: Ductal Carcinoma In Situ.

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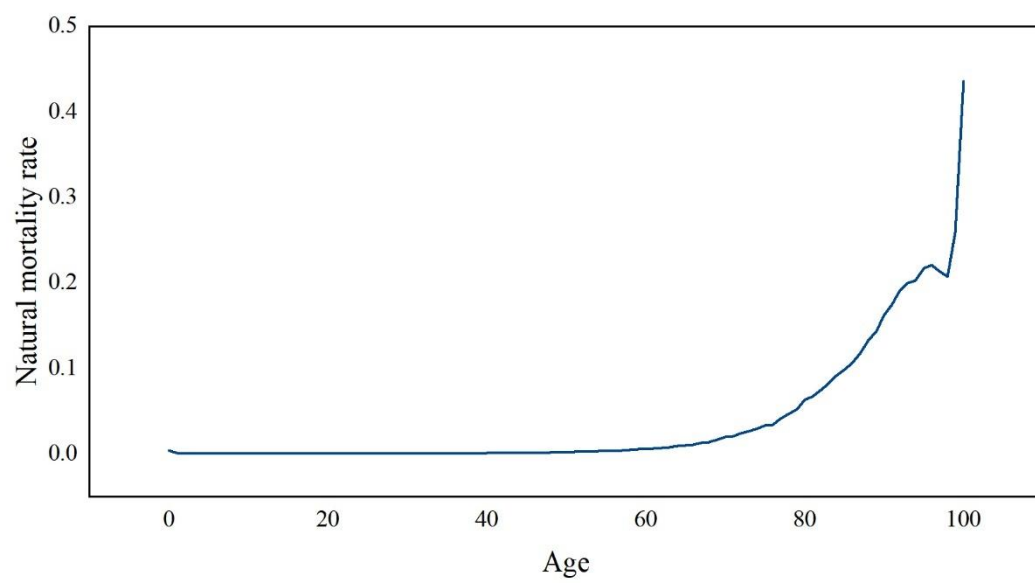
Appendix Table 7. Sensitivity and specificity of screening methods

Parameters	Base-case	Ranges for sensitivity analysis	Distribution for sensitivity analysis	References
Sensitivity				
BSE	20.00%	16.00%-24.00%	Beta (959.80, 3839.20)	O Malley M S et al. (1987)[18]
CBE	36.00%	28.80%-43.20%	Beta (767.64, 1364.69)	Malmartel A et al. (2019)[19]
MAM	80.50%	64.40%-96.60%	Beta (233.20, 56.49)	Omranipour R et al. (2016)[20]
NIO	81.60%	65.28%-97.92%	Beta (219.98, 49.60)	
MRI	71.00%	56.80%-85.20%	Beta (347.29, 141.85)	Kriege M et al. (2006)[21]
CTL	95.20%	76.16%-100.00%	Beta (56.17, 2.83)	Jalalian A et al. (2017)[22]
BM	93.70%	74.96%-100.00%	Beta (74.66, 5.02)	Watanabe T et al. (2021)[23]
CD	94.70%	75.76%-100.00%	Beta (62.65, 3.51)	
Specificity				
BSE	78.00%	62.40%-93.60%	Beta (263.22, 74.24)	Malmartel A et al. (2019)[19]
CBE	78.00%	62.40%-93.60%	Beta (263.22, 74.24)	
MAM	73.30%	58.64%-87.96%	Beta (319.67, 116.44)	Omranipour R et al. (2016)[20]
NIO	57.80%	46.24%-69.36%	Beta (505.82, 369.30)	
MRI	90.00%	72.00%-100.00%	Beta (119.10, 13.23)	Kriege M et al. (2006)[21]
CTL	98.10%	78.48%-100.00%	Beta (43.51, 0.84)	Jalalian A et al. (2017)[22]
BM	61.50%	49.20%-73.80%	Beta (461.38, 288.83)	Watanabe T et al. (2021)[23]
CD	69.20%	55.36%-83.04%	Beta (368.91, 164.20)	

Note: BSE: breast cancer self-examination, CBE: Clinician breast cancer examination, MAM: mammography, NIO: near-infrared optical mammography, MRI: Magnetic resonance imaging, CTL: Computed Tomography Laser Mammography, BM: B-Mode, CD: Color Doppler.

