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# BMJ Open

## Cost of breast cancer diagnosis and treatment in India: a scoping review protocol

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## Cost of breast cancer diagnosis and treatment in India: a scoping review protocol

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### ABSTRACT

**Introduction:** Breast cancer is the foremost cause for mortality among women. The non-communicable disease (NCD) imposes significant economic expenses to communities. Its economic impact includes both direct and indirect healthcare costs. This scoping review will map key concepts underpinning the current direct and indirect expenses of breast cancer in India.

**Methods and analysis:** This scoping review will follow 'Arksey and O'Malley's' approach and updated methodological guidance from the Joanna Briggs Institute. The Cochrane library, Econ Papers, Embase, ProQuest central, PubMed, and SCOPUS will be searched for peer-reviewed scientific journal publications from the year 2000 to 2021. Reference lists of included articles and preprint repositories will be searched for additional and unpublished

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3 literature. Independent screening (title, abstract and full text) and data extraction will be  
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5 carried out against the defined inclusion criteria. The results will be narratively summarised  
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7 and charted under the conceptual areas of this scoping review. The research gaps and scope  
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9 for future research on the topic will be identified. Findings will be reported using the  
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11 Preferred Reporting Items for Systematic Reviews extension for Scoping Reviews  
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13 (PRISMA ScR).  
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16  
17 **Ethics and dissemination:** Ethics clearance will not be obligatory because this evaluation  
18  
19 will only involve publicly available data. The review's findings will be disseminated through  
20  
21 social media and a presentation in a national or international conference related to  
22  
23 economics and healthcare. The findings will be published in a scientific journal that is peer-  
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25 reviewed.  
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28  
29 **Key Words** - “breast cancer”, “diagnostic cost”, “treatment cost”, “economic burden”,  
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31 “health expenditure”, “India”.  
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### 34 35 36 **Strengths and limitations of this study**

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1. Breast cancer diagnosis and treatment costs in India will be investigated using an established, rigorous, and systematic approach.
  2. The extensive search in databases and grey literature is aimed at including published and unpublished research from the past two decades.
  3. The literature search is limited to English language.
  4. The quality of articles in the scoping review will not be assessed.

## INTRODUCTION

India's epidemiological transition has increased the burden of both communicable and NCD. Amongst the NCD, cancers are the most prevalent. Within the Indian context, breast cancer, lung cancer, oral cancer, stomach, and cervical cancer are commonly predominant.<sup>1</sup> Breast cancer is a severe illness, mainly affecting the women of reproductive age in India, with high medical costs and economic impact.<sup>2</sup> In 2020, the worldwide cancer incidence and fatalities reached 19.3 million and 10 million respectively. For the year 2020, the estimated incidence of cancer among females in India was 712,758 (104 per 100,000).<sup>3,4</sup> According to the 'International Agency for Research on Cancer' (IARC), delayed diagnosis leads to poorer probable outcome or prognosis of the breast cancer disease.<sup>5,6</sup> New cancer diagnoses in 2020 were lower than expected due to decline in cancer screening procedures and other preventive care visits during the 'COVID-19' pandemic. Potential impact of the 'COVID-19' pandemic on future cancer outcomes has affected with reduced access to care, delayed routine care, later stage diagnosis and delayed or modified treatment.<sup>4-6</sup> The origin of breast cancer is unclear. However, several risk factors are known to be associated with the disease, such as age, genetics, genes, radiation exposure, obesity, delayed pregnancy, and alcohol.<sup>5</sup> It is the most predominant cancer in women, accounting for about a quarter of all cancer cases in Indian cities, and ranking second in rural India.<sup>3,7</sup>

According to the 'National Cancer Registry Programme', breast cancer accounts for 25 to 32 percent of all female cancers in cities like Ahmedabad, Bengaluru, Bhopal, Chennai, Delhi, Hyderabad and Kolkata.<sup>5</sup> Breast cancer incidence rates are growing with an annual percentage rise ranging from 1.4 percent to 2.8 percent, which is more evident in urban regions such as Bengaluru, Chennai, Delhi and Hyderabad than in rural areas.<sup>1,4,8</sup> The Indian Council for Medical Research (ICMR) reported

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3 1.5 lakh new breast cancer cases in 2019, with 70,000 deaths per year. In India, only  
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5 66 percent of women with breast cancer survive for five years, compared to 90  
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7 percent of women in the United States.<sup>9</sup> According to a study conducted by the  
8  
9 International Agency for Research on Cancer (IARC) in 2020, in the previous year,  
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11 150,000 people had been diagnosed with breast cancer.<sup>8</sup> Breast cancer is primarily  
12  
13 associated with increased life expectancy, changes in population reproductive patterns (e.g.,  
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15 later age at first birth), overweight and obesity, lower levels of physical activity, social  
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17 development and growth, and embracing western lifestyles (World Health Organization  
18  
19 (WHO), 2020).<sup>8-10</sup>  
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24 Cancerous breast tissue originates from breast milk providing milk ducts and lobules.<sup>5</sup>  
25  
26 Breast cancer is categorised as ductal carcinomas and lobular carcinomas. Invasive  
27  
28 ductal carcinoma is the most common type accounting for around 70% of tumours,  
29  
30 whereas invasive lobular carcinomas account for 15–20% of tumours.<sup>5,6,11</sup> Breast  
31  
32 cancer is classified into the five stages depending on the size and spread of the lump  
33  
34 or tumour in breast: Stage 0 (also known as ‘Ductal Carcinoma in Situ’ (DCIS)),  
35  
36 ‘stage I’, ‘stage II’, ‘stage III’, and ‘stage IV’.<sup>7</sup> The stage of cancer is determined by a  
37  
38 series of specialist physical exams, mammography, ultra-sonography, aspiration, biopsies,  
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40 bone scans, and blood tests. Oncologists use a comprehensive strategy to treat breast cancer  
41  
42 such as, surgery, hormone therapy, chemotherapy, radiation therapy and biological  
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44 therapies.<sup>12</sup> Despite advancements in therapy and awareness initiatives, the dangers linked  
45  
46 with breast cancer continue to grow in India. Poor diagnosis and costly treatment lead to a  
47  
48 high death rate.<sup>9</sup> The typical cost of treatment including radiation, surgery, and  
49  
50 investigations costs between INR 5 and 6 lakhs (about US\$6700 to US\$8000). Six rounds of  
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52 chemotherapy with tailored treatment cost more than INR 20 lakhs (US\$27000).<sup>5</sup>  
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57 Expenditures have risen as a result of expensive infrastructure, new technology-  
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3 based research costs, and newer medicines. Statistics suggest only one in every two  
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5 women with breast cancer survive implying a 50% mortality rate. That is, half of  
6  
7 breast cancer patients are not able to effectively combat the disease owing to their lack  
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9 of knowledge and the high expense of treatment.<sup>9-13</sup> Because of patients lack of  
10  
11 knowledge on their disease condition they fail to approach suitable medical facilities  
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13 therefore most breast cancers are detected at an advanced stage. Patients in urban areas are  
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15 predominantly identified at stage two, when the lesions become palpable lumps; but  
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17 in rural regions these lesions are diagnosed only after they have progressed to  
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19 metastatic tumors.<sup>14,15</sup> The cost of targeted therapy on the WHO Essential Medicine  
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21 List (EML) for 'stage I HER2+ breast cancer' Human Epidermal growth factor  
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23 Receptor 2) breast cancer, for example, is projected to be comparable to roughly ten  
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25 years of average yearly income in India.<sup>10,16</sup> As breast cancer treatment is getting  
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27 expensive, primary prevention is the key to breast cancer management. Breast  
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29 cancer has a one hundred percent success rate if detected early and a high survival  
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31 percentage till the middle stages. Approximately half of all breast cancer patients in  
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33 India are in stages 3 and 4, when the chances of survival are exceedingly low and  
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35 treatment costs are considerable. According to the ICMR, less than 5% of women in  
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37 India get their breasts screened. Breast cancer has a low survival rate since it is  
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39 detected late. The sole recourse to improve breast cancer statistics is to raise awareness on  
40  
41 the disease through early detection.<sup>8,9,17</sup> The 2030 Agenda endorsed by the General  
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43 Assembly for Sustainable Development in September 2015, comprises 17 Sustainable  
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45 Development Goals (SDGs). Among 17 SDGs, SDG 1 & 3 have set a target which aim  
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47 for the abolition of all kinds of poverty and a one-third decrease in  
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49 noncommunicable disease-related early death respectively, by 2030.<sup>18</sup> Breast cancer  
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51 is a prominent cause of death in recent decades, posing a significant societal and  
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3 economic threat. As a result, governments must understand the economic burden  
4 (direct and indirect expenses) of breast cancer in order to effectively allocate  
5 resources. Direct expenses include medical and non-medical expenditures incurred  
6 as a result of resource usage owing to inpatient and outpatient health care  
7 occurrences connected with diagnosis and treatment. These also include  
8 transportation and caregivers' costs. Indirect expenses, on the other contrary, include  
9 productivity loss owing to work absenteeism (morbidity) and death from cancer  
10 (mortality) at early age.<sup>19</sup> Direct and indirect expenses together form the economic  
11 burden of breast cancer.  
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25 In India, the amount of information accessible on the economic impact of breast cancer is  
26 limited.<sup>20–23</sup> Although studies on expenses associated with breast cancer<sup>24–26</sup> and state wise  
27 cost of breast cancer<sup>27,28</sup> are available, a comprehensive review of literature on costs of breast  
28 cancer in India is missing.<sup>29</sup> To fill this void, a scoping review assessment of the literature on  
29 the evidence on the cost of diagnosis and treatment of breast cancer in India will be  
30 performed. The major objective is to collect data on the direct and indirect costs of breast  
31 cancer diagnosis and treatment in India. Additionally, this scoping study can serve to  
32 evaluate the impact of illnesses on society, aiding policymakers and decision makers in  
33 forecasting future healthcare expenditures and making resource allocation choices.  
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## 46 **METHODS & ANALYSIS**

### 47 **Protocol Design**

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49 The Arksey and O'Malley's scoping review methodological framework<sup>30</sup>, guidance  
50 by Levac at al.<sup>31</sup>, and JBI updated methodological guidance (Peters et al., 2020) were  
51 used in preparation of this protocol.<sup>2,32</sup> The current procedure and future scoping review  
52 would be documented using the 'Preferred Reporting Items for Systematic Reviews and  
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Meta-Analyses (PRISMA) protocols extension for scoping reviews guidelines' (PRISMA-ScR; Supplementary file-1).<sup>33,34</sup> The scoping review will be carried out in five different stages

1. Identification of the research question
2. Identifying relevant studies
3. Selection of eligible studies
4. Data extraction and charting results
5. Collating, summarizing and reporting the results

### Stage 1: Identification of the research question

The main research question is: "What is the distribution of evidence on the cost (direct and indirect) associated with breast cancer in India among the female population aged 18 years and above? These include costs associated with diagnosis and treatment." Research sub-questions include: What are the direct and indirect expenses of breast cancer treatments (all stages) in India?

### Stage 2: Identifying relevant studies

#### Eligibility Criteria

To discover relevant literature, a comprehensive search strategy was established, which was supported by key inclusion criteria. The eligibility criteria is defined based on 'Population-Concept-Context' (PCC) framework recommended by the 'JBI methodology for scoping reviews' (Table 1).<sup>35</sup>

**Table 1. PCC framework (Eligibility criteria) for study selection**

Criteria	Determinants
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<b>Population</b>	Female participants with breast cancer
<b>Concept</b>	Cost associated with breast cancer disease management
<b>Context</b>	India

**Population:** The scoping review will examine studies including Indian women aged 18 and above who have been diagnosed with breast cancer. Studies on breast cancer that includes male population and does not report cost data separately for the female population, will not be considered.

**Concept:** This scoping review's main goal is to investigate and quantify the costs of breast cancer detection and treatment in India. It will include cost or expenditure categorized as direct and indirect costs. Studies that include cost of diagnosis and treatment with specific modalities will be included. The direct cost will cover the total medical cost, which include the cost of diagnostic and screening such as, physical examination, mammograms, ultrasoundography, fine needle aspiration test (FNAC), bone scans, blood tests, biopsies, and cost of treatment such as, hospitalization cost (including cost of surgery), drug cost, radiotherapy cost, chemotherapy, hormone therapy, biological treatment, consultation cost and non-medical cost (transportation, food, and lodging). Indirect cost will include total patient wage loss, total caregiver wage loss, spending on hired help, productivity loss.<sup>36,37</sup> Direct and indirect cost will also be provided for all stages of breast cancer treatment (Stage 0 to 4).<sup>38</sup> Studies that assess the cost of many cancers simultaneously; but do not provide the specific break down of costs for breast cancer will be excluded.

