Optimisation of breast cancer management in low-resource and middle-resource countries: executive summary of the Breast Health Global Initiative consensus, 2010

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The purpose of the Breast Health Global Initiative (BHGI) 2010 summit was to provide a consensus analysis of breast cancer control issues and implementation strategies for low-income and middle-income countries (LMCs), where advanced stages at presentation and poor diagnostic and treatment capacities contribute to lower breast cancer survival rates than in high-income countries. Health system and patient-related barriers were identified that create common clinical scenarios in which women do not present for diagnosis until their cancer has progressed to locally advanced or metastatic stages. As countries progress to higher economic status, the rate of late presentation is expected to decrease, and diagnostic and treatment resources are expected to improve. Health-care systems in LMCs share many challenges including national or regional data collection, programme infrastructure and capacity (including appropriate equipment and drug acquisitions, and professional training and accreditation), the need for qualitative and quantitative research to support decision making, and strategies to improve patient access and compliance as well as public, health-care professional, and policy-maker awareness that breast cancer is a cost-effective, treatable disease. The biggest challenges identified for low-income countries were little community awareness that breast cancer is treatable, inadequate advanced pathology services for diagnosis and staging, and fragmented treatment options, especially for the administration of radiotherapy and the full range of systemic treatments. The biggest challenges identified for middle-resource countries were the establishment and maintenance of data registries, the coordination of multidisciplinary centres of excellence with broad outreach programmes to provide community access to cancer diagnosis and treatment, and the resource-appropriate prioritisation of breast cancer control programmes within the framework of existing, functional health-care systems.

Introduction

Countries are classified economically by the World Bank by their gross national income per head as low income, middle income (subdivided into lower-middle and upper-middle), or high income.[1] For global health care, this classification provides a framework to assess what resources can be allocated to address the most urgent health-care issues. In the richest nations, gross national income per head is 100 times that in the poorest nations. However, national health-care expenditure per head is almost 200 times that in the poorest countries, suggesting that disparities in health-care delivery are significantly greater than are disparities in national wealth (table 1). The required out-of-pocket expenses are the largest in countries of low and lower-middle income, despite the fact that people in these countries have the least personal resources to cover these costs. With chronic diseases such as cancer, including breast cancer, the financial hardship of paying for health care could mean that patients and their families have to choose between health care and basic sustenance. Socioeconomic status is an independent predictor of breast cancer outcome in both high-income and low-income countries.[2,3]

Poorer countries have lower life expectancy and larger infectious disease burden than do more developed countries. Globally, life expectancy varies by more than two decades, from less than 60 years in the lowest-resource countries to more than 80 years in the highest-resource countries. Health-care needs in the poorest countries with the lowest average life expectancies often centre on the management of the most common communicable diseases such as malaria, tuberculosis, waterborne diseases, and other infectious diseases. The major non-communicable diseases such as cardiovascular disease, cancer, chronic lung disease, and diabetes, which dominate the health-care needs of high-resource countries, are often left unaddressed in the poorest countries.[4]

WHO recognises the rising risks of non-communicable diseases in developing countries, noting that 80% of deaths from chronic disease occur in low-income and middle-income countries (LMCs).[5] In 2005, WHO projected that global deaths from infectious diseases, maternal and perinatal disorders, and nutritional deficiencies combined would decrease by 3% over the next 10 years, while deaths due to non-communicable diseases would increase by 17% during the same period.[5] The most common cancers will become increasingly common as communicable diseases are controlled and as populations age. 5·6 million people worldwide died from HIV/AIDS, tuberculosis, and malaria in 2002. During that year, 7·6 million people died from cancer.[6] By the year 2020, 70% of the 16 million cancer cases are expected to arise in LMCs.[7] Despite the rising cancer toll in these countries, global health policy statements such as the UN Millennium Development Goals and the 2006 agenda for the G8 Group of industrialised nations emphasise infectious diseases as a global health concern, but either make no reference to cancer at all, or instead

	Low income (≤$995)	Lower-middle income ($996–3945)	Upper-middle income ($3946–12 195)	High income (≥$12 196)
Average female life expectancy at birth (years)	57·8	69·3	74·4	82·4
Average GNI per head (2009 US$)	403	1723	6314	36 953
Total national health expenditure per head (2009 US$)	22	76	458	4266
Proportion of GDP spent on health care	5·1%	4·3%	6·4%	11·2%
Proportion of health care paid by public funding	42·0%	42·2%	53·8%	61·3%
Out-of-pocket health expenditure (% of private expenditure on health)	79·2%	90·3%	69·7%	36·3%

GNI=gross national income from World Bank Health Nutrition and Population Statistics database. GDP=gross domestic product. *Health expenditure figures were data reported in 2010 by the World Bank for calendar year 2007.

