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Healthcare Provider Perspectives on Implementing Population-Based Genetic Screening for Gynaecological Cancers in a Resource-Limited Setting: A Qualitative Study

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ABSTRACT:

Gynaecological cancers, particularly ovarian cancer, remain a major global health burden, with many subtypes lacking reliable screening tools for early detection. High-grade serous ovarian carcinoma is often diagnosed at an advanced stage, contributing to poor survival outcomes. In this context, genomics offers a transformative approach to cancer prevention. Population-based genetic Screening (PBGS) for cancer susceptibility genes such as BRCA1, BRCA2, RAD51C, RAD51D, and BRIP1 allows for the identification of at-risk individuals before disease onset[1,2]

Traditionally, genetic testing has been limited to individuals with a strong family history or specific clinical criteria. However, these methods fail to identify over 50% of carriers of pathogenic variants [2,3]. PBGS, which offers testing to unselected individuals, has demonstrated improved detection rates, greater equity, and better cost-effectiveness in comparison [3,4]. It enables the timely implementation of preventive strategies such as risk-reducing salpingo oophorectomy or enhanced surveillance, significantly reducing cancer incidence and mortality [4, 5]Conclusions: By providing extended and sustained pharmacological activity, these polymer based formulations perform better therapeutic action than conventional systems.

Introductionn

Gynaecological cancers, particularly ovarian cancer, remain a major global health burden, with many subtypes lacking reliable screening tools for early detection. High-grade serous ovarian carcinoma is often diagnosed at an advanced stage, contributing to poor survival outcomes. In this context, genomics offers a transformative approach to cancer prevention. Population-based genetic

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Screening (PBGS) for cancer susceptibility genes such as BRCA1, BRCA2, RAD51C, RAD51D, and BRIP1 allows for the identification of at-risk individuals before disease onset[1,2]

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Although the scientific rationale for PBGS is increasingly robust, its practical implementation is hindered by a multitude of factors as tested in other malignancies[6,7]. Studies have reported a multitude of factors which are instrumental in shaping patient acceptance and programme success [5,6].Concerns about consent, access and resource constraints remain prevalent. Many providers also report limited confidence in communicating complex genomic information, especially without specialist genetics support [6,8]. These concerns are further amplified in settings with higher patient load or limited infrastructure. Gynaecologists, oncologists, primary care physicians, and genetic counsellors play critical roles in delivering genetic services which include facilitating testing, result interpretation, counselling, and supporting preventive decision-making [8,9]. Despite the growing body of quantitative research on PBGT in gynaecological malignancies, there is a lack of qualitative data exploring healthcare providers 'experiences and viewpoints.

Proactive models—offering testing outside traditional referral pathways—may enhance access, particularly among underserved groups. However, they challenge existing protocols for genetic counselling and informed consent, raising ethical and logistical questions [6]. Additionally, the psychological impact of genetic risk information on patients, as well as implications for family members, further complicates clinical decision-making [9]. Studies show that the success of PBGT depends on locally relevant and ethically sound delivery models that address sociocultural diversity and provider capacity[10]. As the demand for genetic services expands, it becomes essential to the values of healthcare professionals who will operationalise this shift. Without understanding provider perspectives, efforts to expand PBGT may face resistance, compromise quality, or fail to address real-world implementation barriers.

Hence, this study aimed to primarily explore the perspectives of healthcare providers on population based genetic screening in gynaecologic oncology- in a LMIC (lower middle income country) setting. The secondary objectives were to examine the facilitators and barriers to the successful implementation of this approach and to gather providers' views on strategies to improve its uptake.

Methodology

Study Design

This qualitative study employed an exploratory design using semi-structured interviews to examine healthcare providers' (HCPs) perspectives on population-based genetic screening for gynaecological cancers in a lower middle-income country (LMIC) setting. A qualitative approach was chosen to gain detailed insights into attitudes, perceived barriers, facilitators, and real-world implementation concerns which might be missed by quantitative surveys.

Study adhered to the **COREQ (Consolidated Criteria for Reporting Qualitative Research)** guidelines

Research Team and Reflexivity

Interviews were conducted by the principal investigator (PI) and a co-investigator from the Department of Community and Family Medicine (CFM). Both researchers had prior training in qualitative research methods, including interview techniques and thematic analysis.

The PI is a clinician with experience in oncology-related research, which facilitated contextual understanding. To minimize interpretative bias, a reflexive journal was maintained throughout the study to document assumptions, decisions, and evolving interpretations. Interviewers had no direct relationship with participants which reduced power imbalance.

