



Review

Breast cancer as a global health concern[☆]Steven S. Coughlin^{a,b,*}, Donatus U. Ekwueme^b^a Environmental Epidemiology Service, Office of Public Health and Environmental Hazards, Department of Veterans Affairs, Washington, DC, United States^b Division of Cancer Prevention and Control, National Center for Chronic Disease Prevention and Health Promotion, CDC, Atlanta, United States

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ABSTRACT

Public health data indicate that the global burden of breast cancer in women, measured by incidence, mortality, and economic costs, is substantial and on the increase. Worldwide, it is estimated that more than one million women are diagnosed with breast cancer every year, and more than 410,000 will die from the disease. In low- and middle-income countries (LMCs), the infrastructure and resources for routine screening mammography are often unavailable. In such lower resource settings, breast cancers are commonly diagnosed at late stages, and women may receive inadequate treatment, pain relief, or palliative care. There have been an increasing number of global health initiatives to address breast cancer including efforts by Susan G. Komen for the Cure[®], the Breast Health Global Initiative (BHGI), the U.S. Centers for Disease Control and Prevention (CDC), the American Cancer Society, the National Cancer Institute (NCI), and ongoing work by leading oncology societies in different parts of the world. To support such initiatives, and to provide a scientific evidence base for health policy and public health decision making, there is a need for further health services research and program evaluations. Cancer registries can be invaluable in ascertaining the magnitude of cancer disease burden and its distribution in these countries. Additional data are needed for various geographic areas to assess resources required, cost-effectiveness, and humane approaches for preventing or controlling breast cancer in low resource settings in developing countries.

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The World Health Organization (WHO) estimated that 7.6 million people died of cancer in 2005, and 84 million people will die in the next decade unless action is taken [1]. More than 70% of cancer deaths in 2005 occurred in low- and middle-income countries (LMCs). According to a recent Institute of Medicine (IOM) report, the cancer burden is growing in many poorer countries, partly because of gains in life expectancy, increases in cancer deaths associated with cigarette smoking and obesity, and declines in deaths from infectious diseases [2]. People in LMCs tend to develop chronic diseases “at younger ages, suffer longer – often with preventable complications – and die sooner than those in high income countries” [1].

Public health data indicate that the global burden of breast cancer in women, measured by incidence, mortality, and economic

costs, is substantial and on the increase [3]. Worldwide, it is estimated that more than one million women are diagnosed with breast cancer every year, and more than 410,000 will die from the disease, representing 14% of female cancer deaths [4–6]. Moreover, breast cancer incidence rates have been reported to be increasing by up to 5% per year in many populations in developing countries [7,8]. For example, breast cancer rates in Japan, Singapore, and Korea have doubled or tripled in the past 40 years. Similarly, in the past decade, China’s urban cancer registries have documented increased incidence rates of between 20% and 30% for breast cancer [9,10]. Further, the same pattern of increasing incidence of breast cancer is observed in urban areas of India [11]. These examples clearly indicate that a disease once called ‘a disease of the western world’ has gone global. Hence the commitment to cure it should also be a global effort.

In LMCs, the infrastructure and resources for routine screening mammography are often unavailable. In such lower resource settings, breast cancers are commonly diagnosed at late stages, and women may receive inadequate treatment, pain relief, or palliative care [12,13]. About 75% of women with breast cancer in developing countries are diagnosed in clinical stages III and IV, whereas approximately 70% of newly diagnosed women with breast cancer in North America are in stages 0 and 1 [12,14–16]. Because breast cancer is often diagnosed in late stages in women in LMCs,

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mortality rates are often much higher compared with rates in developed countries [10,17]. These stark statistics underscore the substantial human and societal costs of breast cancer.

In countries around the world, preventable risk factors for breast cancer such as physical inactivity and excessive alcohol consumption as well as cultural factors are important to consider. In some African countries, for example, there may be a belief that breast cancer is caused by social misbehavior such as oral or nipple contact, or a woman wearing dirty clothing or putting money inside her bra. Also, there is a belief that once a woman is diagnosed with breast cancer, she may be divorced by her husband and possibly rejected by the community, or that following a breast cancer diagnosis her breast will be cut off and she will die. As a result of misconceptions and unfounded beliefs, women may tend to hide their breast cancer symptoms at the early stages when treatment is most likely to be effective.

