

The Challenge of Late-Stage Prostate Cancer Diagnosis in Morocco: A Comprehensive Mini-Review

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Abstract

Review Article

Prostate cancer is the most common male malignancy in Morocco and a growing public health concern across the Middle East and North Africa (MENA) region. Despite a rising incidence, the majority of prostate cancer cases in Morocco and similar low- and middle-income settings continue to be diagnosed at advanced stages, contributing to poor survival outcomes and a disproportionately high mortality-to-incidence ratio compared with high-income countries. This mini-review examines the epidemiological burden of prostate cancer in Morocco, identifies the multilevel barriers contributing to late diagnosis, including the absence of organized screening programs, limited public awareness, healthcare system constraints, and socioeconomic factors, and discusses current national cancer control efforts and future perspectives for improving early detection.

Keywords: Prostate cancer, Morocco, MENA region, Epidemiology, Early diagnosis, Late-stage presentation.

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1. INTRODUCTION

Prostate cancer (PCa) is the second most frequently diagnosed cancer and the fifth leading cause of cancer death among men worldwide, with an estimated 1.5 million new cases and 397,000 deaths globally in 2022 [1]. While incidence rates are highest in high-income countries, largely driven by widespread prostate-specific antigen (PSA) testing, mortality rates are disproportionately elevated in low- and middle-income countries (LMICs), reflecting disparities in early detection and access to curative treatment [1-2]. In the MENA region, the age-standardized incidence of prostate cancer reached 27.4 per 100,000 in 2021, representing a 125.1% increase from 1990, while the mortality rate remained stagnant at 10.1 per 100,000 [3]. Morocco, classified among the low-incidence countries for prostate cancer, has nonetheless experienced a rising burden of the disease, with prostate cancer now recognized as the most common male cancer in the country [4]. Critically, most cancer cases in Morocco are diagnosed at advanced stages, when curative therapies are less effective [5]. This mini-review aims to synthesize the available evidence on the epidemiology, barriers, and health system factors contributing to the late diagnosis of prostate cancer in Morocco.

2. Epidemiology of Prostate Cancer in Morocco and the MENA Region

Morocco is situated within the North Africa subregion, where prostate cancer incidence rates are among the lowest globally [6]. According to GLOBOCAN estimates, Northern Africa has consistently reported low age-standardized incidence rates compared with Northern Europe, North America, and sub-Saharan Africa [1,6]. However, this apparent low incidence likely reflects underdiagnosis rather than a true low disease burden, given the limited availability of PSA testing and the absence of organized screening programs [1,7]. While officially classified as a low-incidence country, it is important to note that PCa is frequently the leading or second most common male malignancy in Moroccan regional registries, with its perceived lower burden likely masked by significant under-diagnosis in the pre-symptomatic stage.

The burden of prostate cancer in the MENA region has increased markedly over the past three decades. A Global Burden of Disease (GBD) analysis reported that prostate cancer incidence in the region increased by 77% between 1990 and 2019, with 234% of the increase in new cases attributable to rising age-

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specific incidence rates, 79% to population growth, and 84% to population aging [8]. Despite this rising incidence, the mortality rate has stagnated, suggesting that improvements in detection have not been matched by proportional improvements in treatment outcomes [3,8].

A key indicator of the late-diagnosis problem is the mortality-to-incidence ratio (MIR). In the Middle East and North Africa, the MIR for prostate cancer is significantly higher than in Europe and North America (12.35 vs. 3.00, $p = 0.0476$), with a significant trend of increasing MIR with decreasing Human Development Index (HDI) and income levels [2]. This elevated MIR strongly suggests that a substantial proportion of prostate cancers in the region, including Morocco, are diagnosed at stages where curative treatment is no longer feasible.

3. Evidence of Late-Stage Presentation

Direct data on stage at diagnosis for prostate cancer in Morocco remain limited due to the absence of comprehensive staging information in population-based cancer registries [9-10]. However, indirect evidence strongly supports the predominance of late-stage presentation. In Morocco, 59% of breast cancers and 66% of cervical cancers are diagnosed at stages II and III, and a similar pattern of advanced-stage presentation is expected for prostate cancer, for which no organized early detection program exists [5].