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Study Setting

The study was conducted at a tertiary care teaching hospital in India that provides Gynaecological oncology services and has a robust community outreach through the Community and Family Medicine Department

Participants and Sampling

Eligibility Criteria

Healthcare providers were eligible for study participation if they:

- Had clinical or supportive roles in gynaecological cancer care, oncology services, or genetic testing, and
- Had experience interacting with patients undergoing or eligible for genetic testing.

Sampling Strategy

- Purposive sampling was used to ensure representation across the various disciplines involved in gynaecological cancer care and genetic services. Participants were recruited from the departments of Obstetrics and Gynaecology, Medical Oncology, Community and Family Medicine (CFM), Biochemistry including doctors and nursing officers. Participation was entirely voluntary.

Sample Size and Saturation

- A total of **13 HCPs** participated. Recruitment continued until **data saturation** was achieved, defined as the point after which no new themes emerged in consecutive interviews.

Data Collection

- Semi-structured, face-to-face interviews were conducted between **July and October 2024** in private clinical or academic spaces to ensure confidentiality. An interview guide was developed based on literature review and expert consultation. It loosely covered:
- Awareness and understanding of genetic screening
- Perceived benefits and challenges of PBGS
- Patient communication with patients
- Financial, logistical, and infrastructural issues
- Ethical and psychosocial concerns (e.g., stigma, confidentiality)

Interviews were conducted in **English or Hindi**, according to participant preference, lasting **30–45 minutes** on an average. Interviews were audio-recorded and transcribed verbatim. Field notes were recorded to capture non-verbal cues and contextual observations

Data Analysis

Data were analyzed using thematic analysis following the Framework Method.

Analytical Steps

1. **Familiarization:** Repeated reading of transcripts.
2. **Initial Coding:** Line-by-line open coding performed independently by two researchers using **NVivo 12**.
3. **Developing a Working Analytical Framework:** Codes were discussed and refined into a shared coding framework.
4. **Charting and Mapping:** Data were organized into thematic matrices to identify patterns and relationships.
5. **Theme Development:** Codes were grouped into themes and subthemes.
6. **Interpretation:** Themes were iteratively refined through team discussions.
7. Coding was primarily **inductive**, allowing new themes to emerge from the data rather than putting pre fixed ones.

Rigor and Trustworthiness

To enhance credibility, triangulation was employed by comparing findings across different HCP roles (doctors vs nurses). Member checking was performed by sharing summaries with select participants for validation. Additionally, a reflexive journal was maintained to document researcher biases and methodological decisions.

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Ethical Considerations

Ethical approval was obtained from the institutional review board [IRB number: M5/F140/2024]. Written informed consent was secured from all participants, Confidentiality was maintained through anonymization of transcripts and removal of identifying information. Participation was voluntary, and participants could withdraw at any time without consequence.

Results:

A total of 13 HCPs, including 6 doctors (1Faculty each from departments of Biochemistry and CFM, 2 from OBG, 1 Senior Resident each from OBG and Biochemistry, 7 nursing officers (4 from Oncology and 3 from OBG) participated in the study. Participants were aged between 21-42 years representing early- to mid-career professionals involved in cancer care, diagnostics, and patient counselling.

The following themes and subthemes emerged during the interviews:

Theme 1.

Awareness and Knowledge Deficits

All participants were of the opinion that common people even including healthcare workers were not aware of the genetic tests to predict their risks of malignancy. Though some were aware of the risks of inheriting breast cancer, they were not aware of gynaecological malignancies or the risks involved.

Subthemes:

1.1. *Low Awareness Among Patients and Providers*

Some HCPs noted that even doctors outside oncology lacked genetic literacy.

"Some OBG residents don't know which syndromes to test for. How can we expect patients to know?"And here we are talking about population based genetic screening which is a very new concept. (*Biochemist, 37 years)*

1.2. *Need for Professional Training*

Almost all of the participants called for structured training programs as they felt it would better equip them to counsel patients better.

"Workshops on genetic counselling should be mandatory for everyone dealing with oncology patients or otherwise so they can deal with patients later ." (*Nursing officer, 28 years*)

This theme highlights provider preparedness as a prerequisite for scaling PBGS

2. Communication: Bridging Knowledge Gaps

As evident from the interviews, communication was vital in increasing uptake of population based genetic screening among people. An in-depth explanation would ensure increase in subjects undergoing genetic testing. Also few expressed concern that the general idea was that genetic testing was for persons who already had someone affected with cancers at home. Since PBGS was a entirely new concept, it needed intensive counselling to increase the acceptance rate

Subthemes:

2.1. *Importance of Patient Education*

Participants emphasized the need for clear, culturally sensitive communication to explain genetic testing.

"Many patients don't understand what a 'gene test ' means—they think it's only for rich people or that it can 'cure 'cancer. We must simplify the language." *(Biochemistry Resident, 28 years)*

"If we say 'this test can help your daughters avoid cancer,' compliance increases." *(Gynaecologist, 32 years)*

2.2. *Role of Trust in Doctor-Patient Discussions*

Trust was seen as critical for patient acceptance.

