Breast Cancer in Africa: A Genetic and Epidemiological Perspective on BRCA1 and BRCA2 Mutations in Precision Medicine Strategies

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Statement

This meta-analysis is unique for its diligent methodology, combining data from various credible sources and combining these results to produce new perspectives. This study forms fragmented

datasets into unified narratives, generating new data that supports previous research while maintaining originality and scholarly integrity.

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List of Abbreviations

- ADC – Antibody-Drug Conjugates
- ASR – Age-Standardized Rate
- BRCA – Breast Cancer Gene
- CANSA – Cancer Association of South Africa
- DNA – Deoxyribonucleic Acid
- ER – Estrogen Receptor
- HER2 – Human Epidermal Growth Factor Receptor 2
- HDI – Human Development Index
- HR – Hazard Ratio
- HRR – Homologous Recombination Repair

- IARC – International Agency for Research on Cancer
- IHC – Immunohistochemistry
- KI67 – Antigen Identifying Cell Proliferation
- NGS – Next-Generation Sequencing
- NHEJ – Non-Homologous End Joining
- PARP – Poly (ADP-Ribose) Polymerase
- PD-1 – Programmed Death-1
- PD-L1 – Programmed Death-Ligand 1
- PR – Progesterone Receptor
- R&D – Research and Development
- RNA – Ribonucleic Acid
- SAMRC – South African Medical Research Council
- TNBC – Triple-Negative Breast Cancer
- UNDP – United Nations Development Programme
- WHO – World Health Organization

Abstract

Breast cancer continues to be a predominant cause of mortality among women worldwide, with African women facing distinct genetic, socioeconomic, and healthcare obstacles. This meta-analysis examines the prevalence and importance of BRCA1 and BRCA2 mutations in breast cancer susceptibility among African women and women of African ancestry. These genetic modifications are associated with differences in cancer risk, advancement, and survival rates. Although many African countries report decreasing incidence rates, mortality rates remain disproportionately elevated due to delayed diagnosis, restricted access to healthcare, and an absence of customized genetic screening programs. This work seeks to highlight the significant impact of BRCA1 and BRCA2 mutations on enhancing precision medicine strategies, facilitating early diagnosis, and optimizing treatment options for African populations through the synthesis of available data. This study emphasises the pressing necessity for inclusive healthcare measures to tackle the disparities and distinct genetic profiles in breast cancer treatment throughout the continent.