Data from sub-Saharan Africa, a region sharing many structural healthcare challenges with North Africa, provide further context. A population-based registry study across 10 sub-Saharan African countries found that 37.3% of prostate cancer patients had metastatic disease at diagnosis, only 11.2% had a complete diagnostic workup for risk stratification, and only 17.5% of non-metastatic patients received curative-intent therapy [11]. Similarly, the SURVCAN-3 study reported that nearly half of prostate cancer patients in sub-Saharan Africa were diagnosed with stage IV disease, compared with less than 10% in the United States [12]. While Morocco's healthcare infrastructure is more developed than many sub-Saharan African countries, the absence of PSA-based screening and limited diagnostic capacity in rural areas suggest that late-stage presentation remains a significant problem.

4. Barriers to Early Diagnosis

The barriers to early diagnosis of prostate cancer in Morocco are multilevel and can be categorized into patient-level, healthcare system-level, and policy-level factors.

4.1. Patient-Level Barriers

Lack of awareness and knowledge about prostate cancer is a major barrier to early detection across Africa and the MENA region [13-14]. Studies from sub-Saharan Africa have consistently identified limited knowledge as the most common barrier to prostate

cancer screening, with individuals of lower educational attainment being particularly affected [13].

Cultural beliefs, stigma surrounding cancer diagnosis, and fear of invasive diagnostic procedures, such as digital rectal examination (DRE) and prostate biopsy, significantly discourage men from seeking early evaluation [15-16]. In the Moroccan context, these barriers are further amplified by deeply rooted taboos surrounding male virility and the urogenital sphere. Unlike breast or cervical cancers, which have benefited from extensive national awareness campaigns, prostate health remains a neglected topic in public discourse. It is often perceived as a threat to masculinity, leading patients to delay clinical consultation until symptoms become debilitating.

These patient-level delays are also influenced by socioeconomic and environmental factors. For instance, a study on breast cancer diagnosis delay in Morocco found that opting for traditional treatments (OR = 3.41), residing in rural or semi-urban areas (OR = 2.24), and practical barriers, such as financial constraints, lack of time, or fear (OR = 2.23), were significantly associated with late-stage presentation [17]. Given the shared healthcare infrastructure and similar cultural landscape, these same barriers are highly likely to impede the timely diagnosis of prostate cancer in the Moroccan male population.

4.2. Healthcare System-Level Barriers

Morocco has two population-based cancer registries (Casablanca and Rabat), covering approximately 14% of the national population [5]. The limited geographic coverage of cancer registration means that the true burden of prostate cancer is likely underestimated [9]. Furthermore, most registries in the region lack information on disease staging, making it difficult to quantify the extent of late-stage presentation [10].

Access to diagnostic tools is uneven across the country. While PSA testing and DRE are available in urban centers, access in rural and remote areas remains limited [15,18]. MRI-guided biopsy and advanced imaging modalities are largely confined to tertiary centers. The shortage of trained urologists, oncologists, and pathologists further compounds diagnostic delays [14]. A colorectal cancer screening demonstration project in Morocco highlighted that even when screening was offered through primary health centers, men were significantly underrepresented among participants (only 26.7% of screened individuals were men), suggesting that reaching the male population for cancer screening poses particular challenges [19].

The geographical disparity in healthcare access is a critical determinant of late presentation. Drawing parallels from Moroccan breast cancer studies, residing in rural or semi-urban areas significantly increases the

odds of diagnosis delay. In the case of PCa, the concentration of urological expertise and PSA testing facilities in major urban centers like Casablanca and Rabat leaves a vast majority of the aging male population in remote regions without adequate diagnostic pathways.

4.3. Policy-Level Barriers

Morocco's National Cancer Prevention and Control Plan (NCPCP), launched in 2010 under the partnership between the Ministry of Health and the Lalla Salma Foundation, has been recognized as one of the most comprehensive cancer control plans among LMICs [5]. However, the plan's early detection programs have focused exclusively on breast cancer (clinical breast examination) and cervical cancer (visual inspection with acetic acid), with no organized screening program for prostate cancer [5]. A pilot colorectal cancer screening program using fecal immunochemical testing was implemented in 2017–2019, but prostate cancer screening has not been included in the national agenda [19].