Table 1: **Health-care and economic data by World Bank country income level classification (GNI per head, 2009 US$)***

only broadly reference non-communicable diseases as a group without any specific reference to cancer.[8] As such, the global community, until recently, has paid little attention to cancer in developing countries.[9]

As the most common cancer in women worldwide, with more than 1 million new cases every year,[10] and the most frequent global cause of female cancer mortality, breast cancer is a highly relevant disease for which systematic approaches to early detection, diagnosis, and treatment must be implemented to improve outcome.[11] Worldwide, breast cancer incidence and mortality are expected to increase by 50% between 2002 and 2020.[11] These rising cancer rates will be greatest in developing countries, and are projected to reach a 55% increased incidence and 58% increased mortality in fewer than 20 years.[10] Age-specific breast cancer incidence and mortality rates have been increasing in low-income countries, especially in recent birth cohorts, which could relate to the adoption of lifestyles similar to those in developed countries.[12,13] Thus, the reported low incidence of breast cancer in developing countries today should not be used as a rationale for avoiding the creation of cancer programmes generally, or breast cancer programmes specifically. The establishment of breast cancer programmes should instead be regarded as appropriate preparation for an escalating disease that has highly significant ramifications for future global health.

The Breast Health Global Initiative (BHGI) held three global summits to address health-care disparities (Seattle, WA, USA; 2002), evidence-based resource allocation (Bethesda, MD, USA; 2005), and guideline implementation (Budapest, Hungary; 2007) as related to breast cancer in LMCs.[11,14,15] Modelled after the approach of the National Comprehensive Cancer Network, BHGI developed and applied a consensus panel process, which is now formally endorsed by the Institute of Medicine,[16] to create resource-sensitive guidelines for breast cancer early detection,[17] diagnosis,[18] treatment,[19] and health-care systems[20] as related to health-care delivery for this disease in LMCs. The BHGI guidelines are intended to assist health authorities, policy makers, administrators, and institutions to prioritise resource allocation as breast cancer control

programmes are implemented and developed in their resource-constrained countries.

This executive summary summarises the consensus findings of the fourth BHGI global summit that addressed issues and obstacles to breast cancer early detection, diagnosis, and treatment in low-resource[21] and middle-resource countries.[22] The summit also addressed the need for systematic approaches for problem solving and programme implementation.[23]

Methods
Consensus methodology
The BHGI held its fourth international summit meeting, The Global Summit on International Breast Health: Optimizing Healthcare Delivery, in Chicago, IL, USA, on June 9–11, 2010, in association with the SLACOM-Sociedad Latinoamericana y del Caribe de Oncología Médica. The meeting brought together more than 150 experts from 43 countries and six continents. For economic comparison, the 2010 BHGI summit segregates LMCs into low-resource, lower-middle-resource, and upper-middle-resource countries to identify specific breast cancer control issues for these subgroups and common issues shared by all groups. To provide an organised framework for consensus development, three consensus working groups (low-resource, middle-resource, and problem-solving) were organised.

Working group co-chairs collaborated with summit leadership, directed by both the BHGI Director and the President of SLACOM, to develop an agenda based on previously published BHGI guidelines for resource allocation and to select qualified international experts and advocates to present at the summit. More than 30 invited speakers from 20 countries were selected, and an open poster section had 32 posters from 22 countries to report on information that was not selected for oral presentations. Presenters, working group members, and invited expert guests met and discussed various practical aspects of breast cancer management in LMCs and agreed on the structure and content of the consensus reports resulting from the summit. Each speaker's presentation was recorded and used for consensus development. Working group

consensus statements will be published in a separate consensus supplement, with article sections co-authored or edited by participating expert working group members.[21–23]

Search strategy and selection criteria

A literature search was done to identify, catalogue, and make accessible all indexed reports of breast cancer research undertaken in LMCs between 2000 and 2008, with use of methods described separately.[24] Searched databases included Medline (2000–08), Embase (2000–08), Scopus (2000–08), Biological Abstracts (2000–07), Popline (2000–08), African Journals Online (2003–08), and proceedings from the American Society of Clinical Oncology (2000–08), San Antonio Breast Cancer Symposia (2005–07), International Network for Cancer Treatment and Research (INCTR) annual meetings (2004–08), and the Union for International Cancer Control World Cancer Congress (2008). Studies were included if they specifically addressed the prevention, early detection, diagnosis, treatment, and supportive or palliative care of patients with breast cancer in countries defined as LMCs by the World Bank and were published between 2000 and 2008. This BHGI-INCTR breast cancer control library catalogue was posted online and made available to all authors involved in the writing of consensus reports, and is now publicly available for review and searches.[25]

Panel discussions

Breast cancer is a global health concern

Findings from high-resource countries such as the USA show that breast cancer mortality at a population level can be decreased. In the USA, breast cancer mortality has been falling by nearly 2% every year since 1990.[26] These improvements in breast cancer survival can be attributed to early detection by screening combined with timely and effective treatment.[27,28] Initiated in the 1970s, findings from randomised trials of screening mammography combined with clinical breast examination showed that early cancer detection within a specific population leads to downstaging of disease and improvement in breast cancer survival. At the same time, results from randomised trials showed that endocrine therapy for oestrogen-receptor (ER)-positive cancers and cytotoxic chemotherapy for ER-negative cancers improves survival and durable long-term cure in lymph-node negative, lymph-node positive, and even locally advanced breast cancers.[29]

High breast cancer mortality rates in LMCs are largely attributable to late-stage disease presentation, which leads to particularly poor outcome when combined with limited capacity for correct diagnosis and adequate therapy.[30] In India (historically a low-resource country), between 50% and 70% of patients have locally advanced or metastatic disease at diagnosis.[31] This proportion is high compared with high-resource countries, where 38% of European and 30% of US breast cancer cases were reported to be either locally advanced at diagnosis

or lymph-node positive.[32] Although 50% of patients with breast cancer in Egypt[33] (a lower-middle-resource country) are reported to be diagnosed with invasive tumours that are larger than 4·5 cm, 40% of invasive breast cancers in the USA are diagnosed when tumours are smaller than 1 cm.

