Weaving with a Pink Ribbon: An Interdisciplinary Analysis of Cancer Representation and Research Funding in Qatar

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Plain Language Summary

Scholars have noted and investigated disparities in the funding available to researchers studying different types of cancer. They have found that funding does not proportionately map onto the social burden of each cancer type and that funding advocacy campaigns can have significant impacts on funding. Further, the relationships between funding and different cancers are difficult to study because they are intertwined in complex research and funding ecosystems in places like the US. Using the bounded public health and research context of Qatar as a case, the present study investigates this relationship by using representation theory as a basis for investigating public outreach information about breast and ovarian cancers.

Abstract

In order for scientists to conduct cancer research, they must first acquire funding from organizations that fund research that they deem to be significant, an approach that leads to the selective funding of some cancers over others. Selective funding has caused some cancer types to be funded reliably while others are consistently underfunded, thus creating a disparity of funding that limits the medical advancement of underfunded cancers. To tackle the problem of selective funding and the resulting funding disparity, researchers should understand both how and why organizations fund certain cancer research. While the social effect of different cancers—e.g. cancers with high prevalence or lethality—is an intuitive answer, researchers have found that the social impact does not always correlate with funding levels. Conversely, positive social effect—e.g. advocacy—has historically played a significant role in influencing how organizations allocate funding by influencing how society perceives cancer through representation. However, cancer representation remains understudied in how it interacts with cancer research funding and healthcare. Using Qatar as a feasible case study, I analyzed cancer representations of breast and ovarian cancer within Qatari institutions and mapped this analysis onto Qatar's research and health systems, accounting for Qatar's socio-political structure. In this paper, I explore the potential relationships between representation and funding in a case where representations reinforce governmental research priorities and incorporate localized ideologies to influence health experiences, serving as a example of how researchers might explore cancer representation and its funding in other contexts.

Publication Category

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Academic Context

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Introduction

During an annual breast cancer awareness campaign at the College of North Atlantic Qatar (now University of Doha for Science and Technology), Kim Doucet signed up for a mammogram at a mobile breast cancer screening unit by Qatar's Primary Health Care Cooperation (PHCC). The results may have saved her life. The mammogram showed that Doucet had signs of early breast cancer; however, because the cancer was detected early, Doucet was able to receive early treatments. A year later, she was cancer free. Doucet benefited from Qatar's detection programs, crediting the public campaign for saving her life: "If the PHCC mobile breast screening bus never came to campus, I would have never had a mammogram. I would have never known that I had cancer" ("Early detection saves," 2017, n.p.).

Doucet's story exemplifies the societal impact of Qatar's cancer outreach campaigns, the success of which must be contextualized in Qatar's social and research ecosystem where the campaigns operate. Qatar centralizes its research ecosystem around national priorities that aim to serve Qatar's society, thus Qatar largely funds 'bench-to-bedside' translational research on topics relevant to its population like breast cancer. Such a direct ability to prioritize funding, communicate with a national population to prompt action, and deliver treatment is unique and likely due to Qatar's small size and centralized governing relationship between research funding and national goals. In many national contexts, these relationships are intractable and dynamic, making analysis of what factors impact funding difficult to parse apart. As such, Qatar serves as an important and bounded site for investigating these otherwise complex relationships and stakeholders.

Understanding the factors that contribute to research funding decisions globally is important given the tremendous impacts research funding has on medical treatment advancement and patient experiences and outcomes. In cancer research, some cancer types are funded consistently, while other cancers are funded less in comparison, creating a funding disparity between different cancer types and, by extension, very different experiences and outcomes for those diagnosed. Sometimes this disparity is linked to the proportionate impacts of different cancer types, but research has shown disproportionate funding (Carter & Nguyen, 2012; Gillum et al., 2011; Kamath et al., 2019; Patafio et al., 2016). Other factors, such as effective advocacy campaigns toward funders, can also impact funding allocations (Kolker, 2004). Further, as Doucet's story helps to show, outreach campaigns result in earlier and increased detection, which increases prevalence rates and can result in a reinforcing cycle of social impact and funding when prevalence rates are used to prioritize decisions.