**Context:** The purpose of this scoping review is to assess the economic impact of breast cancer in India. As a result, it would evaluate research in India at all stages (0 to 4) of breast cancer.<sup>38</sup> This review will consider research done in any clinical setting (e.g., inpatient,

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3 outpatient) or health care institution (e.g., hospitals, health centres, nursing homes)  
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5 throughout all Indian states.  
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### 8 **Search strategy**

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11 Only literature published from 2000 onwards in English language will be considered. A  
12 search of several electronic databases was used as the major source of literature: The  
13 Cochrane library, EconPapers, Embase, ProQuest central, PubMed, and Scopus. The  
14 secondary source of potentially relevant material was for grey literature from Google  
15 Scholar and Shodhganga: a reservoir of Indian theses @ INFLIBNET. We will manually  
16 examine the reference lists of included research, reports, related reviews and publications, as  
17 well as preprint repositories, for the inclusion of further relevant studies. Authors will be  
18 contacted. In cooperation with a medical librarian, the team devised a search  
19 technique to find a complete list of relevant terms pertaining to the cost of breast  
20 cancer diagnosis and treatment in India. A primary search on PubMed was initiated  
21 to identify articles for this review. The key words used to describe the relevant articles  
22 will be listed and used to develop a full search strategy for PubMed. Initially “breast cancer”  
23 OR "breast oncology" OR "breast neoplasm" OR "mammary gland" OR  
24 “carcinoma” AND “diagnostic cost” OR "cost", "treatment cost" OR "economic  
25 burden" OR "cost of disease" OR "cost of treatment" OR "cost of diagnosis" AND  
26 “India" OR "LMIC" OR “developing countries” was used for mapping relevant studies.  
27  
28 The search strategy was customized and modified consisting of all keywords and index  
29 terms for Scopus, The Cochrane library, Embase, Econ Papers and ProQuest Central  
30 databases. A search will also be done through scientific repositories such as, the cancer  
31 institute and research centre and the population-based cancer registries repository.  
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The search terms from each concept of the search strategy were merged with appropriate boolean operators to produce the final relevant reports and articles. An example of the search strategy is provided below in Table 2 and search results for PubMed are provided in an online supplementary file 2.

**Table 2. Search strategy**

#	Keywords
1	("Breast Cancer" OR "Cancer of Breast" OR "Mucin like Carcinoma" OR "BRCA 1 Protein" OR "BRCA 2 Protein") OR ("Cancer" OR "Neoplasm" OR "Carcinoma")
2	("Healthcare Cost" OR "Diagnosis Cost" OR "Treatment Cost" OR "Direct Cost" OR "Indirect Cost" OR "Disease Burden" OR "Cost Utility Analysis" OR "Cost Effectiveness Analysis" OR "Cost Benefit Analysis" OR "Disease Cost" OR "Estimation of Cost" OR "Medical Cost")
3	("India" OR "Republic of India" OR "Bharat" OR "Hindustan" OR "LMIC" OR "Developing Country")
4	#1 AND #2 AND #3

### Stage 3: Selection of eligible studies

Identified studies from search on different databases will be collated and imported to Zotero version 5.0. Duplicates will be removed at compilation stage, and the citations and their abstracts will consecutively be transferred to Microsoft Excel for screening process. A two-stage screening process comprising of

1. Title and abstract screening
2. Full-text review will be carried out

Based on the eligibility criteria, two independent reviewers will do the screening of

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3 title and abstract (Table 3) and studies that do not address the research question will be  
4 removed. Any disagreements between the reviewers will be resolved involving a  
5 third reviewer. Further, the screening of full text will be done for articles that meets  
6 the inclusion criteria. Disagreements will be resolved by involving a subject expert.  
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8 Both the stages will follow an identical process and the result will be documented on  
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10 Microsoft Excel spreadsheets. Reasons for exclusion of studies will be informed and  
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12 documented at the full-text screening stage.  
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21 **Table 3 Inclusion & exclusion criteria**

<b>Criteria</b>	<b>Inclusion criteria</b>	<b>Exclusion criteria</b>
<b>Population</b>	Female participants aged 18 years and above diagnosed with breast cancer	Female participants not diagnosed with breast cancer but undergone screening will be excluded
<b>Concept</b>	All studies concerning the expenses related with breast cancer disease management, including direct and indirect costs	Pre-diagnosis screening cost
<b>Context</b>	India	Non-Indian studies or studies with a focus on LMICs or South Asia in which the expenses for India are not reported separately.

<b>Types of evidence sources</b>	Quantitative, qualitative and mixed methods studies	Letter to the editor, viewpoint, reviews, editorials and perspectives
<b>Timeframe</b>	Studies published from January 2000 onwards	Articles published before 2000
<b>Language</b>	Studies published in English	Non-English articles

#### Stage 4: Data extracting and charting results

Data from the included full text articles will be extracted by two reviewers independently using a custom data extraction form (Supplementary file 3) developed by the research team in Microsoft Excel. The data extracted will capture the study components as follows -

1. Details of the study (Study title, aim or research question, the authors, year of publication, state/district/union territories, geographic location, objectives, methodology, and sample size).
2. Population (e.g., age, gender, target population, population excluded and sample size).
3. Type of cancer - Breast cancer stages (stage 0-4)
4. Diagnostic and treatment modalities (e.g., physical examination, mammograms, ultra-sonography, fine needle aspiration test (FNAC), bone scans, blood tests and biopsies, surgery, radiation therapy, chemotherapy and/or targeted therapy).
5. Study setting (e.g., clinical settings – public (government) and private).
6. Type of costs reported - Diagnostic costs, treatment costs, direct costs,

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3 indirect costs.

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5 7. Study design, study duration, data collection period/year, cost related data  
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7 collection methods, result summary, other measures reported, key findings.

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10 8. Relevant Conclusion

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12 During the piloting phase, any adjustments will be made as needed. As the  
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14 evaluation progresses, the data extraction technique will be updated or adjusted. Any  
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16 changes or amendments that are required during the actual review will be  
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18 documented in the scoping review report. The findings will be evaluated with the  
19  
20 team to see if the data extracted meets the scoping reviews goals and objectives.<sup>39</sup>  
21  
22 The resolution of differences between the reviewers will be discussed with a subject  
23  
24 expert or a senior reviewer.<sup>32</sup>

### 25 26 27 28 29 **Stage 5: Collating, summarizing, and reporting the results**

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31 To exhibit the search process, a 'Preferred Reporting Items for Systematic Reviews and  
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33 Meta-analyses' (PRISMA) flow diagram will be used.<sup>40</sup> The flow diagram will help display  
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35 the decision-making process, as well as the outputs of the searches, the exclusion of  
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37 duplicated citations, study selection, complete retrieval, additional bibliography mining, and  
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39 presentation of the final summary.

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44 Studies will be grouped by costs type (direct or indirect), settings, and study design  
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46 along with key findings. A descriptive statistics, such as measures of frequencies and  
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48 central measures of tendency will be used to reflect the kind of research design, costs  
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50 of treatment examined, and costs identification criteria.<sup>41</sup> The results will be  
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52 summarized and analyzed and will be presented in a graphical, tabular, or in a  
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54 detailed descriptive structure that aligns to the purpose and scope of the review.<sup>32</sup>  
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56 Thematic and narrative approach will also be incorporated for the analysis of  
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quantitative and qualitative studies.<sup>42</sup> Inadequacies and limitations in the current literature will be identified and summarised.

Study timeline is depicted in Table 4

**Table 4 Study timeline**

Scoping review steps	Status
1. Identifying the research questions	Completed
2. Identifying relevant studies	Completed
<ul style="list-style-type: none"> <li>• <i>Search terms and inclusion/exclusion criteria</i></li> <li>• <i>Conducting the search</i></li> </ul>	Ongoing
3. Selection of eligible studies	
<ul style="list-style-type: none"> <li>• <i>Title and abstract screening</i></li> <li>• <i>Full text screening</i></li> </ul>	2 Weeks 4 weeks
4. Data extraction and charting	4 weeks
5. Data analysis and reporting the results	6 weeks

## DISCUSSION

This scoping review will map the existing information on the economic burden (direct and indirect costs) of female breast cancer in India. Understanding the economic effect of illness is critical for low-income nations dealing with a high disease burden and limited resources. This is in accordance with the SDGs, which aim for the abolition of all forms of poverty and a one-third decrease in NCD-related early death by 2030.<sup>18</sup> In a narrative format, the findings of this scoping review will address the significance for health care policy, including a debate on national screening programmes in India for current primary prevention of breast cancer through cancer screening programmes and future research. Additionally, cancer treatment leads to high out-of-pocket expenditure (OOPE) in India, which imposes financial hardship, especially for the poorest. Findings from this scoping



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3 review will also help enhance the coverage of risk pooling mechanism for health insurance  
4 packages/schemes for breast cancer treatment in India. We plan to share our findings via  
5 social media, conference presentations, and publishing in peer-reviewed publications. Any  
6 variation from the techniques specified in this protocol shall be documented and disclosed in  
7 the final publication.  
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## 15 **PATIENT AND PUBLIC INVOLVEMENT**

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17 This scoping review procedure was not informed by a patient and public  
18 participation strategy or organisation. The design and development of the procedure  
19 were neither patient- or public-centred.  
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## 26 **ETHICS AND DISSEMINATION**

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28 This scoping review procedure describes a strategy for searching and mapping the  
29 literature on breast cancer management costs for individuals with breast cancer in a  
30 rigorous and methodical manner. Because this evaluation will solely contain publicly  
31 available data, therefore ethical approval is not obligatory. The findings of this study  
32 will be presented at a national or international conference related to economics and  
33 healthcare and published in peer-reviewed journal. The authors expect that our  
34 analysis of the present status of breast cancer diagnostic and treatment research will  
35 help to steer future research and to guide clinical practice and public policy makers  
36 and bring awareness among patients, clinicians, decision makers, third party payers about the  
37 out-of-pocket expenditure for breast cancer. It will also help to understand the economic  
38 burden of breast cancer in India.  
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58  
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2  
3 Manipal, Karnataka, India for coordinating with Department of Commerce, MAHE,  
4  
5 during the research period.  
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## 8 9 FOOTNOTES

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12 **Author Statement:** PCB, HTH, PS, KKK, JB, VSD, PP, AR contributed to the title and  
13  
14 conception or design of the review. PCB, HTH, PS, KKK drafted the protocol manuscript with  
15  
16 suggestions from PP, VJD, JB and AJS. PCB, HTH, PS, KKK developed and conducted the  
17  
18 preliminary searches. JB, VSD, and PP assisted in developing the search strategy, and  
19  
20 protocol development. AR and AJS coordinated between departments and furnished  
21  
22 administrative support. All the authors have proofread the protocol and given the final approval  
23  
24 of the version to be published.  
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29 **Funding:** The authors declare that they received no specific grant, from any funding  
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31 agency in the public, commercial or not-for-profit sectors, for this review.  
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35 **Competing interests:** The authors declare there is no conflict of interest.  
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39 **Provenance and peer review:** Not commissioned, externally peer reviewed  
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43 **Patient consent for publication:** Not required.  
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## Supplementary file 1

## Preferred Reporting Items for Systematic reviews and Meta-Analyses extension for Scoping Reviews (PRISMA-ScR) Checklist

SECTION	ITEM	PRISMA-ScR CHECKLIST ITEM	REPORTED ON PAGE #
<b>TITLE</b>			
Title	1	Identify the report as a scoping review.	1
<b>ABSTRACT</b>			
Structured summary	2	Provide a structured summary that includes (as applicable): background, objectives, eligibility criteria, sources of evidence, charting methods, results, and conclusions that relate to the review questions and objectives.	1-2
<b>INTRODUCTION</b>			
Rationale	3	Describe the rationale for the review in the context of what is already known. Explain why the review questions/objectives lend themselves to a scoping review approach.	6
Objectives	4	Provide an explicit statement of the questions and objectives being addressed with reference to their key elements (e.g., population or participants, concepts, and context) or other relevant key elements used to conceptualize the review questions and/or objectives.	6
<b>METHODS</b>			
Protocol and registration	5	Indicate whether a review protocol exists; state if and where it can be accessed (e.g., a Web address); and if available, provide registration information, including the registration number.	NA
Eligibility criteria	6	Specify characteristics of the sources of evidence used as eligibility criteria (e.g., years considered, language, and publication status), and provide a rationale.	7
Information sources*	7	Describe all information sources in the search (e.g., databases with dates of coverage and contact with authors to identify additional sources), as well as the date the most recent search was executed.	9
Search	8	Present the full electronic search strategy for at least 1 database, including any limits used, such that it could be repeated.	10
Selection of sources of evidence†	9	State the process for selecting sources of evidence (i.e., screening and eligibility) included in the scoping review.	10-12
Data charting process‡	10	Describe the methods of charting data from the included sources of evidence (e.g., calibrated forms or forms that have been tested by the team before their use, and whether data charting was done independently or in duplicate) and any processes for obtaining and confirming data from investigators.	12-13
Data items	11	List and define all variables for which data were sought and any assumptions and simplifications made.	12-13
Critical appraisal of individual sources of evidence§	12	If done, provide a rationale for conducting a critical appraisal of included sources of evidence; describe the methods used and how this information was used in any data synthesis (if appropriate).	NA





SECTION	ITEM	PRISMA-ScR CHECKLIST ITEM	REPORTED ON PAGE #
Synthesis of results	13	Describe the methods of handling and summarizing the data that were charted.	12-13
<b>RESULTS</b>			
Selection of sources of evidence	14	Give numbers of sources of evidence screened, assessed for eligibility, and included in the review, with reasons for exclusions at each stage, ideally using a flow diagram.	NA Protocol
Characteristics of sources of evidence	15	For each source of evidence, present characteristics for which data were charted and provide the citations.	NA Protocol
Critical appraisal within sources of evidence	16	If done, present data on critical appraisal of included sources of evidence (see item 12).	NA scoping review
Results of individual sources of evidence	17	For each included source of evidence, present the relevant data that were charted that relate to the review questions and objectives.	NA
Synthesis of results	18	Summarize and/or present the charting results as they relate to the review questions and objectives.	NA
<b>DISCUSSION</b>			
Summary of evidence	19	Summarize the main results (including an overview of concepts, themes, and types of evidence available), link to the review questions and objectives, and consider the relevance to key groups.	13
Limitations	20	Discuss the limitations of the scoping review process.	2
Conclusions	21	Provide a general interpretation of the results with respect to the review questions and objectives, as well as potential implications and/or next steps.	14
<b>FUNDING</b>			
Funding	22	Describe sources of funding for the included sources of evidence, as well as sources of funding for the scoping review. Describe the role of the funders of the scoping review.	16

JBI = Joanna Briggs Institute; PRISMA-ScR = Preferred Reporting Items for Systematic reviews and Meta-Analyses extension for Scoping Reviews.