For cancers in which prognosis depends on stage at diagnosis, such as breast and cervical cancers, survival variations correlate partly but not completely with the existence of early detection initiatives and level of health-service development. A survival analysis coordinated by the International Agency for Research on Cancer (IARC) showed that in The Gambia (a low-resource country), 5-year age-standardised relative survival was only 12% (table 2).[34] However, other low-resource countries such as Uganda have higher survival rates (46%) that are similar to lower-middle-resource countries such as the Philippines (47%). Although 5-year survival rates vary widely in countries of low and lower-middle income, upper-middle-income and high-income countries consistently have rates greater than 70%. Some countries such as India, China, and Thailand have large survival variations between regions, indicating varying levels of cancer health-service development, particularly comparing urban versus rural areas. Countries with higher life expectancy, gross national income, and health expenditures have correspondingly better overall survival for breast cancer and cervical cancer (table 3). A study investigating stage of breast cancer and health-service development showed that countries with better developed health-care services had higher 5-year breast cancer survival rates than did countries with less developed services.[34] These observations suggest that a close review of delivery systems for

	Breast cancer survival (5-year, female)	Cervical cancer survival (5-year, female)	Life expectancy (female at birth [years])	GNI per head (2009 US$)	Health expenditure per head (2009 US$)
Low income					
The Gambia	12%	22%	57	330	22
Uganda	46%	13%	52	370	28
India	52%	46%	65	990	40
Lower-middle income					
Philippines	47%	37%	74	1460	63
China	82%	67%	75	2490	108
Thailand	63%	61%	72	3240	136
Upper-middle income					
Costa Rica	70%	53%	81	5530	488
Turkey	77%	63%	74	8090	465
High income					
South Korea	79%	79%	83	21210	1362
Singapore	76%	66%	83	34640	1148

GNI=gross national income from World Bank Health Nutrition and Population Statistics database. *Health expenditure figures were data reported in 2010 by World Bank for calendar year 2007. †Age standardised (0–74 years) relative survival from Sankaranarayanan et al.[34]

Table 2: Health-care and economic data for ten countries by World Bank country income classification levels* and 5-year survival for breast and cervical cancers†

	Localised	Regional	Distant metastasis	Unknown stage
More developed health services				
China (Hong Kong), Singapore, Turkey (14 645 cases)	89·6%	75·4%	26·7%	79·7%
Less developed health services				
Costa Rica, India, Philippines, Saudi Arabia, Thailand (17 640 cases)	76·3%	47·4%	14·9%	47·1%

*Age standardised (0–74 years) relative survival from Sankaranarayanan et al.[34]

Table 3: Breast cancer 5-year survival* by cancer stage

breast cancer care in LMCs might identify important findings for successful approaches associated with improved breast cancer outcome.

Individual country survival data for breast cancer do not always correspond directly to World Bank economic stratification or organisation of health-care delivery. For example, despite being an upper-middle-resource country, Algeria has a surprisingly low 39% 5-year breast cancer survival compared with the 84% 5-year survival in North America.[35] And within high-income countries, there are subgroups of patients with different survival rates. For example, within the USA, the CONCORD study[35] showed that 5-year breast cancer survival in black women was systematically and substantially lower than in white women (71% *vs* 85%). In addition to economic factors, these data suggest that social, cultural, and biological issues should all be considered in the assessment of differences in breast cancer survival.

Breast cancer in low-resource countries

Little public awareness of cancer generally, and breast cancer specifically, is a crucial obstacle in low-resource countries where breast cancer commonly remains undiagnosed until it is late stage or metastatic, when treatment options have less benefit or are simply unavailable.[21] Misconceptions about breast cancer diagnosis and treatment can lead women to seek alternative care instead of standard treatment.[36]

Treatment options in low-resource settings are often limited and disorganised because of advanced stages at presentation, and limitations in available health services.[21] The most common intervention for breast cancer in LMCs, mastectomy, can be done in a technically suboptimum manner in which inexperienced surgeons can leave significant and resectable malignant tissue in the mastectomy and axillary beds.[37] In Africa, inadequate anaesthesia services have been reported to restrict access to surgery.[38] Although cobalt radiotherapy is regarded as outdated in high-resource countries, it remains an important therapy in low-resource settings, especially those that have poor infrastructure, physics manpower, and maintenance facilities, and are without consistent and reliable sources of electricity and water that are needed to operate linear accelerator units.[39] High-quality

radiotherapy can be provided with cobalt units, particularly when technical adaptations are made.