Appendix Table 8. Symptoms without screening and attendance rate of screening

Parameters	Base-case	Ranges for sensitivity analysis	Distribution for sensitivity analysis	References
Symptoms without screening				
Stage I	0.40%			Sun L et al. (2018)[2]
Stage II	1.40%			
Stage III	38.00%			
Stage IV	98.00%			
Attendance rate				
Eastern China-urban	55.70%	44.56%-66.84%	Beta (132.34, 105.26)	Chao Qin et al. (2021)[6]
Eastern China-rural	60.70%	48.56%-72.84%	Beta (117.29, 75.94)	
Central China-urban	59.90%	47.92%-71.88%	Beta (119.70, 80.13)	
Central China-rural	64.90%	51.92%-77.88%	Beta (104.65, 56.60)	
Western China-urban	50.30%	40.24%-60.36%	Beta (148.60, 146.82)	
Western China-rural	55.30%	44.24%-66.36%	Beta (133.55, 107.95)	
Northeastern China-urban	55.30%	44.24%-66.36%	Beta (133.55, 107.95)	
Northeastern China-rural	60.30%	48.24%-72.36%	Beta (118.50, 78.02)	
Proportion of referral compliance				
Rescreening	90.00%	72.00%-100.00%	Beta (29.10, 3.23)	Dong B et al. (2021)[7]
Treatment	95.00%	76.00%-100.00%	Beta (24.00, 1.26)	Assumed



Appendix Figure 3. Natural mortality rate used in Markov model[17]

133 **Appendix Table 9. GDP used in eight settings**

Regions	Total GDP, CNY	Total population	Urbanization rate	Disposable income, urban, CNY	Disposable income, rural, CNY	One-time per capita GDP, urban, USD	One-time per capita GDP, rural, USD
Western China	3.00E+13	3.83E+08	52.86%	40582.6	15608.2	13435.74	5794.45
Central China	3.00E+13	3.65E+08	59.71%	40706.8	17857.5	12462.75	8102.47
Eastern China	6.00E+13	5.64E+08	68.82%	56378.3	23556.1	16566.96	15278.23
Northeastern China	6.00E+12	9.85E+07	63.89%	38224.6	18280.4	9123.93	7720.23

134 **The calculation formula of eight settings per capita GDP:**

$$\begin{aligned}
 & \text{The per capita GDP for rural settings} \\
 & = \text{total GDP in rural areas} / \text{total rural population} \\
 & = \frac{\text{total GDP}}{(1 + \text{urban to rural ratio of per capita disposable income})(\text{the total population}(1 - \text{urbanization rate}))} \\
 & = \frac{\text{overall per capita national GDP}}{((1 + \text{urban to rural ratio of per capita disposable income})(1 - \text{urbanization rate}))} \\
 & \text{The per capita GDP for urban China} \\
 & = \frac{\text{overall per capita national GDP}}{\left(1 + \left(\frac{1}{\text{urban to rural ratio of per capita disposable income}}\right)\right) * \text{urbanization rate}}
 \end{aligned}$$

		Eastern China-urban		Eastern China-rural	Central China-urban	Central China-rural	Western China-urban	Western China-rural	Northeastern China-urban	Northeastern China-rural
Base-case	One-time GDP	35-70 (2)	MAM+CTL	40-70 (3) MAM+CTL	35-70 (1) MAM+CTL	No screening	35-70 (2) MAM+CTL	40-65 (1) CBE+CTL	40-70 (2) MAM+CTL	40-65 (1) CBE+MRI
	Three-times GDP	30-70 (1) MAM+CTL		35-70(1) MAM+CTL	30-70 (1) MAM+CTL	50-70 (3) MAM+CTL	30-70 (1) MAM+CTL	20-75 (1) CBE+CTL	30-70 (1) MAM+CTL	30-70 (2) MAM+CTL
Transition rate	-20% One-time		—	—	—	—	—	—	—	40-70 (1) CBE+MRI
	Three-times		—	—	—	45-70 (3) MAM+CTL	—	—	—	35-70 (1) MAM+CTL
	+20% One-time	40-70 (2) MAM+CTL		—	—	—	—	—	—	—
	Three-times	—		—	—	—	—	—	—	—
Sensitivity and Specificity	-20% One-time	45-65 (2) MAM+CTL		No universal screening	40-70 (2) MAM+CTL	—	45-65 (3) MAM+CTL	No screening	50-60 (5) MAM+CTL	No screenings
	Three-times	40-70 (1) MAM+CTL		45-65 (2) MAM+CTL	40-70 (1) MAM+CTL	No screening	40-65 (1) MAM+CTL	45-55 (2) MAM+CTL	40-70 (2) MAM+CTL	45-65 (2) MAM+CTL
	+20% One-time	30-70 (1) 26		30-70 (1) 22	30-70 (1) MAM+CTL	40-70 (1) BSE+MRI	30-70 (1) CBE+CTL	30-70 (1) CBE+CTL	30-70 (1) CBE+MAM	30-70 (1) CBE+MRI
	Three-times	—		30-70 (1) MAM+CTL	25-70 (1) MAM+CTL	25-70 (1) BSE+MRI	—	—	—	30-70 (1) MAM+CTL
Attendance of screening	-20% One-time	40-70 (1) MAM+CTL		45-65 (2) MAM+CTL	—	—	40-65 (1) MAM+CTL	40-60 (1) CBE+CTL	40-70 (1) CBE+CTL	45-65 (1) CBE+MRI
	Three-times	—		—	25-70 (1) MAM+CTL	50-70 (2) CBE+CTL	—	—	—	40-70 (1) MAM+CTL
	+20% One-time	—		—	30-70 (2) MAM+CTL	—	—	30-65 (2) CBE+CTL	—	—
	Three-times	—		30-70 (2) MAM+CTL	—	45-70 (5) MAM+CTL	—	30-70 (2) MAM+CTL	30-70 (2) MAM+CTL	—
Cost of screening	-20% One-time	40-70 (1) MAM+CTL		40-70 (2) MAM+CTL	30-70 (1) MAM+CTL	—	30-70 (2) MAM+CTL	30-65 (1) CBE+CTL	—	40-70 (1) CBE+MRI
	Three-times	—		30-70 (1) MAM+CTL	25-70 (1) MAM+CTL	45-70 (3) MAM+CTL	—	30-70 (1) MAM+CTL	—	30-70 (1) MAM+CTL
	+20% One-time	40-70 (2) MAM+CTL		45-65 (3) MAM+CTL	30-70 (2) MAM+CTL	—	40-70 (2) MAM+CTL	40-60 (1) CBE+CTL	40-70 (1) CBE+MRI	—
	Three-times	—		30-70 (2) MAM+CTL	—	50-70 (5) MAM+CTL	—	—	35-70 (1) MAM+CTL	—
Cost of treatment	-20% One-time	—		—	—	—	—	—	—	40-70 (1) CBE+MRI
	Three-times	—		—	—	—	—	—	—	—
	+20% One-time	—		—	—	—	—	—	—	—