This article gives a brief background on current global initiatives to combat breast health care and provides examples of potential future directions for research aimed at addressing breast cancer in LMCs.

1. Global initiatives to combat breast cancer

In view of the breast cancer disease burden in LMCs and the fact that these cancers are commonly diagnosed at late stages in low resource settings, there have been an increasing number of global health initiatives to address breast cancer. In 2002, a group of breast cancer experts from around the world, with assistance from the U.S.-based Susan G. Komen for the Cure[®], and Fred Hutchison Cancer Research Center helped cofound the Breast Health Global Initiative (BHGI) [12]. The mission of BHGI is to “develop evidence-based, economically feasible, and culturally appropriate guidelines for underdeveloped nations to improve breast health outcomes” [12]. As part of BHGI, Anderson et al. [13] proposed a sequential action plan: “(1) promote the empowerment of women to obtain health care, (2) develop infrastructure for the diagnosis and treatment of breast cancer, (3) begin early detection efforts through breast cancer education and awareness, and (4) when resources permit, expand early detection efforts to include mammographic screening.” BHGI developed resource-specific and evidence-based guidelines for all aspects of breast cancer management. In 2005, the U.S. Centers for Disease Control and Prevention (CDC), Susan G. Komen for the Cure, the National Cancer Institute (NCI), and other collaborating organizations cosponsored the BHGI biennial meeting in Bethesda, Maryland. At the Bethesda meeting, the BHGI developed and defined four resource stratification levels: basic, limited, enhanced, and maximal for global breast health care [18]. According to the BHGI [19] “basic-level” is the lowest resource level or services necessary for any breast health care program to function and it may be applied in a single clinical interaction. “Limited-level” is the second lowest resource level or services that are intended to produce major improvements in health outcome such as increased survival and may include single or multiple interactions. “Enhanced-level” is the third lowest resource level or services that are optional but important. This level of resources is intended to produce more improvements in health outcomes and increase patients’ quality of life. The final level of resource stratification is “maximal”, which is the highest level of resources or services that may be used in some high resource countries. This resource level may be a lower priority to LMCs compared with basic, limited, and enhanced resource levels, respectively. This is because it requires the development and implementation of the first three resource-levels for it to be functional. These resource stratification levels are designed to meet country-specific financial means and its allotted health care resources [18,19]. The stratification method assumes an incre-

mental resource allocation. That is, a country with limited level of resources is assumed to have all of the resources recommended for the basic level of breast health care.

In 2007, the U.S.-based Susan G. Komen for the Cure in collaboration with other organizations cosponsored the BHGI biennial meeting in Budapest, Hungary. The meeting focused on effective implementation and integration of the previously developed guidelines for breast health and cancer control [9,19]. To our knowledge, the BHGI efforts are unique. The BHGI’s comprehensive approach to addressing breast cancer issues, from development of guidelines to their implementation, should facilitate efforts to address breast cancer in LMCs. According to the 2007 IOM report, the BHGI model is a “highly innovative effort”, which could be used to develop resource-level-specific guidelines for cervical, colorectal and head and neck cancers [20].

Other important initiatives that are complimentary to BHGI’s efforts include ongoing work by leading oncology societies in different parts of the world and the International Network for Cancer Treatment and Research [21]. The U.S.-based Susan G. Komen for the Cure has provided more than \$5.5 million dollars in funding for international community education and outreach programs and has established international affiliates in Puerto Rico, Italy, and Germany. The organization’s focus is on community organization, education, advocacy, and access to care, including palliative care. In addition, the American Cancer Society (ACS) has an increasing number of international initiatives for cancer prevention and control, including the ACS University, which has had several sessions each year since 2001 and reached over 535 scholars in 85 countries [22].