\* Where *sources of evidence* (see second footnote) are compiled from, such as bibliographic databases, social media platforms, and Web sites.

† A more inclusive/heterogeneous term used to account for the different types of evidence or data sources (e.g., quantitative and/or qualitative research, expert opinion, and policy documents) that may be eligible in a scoping review as opposed to only studies. This is not to be confused with *information sources* (see first footnote).

‡ The frameworks by Arksey and O'Malley (6) and Levac and colleagues (7) and the JBI guidance (4, 5) refer to the process of data extraction in a scoping review as data charting.

§ The process of systematically examining research evidence to assess its validity, results, and relevance before using it to inform a decision. This term is used for items 12 and 19 instead of "risk of bias" (which is more applicable to systematic reviews of interventions) to include and acknowledge the various sources of evidence that may be used in a scoping review (e.g., quantitative and/or qualitative research, expert opinion, and policy document).

From: Tricco AC, Lillie E, Zarin W, O'Brien KK, Colquhoun H, Levac D, et al. PRISMA Extension for Scoping Reviews (PRISMA-ScR): Checklist and Explanation. *Ann Intern Med.* 2018;169:467–473. doi: [10.7326/M18-0850](https://doi.org/10.7326/M18-0850).



## Supplementary file 2: Draft Search Strategy for PubMed/MEDLINE

PubMed/MEDLINE
<p>((("breast neoplasms"[MeSH Terms] OR ("breast"[All Fields] AND "neoplasms"[All Fields]) OR "breast neoplasms"[All Fields] OR ("breast"[All Fields] AND "cancer"[All Fields]) OR "breast cancer"[All Fields] OR ("brca 1 protein"[All Fields] OR "brca 2 protein"[All Fields] OR "cancer of the breast"[All Fields] OR "breast cancer cell"[All Fields] OR "ductal carcinoma"[All Fields] OR "brca2 protein"[All Fields] OR "brca1 protein"[All Fields] OR "Breast Tumor"[All Fields] OR "Breast Malignant Tumors"[All Fields] OR "Malignant Neoplasm"[All Fields] OR "Breast Malignant Neoplasm"[All Fields] OR "Breast Carcinoma"[All Fields] OR "Triple Negative Breast Cancer"[All Fields] OR "Triple Negative Breast Neoplasms"[All Fields] OR "Triple Negative Breast Neoplasm"[All Fields] OR "Inflammatory Breast Neoplasms"[All Fields] OR "Inflammatory Breast Cancer"[All Fields] OR "Mucin-like Carcinoma-associated Antigen"[All Fields] OR "Unilateral Breast Cancer"[All Fields] OR "Hereditary Breast Cancer"[All Fields] OR "Mammary Cancer"[All Fields] OR "Mammary Cancers"[All Fields] OR "Human Mammary Carcinomas"[All Fields] OR "Human Mammary Cancer"[All Fields] OR "Breast Carcinoma In Situ"[All Fields])) AND ("healthcare cost"[Text Word] OR "cancer treatment cost"[Title/Abstract] OR "cost"[All Fields] OR "treatment cost"[All Fields] OR "health care cost"[All Fields] OR "diagnostic cost"[All Fields] OR "indirect cost"[All Fields] OR "direct cost"[All Fields] OR "disease burden"[All Fields] OR "cost effectiveness analysis"[All Fields] OR "cost effectiveness benefit"[All Fields] OR "cost utility analysis"[All Fields] OR "cost estimation"[All Fields] OR "pharmacoeconomic"[Text Word] OR "cost of illness"[All Fields] OR "cost of disease"[All Fields] OR "disease cost"[All Fields] OR "hospital cost"[All Fields] OR "health economics"[All Fields] OR "economic evaluation"[Title/Abstract] OR "economic burden"[All Fields] OR "economic impact"[Text Word] OR "oop"[All Fields] OR "out of pocket"[All Fields] OR "out of pocket expenditure"[All Fields] OR "out of pocket payment"[All Fields] OR "medical cost"[All Fields] OR "medical care cost"[All Fields] OR ("developing countr"[All Fields] OR "lmic"[All Fields] OR "low income econom"[All Fields] OR "developing econom"[All Fields] OR "developing nation"[All Fields] OR "developing population"[All Fields] OR "less developed countr"[All Fields] OR "Less-Developed Countries"[All Fields] OR "third world countr"[All Fields] OR "third world nation"[All Fields] OR "less developed nation"[All Fields] OR "less developed econom"[All Fields] OR "low to middle income countr"[All Fields] OR "low middle income countr"[All Fields] OR "low income countr"[All Fields] OR "low income econom"[All Fields] OR "lower income countr"[All Fields] OR "lower income nation"[All Fields] OR "lower income econom"[All Fields] OR "lower income population"[All Fields] OR "middle income countr"[All Fields] OR "middle income econom"[All Fields] OR "middle income nation"[All Fields] OR "middle income group"[All Fields] OR "transitional countr"[All Fields] OR "transitional econom"[All Fields] OR "under developed count"[All Fields] OR "under developed nation"[All Fields])) AND ("india"[All Fields] OR "asia"[All Fields] OR "south asia"[All Fields] OR "bharat"[All Fields] OR "hindustan"[All Fields] OR "kerala"[All Fields] OR "tamil nadu"[All Fields] OR "karnataka"[All Fields] OR "andra pradesh"[All Fields] OR "telangana"[All Fields] OR "goa"[All Fields] OR "Maharashtra"[All Fields] OR "Gujarat"[All Fields] OR "punjab"[All Fields] OR "Rajasthan"[All Fields] OR "Haryana"[All Fields] OR "Uttarakhand"[All Fields] OR "Jammu and Kashmir"[All Fields] OR "Uttar Pradesh"[All Fields] OR "Madhya Pradesh"[All Fields] OR "orissa"[All Fields] OR "bihar"[All Fields] OR "Jharkhand"[All Fields] OR "Chhattisgarh"[All Fields] OR "manipur"[All Fields] OR "West Bengal"[All Fields] OR "Sikkim"[All Fields] OR "Meghalaya"[All Fields] OR "assam"[All Fields] OR "Mizoram"[All Fields] OR "Tripura"[All Fields] OR "Arunachal Pradesh"[All Fields] OR "Himachal Pradesh"[All Fields] OR "Republic of India"[All Fields])) AND ((humans[Filter]) AND (english[Filter]) AND (2000:2021[pdat]))</p>



### Supplementary file 3. Data extraction form

<b>Citation Information</b>	
Title of the Study	
Author(s)	
Date of publication	
Type and source of publication	
Author Affiliation	
Contact Information	
<b>Study Characteristics</b>	
Study title	
Aim/Objective of the Study	
Study Period	
Study design	
Setting/ Location (State where the study was conducted)	
Type of cancer assessed	
Stage of cancer	
Type of costs reported	
Follow-up costs reported	
Currency of costs reported	

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Other measures reported	
Data collection period	
Target Population	
Sample Size	
Sampling method	
Data Sources	
Key findings	
Conclusion	
Comments	

For peer review only

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# BMJ Open

## Cost of breast cancer diagnosis and treatment in India: a scoping review protocol

Journal:	<i>BMJ Open</i>
Manuscript ID	bmjopen-2021-057008.R1
Article Type:	Protocol
Date Submitted by the Author:	08-Oct-2021
Complete List of Authors:	Barathe, Priyanka; Manipal Academy of Higher Education, Department of Commerce Haridas, Herosh ; Manipal Academy of Higher Education, Department of Commerce Soni, Priya; Manipal Academy of Higher Education, Department of Commerce Kudiya, Krithi; Manipal Academy of Higher Education, Department of Commerce Krishnan, Jisha ; Manipal Academy of Higher Education, Public Health evidence South Asia, Prasana School of Public Health (PSPH), Dhyani, Vijay Shree; Manipal Academy of Higher Education, Public Health evidence South AsiaPrasana School of Public Health (PSPH), Rajendran, Ambigai; Manipal Academy of Higher Education, Department of Commerce; Manipal Academy of Higher Education Sirur, Andria; Manipal Academy of Higher Education, Department of Commerce Pundir, Prachi; Manipal Academy of Higher Education, Public Health Evidence South Asia
<b>Primary Subject Heading</b>:	Health economics
Secondary Subject Heading:	Health economics, Evidence based practice, Public health
Keywords:	Breast tumours < ONCOLOGY, HEALTH ECONOMICS, Quality in health care < HEALTH SERVICES ADMINISTRATION & MANAGEMENT

SCHOLARONE™  
Manuscripts

## Cost of breast cancer diagnosis and treatment in India: a scoping review protocol

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Word Count: 3,543

### ABSTRACT

**Introduction:** Breast cancer is the foremost cause for mortality among women. The non-communicable disease (NCD) imposes significant economic expenses to communities. Its economic impact includes both direct and indirect healthcare costs. This scoping review will map key concepts underpinning the current direct and indirect expenses of breast cancer in India.

**Methods and analysis:** This scoping review will follow 'Arksey and O'Malley's' approach and updated methodological guidance from the Joanna Briggs Institute. The Cochrane library, Econ Papers, Embase, ProQuest central, PubMed, and SCOPUS will be searched for peer-reviewed scientific journal publications from the year 2000 to 2021. Reference lists of included articles and preprint repositories will be searched for additional and unpublished

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3 literature. Independent screening (title, abstract and full text) and data extraction will be  
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5 carried out against the defined inclusion criteria. The results will be narratively summarised  
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7 and charted under the conceptual areas of this scoping review. The research gaps and scope  
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9 for future research on the topic will be identified. Findings will be reported using the  
10  
11 Preferred Reporting Items for Systematic Reviews extension for Scoping Reviews  
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13 (PRISMA ScR).  
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17 **Ethics and dissemination:** Ethics clearance will not be obligatory because this scoping  
18  
19 review will only involve publicly available data. The review's findings will be disseminated  
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21 through social media and a presentation in a national or international conference related to  
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23 economics and healthcare. The findings will be published in a scientific journal that is peer-  
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29 **Key Words** - “breast cancer”, “diagnostic cost”, “treatment cost”, “economic burden”,  
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31 “health expenditure”, “India”.  
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### 34 35 36 **Strengths and limitations of this study**

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1. Breast cancer diagnosis and treatment costs in India will be investigated using an established, rigorous, and systematic approach.
  2. The extensive search in databases and grey literature is aimed at including published and unpublished research from the past two decades.
  3. The literature search is limited to English language.
  4. The quality of articles in the scoping review will not be assessed.