The absence of a prostate cancer screening policy in Morocco reflects the broader international controversy surrounding PSA-based screening. While PSA testing has contributed to earlier detection and improved survival in high-income countries, it is also associated with overdiagnosis and overtreatment [20–21]. The US Preventive Services Task Force recommends shared decision-making for men aged 55–69 years rather than population-based screening [1]. In resource-limited settings, the balance of benefits and harms may differ, and the development of context-appropriate screening strategies remains an unmet need [22].

5. Consequences of Late Diagnosis

Late-stage diagnosis of prostate cancer has profound consequences for patient outcomes and healthcare systems. Prostate cancer survival is strongly stage-dependent: 5-year survival in the United States exceeds 98% for localized disease but drops dramatically for metastatic disease [12]. In lower HDI settings, 5-year survival for prostate cancer is substantially lower, approximately 50% in Zimbabwe, with no improvement over two decades [12]. The divergence in survival between high- and low-HDI countries is largely attributable to differences in stage at diagnosis and access to curative treatment [12,23].

From a health system perspective, late-stage prostate cancer requires more intensive and costly treatment, including androgen deprivation therapy, chemotherapy, and palliative care, placing additional strain on already limited healthcare resources [18]. In Morocco, catastrophic financial expenditure has been identified as a major limiting factor to universal healthcare for cancer patients [5].

6. Current Efforts and Future Perspectives

Morocco has made significant strides in cancer control infrastructure. The number of regional oncology centers increased from four in 2007 to nine in 2017, and Morocco became the first African country to replace all telecobalt units with linear accelerators [5]. The introduction of multidisciplinary tumor boards and improved access to generic and innovative drugs have enhanced treatment capacity. However, these investments cannot achieve their full potential unless patients present at earlier clinical stages [5].

Several strategies could be considered to address the late diagnosis of prostate cancer in Morocco:

- **Awareness campaigns:** Targeted public education campaigns about prostate cancer symptoms, risk factors, and the importance of early consultation could help reduce patient-level delays. Religious institutions and community leaders may serve as effective channels for health messaging, as suggested by studies in similar settings [16].
- **Opportunistic PSA testing:** In the absence of population-based screening, opportunistic PSA testing integrated into primary healthcare visits for men aged 50 years and older (or 45 years for high-risk individuals) could facilitate earlier detection. The development of low-cost, point-of-care PSA assays may make this approach more feasible in resource-limited settings [18].
- **Strengthening cancer registration:** Expanding the geographic coverage of population-based cancer registries and incorporating staging data would provide essential evidence to guide policy decisions and monitor the impact of interventions [9–10].
- **Risk-stratified screening:** Emerging approaches to risk-stratified screening, which target high-risk individuals based on age, family history, and potentially genetic markers such as BRCA1/2 mutations, may offer a more cost-effective alternative to universal screening [4,15]. Given the evidence of BRCA1 and BRCA2 mutations among Moroccan patients with a positive family history, a transition toward precision prevention may be warranted. Rather than a resource-intensive universal screening program, Morocco could prioritize high-risk individuals through genetic counseling and targeted PSA surveillance, offering a more cost-effective strategy tailored to the country's specific epidemiological and economic profile [4].
- **Health system strengthening:** Improving access to diagnostic services in rural areas, training primary healthcare providers in prostate cancer awareness and DRE, and reducing financial barriers to diagnosis and treatment are essential components of a comprehensive strategy [14,17].

While the NCPCP has successfully established a robust framework for female-specific cancers, there is an urgent need to integrate a 'men's health' component into future strategic phases. Expanding the early detection agenda to include PCa, starting with opportunistic screening and primary care provider training, would address the current gender imbalance in Morocco's cancer control efforts.

7. CONCLUSION

Late diagnosis of prostate cancer remains a critical challenge in Morocco, driven by the absence of organized screening programs, limited public awareness, healthcare system constraints, and socioeconomic barriers. The rising incidence of prostate cancer in the MENA region, coupled with a disproportionately high mortality-to-incidence ratio, underscores the urgent need for context-appropriate early detection strategies. Morocco's strong national cancer control framework provides a foundation upon which prostate cancer early detection initiatives can be built. Future efforts should focus on integrating opportunistic PSA testing into primary care, expanding cancer registration with staging data, launching targeted awareness campaigns, and addressing the structural barriers that prevent men from accessing timely diagnosis and treatment.

Declaration

Authors' contributions

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