The absence of advanced pathology services to establish hormone-receptor status continues to obstruct appropriate decision making for endocrine therapy.[40] The safe administration of systemic chemotherapy, which is crucial to improve breast cancer outcome for ER-negative and node-positive cancers, needs the availability of drugs, infrastructure for drug administration, and well trained physician and nonphysician staff. Trained personnel, training programmes, and formal accreditation processes are scarce in low-resource countries.[21] For example, Ghana has no formal in-country certification process for medical oncology, and nor is the development of subspecialty certification being considered nationally. Moreover, the cost of present chemotherapeutic agents for all patients with cancer exceeds the health-care budgets of low-resource countries. Supportive care, which broadly includes side-effect treatment, palliative care, and end-of-life care, is an emerging specialty in such countries, where attention to treatment side-effects and care of advanced breast cancer is neglected, and where morphine availability for patients is highly problematic.

Breast cancer in middle-resource countries

Although cancer control programmes are gaining priority in middle-resource countries, where the pattern of disease is shifting from infectious to chronic non-communicable diseases, late stage at presentation is a substantial barrier to improve breast cancer outcomes and underscores the importance of early detection programmes.[22] Economic modelling suggests that in the emerging economies of lower-middle-resource countries, clinical breast examination done yearly from ages 40 to 60 years can be nearly as efficacious as mammographic screening every 2 years for reducing breast cancer mortality, but at substantially lower cost.[41] When mammographic screening programmes are implemented in middle-resource countries, they are generally opportunistic rather than population based, and are commonly hampered by logistical and financial difficulties and sociocultural barriers. In these settings, few women in the target group actually receive adequate screening, as shown in several studies in the Philippines,[42] China,[43] and Colombia.[44] WHO has suggested that to achieve a substantial effect on cancer mortality, an effective screening programme needs to achieve coverage of no less than 70% of the target population, which in the case of screening mammography presents an economically unattainable challenge for most lower-middle-resource countries and some upper-middle-resource countries.[45]

Adequate multidisciplinary breast cancer treatment services generally exist in upper-middle-resource countries,[46] but geographical and economic access to these services can lead to inequity in distribution.[22] Many individuals in middle-resource countries have little personal finances, which is a substantial barrier to care.

Out-of-pocket payments can push families into poverty, adversely affecting otherwise desirable health-seeking behaviour of women with few financial resources who have breast complaints. Despite the improved availability of surgery, pathology, radiology, and radiotherapy services in middle-resource countries, the paucity of system-based health-care data collection in most middle-resource countries makes confirmation of whether effective care is being administered on a large scale difficult.[47] National commitment has been poor in a large proportion of middle-resource countries (and low-resource countries). Experts suggest a pressing need to allocate a balanced proportion of national cancer budgets to the purchase of essential drugs to make anticancer drugs available to the most vulnerable patients.[48]

Despite these challenges, earlier detection and better treatment options have resulted in an increasing number of breast cancer survivors in middle-resource countries, especially as the economies in these countries strengthen. Breast self-examination as part of breast health awareness, and clinical breast examination by ancillary health workers have been advocated for early detection in low-resource settings. Breast self-examination is associated with early presentation; in a study in Egypt,[49] women reporting breast self-examination had a higher proportion of early stage tumours (stage I and II) at diagnosis than did those who never self-examined (84% vs 51%). Singapore is a country that has evolved economically over the past four decades from a lower-middle-resource country to a high-income country, and has correspondingly improved early detection and treatment programmes to yield improved 5-year breast cancer relative survival rates (46% in 1968–72 vs 71% in 1988–92) that are now similar to those recorded in the USA and most advanced European countries.[50]

Recommended implementation strategies
Health-care systems
Assessing the burden of breast cancer
Breast cancer incidence and mortality data should be obtained from population-based cancer registries (PBCRs) and mortality registers when they exist, such as those that are summarised in the IARC's series of cancer incidence in five continents.[51] In the absence of registries, the Globocan 2008 database of the IARC provides valuable statistical projections of cancer incidence and mortality rates in all countries.[52] Although representing inferior alternatives to PBCRs and mortality registers, the pooling of hospital registry data, or a short-term cancer prevalence survey, can be undertaken to provide rough estimates of the cancer burden.[23]

Alternative estimates of mortality include the review of properly completed death certificates, and the technique of verbal autopsy (information about cause of death is obtained from family members and close acquaintances) is useful to assess mortality causes when a substantial proportion of deaths occur outside of hospitals and without

medical certification.[53] However, these alternative strategies for data collection should be applied only in few circumstances, because cancer prevalence surveys can be cumbersome and resource intensive to develop.[54] Whenever possible, data for stage and tumour size at diagnosis should be collected. Studies to assess survival by stage should be undertaken regularly in all cancer-treating facilities to assess and monitor the quality of treatment.[55]

Notably, PBCRs have been established in some low-resource (The Gambia, Uganda, and Zimbabwe), lower-middle-resource (the Philippines, India, China, and Thailand), and upper-middle-resource (Algeria, Brazil, Peru, Colombia, and Costa Rica) countries with some success. These registries have allowed for the development of a network of sentinel PBCRs and national registries to address their cancer information needs.[34]

Programme organisation
Breast cancer care should be centralised (with multidisciplinary expertise) to avoid system fragmentation and to help health policy be adopted more readily in a consistent, systematic manner.[56] Although the importance of multidisciplinary coordination of breast health care is recognised, its adoption in a practical sense has been incomplete even in high-resource countries.[57] This type of multidisciplinary coordination can be very difficult to organise in countries with low and low-middle resources that have more extreme competing health-care demands. However, there is both short-term and long-term value in working to create accredited breast cancer centres of excellence. These centres begin to define a standard of care that can become recognised within the country. The institutional and organisational infrastructures can serve as a model platform to manage other chronic non-communicable diseases.