## INTRODUCTION

India's epidemiological transition has increased the burden of both communicable and NCD. Amongst the NCD, cancers are the most prevalent. Within the Indian context, breast cancer, lung cancer, oral cancer, stomach, and cervical cancer are commonly predominant.<sup>1</sup> Breast cancer is a severe illness, mainly affecting the women of reproductive age in India, with high medical costs and economic impact.<sup>2</sup> In 2020, the worldwide cancer incidence and fatalities reached 19.3 million and 10 million respectively. For the year 2020, the estimated incidence of cancer among females in India was 712,758 (104 per 100,000).<sup>3,4</sup> According to the 'International Agency for Research on Cancer' (IARC), delayed diagnosis leads to poorer probable outcome or prognosis of the breast cancer disease.<sup>5,6</sup> The origin of breast cancer is unclear. However, several risk factors are known to be associated with the disease, such as age, genetics, genes, radiation exposure, obesity, delayed pregnancy, and alcohol.<sup>5</sup> It is the most predominant cancer in women, accounting for about a quarter of all cancer cases in Indian cities, and ranking second in rural India.<sup>3,7</sup>

According to the 'National Cancer Registry Programme', breast cancer accounts for 25 to 32 percent of all female cancers in cities like Ahmedabad, Bengaluru, Bhopal, Chennai, Delhi, Hyderabad and Kolkata.<sup>5</sup> Breast cancer incidence rates are growing with an annual percentage rise ranging from 1.4 percent to 2.8 percent, which is more evident in urban regions such as Bengaluru, Chennai, Delhi and Hyderabad than in rural areas.<sup>1,4,8</sup> The Indian Council for Medical Research (ICMR) reported 1.5 lakh new breast cancer cases in 2019, with 70,000 deaths per year. In India, only 66 percent of women with breast cancer survive for five years, compared to 90 percent of women in the United States.<sup>9</sup> According to a study conducted by the International Agency for Research on Cancer (IARC) in 2020, in the previous year,

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3 150,000 people had been diagnosed with breast cancer.<sup>8</sup> Breast cancer is primarily  
4 associated with increased life expectancy, changes in population reproductive patterns (e.g.,  
5 later age at first birth), overweight and obesity, lower levels of physical activity, social  
6 development and growth, and embracing western lifestyles (World Health Organization  
7 (WHO), 2020).<sup>8-10</sup>

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15 Cancerous breast tissue originates from breast milk providing milk ducts and lobules.<sup>5</sup>  
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17 Breast cancer is categorised as ductal carcinomas and lobular carcinomas. Invasive  
18 ductal carcinoma is the most common type accounting for around 70% of tumours,  
19 whereas invasive lobular carcinomas account for 15–20% of tumours.<sup>5,6,11</sup> Breast  
20 cancer is classified into the five stages depending on the size and spread of the lump  
21 or tumour in breast: Stage 0 (also known as ‘Ductal Carcinoma in Situ’ (DCIS)),  
22 ‘stage I’, ‘stage II’, ‘stage III’, and ‘stage IV’.<sup>7</sup> The stage of cancer is determined by a  
23 series of specialist physical exams, mammography, ultra-sonography, aspiration, biopsies,  
24 bone scans, and blood tests. Oncologists use a comprehensive strategy to treat breast cancer  
25 such as, surgery, hormone therapy, chemotherapy, radiation therapy and biological  
26 therapies.<sup>12</sup> Despite advancements in therapy and awareness initiatives, the dangers linked  
27 with breast cancer continue to grow in India. Poor diagnosis and costly treatment lead to a  
28 high death rate.<sup>9</sup> The typical cost of treatment including radiation, surgery, and  
29 investigations costs between INR 5 and 6 lakhs (about US\$6700 to US\$8000). Six rounds of  
30 chemotherapy with tailored treatment cost more than INR 20 lakhs (US\$27000).<sup>5</sup>

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50 Expenditures have risen as a result of expensive infrastructure, new technology-  
51 based research costs, and newer medicines. Statistics suggest only one in every two  
52 women with breast cancer survive implying a 50% mortality rate. That is, half of  
53 breast cancer patients are often unable to successfully combat the disease due to a lack of  
54 awareness of the disease, and the majority of breast cancers are diagnosed at a very advanced

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3 stage, resulting in no response to treatment and expensive treatment costs..<sup>9-13</sup> Because of  
4 patients lack of knowledge on their disease condition they fail to approach suitable medical  
5 facilities therefore most breast cancers are detected at an advanced stage. Patients in urban  
6 areas are predominantly identified at stage two, when the lesions become palpable  
7 lumps; but in rural regions these lesions are diagnosed only after they have  
8 progressed to metastatic tumors.<sup>14,15</sup> The cost of targeted therapy on the WHO  
9 Essential Medicine List (EML) for 'stage I HER2+ breast cancer' Human Epidermal  
10 growth factor Receptor 2) breast cancer, for example, is projected to be comparable  
11 to roughly ten years of average yearly income in India.<sup>10,16</sup> As breast cancer  
12 treatment is getting expensive, primary prevention is the key to breast cancer  
13 management. Breast cancer has a one hundred percent success rate if detected early  
14 and a high survival percentage till the middle stages. Approximately half of all  
15 breast cancer patients in India are in stages 3 and 4, when the chances of survival are  
16 exceedingly low and treatment costs are considerable. According to the ICMR, less  
17 than 5% of women in India undergo breast screening. Breast cancer has a low  
18 survival rate since it is detected late. If a variety of early detection measures were  
19 improved, breast cancer mortality may be lowered. Raising knowledge of the benefits and  
20 potential risks of breast screening, as well as making it more widely available, could also  
21 help in promoting early identification of this disease and consequently reducing the  
22 associated costs.<sup>8,9,17</sup> The 2030 Agenda endorsed by the General Assembly for  
23 Sustainable Development in September 2015, comprises 17 Sustainable Development Goals  
24 (SDGs). Among 17 SDGs, SDG 1 & 3 have set a target which aim for the abolition  
25 of all kinds of poverty and a one-third decrease in non-communicable disease-  
26 related early death respectively, by 2030.<sup>18</sup> Breast cancer is a prominent cause of  
27 death in recent decades, posing a significant societal and economic threat. As a  
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3 result, governments must understand the economic burden (direct and indirect  
4 expenses) of breast cancer in order to effectively allocate resources. Direct expenses  
5 include medical and non-medical expenditures incurred as a result of resource usage  
6 owing to inpatient and outpatient health care occurrences connected with diagnosis  
7 and treatment. These also include transportation and caregivers' costs. Indirect  
8 expenses, on the other contrary, include productivity loss owing to work  
9 absenteeism (morbidity) and death from cancer (mortality) at early age.<sup>19</sup> Direct and  
10 indirect expenses together form the economic burden of breast cancer.  
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23 In India, the amount of information accessible on the economic impact of breast cancer is  
24 limited.<sup>20–23</sup> Although studies on expenses associated with breast cancer<sup>24–26</sup> and state wise  
25 cost of breast cancer<sup>27,28</sup> are available, a comprehensive review of literature on costs of breast  
26 cancer in India is missing.<sup>29</sup> To fill this void, a scoping review assessment of the literature on  
27 the evidence on the cost of diagnosis and treatment of breast cancer in India will be  
28 performed. The major objective is to collect data on the direct and indirect costs of breast  
29 cancer diagnosis and treatment in India. Additionally, this scoping study can serve to  
30 evaluate the impact of illnesses on society, aiding policymakers and decision makers in  
31 forecasting future healthcare expenditures and making resource allocation choices.  
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## 44 **METHODS & ANALYSIS**

### 45 **Protocol Design**

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47 The Arksey and O'Malley's scoping review methodological framework<sup>30</sup>, guidance  
48 by Levac et al.<sup>31</sup>, and JBI updated methodological guidance by Peters et al., 2020, were  
49 used in preparation of this protocol.<sup>2,32</sup> The current procedure and future scoping review  
50 would be documented using the 'Preferred Reporting Items for Systematic Reviews and  
51 Meta-Analyses (PRISMA) protocols extension for scoping reviews guidelines' (PRISMA-  
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ScR; Supplementary file-1).<sup>33,34</sup> The scoping review will be carried out in five different stages

1. Identification of the research question
2. Identifying relevant studies
3. Selection of eligible studies
4. Data extraction and charting results
5. Collating, summarizing and reporting the results

### Stage 1: Identification of the research question

The main research question is: “What is the cost (direct and indirect) associated with breast cancer in India among the female population aged 18 years and above? These include costs associated with diagnosis and treatment.” Research sub-questions include: What are the direct and indirect expenses of breast cancer treatments (all stages) in India?

### Stage 2: Identifying relevant studies

#### Eligibility Criteria

To discover relevant literature, a comprehensive search strategy was established, which was supported by key inclusion criteria. The eligibility criteria is defined based on ‘Population-Concept-Context’ (PCC) framework recommended by the ‘JBI methodology for scoping reviews’ (Table 1).<sup>35</sup>

**Table 1. PCC framework (Eligibility criteria) for study selection**

Criteria	Determinants
Population	Female participants with breast cancer

<b>Concept</b>	Cost associated with breast cancer disease management
<b>Context</b>	India

**Population:** The scoping review will examine studies including Indian women aged 18 and above, who have been diagnosed with breast cancer. Studies on breast cancer that includes male population and does not report cost data separately for the female population, will not be considered.

**Concept:** This scoping review's main goal is to investigate and quantify the costs of breast cancer detection and treatment in India. It will include cost or expenditure categorized as direct and indirect costs. Studies that include cost of diagnosis and treatment with specific modalities will be included. The direct cost will cover the total medical cost, which include the cost of diagnostic and screening such as, physical examination, mammograms, ultrasonography, fine needle aspiration test (FNAC), bone scans, blood tests, biopsies, and cost of treatment such as, hospitalization cost (including cost of surgery), drug cost, radiotherapy cost, chemotherapy, hormone therapy, biological treatment, consultation cost and non-medical cost (transportation, food, and lodging). Indirect cost will include total patient wage loss, total caregiver wage loss, spending on hired help, productivity loss.<sup>36,37</sup> Direct and indirect cost will also be provided for all stages of breast cancer treatment (Stage 0 to 4).<sup>38</sup> Studies that assess the cost of many cancers simultaneously; but do not provide the specific break down of costs for breast cancer will be excluded.

**Context:** The purpose of this scoping review is to assess the economic impact of breast cancer in India. As a result, it would evaluate research in India at all stages (0 to 4) of breast cancer.<sup>38</sup> This review will consider research done in any clinical setting (e.g., inpatient, outpatient) or health care institution (e.g., hospitals, health centres, nursing homes)

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3 throughout all Indian states.  
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### 6 **Search strategy** 7 8

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10 The literature published from the year 2000 onwards will be considered, to capture the trend  
11 for costs associated with breast cancer in India for two decades. A search of several  
12 electronic databases was used as the major source of literature: The Cochrane library,  
13 EconPapers, Embase, ProQuest central, PubMed, and Scopus. The secondary source of  
14 potentially relevant material was for grey literature from Google Scholar and Shodhganga: a  
15 reservoir of Indian theses @ INFLIBNET. We will manually examine the reference lists of  
16 included research, reports, related reviews and publications, as well as preprint repositories,  
17 for the inclusion of further relevant studies. Authors will be contacted. In cooperation with  
18 a medical librarian, the team devised a search technique to find a complete list of  
19 relevant terms pertaining to the cost of breast cancer diagnosis and treatment in  
20 India. A primary search on PubMed was initiated to identify articles for this review.  
21 The key words used to describe the relevant articles will be listed and used to develop a full  
22 search strategy for PubMed. Initially "breast cancer" OR "breast oncology" OR "breast  
23 neoplasm" OR "mammary gland" OR "carcinoma" AND "diagnostic cost" OR "cost",  
24 "treatment cost" OR "economic burden" OR "cost of disease" OR "cost of  
25 treatment" OR "cost of diagnosis" AND "India" OR "LMIC" OR "developing  
26 countries" was used for mapping relevant studies. The search strategy was customized and  
27 modified consisting of all keywords and index terms for Scopus, The Cochrane library,  
28 Embase, Econ Papers and ProQuest Central databases. A search will also be done through  
29 scientific repositories such as, the cancer institute and research centre and the population-  
30 based cancer registries repository.  
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The search terms from each concept of the search strategy were merged with appropriate boolean operators to produce the final relevant reports and articles. An example of the search strategy is provided below in Table 2 and search results for PubMed are provided in an online supplementary file 2.

**Table 2. Search strategy**

#	Keywords
1	("Breast Cancer" OR "Cancer of Breast" OR "Mucin like Carcinoma" OR "BRCA 1 Protein" OR "BRCA 2 Protein") OR ("Cancer" OR "Neoplasm" OR "Carcinoma")
2	("Healthcare Cost" OR "Diagnosis Cost" OR "Treatment Cost" OR "Direct Cost" OR "Indirect Cost" OR "Disease Burden" OR "Cost Utility Analysis" OR "Cost Effectiveness Analysis" OR "Cost Benefit Analysis" OR "Disease Cost" OR "Estimation of Cost" OR "Medical Cost")
3	("India" OR "Republic of India" OR "Bharat" OR "Hindustan" OR "LMIC" OR "Developing Country")
4	#1 AND #2 AND #3

### Stage 3: Selection of eligible studies

Identified studies from search on different databases will be collated and imported to Zotero version 5.0. Duplicates will be removed at compilation stage, and the citations and their abstracts will consecutively be transferred to Microsoft Excel for screening process. A two-stage screening process comprising of

1. Title and abstract screening
2. Full-text review will be carried out

Based on the eligibility criteria, two independent reviewers will do the screening of

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3 title and abstract (Table 3) and studies that do not address the research question will be  
4 removed. Any disagreements between the reviewers will be resolved involving a  
5 third reviewer, an expert in health economics. Further, the screening of full text will  
6 be done for articles that meets the inclusion criteria. Disagreements will be resolved  
7 by involving a subject expert. Both the stages will follow an identical process and the  
8 result will be documented on Microsoft Excel spreadsheets. Reasons for exclusion of  
9 studies will be informed and documented at the full-text screening stage.