"If the family trusts the doctor, they will agree. But if they suspect financial motives, they refuse." (*Nursing Officer, 28 years*)

3. Accessibility and Financial Barriers

All our subjects agreed that financial constraints were one of the major deterrents in acceptance of genetic testing among common people. Logistic issues were more of a consideration in rural areas

Subthemes:

3.1 *High Costs*

Affordability was considered as the biggest hurdle for the uptake.

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"The test costs a month's salary for many. No policy covers it—how is this not a burden for people?" And we are targetting quite a sizeable population through this approach instead of going traditional. (*Biochemist, 37 years)*

"I'd do it if it were free or subsidized—why wouldn't I, let alone other people?" (*OBG Resident, 29 years)*

3.2. *Geographic and Systemic Challenges*

Rural patients faced additional logistical barriers according to some.

"Even if we prescribe the test, patients from villages can't travel multiple times for follow-ups, once for testing and then for reports" (*Nursing Officer, 29 years)*

4. Fear and Social Stigma

Subthemes:

4.1. *Cancer as a 'Death Sentence' Mentality*

Cultural beliefs exacerbated fear as brought forth by the interviews. Participants felt that simply the name'cancer'was enough to strike fear in the minds of patients. Also patients did not understand the difference between being 'a high risk for cancers' and being 'diagnosed with cancer'.

"Many women say, 'If I test positive, my husband will leave me.'" *(Nursing Officer, 31 years)*

"You told this test will tell if I am at risk for cancer. Is it like I have cancer?" *(OBG Resident, 29 years)*

4.2. *Familial Tensions Over Genetic Risk*

Participants reported family resistance over positive reports.

"I remember once in field visit one patient's brother forbade testing, saying it would 'ruin marriage prospects 'for the whole family even though their mother had ovarian cancer. We were trying to counsel them for genetic testing as there was a family history"*(CFM Consultant, 38 years)*

Recommendations for Implementation

Our study subjects proposed strategies to enhance PBGS adoption, including:

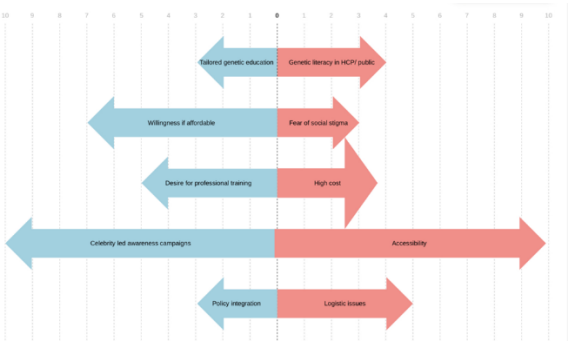
- Public awareness campaigns
- Integration of PBGS into cancer control programs
- Government subsidies
- Normalization through public figures

"Celebrities should speak out—like Angelina Jolie did in the West." (*Nursing Officer, 27 years*)

"Government must subsidize testing and include it in cancer control programs." (Biochemist, 36 years)

Based on the qualitative findings from healthcare providers, we conducted a Force Field Analysis[12] to categorise driving forces (facilitators) and restraining forces (barriers) influencing the adoption of genetic screening in a lower middle-income country (LMIC) setting.

Figure 1: Force field analysis image : PBGS in gynaecological malignancies



Facilitators Barriers

Summary of Findings

While HCPs acknowledged the potential of genetic screening in gynaecological oncology, key challenges included cost, low awareness, stigma, and systemic barriers. Participants stressed the need for patient education, provider training, and policy reforms to enable equitable implementation

Discussion

Our study provides qualitative insight into healthcare providers' perspectives on implementing population-based genetic screening (PBGS) for gynaecological cancers within an LMIC health system. While participants recognized the potential of PBGS, they opined that the present health system is not structurally or socially prepared yet for its widescale adoption.

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Barriers extended beyond individual awareness to include workforce capacity, affordability, sociocultural perceptions of cancer, and limitations in genetic counselling infrastructure. These findings suggest that PBGS implementation in our settings represents not only a clinical innovation but also a health system challenge.

Awareness and Knowledge Gaps Among Providers and Patients

A prominent theme in this study was the lack of awareness regarding genetic testing for gynaecological cancers, even among healthcare professionals dealing with oncology patients. This finding mirrors global reports indicating that many clinicians lack in depth knowledge about genetic risks in ovarian malignancies.[13]. As noted by one of our participants, even obstetrics and gynaecology (OBG) residents were unfamiliar with hereditary cancer syndromes, reinforcing the need for structured training. Similar knowledge deficits have been documented in both high and low income countries (HICs and LMICs) where primary care providers often feel ill-equipped to counsel patients on genetic testing [13-15]. The gap though is more pronounced in LMICs due to limited availability of genetic counsellors and allied services [14].