Where centres of excellence exist in either a low-resource or middle-resource setting, access is often limited to a small proportion of the population. Outreach into rural and surrounding areas can increase access,[58] as has been exemplified by the recent decentralisation of the National Cancer Institute in Peru, an upper-middle-resource country, and outreach programmes in the Fakous region of Egypt, a low-resource country.[59] In many middle-resource countries, quality assurance programmes might be in place, but implementation can be problematic, making it difficult to assess the extent to which care is being implemented well. All countries should consider the establishment of national councils for cancer control to ensure that cancer care delivery is being provided appropriately in their country; such councils are considered an integral component of WHO policy.

Training
Because cancer care delivery systems are often newly established in LMCs, education and training become a crucial and sometimes rate-limiting step. Policy makers need to establish whether oncology training will be

provided within the country or if health-care providers will be sent to outside locations for some time. Onsite training has advantages because it does not require transportation of the trainees and can provide opportunities to measure outcomes before and after training, match the training to the procurement of proper equipment, and adapt the training assignments and equipment placement to the specific needs of the population. Onsite training allows faster skill transfer and the ability to accommodate different learning styles and rates. The trained staff can continue to work together on new skills and strategies. Having international experts onsite for focused training experiences to supplement the onsite training has the advantage of allowing external experts to see the facility, identify any possible facility or resource constraints, and help to customise training and suggest ways to optimise existing systems.

Health-care workers who train abroad might acquire more skills than if trained onsite and will have experiences that they would not have had at their home institution. However, international training can become problematic if trainees choose not to return to their country of origin (so-called brain drain). Training abroad should be targeted to address specific in-country needs, and these trainees should be encouraged and supported to build systems to practise what they have learned. For different categories of health-care workers, training abroad can be frustrating when they return home to a work environment that is not as empowering as the one in which they were trained. They might face resistance from colleagues or superiors who have not been trained abroad and are either jealous or are reticent to make changes within the system that they know. For example, nurses trained abroad should be given commensurate responsibilities and compensation to increase retention rates in their communities. Local communities should understand that people sent outside for training will bring back new ideas and skills, and can be trainers for local health-care workers. Financial incentives to draw trainees back home include salary or budgetary allocation for material and equipment that are essential for the work done abroad to be continued at home. However, differential remunerations within the same systems can be demoralising and introduce discrimination. Training exchanges between countries of similar resources might be appropriate, in view of resource equivalence and the prevention of brain drain.

Implementation research
BHGI experts agree that studies are needed to improve understanding of the effect of existing services and interventions, health-care outcomes, and quality-of-life issues in medically underserved communities. All countries, irrespective of resource level, need a national cancer plan to establish priorities that address the specific national problems in oncology. Additionally, funding for scientific research is needed to ensure that these cancer plans are implemented effectively and in accordance with the country's most urgent priorities.

The dominant notion in the medical community that good research and publication should be sufficient to ensure the translation of scientific findings into general practice has not proven to be true.[60] A landmark 2001 report by the Institute of Medicine clearly identified the failure of much scientific innovation to be translated into practice, even in a high-income setting.[61] Implementation research, which has been an emerging science in high-resource countries, can provide substantial and important methods for how to test, implement, and assess solutions to the challenges in breast health facing LMCs.[60]

Patient advocacy and survivorship
People who survive cancer are important advocacy spokespeople to address the need to build community awareness and downstage breast cancer at initial diagnosis.[62] Organised breast cancer survivor groups have an important role in providing newly diagnosed women with practical and emotional support through cancer treatment and afterwards. For example, one-on-one peer support was effective in a study undertaken in Mexico.[63] Breast cancer survivors can become important communicators about the relevance and effect of early detection, since their existence is proof to the general population that favourable cancer outcomes are possible.

Survivor groups, often led by clinical experts, can organise into political advocacy groups that have a real and positive effect on health-care policy or national cancer research agendas.[64,65] Advocacy information campaigns that target health-care leadership are essential because major changes in health-care delivery are largely impossible in the absence of directed and sustained governmental leadership and support. Little work has been done into survivorship for patients with breast cancer in LMCs, despite the growing population of survivors.[24]

Advocacy groups in low-resource settings often begin by sponsoring local breast cancer awareness meetings. With more experience and resources, advocacy efforts can expand to include working with policy makers to create political will, and sponsoring international scientific conferences, outreach programmes, and research.[66] Successful advocacy efforts use existing networks to train local people rather than rely on outside specialists to provide breast cancer education. Community and physician leaders should be involved in advocacy efforts to avoid the potential undermining of early detection activities that influential leaders might not otherwise understand or endorse.