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21 **Table 3 Inclusion & exclusion criteria**

<b>Criteria</b>	<b>Inclusion criteria</b>	<b>Exclusion criteria</b>
<b>Population</b>	Female participants aged 18 years and above diagnosed with breast cancer	Female participants not diagnosed with breast cancer but undergone screening will be excluded
<b>Concept</b>	All studies concerning the expenses related with breast cancer disease management, including direct and indirect costs	Pre-diagnosis screening cost
<b>Context</b>	India	Non-Indian studies or studies with a focus on LMICs or South Asia in which the expenses for India are not reported separately.

<b>Types of evidence sources</b>	Quantitative, qualitative and mixed methods studies	Letter to the editor, viewpoint, reviews, editorials and perspectives
<b>Timeframe</b>	Studies published from January 2000 onwards	Articles published before 2000
<b>Language</b>	Studies published in English language	Non-English articles

#### Stage 4: Data extracting and charting results

Data from the included full text articles will be extracted by two reviewers independently using a custom data extraction form (Supplementary file 3) developed by the research team in Microsoft Excel. The data extracted will capture the study components as follows -

1. Details of the study (Study title, aim or research question, the authors, year of publication, state/district/union territories, geographic location, objectives, methodology, and sample size).
2. Population (e.g., age, gender, target population, population excluded and sample size).
3. Type of cancer - Breast cancer stages (stage 0-4)
4. Diagnostic and treatment modalities (e.g., physical examination, mammograms, ultra-sonography, fine needle aspiration test (FNAC), bone scans, blood tests and biopsies, surgery, radiation therapy, chemotherapy and/or targeted therapy).
5. Study setting (e.g., clinical settings – public (government) and private).
6. Type of costs reported - Diagnostic costs, treatment costs, direct costs,

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3 indirect costs.

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5 7. Study design, study duration, data collection period/year, cost related data  
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7 collection methods, result summary, other measures reported, key findings.

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10 8. Relevant Conclusion

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12 During the piloting phase, any adjustments will be made as needed. As the scoping  
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14 review progresses, the data extraction technique will be updated or adjusted. Any  
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16 changes or amendments that are required during the actual review will be  
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18 documented in the scoping review report. The findings will be evaluated with the  
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20 team to see if the data extracted meets the scoping reviews goals and objectives.<sup>39</sup>  
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22 The resolution of differences between the reviewers will be discussed with a subject  
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24 expert or a senior reviewer.<sup>32</sup>  
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### 29 **Stage 5: Collating, summarizing, and reporting the results**

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31 To exhibit the search process, a 'Preferred Reporting Items for Systematic Reviews and  
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33 Meta-analyses' (PRISMA) flow diagram will be used.<sup>40</sup> The flow diagram will help display  
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35 the decision-making process, as well as the outputs of the searches, the exclusion of  
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37 duplicated citations, study selection, complete retrieval, additional bibliography mining, and  
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39 presentation of the final summary.  
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44 Studies will be grouped by costs type (direct or indirect), settings, and study design  
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46 along with key findings. A descriptive statistics, such as measures of frequencies and  
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48 central measures of tendency will be used to reflect the kind of research design, costs  
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50 of treatment examined, and costs identification criteria.<sup>41</sup> The results will be  
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52 summarized and analyzed and will be presented in a graphical, tabular, or in a  
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54 detailed descriptive structure that aligns to the purpose and scope of the review.<sup>32</sup>  
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56 Thematic and narrative approach will also be incorporated for the analysis of  
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quantitative and qualitative studies.<sup>42</sup> Inadequacies and limitations in the current literature will be identified and summarised.

Study timeline is depicted in Table 4

**Table 4 Study timeline**

Scoping review steps	Status
1. Identifying the research questions	Completed
2. Identifying relevant studies	Completed
<ul style="list-style-type: none"> <li>• <i>Search terms and inclusion/exclusion criteria</i></li> <li>• <i>Conducting the search</i></li> </ul>	Ongoing
3. Selection of eligible studies	
<ul style="list-style-type: none"> <li>• <i>Title and abstract screening</i></li> <li>• <i>Full text screening</i></li> </ul>	2 Weeks 4 weeks
4. Data extraction and charting	4 weeks
5. Data analysis and reporting the results	6 weeks

## DISCUSSION

This scoping review will map the existing information on the economic burden (direct and indirect costs) of female breast cancer in India. Understanding the economic effect of illness is critical for low-income nations dealing with a high disease burden and limited resources. This is in accordance with the SDGs, which aim for the abolition of all forms of poverty and a one-third decrease in NCD-related early death by 2030.<sup>18</sup> In a narrative format, the findings of this scoping review will address the significance for health care policy, including a debate on national screening programmes in India for current primary prevention of breast cancer through cancer screening programmes and future research. Additionally, cancer treatment leads to high out-of-pocket expenditure (OOPE) in India, which imposes financial hardship, especially for the poorest. Findings from this scoping

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3 review will also help enhance the coverage of risk pooling mechanism for health insurance  
4 packages/schemes for breast cancer treatment in India. Any variation from the techniques  
5 specified in this protocol shall be documented and disclosed in the final publication.  
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## 10 **PATIENT AND PUBLIC INVOLVEMENT**

11 This scoping review procedure was not informed by a patient and public  
12 participation strategy or organisation. The design and development of the procedure  
13 were neither patient- or public-centred.  
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## 20 **ETHICS AND DISSEMINATION**

21 This scoping review procedure describes a strategy for searching and mapping the  
22 literature on breast cancer management costs for individuals with breast cancer in a  
23 rigorous and methodical manner. Because this scoping review will solely contain  
24 publicly available data, therefore ethical approval is not obligatory. The findings of  
25 this study will be presented at a national or international conference related to economics  
26 and healthcare and published in peer-reviewed journal. The authors expect that our  
27 analysis of the present status of breast cancer diagnostic and treatment research will  
28 help to steer future research and to guide clinical practice and public policy makers  
29 and bring awareness among patients, clinicians, decision makers, third party payers about the  
30 out-of-pocket expenditure for breast cancer. It will also help to understand the economic  
31 burden of breast cancer in India.  
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54 during the research period.  
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## FOOTNOTES

**Author Statement:** PCB, HTH, PS, KKK, JB, VSD, PP, AR contributed to the title and conception or design of the review. PCB, HTH, PS, KKK drafted the protocol manuscript with suggestions from PP, VJD, JB and AJS. PCB, HTH, PS, KKK developed and conducted the preliminary searches. JB, VSD, and PP assisted in developing the search strategy, and protocol development. AR and AJS coordinated between departments and furnished administrative support. All the authors have proofread the protocol and given the final approval of the version to be published.

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**Provenance and peer review:** Not commissioned, externally peer reviewed

**Patient consent for publication:** Not required.

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## Supplementary file 1

## Preferred Reporting Items for Systematic reviews and Meta-Analyses extension for Scoping Reviews (PRISMA-ScR) Checklist

SECTION	ITEM	PRISMA-ScR CHECKLIST ITEM	REPORTED ON PAGE #
<b>TITLE</b>			
Title	1	Identify the report as a scoping review.	1
<b>ABSTRACT</b>			
Structured summary	2	Provide a structured summary that includes (as applicable): background, objectives, eligibility criteria, sources of evidence, charting methods, results, and conclusions that relate to the review questions and objectives.	1-2
<b>INTRODUCTION</b>			
Rationale	3	Describe the rationale for the review in the context of what is already known. Explain why the review questions/objectives lend themselves to a scoping review approach.	6
Objectives	4	Provide an explicit statement of the questions and objectives being addressed with reference to their key elements (e.g., population or participants, concepts, and context) or other relevant key elements used to conceptualize the review questions and/or objectives.	6
<b>METHODS</b>			
Protocol and registration	5	Indicate whether a review protocol exists; state if and where it can be accessed (e.g., a Web address); and if available, provide registration information, including the registration number.	NA
Eligibility criteria	6	Specify characteristics of the sources of evidence used as eligibility criteria (e.g., years considered, language, and publication status), and provide a rationale.	7
Information sources*	7	Describe all information sources in the search (e.g., databases with dates of coverage and contact with authors to identify additional sources), as well as the date the most recent search was executed.	9
Search	8	Present the full electronic search strategy for at least 1 database, including any limits used, such that it could be repeated.	10
Selection of sources of evidence†	9	State the process for selecting sources of evidence (i.e., screening and eligibility) included in the scoping review.	10-12
Data charting process‡	10	Describe the methods of charting data from the included sources of evidence (e.g., calibrated forms or forms that have been tested by the team before their use, and whether data charting was done independently or in duplicate) and any processes for obtaining and confirming data from investigators.	12-13
Data items	11	List and define all variables for which data were sought and any assumptions and simplifications made.	12-13
Critical appraisal of individual sources of evidence§	12	If done, provide a rationale for conducting a critical appraisal of included sources of evidence; describe the methods used and how this information was used in any data synthesis (if appropriate).	NA





SECTION	ITEM	PRISMA-ScR CHECKLIST ITEM	REPORTED ON PAGE #
Synthesis of results	13	Describe the methods of handling and summarizing the data that were charted.	12-13
<b>RESULTS</b>			
Selection of sources of evidence	14	Give numbers of sources of evidence screened, assessed for eligibility, and included in the review, with reasons for exclusions at each stage, ideally using a flow diagram.	NA Protocol
Characteristics of sources of evidence	15	For each source of evidence, present characteristics for which data were charted and provide the citations.	NA Protocol
Critical appraisal within sources of evidence	16	If done, present data on critical appraisal of included sources of evidence (see item 12).	NA scoping review
Results of individual sources of evidence	17	For each included source of evidence, present the relevant data that were charted that relate to the review questions and objectives.	NA
Synthesis of results	18	Summarize and/or present the charting results as they relate to the review questions and objectives.	NA
<b>DISCUSSION</b>			
Summary of evidence	19	Summarize the main results (including an overview of concepts, themes, and types of evidence available), link to the review questions and objectives, and consider the relevance to key groups.	13
Limitations	20	Discuss the limitations of the scoping review process.	2
Conclusions	21	Provide a general interpretation of the results with respect to the review questions and objectives, as well as potential implications and/or next steps.	14
<b>FUNDING</b>			
Funding	22	Describe sources of funding for the included sources of evidence, as well as sources of funding for the scoping review. Describe the role of the funders of the scoping review.	16

JBI = Joanna Briggs Institute; PRISMA-ScR = Preferred Reporting Items for Systematic reviews and Meta-Analyses extension for Scoping Reviews.

\* Where *sources of evidence* (see second footnote) are compiled from, such as bibliographic databases, social media platforms, and Web sites.

† A more inclusive/heterogeneous term used to account for the different types of evidence or data sources (e.g., quantitative and/or qualitative research, expert opinion, and policy documents) that may be eligible in a scoping review as opposed to only studies. This is not to be confused with *information sources* (see first footnote).

‡ The frameworks by Arksey and O'Malley (6) and Levac and colleagues (7) and the JBI guidance (4, 5) refer to the process of data extraction in a scoping review as data charting.

§ The process of systematically examining research evidence to assess its validity, results, and relevance before using it to inform a decision. This term is used for items 12 and 19 instead of "risk of bias" (which is more applicable to systematic reviews of interventions) to include and acknowledge the various sources of evidence that may be used in a scoping review (e.g., quantitative and/or qualitative research, expert opinion, and policy document).

From: Tricco AC, Lillie E, Zarin W, O'Brien KK, Colquhoun H, Levac D, et al. PRISMA Extension for Scoping Reviews (PRISMA-ScR): Checklist and Explanation. *Ann Intern Med.* 2018;169:467–473. doi: [10.7326/M18-0850](https://doi.org/10.7326/M18-0850).