In this project, I am specifically interested in investigating a mediating site between these different parts of the national priority, research funding, and translational research ecosystem: the public representations of cancer which depict and influence public understanding of cancer types, their respective at-risk groups, and their early detection. Representation broadly is the process of using language (including signs and symbols) to describe or interpret the world in culturally specific ways (Hall, 1997). I adapt this framework to unpack public representations of cancer types. I zoom in on Qatar's context, where representations linked to national sources are centralized and directly linked to national priorities and research funding allocation. I specifically investigate and compare public postings around breast (highly funded) and ovarian (less funded) cancer, and my findings suggest that Qatar's representations encourage its population actively to seek some cancer screening opportunities and attend less to others, accordingly reflecting differences in research funding allocation. I seek to build a point of departure for other research that may extend this work on of public cancer representation into larger, more diverse and complex research settings.

Review of Literature

The differences across cancer research funding correlate to a difference in opportunities for cancer patients. While well-studied cancers have better diagnosis methods and more options for treatment, less studied cancers may conversely have poorer diagnosis and minimal treatment options due to lack of funding. Researchers heretofore have addressed the cause of the funding disparity between cancer types through three main considerations: social burden, visibility in media, and advocacy.

Research on social burden investigates the burden that each cancer type inflicts on individuals in society. Researchers typically assess a cancer's burden by evaluating its mortality (Patafio et al., 2016), incidence, and

other factors like "Years of Life Lost" (Carter & Nguyen, 2012; Gillum et al., 2011; Kamath et al., 2019). This research, conducted in the US and Canada, found that some cancers were overfunded relative to their burden, and some cancers were underfunded relative to their burden, meaning that the research funds are not always proportionately awarded based on the impact each cancer inflicts on society.

In an alternative approach to understanding these disparities, Martin and Mallela (2015) investigate cancer visibility in relation to cancer research funding. Martin and Mallela (2015) assessed visibility by counting the number of times a cancer was mentioned in wide-coverage media outlets in the US, determining that breast cancer was both mentioned and funded twice as many times as prostate cancer, even though prostate cancer was the most prevalent cancer in the US, and breast cancer was the second most prevalent.

By studying funding allocations against media coverage of different cancers, Martin and Mallela imply that there is a possible correlation between cancer visibility and funding allocation, though they offer no definitive conclusion. While quantitatively studying visibility helps to establish a relationship between public exposure to content about each cancer and its funding, the nature of these mentions remains unknown. Using representation as a basis for qualitatively understanding this visibility may offer insight into how cancer is represented and perceived.

Indeed, some scholars have researched similar influences in the context of funding advocacy. Funding advocates have been influential in changing cancer research funding, most prominently for breast cancer. For example, US congressional breast cancer funding increased by threefold from 1992 to 1993 after activists lobbied Congress (Anglin, 1997). Advocates culturally reframed breast cancer from a private problem of individual women to a public health problem impacting all women by redefining breast cancer as an "epidemic" (Kolker, 2004, p. 825), pointing out that the increasing prevalence of breast cancer may be due to environmental factors and institutional neglect. By shifting the responsibilty of breast cancer to institutional players, advocates demanded an increase in research funding for scientists to better understand the causes of breast cancer, which would benefit all women. In doing so, advocates redefined breast cancer from a private problem of individual women to a public health issue in need of governmental intervention.

Through this reframing of breast cancer, advocates represented research as a social good and even an institutional obligation to compel the government to increase research funding. They represented breast cancer in socially relevant ways to make their cause more compelling, successfully leading to increased funding. The success of breast cancer advocacy inspired other cancer advocates, such as those concerned with ovarian cancer (Perlmutter et al., 2013), to successfully lobby for congressional funding. Ovarian cancer witnessed some advocacy for an increase in funding in Canada, as well (Baugh et al, 2022), yet it remains drastically less funded than breast cancer and underfunded compared to its social burden[1] (Kamath et al., 2019). Analyzing advocacy through representation theory provides further insight.

In sum, although cancer visibility serves as a quantitative measure of public exposure, it lacks the qualitative analysis that can unpack the cultural forces present in different representations. Advocacy utilizes the cultural forces within representations, but while representation is at work in advocacy, specific and current representations remain understudied. In this project, I seek to build on this previous research by deploying a representational analysis of cancer types in public contexts.