These and many other efforts of these organizations to address breast cancer in countries around the globe benefit from cumulative international activities for cancer prevention and control, including those described in monographs published by the WHO, the International Union Against Cancer/Union Internationale Contre le Cancer (UICC), the World Bank, and the IOM [2,23–25]. In addition, an increasing number of countries have developed national plans for combating cancer and other chronic diseases, including initiatives aimed at the primary prevention of illness through the promotion of physical activity and proper diet (e.g., avoidance of excessive alcohol consumption). The World Health Assembly passed a resolution on cancer prevention and control (WHA58.22) in May 2005 calling on member States to intensify action against cancer by developing and reinforcing cancer control programs. Countries have prioritized and acted on cancer prevention and control activities in different ways depending on the burden of cancer in the country, the prevalence of cancer risk factors, the extent of resources and health infrastructure, and other considerations [2,23]. For breast cancer, which is still a shameful secret in many LMCs, the first step some countries are taking to conquering the disease is understating how it works. Through the help of Susan G. Komen for the Cure and the WHO’s sponsored lectures and events to educate women and the public about breast cancer and encouraging them to speak out about the disease, breast cancer is now being discussed openly in more places than ever. For example, in Egypt, religious leaders now speak out in favor of breast cancer awareness and screening, making it clear to husbands that their wives must be examined regularly. Further, in South Africa, there is an increase in mobile mammography units to help improve low level rates of screening mammography for breast cancer.

Other key developments include efforts to evaluate and further develop palliative care programs in developing countries [26–28] and activities undertaken through the International Cancer Information Service Group (ICISG) [29]. The latter is a network of almost 50 cancer organizations from 30 countries including LMCs (e.g., Bangladesh, Brazil, India, Kenya, Malaysia, and Nigeria).

ICISG partners include UICC, NCI, ACS, and many other organizations [29]. A formal partnership between ICISG and UICC to strengthen the dissemination of cancer information around the world (e.g., Internet, print mailings, community outreach) helps people understand how they can maintain a healthy lifestyle, manage their illness, including during the cancer survivorship phase, and maximize quality of life [29].

In the long term, such initiatives require sustained commitment from international donors and the respective governments of LMCs [30,31]. However, given the enormous number of public health problems globally, breast cancer, and cancer prevention may not be priorities to international donors and the governments of LMCs. For example, world leaders at the 2000 United Nations Summit for the Millennium Development Goals identified HIV/AIDS, malaria, and TB prevention as priorities for prevention in developing countries over the next 15 years (i.e., 2000–2015) [32], even though breast cancer also poses a significant health and economic burden in these countries. To garner additional resources, cancer prevention and control advocates in LMCs should develop new approaches to advocate for increased resources for breast cancer prevention, as well as the prevention of other chronic diseases that affect women and men [33,34]. For example, breast cancer advocates can integrate their efforts with those of cervical cancer advocacy groups. This approach may create synergy to mobilize global resources and create economies of scale to organize effective cancer screening, treatment, and palliative care programs for these two cancers. Among cancers that affect women, breast and cervical cancers have the highest incidence in many LMCs [35–37]. For example, data obtained from GLOBOCAN 2002 [35] show that in Africa, breast and cervical cancers accounted for approximately 90% of cancers that specifically affect women (Table 1). This type of creative collaboration has a possibility to save millions of lives of women in LMCs.

Global initiatives to combat breast cancer benefit from improvements in cancer registration. However, there are many infrastructural challenges affecting the process of developing, implementing, and maintaining effective and efficient cancer registries in LMCs. Such infrastructural challenges may include but are not limited to (1) underdeveloped transportation systems such as road and highway networks; (2) unreliable electricity supply; (3) unreliable communication systems such as telephone or mobile phone networks, internet services, and computer systems, (4) lack of physical and organizational structures such as human and financial resources and hospital facilities to establish a functional cancer registry, and (5) political instability which can prevent and disrupt routine data collection and follow-up of patients' vital records. Because of the infrastructural challenges, the ability for registries in LMCs to collect data and reach the population is often suboptimal. For instance, the Kampala Cancer Registry, which was established nearly 60 years ago, has been hampered in its growth by political instability and other infrastructural challenges discussed above [38]. As the longest standing cancer registry on

the African continent, it is only reaching 5.4% (1.2 million of 22.2 million) of the population [38].

The reasons why LMCs are not prioritizing cancer registries, which include breast cancer, are multifold. First, there are misconceptions in developing countries that breast cancer only affects wealthy developed countries [39]. Although, LMCs face numerous health issues that tend to compete with limited health budgets, this type of misconception may explain why breast cancer is not considered a significant health problem in the LMCs. Second, in addition to limited financial resources faced by LMCs, these countries also lack qualified trained tumor registrars to abstract and analyze data.