## Supplementary file 2: Draft Search Strategy for PubMed/MEDLINE

PubMed/MEDLINE
<pre> (("breast neoplasms"[MeSH Terms] OR ("breast"[All Fields] AND "neoplasms"[All Fields]) OR "breast neoplasms"[All Fields] OR ("breast"[All Fields] AND "cancer"[All Fields]) OR "breast cancer"[All Fields] OR ("brca 1 protein"[All Fields] OR "brca 2 protein"[All Fields] OR "cancer of the breast"[All Fields] OR "breast cancer cell"[All Fields] OR "ductal carcinoma"[All Fields] OR "brca2 protein"[All Fields] OR "brca1 protein"[All Fields] OR "Breast Tumor"[All Fields] OR "Breast Malignant Tumors"[All Fields] OR "Malignant Neoplasm"[All Fields] OR "Breast Malignant Neoplasm"[All Fields] OR "Breast Carcinoma"[All Fields] OR "Triple Negative Breast Cancer"[All Fields] OR "Triple Negative Breast Neoplasms"[All Fields] OR "Triple Negative Breast Neoplasm"[All Fields] OR "Inflammatory Breast Neoplasms"[All Fields] OR "Inflammatory Breast Cancer"[All Fields] OR "Mucin-like Carcinoma- associated Antigen"[All Fields] OR "Unilateral Breast Cancer"[All Fields] OR "Hereditary Breast Cancer"[All Fields] OR "Mammary Cancer"[All Fields] OR "Mammary Cancers"[All Fields] OR "Human Mammary Carcinomas"[All Fields] OR "Human Mammary Cancer"[All Fields] OR "Breast Carcinoma In Situ"[All Fields])) AND ("healthcare cost"[Text Word] OR "cancer treatment cost"[Title/Abstract] OR "cost"[All Fields] OR "treatment cost"[All Fields] OR "health care cost"[All Fields] OR "diagnostic cost"[All Fields] OR "indirect cost"[All Fields] OR "direct cost"[All Fields] OR "disease burden"[All Fields] OR "cost effectiveness analysis"[All Fields] OR "cost effectiveness benefit"[All Fields] OR "cost utility analysis"[All Fields] OR "cost estimation"[All Fields] OR "pharmacoeconomic"[Text Word] OR "cost of illness"[All Fields] OR "cost of disease"[All Fields] OR "disease cost"[All Fields] OR "hospital cost"[All Fields] OR "health economics"[All Fields] OR "economic evaluation"[Title/Abstract] OR "economic burden"[All Fields] OR "economic impact"[Text Word] OR "oop"[All Fields] OR "out of pocket"[All Fields] OR "out of pocket expenditure"[All Fields] OR "out of pocket payment"[All Fields] OR "medical cost"[All Fields] OR "medical care cost"[All Fields] OR ("developing countr"[All Fields] OR "lmic"[All Fields] OR "low income econom"[All Fields] OR "developing econom"[All Fields] OR "developing nation"[All Fields] OR "developing population"[All Fields] OR "less developed countr"[All Fields] OR "Less-Developed Countries"[All Fields] OR "third world countr"[All Fields] OR "third world nation"[All Fields] OR "less developed nation"[All Fields] OR "less developed econom"[All Fields] OR "low to middle income countr"[All Fields] OR "low middle income countr"[All Fields] OR "low income countr"[All Fields] OR "low income econom"[All Fields] OR "lower income countr"[All Fields] OR "lower income nation"[All Fields] OR "lower income econom"[All Fields] OR "lower income population"[All Fields] OR "middle income countr"[All Fields] OR "middle income econom"[All Fields] OR "middle income nation"[All Fields] OR "middle income group"[All Fields] OR "transitional countr"[All Fields] OR "transitional econom"[All Fields] OR "under developed count"[All Fields] OR "under developed nation"[All Fields])) AND ("india"[All Fields] OR "asia"[All Fields] OR "south asia"[All Fields] OR "bharat"[All Fields] OR "hindustan"[All Fields] OR "kerala"[All Fields] OR "tamil nadu"[All Fields] OR "karnataka"[All Fields] OR "andra pradesh"[All Fields] OR "telangana"[All Fields] OR "goa"[All Fields] OR "Maharashtra"[All Fields] OR "Gujarat"[All Fields] OR "punjab"[All Fields] OR "Rajasthan"[All Fields] OR "Haryana"[All Fields] OR "Uttarakhand"[All Fields] OR "Jammu and Kashmir"[All Fields] OR "Uttar Pradesh"[All Fields] OR "Madhya Pradesh"[All Fields] OR "orissa"[All Fields] OR "bihar"[All Fields] OR "Jharkhand"[All Fields] OR "Chhattisgarh"[All Fields] OR "manipur"[All Fields] OR "West Bengal"[All Fields] OR "Sikkim"[All Fields] OR "Meghalaya"[All Fields] OR "assam"[All Fields] OR "Mizoram"[All Fields] OR "Tripura"[All Fields] OR "Arunachal Pradesh"[All Fields] OR "Himachal Pradesh"[All Fields] OR "Republic of India"[All Fields])) AND ((humans[Filter]) AND (english[Filter]) AND (2000:2021[pdat])) </pre>

### Supplementary file 3. Data extraction form

<b>Citation Information</b>	
Title of the Study	
Author(s)	
Date of publication	
Type and source of publication	
Author Affiliation	
Contact Information	
<b>Study Characteristics</b>	
Study title	
Aim/Objective of the Study	
Study Period	
Study design	
Setting/ Location (State where the study was conducted)	
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Stage of cancer	
Type of costs reported	
Follow-up costs reported	
Currency of costs reported	

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For peer review only

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# BMJ Open

## Cost of breast cancer diagnosis and treatment in India: a scoping review protocol

Journal:	<i>BMJ Open</i>
Manuscript ID	bmjopen-2021-057008.R2
Article Type:	Protocol
Date Submitted by the Author:	05-Feb-2022
Complete List of Authors:	Barathe, Priyanka; Manipal Academy of Higher Education, Department of Commerce Haridas, Herosh ; Manipal Academy of Higher Education, Department of Commerce Soni, Priya; Manipal Academy of Higher Education, Department of Commerce Kudiya, Krithi; Manipal Academy of Higher Education, Department of Commerce Krishnan, Jisha ; Manipal Academy of Higher Education, Public Health evidence South Asia, Prasana School of Public Health (PSPH), Dhyani, Vijay Shree; Manipal Academy of Higher Education, Public Health evidence South AsiaPrasana School of Public Health (PSPH), Rajendran, Ambigai; Manipal Academy of Higher Education, Department of Commerce; Manipal Academy of Higher Education Sirur, Andria; Manipal Academy of Higher Education, Department of Commerce Pundir, Prachi; Manipal Academy of Higher Education, Public Health Evidence South Asia
<b>Primary Subject Heading</b>:	Health economics
Secondary Subject Heading:	Health economics, Evidence based practice, Public health
Keywords:	Breast tumours < ONCOLOGY, HEALTH ECONOMICS, Quality in health care < HEALTH SERVICES ADMINISTRATION & MANAGEMENT

SCHOLARONE™  
Manuscripts

## Cost of breast cancer diagnosis and treatment in India: a scoping review protocol

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Word Count: 3,015

### ABSTRACT

**Introduction:** Breast cancer is the foremost cause for mortality among women. The non-communicable disease (NCD) imposes significant economic expenses to communities. Its economic impact includes both direct and indirect healthcare costs. This scoping review will map key concepts underpinning the current direct and indirect expenses of breast cancer in India.

**Methods and analysis:** This scoping review will follow 'Arksey and O'Malley's' approach and updated methodological guidance from the Joanna Briggs Institute. The Cochrane library, Econ Papers, Embase, ProQuest central, PubMed, and SCOPUS will be searched for peer-reviewed scientific journal publications from the year 2000 to 2021. Reference lists of included articles and preprint repositories will be searched for additional and unpublished

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3 literature. Independent screening (title, abstract and full text) and data extraction will be  
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5 carried out against the defined inclusion criteria. The results will be narratively summarised  
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7 and charted under the conceptual areas of this scoping review. The research gaps and scope  
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9 for future research on the topic will be identified. Findings will be reported using the  
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11 Preferred Reporting Items for Systematic Reviews extension for Scoping Reviews  
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13 (PRISMA ScR).  
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17 **Ethics and dissemination:** Ethics clearance will not be obligatory because this scoping  
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19 review will only involve publicly available data. The review's findings will be disseminated  
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21 through social media and a presentation in a national or international conference related to  
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23 economics and healthcare. The findings will be published in a scientific journal that is peer-  
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29 **Key Words** - “breast cancer”, “diagnostic cost”, “treatment cost”, “economic burden”,  
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31 “health expenditure”, “India”.  
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### 34 35 36 **Strengths and limitations of this study**

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1. Breast cancer diagnosis and treatment costs in India will be investigated using an established, rigorous, and systematic approach.
  2. The extensive search in databases and grey literature is aimed at including published and unpublished research from the past two decades.
  3. The literature search is limited to English language.
  4. The quality of articles in the scoping review will not be assessed.

## INTRODUCTION

India's epidemiological transition has increased the burden of both communicable and NCD. Amongst the NCD, cancers are the most prevalent. Within the Indian context, breast cancer, lung cancer, oral cancer, stomach, and cervical cancer are commonly predominant.<sup>1</sup> Breast cancer is a severe illness, mainly affecting the women of reproductive age in India, with high medical costs and economic impact.<sup>2</sup> In 2020, the worldwide cancer incidence and fatalities reached 19.3 million and 10 million respectively. For the year 2020, the estimated incidence of cancer among females in India was 712,758 (104 per 100,000).<sup>3,4</sup> The origin of breast cancer is unclear. However, several risk factors are known to be associated with the disease, such as age, genetics, genes, radiation exposure, obesity, delayed pregnancy, and alcohol.<sup>5</sup> According to the 'International Agency for Research on Cancer' (IARC), delayed diagnosis leads to poorer probable outcome or prognosis of the breast cancer disease.<sup>6</sup> It is the most predominant cancer in women, accounting for about a quarter of all cancer cases in Indian cities, and ranking second in rural India.<sup>3,7</sup>

According to the 'National Cancer Registry Programme', breast cancer accounts for 25 to 32 percent of all female cancers in cities like Ahmedabad, Bengaluru, Bhopal, Chennai, Delhi, Hyderabad and Kolkata.<sup>5</sup> Breast cancer incidence rates are growing with an annual percentage rise ranging from 1.4 percent to 2.8 percent, which is more evident in urban regions such as Bengaluru, Chennai, Delhi and Hyderabad than in rural areas.<sup>1,4,8</sup> The Indian Council for Medical Research (ICMR) reported 1.5 lakh new breast cancer cases in 2019, with 70,000 deaths per year. In India, only 66 percent of women with breast cancer survive for five years, compared to 90 percent of women in the United States.<sup>9</sup> According to a study conducted by the International Agency for Research on Cancer (IARC) in 2020, in the previous year,

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3 150,000 people had been diagnosed with breast cancer.<sup>8</sup> Breast cancer is primarily  
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5 associated with increased life expectancy, changes in population reproductive patterns (e.g.,  
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7 later age at first birth), overweight and obesity, lower levels of physical activity, social  
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9 development and growth, and embracing western lifestyles (World Health Organization  
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11 (WHO), 2020).<sup>8-10</sup>  
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15 Cancerous breast tissue originates from breast milk providing milk ducts and lobules.<sup>5</sup>  
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17 Breast cancer is categorised as ductal carcinomas and lobular carcinomas. Invasive  
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19 ductal carcinoma is the most common type accounting for around 70% of tumours,  
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21 whereas invasive lobular carcinomas account for 15–20% of tumours.<sup>5,6,11</sup> Breast  
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23 cancer is classified into the five stages depending on the size and spread of the lump  
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25 or tumour in breast: Stage 0 (also known as ‘Ductal Carcinoma in Situ’ (DCIS)),  
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27 ‘stage I’, ‘stage II’, ‘stage III’, and ‘stage IV’.<sup>7</sup> The stage of cancer is determined by a  
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29 series of specialist physical exams, mammography, ultra-sonography, aspiration, biopsies,  
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31 bone scans, and blood tests. Oncologists use a comprehensive strategy to treat breast cancer  
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33 such as, surgery, hormone therapy, chemotherapy, radiation therapy and biological  
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35 therapies.<sup>12</sup> Despite advancements in therapy and awareness initiatives, the dangers linked  
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37 with breast cancer continue to grow in India. Poor diagnosis and costly treatment lead to a  
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39 high death rate.<sup>9</sup> The typical cost of treatment including radiation, surgery, and  
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41 investigations costs between INR 5 and 6 lakhs (about US\$6700 to US\$8000). Six rounds of  
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43 chemotherapy with tailored treatment cost more than INR 20 lakhs (US\$27000).<sup>5</sup>  
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50 Expenditures have risen as a result of expensive infrastructure, new technology-  
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52 based research costs, and newer medicines. Statistics suggest only one in every two  
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54 women with breast cancer survive, implying a 50% mortality rate. The high mortality  
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56 rate of breast cancer can be attributed to the lack of awareness about the disease, as majority  
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58 of the breast cancers are identified at an advanced stage, resulting in poor response to  
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3 treatment and high treatment costs.<sup>9-13</sup> Because of patients lack of knowledge on their  
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5 disease condition they fail to approach suitable medical facilities therefore most breast  
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7 cancers are detected at an advanced stage. Patients in urban areas are predominantly  
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9 identified at stage two, when the lesions become palpable lumps; but in rural regions  
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11 these lesions are diagnosed only after they have progressed to metastatic tumors.<sup>14,15</sup>  
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13 The cost of targeted therapy on the WHO Essential Medicine List (EML) for ‘stage I  
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15 HER2+ breast cancer’ Human Epidermal growth factor Receptor 2) breast cancer,  
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17 for example, is projected to be comparable to roughly ten years of average yearly  
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19 income in India.<sup>10,16</sup> As breast cancer treatment is getting expensive, primary  
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21 prevention is the key to breast cancer management. Breast cancer has a one hundred  
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23 percent success rate if detected early and a high survival percentage till the middle  
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25 stages. Approximately half of all breast cancer patients in India are in stages 3 and 4,  
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27 when the chances of survival are exceedingly low and treatment costs are  
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29 considerable. According to the ICMR, less than 5% of women in India have their  
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31 breasts screened. Breast cancer has a low survival rate since it is detected late. If a  
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33 variety of early detection measures were improved, breast cancer mortality may be  
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35 lowered. Raising knowledge of the benefits and potential risks of breast screening,  
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37 as well as making it more widely available, could also help in promoting early  
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39 identification of this disease and consequently reducing the associated costs.<sup>8,9,17</sup>  
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41 The 2030 Agenda endorsed by the General Assembly for Sustainable Development in  
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43 September 2015, comprises 17 Sustainable Development Goals (SDGs). Among 17 SDGs,  
44  
45 SDG 1 & 3 have set a target which aim for the abolition of all kinds of poverty and a  
46  
47 one-third decrease in noncommunicable disease-related early death respectively, by  
48  
49 2030.<sup>18</sup> Breast cancer is a prominent cause of death in recent decades, posing a  
50  
51 significant societal and economic threat. As a result, governments must understand  
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3 the economic burden (direct and indirect expenses) of breast cancer in order to  
4 effectively allocate resources. Direct expenses include medical and non-medical  
5 expenditures incurred as a result of resource usage owing to inpatient and outpatient  
6 health care occurrences connected with diagnosis and treatment. These also include  
7 transportation and caregivers' costs. Indirect expenses, on the other contrary, include  
8 productivity loss owing to work absenteeism (morbidity) and death from cancer  
9 (mortality) at early age.<sup>19</sup> Direct and indirect expenses together form the economic  
10 burden of breast cancer.  
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22 In India, the amount of information accessible on the economic impact of breast cancer is  
23 limited.<sup>20–23</sup> Although studies on expenses associated with breast cancer<sup>24–26</sup> and state wise  
24 cost of breast cancer<sup>27,28</sup> are available, a comprehensive review of literature on costs of breast  
25 cancer in India is missing.<sup>29</sup> To fill this void, a scoping review assessment of the literature on  
26 the evidence on the cost of diagnosis and treatment of breast cancer in India will be  
27 performed. The major objective is to collect data on the direct and indirect costs of breast  
28 cancer diagnosis and treatment in India. Additionally, this scoping study can serve to  
29 evaluate the impact of illnesses on society, aiding policymakers and decision makers in  
30 forecasting future healthcare expenditures and making resource allocation choices.  
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## 44 **METHODS & ANALYSIS**