Utilities	-20%	Three-times	—	—	—	—	—	—	—	—
		One-time	40-70 (2) MAM+CTL	45-65 (3) MAM+CTL	30-70 (2) MAM+CTL	—	40-70 (2) MAM+CTL	203CBE+CTL	40-70 (1) CBE+MRI	45-65 (1) CBE+MRI
		Three-times	—	30-70 (2) MAM+CTL	—	50-70 (5) MAM+CTL	—	—	35-70 (1) MAM+CTL	—
		One-time	40-70 (1) MAM+CTL	40-70 (2) MAM+CTL	30-70 (1) MAM+CTL	—	30-70 (2) MAM+CTL	30-65 (1) CBE+CTL	—	40-70 (1) CBE+MRI
		Three-times	—	30-70 (1) MAM+CTL	25-70 (1) MAM+CTL	45-70 (3) MAM+CTL	—	30-70 (1) MAM+CTL	—	35-70 (1) MAM+CTL
		One-time	30-70 (1) MAM+CTL	30-70 (2) MAM+CTL	25-70 (1) MAM+CTL	50-65 (5) MAM+CTL	30-70 (1) MAM+CTL	25-70 (1) CBE+CTL	30-70 (1) MAM+CTL	30-70 (2) MAM+CTL
	+20%	Three-times	25-70 (1) MAM+CTL	25-70 (1) MAM+CTL	25-70 (1) MAM+CTL	30-70 (2) MAM+CTL	25-70 (1) MAM+CTL	25-70 (1) MAM+CTL	25-70 (1) MAM+CTL	25-70 (1) MAM+CTL
		One-time	40-70 (2) MAM+CTL	45-65 (5) MAM+CTL	35-70 (2) MAM+CTL	—	40-70 (1) CBE+CTL	45-55 (1) CBE+CTL	45-70 (1) CBE+MRI	45-60 (1) CBE+MRI
		Three-times	35-70 (1) MAM+CTL	35-70 (2) MAM+CTL	—	50-65 (5) MAM+CTL	35-70 (1) MAM+CTL	30-70 (1) CBE+CTL	30-70 (2) MAM+CTL	40-70 (2) MAM+CTL
		One-time	40-70 (2) MAM+CTL	45-65 (5) MAM+CTL	35-70 (2) MAM+CTL	—	40-70 (1) CBE+CTL	45-55 (1) CBE+CTL	45-70 (1) CBE+MRI	45-60 (1) CBE+MRI
		Three-times	35-70 (1) MAM+CTL	35-70 (2) MAM+CTL	—	50-65 (5) MAM+CTL	35-70 (1) MAM+CTL	30-70 (1) CBE+CTL	30-70 (2) MAM+CTL	40-70 (2) MAM+CTL
		One-time	40-70 (2) MAM+CTL	45-65 (5) MAM+CTL	35-70 (2) MAM+CTL	—	40-70 (1) CBE+CTL	45-55 (1) CBE+CTL	45-70 (1) CBE+MRI	45-60 (1) CBE+MRI

Appendix Table 11. Probabilistic sensitivity analysis

		Eastern China		Central China		Western China		Northeastern China	
		Urban	Rural	Urban	Rural	Urban	Rural	Urban	Rural
One-time GDP	No universal screening	103	304	109	—	84	203	226	534
	Status quo	0	0	0	0	0	0	0	0
	Strategy recommended	9897	9696	9891	10000	9916	9797	9774	9466
Three-times GDP	No universal screening	0	0	0	921	0	0	0	0
	Status quo	0	0	0	0	0	0	0	0
	Strategy recommended	10000	10000	10000	9079	10000	10000	10000	10000

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