Breast Cancer in Low- and Middle-Income Countries
Why We Need Pathology Capability to Solve This Challenge

Yehoda M. Martei, MD[a], Lydia E. Pace, MD, MPH[b],
Jane E. Brock, MBBS, PhD[c], Lawrence N. Shulman, MD[a],*

KEYWORDS

- Breast cancer • Pathology • Sub-Saharan Africa
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KEY POINTS

- Breast cancer is the leading cause of cancer mortality among women in low- and middle-income countries (LMIC). Timely and accurate histopathological diagnoses of breast cancer are critical to delivering high-quality breast cancer care to patients in LMIC.
- The most important prognostic factors in breast cancer along with tumor size and nodal status are tumor grade and estrogen receptor status. Human epidermal growth factor receptor 2 status is important in countries where specific targeted therapies are available.
- Endocrine therapy with tamoxifen is affordable and widely available in most LMIC. It is therefore critical for basic pathology evaluations to include an assessment of estrogen receptor status by immunohistochemistry to identify those women who could benefit from endocrine therapy.
- Detailed and complete cancer registry data are needed to assess a country's disease burden and specific patient population needs to guide disease prioritization and allocation of resources for breast cancer treatment.
- Innovations in leapfrog technology and low-cost point-of-care tests for molecular evaluations are needed to provide accurate and timely pathology, with the ultimate goal of improving survival outcomes for patients with breast cancer in LMIC.

INTRODUCTION

The global burden of cancer is increasing worldwide, with most new cancer cases and cancer-related mortality occurring in low- and middle-income countries (LMIC).[1] It is estimated that by 2035, two-thirds of new cancer diagnoses will occur in developing countries.[2] Breast cancer remains the leading cancer diagnosis and cause of cancer-related deaths among women globally.[1] In most LMIC, breast cancer is either the leading or the second most common cause of cancer deaths among women. Although early-stage breast cancer is potentially curable, mortality-to-incidence ratios for breast cancer are significantly worse in LMIC than in countries of high income.[3] The high mortality-to-incidence ratio means patients diagnosed with breast cancer are more likely to die from their cancer in LMIC. Some of the mortality-to-incidence ratios reported in Middle, Eastern, and West Africa are as high as 0.55, compared with 0.16 in North America.[3] These alarming figures have drawn global attention to this cancer epidemic and the socially and economically devastating consequences of breast cancer among women in the world's poorest settings.

A country's strategy for national cancer planning requires knowledge of the disease burden in the country, information that is obtained when it is possible to make an accurate cancer diagnosis and document all relevant prognostic factors for a tumor. With this information, it is then possible to allocate available resources for patient care. Accurate diagnoses require timely and adequate pathology support.[4] Current reports show a significant deficiency in both professional and technical pathology services in LMIC, with some of the lowest numbers of pathologist-to-population ratios documented in sub-Saharan Africa.[5] Ratios in sub-Saharan Africa vary from that in Mauritius, where there is approximately 1 pathologist for every 84,133 persons, to Niger where there is one pathologist to 9,264,500 persons.[5] Moreover, countries like Somalia, Benin, Eritrea, and Burundi have only one or no pathologist in-country.[6] By comparison, the pathologist-to-population ratio in North America is 1 to 17,544 persons.[7]

Most patients in sub-Saharan Africa present with advanced stage disease: stage III and IV.[8–15] Despite the advanced stage of their disease, many of these patients can benefit from surgery, chemotherapy, targeted therapies, and endocrine therapy, depending on tumor biology, with treatments aimed at improving quality of life, and in some cases, significantly prolonging life. Even advanced disease requires confirmation of the presence of breast carcinoma by pathologic diagnosis, because other benign or malignant tumors can mimic breast cancer, for example, lymphoma, phyllodes tumor, or untreated infection, and all of these merit different treatment approaches.[16] A significant proportion of breast biopsies for palpable masses in a large cohort of breast cases in Ghana and a retrospective analysis of breast presentations in Rwanda was benign.[9,16] Thus, it is unethical and unsafe to offer mastectomy, cytotoxic chemotherapy, or other systemic therapy to a woman without having a pathologically confirmed diagnosis of breast cancer at the onset, and optimal treatment depends on the elucidation of both the stage of disease and the biologic markers, hormone receptors, and Human epidermal growth factor receptor 2 (HER2).

Prognostic factors, including tumor size, grade, estrogen receptor (ER) status, and nodal involvement, drive treatment choices. These prognostic factors are obtained from gross examination of a surgical specimen and subsequent histopathological review under a microscope. Tissue samples obtained by fine-needle aspirate (FNA), core-needle biopsy, or excision biopsy can all be adequate specimens for diagnostic purposes. In the United States, initial diagnosis with core-needle biopsy is recommended. It is more likely to yield adequate tissue to assess invasive versus in situ status