### 45 **Protocol Design**

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47 The Arksey and O'Malley's scoping review methodological framework<sup>30</sup>, guidance  
48 by Levac et al.<sup>31</sup>, and JBI updated methodological guidance (Peters et al., 2020) were  
49 used in preparation of this protocol.<sup>2,32</sup> The current procedure and future scoping review  
50 would be documented using the 'Preferred Reporting Items for Systematic Reviews and  
51 Meta-Analyses (PRISMA) protocols extension for scoping reviews guidelines' (PRISMA-  
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ScR; Supplementary file-1).<sup>33,34</sup> The scoping review will be carried out in five different stages

1. Identification of the research question
2. Identifying relevant studies
3. Selection of eligible studies
4. Data extraction and charting results
5. Collating, summarizing and reporting the results

### Stage 1: Identification of the research question

The main research question is: “What is the cost (direct and indirect) associated with breast cancer in India among the female population aged 18 years and above? These include costs associated with diagnosis and treatment.” Research sub-questions include: What are the direct and indirect expenses of breast cancer treatments (all stages) in India?

### Stage 2: Identifying relevant studies

#### Eligibility Criteria

To discover relevant literature, a comprehensive search strategy was established, which was supported by key inclusion criteria. The eligibility criteria is defined based on ‘Population-Concept-Context’ (PCC) framework recommended by the ‘JBI methodology for scoping reviews’ (Table 1).<sup>35</sup>

**Table 1. PCC framework (Eligibility criteria) for study selection**

Criteria	Determinants
Population	Female participants with breast cancer

<b>Concept</b>	Cost associated with breast cancer disease management
<b>Context</b>	India

**Population:** The scoping review will examine studies including Indian women aged 18 and above who have been diagnosed with breast cancer. Studies on breast cancer that includes male population and does not report cost data separately for the female population, will not be considered.

**Concept:** This scoping review's main goal is to investigate and quantify the costs of breast cancer detection and treatment in India. It will include cost or expenditure categorized as direct and indirect costs. Studies that include cost of diagnosis and treatment with specific modalities will be included. The direct cost will cover the total medical cost, which include the cost of diagnostic and screening such as, physical examination, mammograms, ultrasonography, fine needle aspiration test (FNAC), bone scans, blood tests, biopsies, and cost of treatment such as, hospitalization cost (including cost of surgery), drug cost, radiotherapy cost, chemotherapy, hormone therapy, biological treatment, consultation cost and non-medical cost (transportation, food, and lodging). Indirect cost will include total patient wage loss, total caregiver wage loss, spending on hired help, productivity loss.<sup>36,37</sup> Direct and indirect cost will also be provided for all stages of breast cancer treatment (Stage 0 to 4).<sup>38</sup> Studies that assess the cost of many cancers simultaneously; but do not provide the specific break down of costs for breast cancer will be excluded.

**Context:** The purpose of this scoping review is to assess the economic impact of breast cancer in India. As a result, it would evaluate research in India at all stages (0 to 4) of breast cancer.<sup>38</sup> This review will consider research done in any clinical setting (e.g., inpatient, outpatient) or health care institution (e.g., hospitals, health centres, nursing homes)

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3 throughout all Indian states.  
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### 5 6 **Search strategy** 7

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10 Only literature published from 2000 onwards in English language will be considered. A  
11 search of several electronic databases was used as the major source of literature: The  
12 Cochrane library, EconPapers, Embase, ProQuest central, PubMed, and Scopus. The  
13  
14 secondary source of potentially relevant material was for grey literature from Google  
15 Scholar and Shodhganga: a reservoir of Indian theses @ INFLIBNET. We will manually  
16 examine the reference lists of included research, reports, related reviews and publications, as  
17 well as preprint repositories, for the inclusion of further relevant studies. Authors will be  
18 contacted. In cooperation with a medical librarian, the team devised a search  
19 technique to find a complete list of relevant terms pertaining to the cost of breast  
20 cancer diagnosis and treatment in India. A primary search on PubMed was initiated  
21 to identify articles for this review. The key words used to describe the relevant articles  
22 will be listed and used to develop a full search strategy for PubMed. Initially “breast cancer”  
23 OR "breast oncology" OR "breast neoplasm" OR "mammary gland" OR  
24 “carcinoma” AND “diagnostic cost” OR "cost", "treatment cost" OR "economic  
25 burden" OR "cost of disease" OR "cost of treatment" OR "cost of diagnosis" AND  
26 “India” OR "LMIC" OR “developing countries” was used for mapping relevant studies.  
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28 The search strategy was customized and modified consisting of all keywords and index  
29 terms for Scopus, The Cochrane library, Embase, Econ Papers and ProQuest Central  
30 databases. A search will also be done through scientific repositories such as, the cancer  
31 institute and research centre and the population-based cancer registries repository.  
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33 The search terms from each concept of the search strategy were merged with  
34 appropriate boolean operators to produce the final relevant reports and articles. An  
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example of the search strategy is provided below in Table 2 and search results for PubMed are provided in an online supplementary file 2.

**Table 2. Search strategy**

#	Keywords
1	("Breast Cancer" OR "Cancer of Breast" OR "Mucin like Carcinoma" OR "BRCA 1 Protein" OR "BRCA 2 Protein") OR ("Cancer" OR "Neoplasm" OR "Carcinoma")
2	("Healthcare Cost" OR "Diagnosis Cost" OR "Treatment Cost" OR "Direct Cost" OR "Indirect Cost" OR "Caregiver Cost" OR "Societal Cost" OR "Disease Burden" OR "Cost Utility Analysis" OR "Cost Effectiveness Analysis" OR "Cost Benefit Analysis" OR "Disease Cost" OR "Estimation of Cost" OR "Medical Cost")
3	("India" OR "Republic of India" OR "Bharat" OR "Hindustan" OR "LMIC" OR "Developing Country")
4	#1 AND #2 AND #3

### Stage 3: Selection of eligible studies

Identified studies from search on different databases will be collated and imported to Zotero version 5.0. Duplicates will be removed at compilation stage, and the citations and their abstracts will consecutively be transferred to Microsoft Excel for screening process. A two-stage screening process comprising of

1. Title and abstract screening
2. Full-text review will be carried out

Based on the eligibility criteria, two independent reviewers will do the screening of title and abstract (Table 3) and studies that do not address the research question will be

removed. Any disagreements between the reviewers will be resolved involving a third reviewer, an expert in health economics. Further, the screening of full text will be done for articles that meets the inclusion criteria. Disagreements will be resolved by involving a subject expert. Both the stages will follow an identical process and the result will be documented on Microsoft Excel spreadsheets. Reasons for exclusion of studies will be informed and documented at the full-text screening stage.

**Table 3 Inclusion & exclusion criteria**

<b>Criteria</b>	<b>Inclusion criteria</b>	<b>Exclusion criteria</b>
<b>Population</b>	Female participants aged 18 years and above diagnosed with breast cancer	Female participants not diagnosed with breast cancer but undergone screening will be excluded
<b>Concept</b>	All studies concerning the expenses related with breast cancer disease management, including direct and indirect costs	Pre-diagnosis screening cost
<b>Context</b>	India	Non-Indian studies or studies with a focus on LMICs or South Asia in which the expenses for India are not reported separately.
<b>Types of evidence sources</b>	Quantitative, qualitative	Letter to the editor,

	and mixed methods studies	viewpoint, reviews, editorials and perspectives
<b>Timeframe</b>	Studies published from January 2000 onwards	Articles published before 2000
<b>Language</b>	Studies published in English	Non-English articles

#### Stage 4: Data extracting and charting results

Data from the included full text articles will be extracted by two reviewers independently using a custom data extraction form (Supplementary file 3) developed by the research team in Microsoft Excel. The data extracted will capture the study components as follows -

1. Details of the study (Study title, aim or research question, the authors, year of publication, state/district/union territories, geographic location, objectives, methodology, and sample size).
2. Population (e.g., age, gender, target population, population excluded and sample size).
3. Type of cancer - Breast cancer stages (stage 0-4)
4. Diagnostic and treatment modalities (e.g., physical examination, mammograms, ultra-sonography, fine needle aspiration test (FNAC), bone scans, blood tests and biopsies, surgery, radiation therapy, chemotherapy and/or targeted therapy).
5. Study setting (e.g., clinical settings – public (government) and private).
6. Type of costs reported - Diagnostic costs, treatment costs, direct costs, indirect costs.



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3 7. Study design, study duration, data collection period/year, cost related data  
4 collection methods, result summary, other measures reported, key findings.  
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8 8. Relevant Conclusion  
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10 During the piloting phase, any adjustments will be made as needed. As the scoping  
11 review progresses, the data extraction technique will be updated or adjusted. Any  
12 changes or amendments that are required during the actual review will be  
13 documented in the scoping review report. The findings will be evaluated with the  
14 team to see if the data extracted meets the scoping reviews goals and objectives.<sup>39</sup>  
15 The resolution of differences between the reviewers will be discussed with a subject  
16 expert or a senior reviewer.<sup>32</sup>  
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### 27 **Stage 5: Collating, summarizing, and reporting the results**

28 To exhibit the search process, a 'Preferred Reporting Items for Systematic Reviews and  
29 Meta-analyses' (PRISMA) flow diagram will be used.<sup>40</sup> The flow diagram will help display  
30 the decision-making process, as well as the outputs of the searches, the exclusion of  
31 duplicated citations, study selection, complete retrieval, additional bibliography mining, and  
32 presentation of the final summary.  
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42 Studies will be grouped by costs type (direct or indirect), settings, and study design  
43 along with key findings. A descriptive statistics, such as measures of frequencies and  
44 central measures of tendency will be used to reflect the kind of research design, costs  
45 of treatment examined, and costs identification criteria.<sup>41</sup> The results will be  
46 summarized and analyzed and will be presented in a graphical, tabular, or in a  
47 detailed descriptive structure that aligns to the purpose and scope of the review.<sup>32</sup>  
48 Thematic and narrative approach will also be incorporated for the analysis of  
49 quantitative and qualitative studies.<sup>42</sup> Inadequacies and limitations in the current  
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literature will be identified and summarised.