Payment policy development
Focused and sustained government support is needed to provide, subsidise, and regulate health-care services in developing countries, where the role of government can shift from direct service provider to financier, regulator, and manager of growth. Schieber and colleagues[67] suggest

that governments can have a pivotal role in the implementation of health-care reform by informing patients, ensuring equity, and protecting patients from undue risk. Specific consideration is necessary in assessment of governmental budget lines to secure sustainability, development, and expansion of services. Essential guidelines for cancer diagnosis and treatment are necessary to guide resource allocation and save health-care budgets that inevitably have limits.

BHGI experts suggest that the development of social, private, and community-based insurance is needed to support the development of national health-care systems for countries at all economic levels, as is the use of cost–recovery policies tailored to the needs of the most economically vulnerable patient populations. Non-governmental organisations (NGOs) and private or external assistance often play important parts in many countries of low and low-middle resources, because governmental assistance is often limited and typically is confined to addressing the needs of the employed sector.

Policies that provide financial protection for those using health-care services are needed so that health-care expenses do not prevent patients from paying for basic household necessities such as food, shelter, clothing, and education. This tenet is relevant even in high-income countries such as the USA.[68] In health systems in which patients' inability to pay is a common limiting factor in the provision of health care, increases in governmental subsidies and progressive cost–recovery policies should be considered to avoid relinquishment of medical services or significant delays (>3 months) in the initiation of proper cancer diagnosis and treatment.

Although health-care ministers in a country might change every few years with changes in administration, ministry civil servants often continue to work with new administrations and can serve as a link for NGOs trying to assist with long-term health programme implementation and sustainability. Establishment of a consistent dialogue with ministry staff and convening regular meetings can help to ensure programme continuation and keep early detection and screening agendas active. Civil society, academic resources, and grassroots organisations need to be involved to create programme continuity. International organisations can help to keep issues on the political agenda both locally and internationally.

Early detection
Community awareness
Making the public aware that breast cancer outcomes are improved through early detection is crucial to improve participation in cancer control programmes, irrespective of the applied screening technique (breast self-examination, clinical breast examination, screening mammography, or some combination of these methods). The general population can have important misconceptions about the nature or curability of breast cancer.[17] Qualitative research should be used to identify community information sources and belief systems to help to guide programme design for early detection.[69]

Failure to anticipate the inhibitory effects of social obstacles or cultural beliefs can adversely affect participation in early detection programmes and can damage otherwise well designed research protocols. For example, a large population-based randomised trial studying screening with clinical breast examination in the Philippines could not be completed because more than 60% of women from this fairly well educated population in Manila refused to complete the required follow-up diagnostic studies once a finding on examination was identified.[42] The reticence of women who had abnormalities and were informed of the implications to their life to pursue diagnosis and treatment had been noted during a pilot phase. Anticipating that financial barriers could be an obstacle, the study provided patients with free transportation and consultation services. Nevertheless, patients who were found to have abnormalities still declined to participate in diagnostic work-ups. Ultimately, a programme of home visits was introduced, but even this intervention did not increase compliance with diagnostic follow-up to more than 35%. The researchers concluded that cultural and logistic barriers to seeking diagnosis and treatment have to be addressed before any screening programme is introduced.

Community awareness initiatives should include education about the disease, conveying the positive message that breast cancer is treatable and can often be cured without the need for mastectomy if the cancer is diagnosed early. When developing educational programmes, researchers need to identify and include the key health-care decision makers within a targeted community. In low-resource countries, key health-care decision makers will probably include village elders and traditional healers (figure). Policy makers and health ministers should also be viewed as health-care decision makers in a community, since they decide what health financing model to implement for a population. Change can often involve a
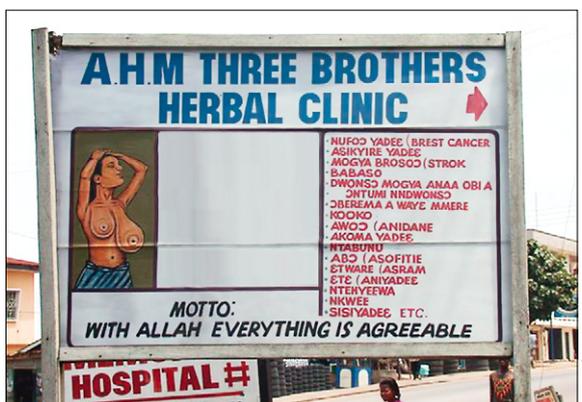

Figure: Street billboard advertising local herbal medicine clinic in Kumasi, Ghana with claim that breast cancer treatment is provided (2004)

so-called programme champion, who can collaborate with a programme administrator. Champions often include medical and educational professionals, politicians, cancer survivors and their family members, community religious leaders in some regions, and celebrities. Successful outreach efforts should include both men and women, use the press, and involve local politicians, opinion leaders, and popular entertainers to help to communicate key messages.[21]