Patient awareness was also a significant barrier, consistent with studies showing that many individuals conflate genetic risk assessment with a cancer diagnosis [14]. Misconceptions, such as the belief that testing is only for the wealthy or those with a strong family history, further hinder uptake. These findings emphasize the need for culturally adapted educational campaigns, as suggested by participants, to simplify population based genetic testing and clarify its preventive role [8].

Communication and Trust as Key Facilitators

Effective communication emerged as a crucial factor in improving acceptance of PBGS. Participants highlighted the importance of simplifying complex genetic concepts, a strategy supported by studies demonstrating that patient comprehension improves when information is delivered in lay terms [16,17]. The role of trust in doctor-patient relationships was another recurring theme, aligning with research showing that patients are more likely to undergo testing if recommended repeatedly by their trusted physicians [17]. Measures like training of health care providers through continuing medical education and periodic assessments could improve the communication between the patients and their healthcare providers in facilitating the uptake of services [18].

Financial and Systemic Barriers

Participants perceived the high cost of genetic testing as one of the most frequently cited barriers, consistent with studies where out-of-pocket expenses were found to limit access to genomic medicine [4,14]. Unlike HICs, where insurance often covers genetic testing, participants in this study noted that most patients in India cannot afford testing without subsidies. This aligns with economic analyses suggesting that PBGS may only be cost-effective as compared to the traditional clinical criteria/ FH clinical testing in either HICs/ UMI or LMICs[19,20] (High income countries, upper middle income or lower middle income countries)

Geographic disparities further exacerbate inequities, as participants highlighted that rural patients face logistical challenges in accessing testing and follow-up care. Similar barriers have been reported in studies, where centralized genetic services create travel burdens for underserved populations [20,21] Task-shifting—such as training community health workers to facilitate testing—could mitigate these challenges as proposed in studies [8].

Sociocultural Stigma and Familial Implications

Fear and stigma surrounding cancer risk were significant deterrents to PBGS uptake, reflecting deeply rooted cultural beliefs [8,17, 22]. Participants reported that a positive test result could lead to marital discord or social ostracization, consistent with studies where hereditary cancer risk determination carries profound familial implications [14, 22]. The concept of genetic risk associated with a probable cancer diagnosis further compounds anxiety, as found in other populations with low genetic literacy [22]. These findings highlight the ethical complexities of PBGS in societies, where individual autonomy may conflict with family interests. In LMICs, where familial decision-making often overrides individual choice, culturally sensitive counselling frameworks are urgently needed for better utilisation of testing. [22].

Access to genetic counselling services is another theme emergent from our studies. Participants felt its difficult for most of our rural population to access the services due

to time constraints which is in line with the existing literature [8]. Studies have found that one solution to this could be in the form of issuance of the results on the day of testing itself. [23]

Recommendations for Implementation:

Our participants proposed several strategies to enhance PBGS uptake, including:

1. *Provider Training*: Mandatory workshops on genetic counselling for oncologists, OBGs, and primary care physicians.

2. *Public Awareness Campaigns:* Leveraging mass media and celebrity endorsements to normalize genetic testing (e.g., Angelina Jolie's impact on BRCA testing [24].

3. *Policy Reforms*: Government subsidies for testing and integration into national cancer control programs.

4. *Task-Shifting:* Utilizing nurses and community health workers to expand reach in rural areas.

These recommendations align with successful PBGS models in HICs, such as the NHS Genomic Medicine Service, which combines centralized testing with primary care engagement [25]. However, LMICs must adapt these models to local contexts, prioritizing affordability and cultural acceptability. Several innovative strategies have also been studied like introduction of telegenetics or utilisation of chatbot driven software programmes to increase the uptake of genetic screening among the general population but these are in nascent phase[26]

Strengths and Limitations

This study provides novel insights into HCP perspectives on PBGS in an LMIC, filling a gap in the qualitative literature. The use of framework analysis and member checking enhanced rigor, while purposive sampling ensured diverse clinical representation. However, the single-center design may limit generalizability, and the small sample size (n=13) cannot predict broader conclusions. Future multi-center studies with larger cohorts are needed to validate these findings.

Conclusion

This study underscores the potential of PBGS to transform gynaecological cancer prevention in LMICs but highlights substantial implementation barriers. Addressing cost, awareness, and stigma requires multidisciplinary collaboration, policy reforms, and culturally adapted counselling strategies. As genomic medicine advances, integrating provider insights into program design will be essential for equitable and effective PBGS rollout.

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