Study timeline is depicted in Table 4

**Table 4 Study timeline**

Scoping review steps	Status
1. Identifying the research questions	Completed
2. Identifying relevant studies	Completed
<ul style="list-style-type: none"> <li>• <i>Search terms and inclusion/exclusion criteria</i></li> <li>• <i>Conducting the search</i></li> </ul>	Ongoing
3. Selection of eligible studies	2 Weeks
<ul style="list-style-type: none"> <li>• <i>Title and abstract screening</i></li> <li>• <i>Full text screening</i></li> </ul>	4 weeks
4. Data extraction and charting	4 weeks
5. Data analysis and reporting the results	6 weeks

## PATIENT AND PUBLIC INVOLVEMENT

This scoping review procedure was not informed by a patient and public participation strategy or organisation. The design and development of the procedure were neither patient- nor public-centred.

## ETHICS AND DISSEMINATION

This scoping review procedure describes a strategy for searching and mapping the literature on breast cancer management costs for individuals with breast cancer in a rigorous and methodical manner. Because this scoping review will solely contain publicly available data, therefore ethical approval is not obligatory. The findings of this study will be presented at a national or international conference related to economics

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3 and healthcare and published in peer-reviewed journal. The authors expect that our  
4  
5 analysis of the present status of breast cancer diagnostic and treatment research will  
6  
7 help to steer future research and to guide clinical practice and public policy makers  
8  
9 and bring awareness among patients, clinicians, decision makers, third party payers about the  
10  
11 out-of-pocket expenditure for breast cancer. It will also help to understand the economic  
12  
13 burden of breast cancer in India.  
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26 during the research period.  
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## 30 31 **FOOTNOTES**

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34 **Author Statement:** PCB, HTH, PS, KKK, JB, VSD, PP, AR contributed to the title and  
35  
36 conception or design of the review. PCB, HTH, PS, KKK drafted the protocol manuscript with  
37  
38 suggestions from PP, VJD, JB and AJS. PCB, HTH, PS, KKK developed and conducted the  
39  
40 preliminary searches. JB, VSD, and PP assisted in developing the search strategy, and  
41  
42 protocol development. AR and AJS coordinated between departments and furnished  
43  
44 administrative support. All the authors have proofread the protocol and given the final approval  
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46 of the version to be published.  
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3 **Patient consent for publication: Not required.**  
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For peer review only

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## Supplementary file 1

## Preferred Reporting Items for Systematic reviews and Meta-Analyses extension for Scoping Reviews (PRISMA-ScR) Checklist

SECTION	ITEM	PRISMA-ScR CHECKLIST ITEM	REPORTED ON PAGE #
<b>TITLE</b>			
Title	1	Identify the report as a scoping review.	1
<b>ABSTRACT</b>			
Structured summary	2	Provide a structured summary that includes (as applicable): background, objectives, eligibility criteria, sources of evidence, charting methods, results, and conclusions that relate to the review questions and objectives.	1-2
<b>INTRODUCTION</b>			
Rationale	3	Describe the rationale for the review in the context of what is already known. Explain why the review questions/objectives lend themselves to a scoping review approach.	6
Objectives	4	Provide an explicit statement of the questions and objectives being addressed with reference to their key elements (e.g., population or participants, concepts, and context) or other relevant key elements used to conceptualize the review questions and/or objectives.	6
<b>METHODS</b>			
Protocol and registration	5	Indicate whether a review protocol exists; state if and where it can be accessed (e.g., a Web address); and if available, provide registration information, including the registration number.	NA
Eligibility criteria	6	Specify characteristics of the sources of evidence used as eligibility criteria (e.g., years considered, language, and publication status), and provide a rationale.	7
Information sources*	7	Describe all information sources in the search (e.g., databases with dates of coverage and contact with authors to identify additional sources), as well as the date the most recent search was executed.	9
Search	8	Present the full electronic search strategy for at least 1 database, including any limits used, such that it could be repeated.	10
Selection of sources of evidence†	9	State the process for selecting sources of evidence (i.e., screening and eligibility) included in the scoping review.	10-12
Data charting process‡	10	Describe the methods of charting data from the included sources of evidence (e.g., calibrated forms or forms that have been tested by the team before their use, and whether data charting was done independently or in duplicate) and any processes for obtaining and confirming data from investigators.	12-13
Data items	11	List and define all variables for which data were sought and any assumptions and simplifications made.	12-13
Critical appraisal of individual sources of evidence§	12	If done, provide a rationale for conducting a critical appraisal of included sources of evidence; describe the methods used and how this information was used in any data synthesis (if appropriate).	NA





SECTION	ITEM	PRISMA-ScR CHECKLIST ITEM	REPORTED ON PAGE #
Synthesis of results	13	Describe the methods of handling and summarizing the data that were charted.	12-13
<b>RESULTS</b>			
Selection of sources of evidence	14	Give numbers of sources of evidence screened, assessed for eligibility, and included in the review, with reasons for exclusions at each stage, ideally using a flow diagram.	NA Protocol
Characteristics of sources of evidence	15	For each source of evidence, present characteristics for which data were charted and provide the citations.	NA Protocol
Critical appraisal within sources of evidence	16	If done, present data on critical appraisal of included sources of evidence (see item 12).	NA scoping review
Results of individual sources of evidence	17	For each included source of evidence, present the relevant data that were charted that relate to the review questions and objectives.	NA
Synthesis of results	18	Summarize and/or present the charting results as they relate to the review questions and objectives.	NA
<b>DISCUSSION</b>			
Summary of evidence	19	Summarize the main results (including an overview of concepts, themes, and types of evidence available), link to the review questions and objectives, and consider the relevance to key groups.	13
Limitations	20	Discuss the limitations of the scoping review process.	2
Conclusions	21	Provide a general interpretation of the results with respect to the review questions and objectives, as well as potential implications and/or next steps.	14
<b>FUNDING</b>			
Funding	22	Describe sources of funding for the included sources of evidence, as well as sources of funding for the scoping review. Describe the role of the funders of the scoping review.	16

JBI = Joanna Briggs Institute; PRISMA-ScR = Preferred Reporting Items for Systematic reviews and Meta-Analyses extension for Scoping Reviews.

\* Where *sources of evidence* (see second footnote) are compiled from, such as bibliographic databases, social media platforms, and Web sites.

† A more inclusive/heterogeneous term used to account for the different types of evidence or data sources (e.g., quantitative and/or qualitative research, expert opinion, and policy documents) that may be eligible in a scoping review as opposed to only studies. This is not to be confused with *information sources* (see first footnote).

‡ The frameworks by Arksey and O'Malley (6) and Levac and colleagues (7) and the JBI guidance (4, 5) refer to the process of data extraction in a scoping review as data charting.

§ The process of systematically examining research evidence to assess its validity, results, and relevance before using it to inform a decision. This term is used for items 12 and 19 instead of "risk of bias" (which is more applicable to systematic reviews of interventions) to include and acknowledge the various sources of evidence that may be used in a scoping review (e.g., quantitative and/or qualitative research, expert opinion, and policy document).

From: Tricco AC, Lillie E, Zarin W, O'Brien KK, Colquhoun H, Levac D, et al. PRISMA Extension for Scoping Reviews (PRISMA-ScR): Checklist and Explanation. *Ann Intern Med.* 2018;169:467–473. doi: [10.7326/M18-0850](https://doi.org/10.7326/M18-0850).



## Supplementary file 2: Draft Search Strategy for PubMed/MEDLINE

PubMed/MEDLINE
<p>((("breast neoplasms"[MeSH Terms] OR ("breast"[All Fields] AND "neoplasms"[All Fields]) OR "breast neoplasms"[All Fields] OR ("breast"[All Fields] AND "cancer"[All Fields]) OR "breast cancer"[All Fields] OR ("brca 1 protein"[All Fields] OR "brca 2 protein"[All Fields] OR "cancer of the breast"[All Fields] OR "breast cancer cell"[All Fields] OR "ductal carcinoma"[All Fields] OR "brca2 protein"[All Fields] OR "brca1 protein"[All Fields] OR "Breast Tumor"[All Fields] OR "Breast Malignant Tumors"[All Fields] OR "Malignant Neoplasm"[All Fields] OR "Breast Malignant Neoplasm"[All Fields] OR "Breast Carcinoma"[All Fields] OR "Triple Negative Breast Cancer"[All Fields] OR "Triple Negative Breast Neoplasms"[All Fields] OR "Triple Negative Breast Neoplasm"[All Fields] OR "Inflammatory Breast Neoplasms"[All Fields] OR "Inflammatory Breast Cancer"[All Fields] OR "Mucin-like Carcinoma-associated Antigen"[All Fields] OR "Unilateral Breast Cancer"[All Fields] OR "Hereditary Breast Cancer"[All Fields] OR "Mammary Cancer"[All Fields] OR "Mammary Cancers"[All Fields] OR "Human Mammary Carcinomas"[All Fields] OR "Human Mammary Cancer"[All Fields] OR "Breast Carcinoma In Situ"[All Fields])) AND ("healthcare cost"[Text Word] OR "cancer treatment cost"[Title/Abstract] OR "cost"[All Fields] OR "treatment cost"[All Fields] OR "health care cost"[All Fields] OR "diagnostic cost"[All Fields] OR "indirect cost"[All Fields] OR "direct cost"[All Fields] OR "disease burden"[All Fields] OR "cost effectiveness analysis"[All Fields] OR "cost effectiveness benefit"[All Fields] OR "cost utility analysis"[All Fields] OR "cost estimation"[All Fields] OR "pharmacoeconomic"[Text Word] OR "cost of illness"[All Fields] OR "cost of disease"[All Fields] OR "disease cost"[All Fields] OR "hospital cost"[All Fields] OR "health economics"[All Fields] OR "economic evaluation"[Title/Abstract] OR "economic burden"[All Fields] OR "economic impact"[Text Word] OR "oop"[All Fields] OR "out of pocket"[All Fields] OR "out of pocket expenditure"[All Fields] OR "out of pocket payment"[All Fields] OR "medical cost"[All Fields] OR "medical care cost"[All Fields] OR ("developing countr"[All Fields] OR "lmic"[All Fields] OR "low income econom"[All Fields] OR "developing econom"[All Fields] OR "developing nation"[All Fields] OR "developing population"[All Fields] OR "less developed countr"[All Fields] OR "Less-Developed Countries"[All Fields] OR "third world countr"[All Fields] OR "third world nation"[All Fields] OR "less developed nation"[All Fields] OR "less developed econom"[All Fields] OR "low to middle income countr"[All Fields] OR "low middle income countr"[All Fields] OR "low income countr"[All Fields] OR "low income econom"[All Fields] OR "lower income countr"[All Fields] OR "lower income nation"[All Fields] OR "lower income econom"[All Fields] OR "lower income population"[All Fields] OR "middle income countr"[All Fields] OR "middle income econom"[All Fields] OR "middle income nation"[All Fields] OR "middle income group"[All Fields] OR "transitional countr"[All Fields] OR "transitional econom"[All Fields] OR "under developed count"[All Fields] OR "under developed nation"[All Fields])) AND ("india"[All Fields] OR "asia"[All Fields] OR "south asia"[All Fields] OR "bharat"[All Fields] OR "hindustan"[All Fields] OR "kerala"[All Fields] OR "tamil nadu"[All Fields] OR "karnataka"[All Fields] OR "andra pradesh"[All Fields] OR "telangana"[All Fields] OR "goa"[All Fields] OR "Maharashtra"[All Fields] OR "Gujarat"[All Fields] OR "punjab"[All Fields] OR "Rajasthan"[All Fields] OR "Haryana"[All Fields] OR "Uttarakhand"[All Fields] OR "Jammu and Kashmir"[All Fields] OR "Uttar Pradesh"[All Fields] OR "Madhya Pradesh"[All Fields] OR "orissa"[All Fields] OR "bihar"[All Fields] OR "Jharkhand"[All Fields] OR "Chhattisgarh"[All Fields] OR "manipur"[All Fields] OR "West Bengal"[All Fields] OR "Sikkim"[All Fields] OR "Meghalaya"[All Fields] OR "assam"[All Fields] OR "Mizoram"[All Fields] OR "Tripura"[All Fields] OR "Arunachal Pradesh"[All Fields] OR "Himachal Pradesh"[All Fields] OR "Republic of India"[All Fields])) AND ((humans[Filter]) AND (english[Filter]) AND (2000:2021[pdat]))</p>

### Supplementary file 3. Data extraction form

<b>Citation Information</b>	
Title of the Study	
Author(s)	
Date of publication	
Type and source of publication	
Author Affiliation	
Contact Information	
<b>Study Characteristics</b>	
Study title	
Aim/Objective of the Study	
Study Period	
Study design	
Setting/ Location (State where the study was conducted)	
Type of cancer assessed	
Stage of cancer	
Type of costs reported	
Follow-up costs reported	
Currency of costs reported	

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Other measures reported	
Data collection period	
Target Population	
Sample Size	
Sampling method	
Data Sources	
Key findings	
Conclusion	
Comments	

For peer review only

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