Early detection programmes
BHGI experts recommend that countries of low and low-middle resources establish the prevention of locally advanced breast cancer as a priority with use of resource-appropriate approaches that match stage at presentation. At a basic level, public awareness is augmented through the training of primary health-care staff, which Devi and colleagues[70] showed can be effective for downstaging disease, and should become part of any breast health programme. Most low-resource countries do not have mammography available for breast cancer diagnosis or screening, although the exact role of screening ultrasound is still debated. Mammographic screening programmes for the general population (eg, all women above a specific age) are too resource demanding for low-resource and most low-middle-resource countries, and are not cost effective when competing health-care demands are considered. In some middle-resource countries, screening mammography can be affordable for a target population of high-risk women (eg, women aged 50–69 years) but is unlikely to be affordable for the general population. Even when funding is available, simply establishing a public policy for screening programmes is unlikely to be adequate. Mammographic equipment cannot be effectively applied when there are insufficient numbers of technicians or radiologists for proper equipment use and maintenance. Most developing countries would have difficulty meeting WHO recommendations that a well implemented screening programme should achieve participation of at least 70% of the target group.[71] Because a high proportion of patients in LMCs present with cancer diagnosis in their 40s, application of screening mammography to this younger age group might not be feasible because of immediate financial constraints, although it could be cost effective in the long term. Alternative strategies for this group might be needed that include public awareness programmes, breast self-examination, and clinical breast examination.

Breast cancer diagnosis
Clinical breast examination
Clinical breast examination is recommended as a diagnostic method for all economic levels and is regarded as a basic and necessary resource for breast cancer surgical treatment.[18] Screening programmes for clinical breast examination, however, need further assessment both in terms of effectiveness and clinical systems

application (such as training nurses or midwives) and in the cost-effectiveness and best approach for extending these services to rural areas. More studies are desired to confirm preliminary data from a large randomised trial in India[72] that suggest that clinical breast examination can be used as a screening method to downstage breast cancer, which, when combined with effective treatment, will improve disease-specific outcomes and survival.

Tissue sampling
The choice of tissue sampling procedure largely depends on the equipment and expertise available locally. Needle sampling is preferred to open biopsy for tissue diagnosis, although the use of percutaneous sampling in LMCs can be limited by technical inexperience and possibly by the adverse financial incentives for surgeons who prefer to undertake surgical excisions.[40] Debate remains about fine-needle aspiration cytology as an appropriate resource to ameliorate the difficulties with inadequate pathology services in low-resource environments. Fine-needle aspiration cytology needs access to pathologists who are trained in cytopathology or to trained cytologists.[40] Efforts should be made to establish programmes that will introduce core-needle biopsies in resource-limited settings, but the cost and scarce supply of needles hamper programmatic efforts.

Surgical pathology
BHGI experts agree that the value of best possible practice of breast pathology for the delivery of care to patients with breast disease is well recognised. Accreditation of pathology laboratories should include attention to the development of affordable and easy to implement procedures that include quality control efforts, because poorly executed diagnostic tests waste valuable resources. Proper surgical pathology services and accurate reporting with the internationally recognised TNM system continue to be crucial to establish cancer databases and collaborative networks.[20,40]

Specimen quality is essential for accurate diagnosis and effective treatment planning. The BHGI consensus panels have concluded that managed regional pathology laboratory systems supporting multiple hospitals are a better solution to the present scarcity of pathology services than is the establishment of several laboratories in individual hospitals. Many small laboratories, a common occurrence in low-resource countries, have few personnel and resources and are at risk for performing suboptimum quality control. By contrast, high-volume tissue processing can improve diagnostic skills at centralised laboratories and allow for the procurement of shared advanced tissue processing equipment and hardware. Results from hub laboratories can be sent by text messages and emails to the referring hospitals or health-care providers.

Such laboratories can also serve as training and research centres. Collaborations between low-resource

and high-resource countries, such as the Ghana–Norway collaboration, can help to bridge the capacity gaps in low-resource programmes while programnes are being developed locally.[73] The dearth of local pathology services needs creative and collaborative efforts, including international training programmes and partnerships, and consideration of remote telepathology programmes.

Breast cancer treatment
Breast surgery
Adequate support services for breast surgery, including operative theatres, anaesthesia, and technical assistance, should be part of all breast cancer control programmes.[21] Quality issues, which can seem like a barrier to programme development and expansion, help to set standards that can define performance improvement programmes. Regulations and procedures can be adapted to local conditions without compromising quality. For example, use of local anaesthesia as an alternative to general anaesthesia can be appropriate for smaller diagnostic procedures such as breast biopsies, but present a challenge if performing a total mastectomy and especially axillary lymph-node dissection. Quality control requirements apply to all areas of care including pathology and other treatment methods.