Current global initiatives are making efforts to address these infrastructural challenges. For example, BHGI is collaborating with Susan G. Komen for the Cure, HopeXchange, and the Ghana Breast Cancer Alliance to develop and implement educational and training programs. This program provides educational outreach to inform the public that breast cancer is treatable, especially when identified at early stages. It is also training pathologists to provide prompt pathological services to facilitate proper care, as well as to provide accurate data to establish a cancer registry. Further, the BHGI and Susan G. Komen for the Cure are collaborating with the Colombian government, a middle-income country to develop a breast health early detection and diagnosis program. This program provides patient education, screening mammography and clinical breast examination. It also provides diagnosis, which includes tissue sampling and pathology as well as linking diagnosis and treatment programs. The program is designed to serve as a model for other middle-income countries in South America, Eastern Europe and Asia [40].

2. Future directions for research aimed at addressing breast cancer in low- and middle-income countries

To support initiatives such as those spearheaded by BHGI, Susan G. Komen for the Cure, ACS, CDC, NCI, and UICC, and to provide a scientific evidence base for health policy and public health decision making, there is a need for further health services research and program evaluations. Additional evaluation studies focused on health communication and behavioral aspects of breast cancer prevention and control could be undertaken through ICISG. Because of the importance of data for decision making, cancer registries can be invaluable in ascertaining the magnitude of cancer disease burden and its distribution in these countries. Many countries do not have national cancer registries, especially in LMCs [1,2]. This information is critical to allocate resources effectively to regions with higher incidence of cancers specific to women. For example, in Table 1, the percentage of cervical cancer cases was greater in the eastern (60%) and central (54%) regions of Africa, compared with the percentage distribution of other cancers that specifically affect women. Alternatively, the percentage of breast cancer cases was greater in the northern region of Africa (59%).

Table 1
Distribution of cancers specific to women by region of the African continent, 2002.

Cancer site	Eastern		Central		Northern		Southern		Western		All Africa	
	Count ^a	% ^b	Count ^a	% ^b	Count ^a	% ^b	Count ^a	% ^b	Count ^a	% ^b	Count ^a	% ^b
Breast	15,564	27.5	5,173	33.8	16,588	58.9	6,474	41.0	21,397	45.2	65,196	39.93
Cervix uteri	33,903	59.9	8,201	53.5	8,175	29.0	7,698	48.7	20,919	44.1	78,896	48.32
Corpus uteri	2,407	4.3	763	5.0	1,534	5.4	633	4.0	1,476	3.1	6,813	4.17
Ovary and other uterine adnexa	4,706	8.3	1,182	7.7	1,892	6.7	1,003	6.3	3,601	7.6	12,384	7.58
Total	56,580	100.0	15,319	100.0	28,189	100.0	15,808	100.0	47,393	100.0	163,289	100.00

^a Data were obtained from the GLOBOCAN 2002 [35].

^b Percentages were calculated by the authors.

In terms of economic cost, additional data are needed for various geographic areas (e.g., regions within countries, specific countries, regions of the world) to assess resources required, cost, cost-effectiveness, and humane approaches for preventing or controlling breast cancer in low resource settings in developing countries. Furthermore, economic resources are needed to assist women following a breast cancer diagnosis, from the treatment phase to survivorship phase, as well as end of life care. Country-specific economic cost data would provide useful information to policy makers, public health agencies, community-based organizations, and advocacy groups to help them make informed decisions on planning and developing country-specific breast cancer control policies and programs. Moreover, country-specific economic evaluation research would help to inform these agencies, organizations, and groups on how best to allocate scarce resources to national cancer control programs to identify the most efficient ways of delivering screening, diagnostic, treatment, and palliative care services [41]. Because only sparse data are currently available on the economic burden of breast cancer in LMCs, there is a need for additional studies and program evaluation to examine the costs, potential cost savings, and impact of screening, early detection, and treatment on quality of life for women with breast cancer in these countries.

Conflict of interest

The authors have no conflicts of interest to report.

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