Breast radiotherapy
Breast cancer radiotherapy is more commonly used for palliative care in low-resource than in high-resource countries because of the pattern of advanced disease presentation. As more patients present with early-stage disease, radiotherapy can shift to appropriate curative treatment regimens and should be integrated into comprehensive cancer control programmes to improve treatment options and outcomes. The manufacturing of simplified radiotherapy equipment that is more suitable for lower-resource settings could be helpful. When budgets are very restricted, funding should be directed to maintain existing equipment rather than buying new and more expensive machines. Radiation equipment maintenance and calibration should be done routinely. Programme administrators should consider taking advantage of the Quality Assurance Team for Radiation Oncology (QUATRO) programme developed by the International Atomic Energy Agency. This programme performs onsite visits to radiotherapy centres to audit the radiotherapy process, including the organisation, infrastructure, and clinical and medical physics aspects of the radiotherapy services and to review the hospital's professional competence with a view to quality improvement in radiation therapy.[74]

Systemic therapy
BHGI consensus panels agreed that systemic treatment represents one of the great challenges in cancer control efforts in LMCs. Access barriers to cancer drugs are especially striking in view of the many therapeutic advances in recent years. Pathology services that measure tumour ER expression should be available for optimum selection of systemic therapy (cytotoxic chemotherapy, endocrine therapy, and biological agents). Laboratory assessment of progesterone receptor (PR) expression and HER2 amplification are helpful additions. Knowledge of toxic effects and expertise in drug management are mandatory for systemic therapy. In low-resource countries, medical oncologists are often not available and systemic therapy is administered by primary care physicians, surgeons, or radiation therapists. Therefore, training of dedicated medical oncologists should be a priority. In the meantime, training courses for non-medical oncologists who administer chemotherapy in such settings should be held regularly. Basic education about molecular oncology should be provided in the undergraduate curriculum to prepare general practitioners for this role. Prioritisation of curative and adjuvant treatments is crucial. Tailored guidelines for drug selection and administration are very important to ensure that all patients with cancer are receiving the correct drugs in appropriate and therapeutic doses. These guidelines should be evidence based and consider cost-effectiveness and years of life saved.

Palliative care
Low-resource countries benefit from continued medical education of health-care providers in palliative care and from having adequately trained physicians, nurses, and social workers. Palliative chemotherapy and biological treatments must be provided according to availability of resources. Undergraduate and postgraduate training and education programmes are recommended. All essential drugs for palliative care and pain management should be made more available and easily accessible than at present. Adoption of national palliative care and pain management guidelines is recommended.

Summary
Breast cancer mortality can be decreased in any population with appropriate diagnosis and treatment programmes. Low-income countries face many challenges, including community awareness that breast cancer is a treatable disease, and few advanced pathology services and treatment options (including radiotherapy and the full range of systemic treatments that are available in high-resource settings). Many middle-resource countries share these challenges but to a lesser extent because their health expenditure per head is greater and their health systems prioritise programmes for breast cancer control. LMCs' health-care systems face several challenges including national or regional data collection, programme infrastructure and capacity (including appropriate equipment and drug acquisitions and professional training and accreditation), the need for qualitative and quantitative research to support decision making, and strategies to improve patient access and compliance and public, health-care

professional, and policy-maker awareness that breast cancer is a cost-effective, treatable disease.

Even with the establishment of breast cancer programmes in countries of low, lower-middle, and upper-middle resources, improved outcome is difficult or impossible to show because of the lack of national or regional data collection systems for breast cancer. Alternative data collection systems could be an intermediate step. Data for health system capacity indicators will help to identify system strengths and weaknesses, including information about the number and distribution of radiotherapy, ultrasound and mammography machines, and information about the number and distribution of health-care professionals and breast cancer specialists. Quantitative, qualitative, and cost-effectiveness research programmes and published work that could guide the development of pragmatic solutions in developing countries are needed. Crucial workforce issues, such as an insufficient number of nurses, are experienced globally, and limit access to care. Investments in training programmes for medical personnel in LMCs are needed. Systematic approaches to patient navigation, which guide patients and primary care providers to appropriate available services, are becoming an increasingly important part of timely referral pathways within the health system of high-income countries, but have not been developed to scale in middle-income countries, and are absent in low-income countries.

The 2010 BHGI summit focused on collecting consensus about the state of breast cancer care in LMCs, and key implementation and problem solving strategies applicable to these countries (panel shows a summary of recommendations). Our close look at breast cancer control in countries of low, lower-middle, and upper-middle income identified common problems suggesting common solutions. At the same time, differences exist both between and within countries, which suggest a need to look more closely at subpopulations within each country or region to understand better how to optimise breast cancer care for underserved women worldwide.

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Panel: Recommendations developed by the Breast Health Global Initiative consensus panel for low-resource and middle-resource countries

- Cancer registries are needed so that disease prevalence, stage, and treatment outcome can be measured
- National cancer plans should define health-care networks in which centres of excellence become connected through outreach to rural and surrounding areas for consultation and patient triage
- Resource-adapted multidisciplinary cancer care models should be used to avoid system fragmentation and to facilitate consistent health-policy reform
- Training for physician and non-physician staff should be linked to equipment acquisition and quality care initiatives that measure utilisation and clinical outcomes
- Public awareness that breast cancer outcomes are improved through early detection should be promoted in conjunction with the development of resource-appropriate early detection programmes
- Clinical breast examination should be promoted as a necessary method for clinical diagnosis of breast abnormalities
- Diagnostic services, surgical treatment, radiotherapy, systemic therapy, and palliative care should become integrated within coordinated multidisciplinary environments
- Systems for coordinated tissue sampling and pathology services should be developed to optimise pathology practices for accurate diagnosis and effective treatment planning
- Barriers to accessing cancer drugs need to be addressed in conjunction with the deployment of properly trained physicians and staff
- Workforce issues should be addressed through resource-sensitive strategies that provide quality care but without limiting access

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