I argue that cancer representation may have important interactions with healthcare systems and experiences, which positions representation as a factor with potential implications on research funding. To explore this relationship, I study public cancer representations, healthcare, and funding patterns in Qatar's research and funding ecosystem, where I can more clearly track institutional players and research priorities. I analyze representations quantitatively and qualitatively and map the results onto Qatar's funding patterns. This approach of characterizing representations, contextualized by a comparatively bounded research, funding and outreach ecosystem, provides a

[1] cf. Carter and Nguyen (2012) claim that ovarian cancer is overfunded compared to its incidence, though they do not classify it as generally overfunded when taking into account multiple measures of burden together. Note that this study uses statistics from the SEER Cancer Statistics Review 1975-2007 published by the National Cancer Institute, which "makes estimations of national statistics based on direct information from 26% of the US population" (p. 4), compared to other studies (Kamath et al., 2019) that used more recent data from 2017 from the SEER database and found that ovarian cancer was underfunded compared to its burden.

view of the implications that representation may have on research and its funding.

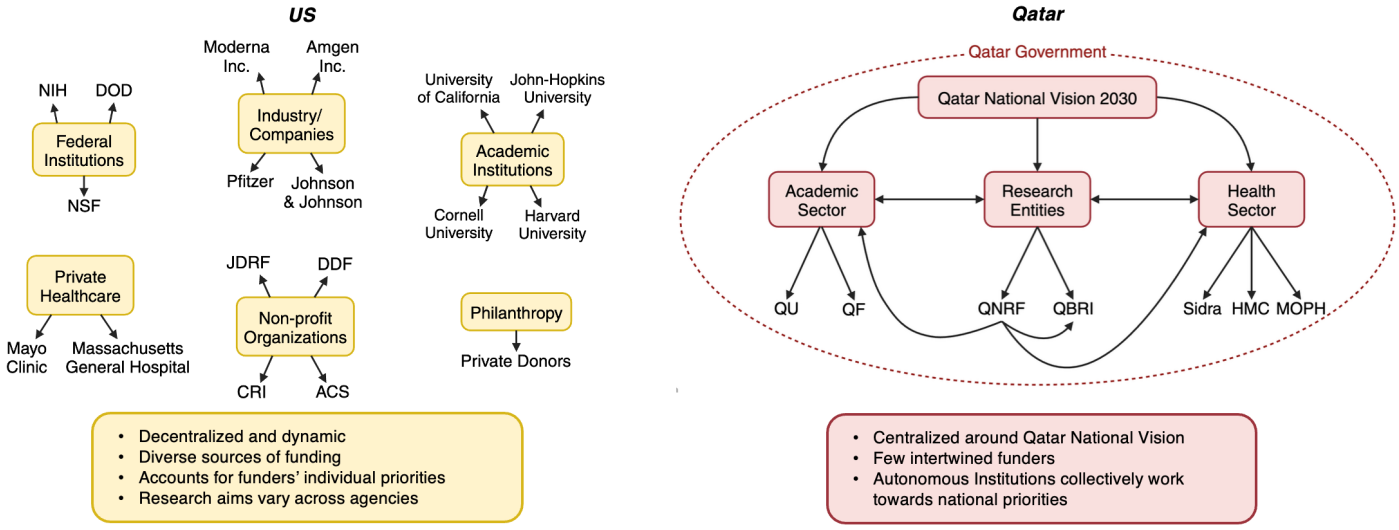
Studying Representations and Funding in Qatar's Research and Healthcare Context

While there may be global gaps and needs in cancer research on the scientific and clinical level, cancer representation may change how systems prioritize needs based on the patient or social experiences in different cultural contexts. One inference from the US breast cancer campaigns is that research funding can be influenced by advocacy for specific needs. However, because the US has a complicated socio-political system which houses large, highly diverse groups with different needs and stakeholders, US cancer representations can manifest in similarly diverse and complicated ways. In contrast, Qatar's population is small and share generally similar needs, enabling Qatar's system to be centralized and focused, which makes possible interplay between representation and research funding more direct or visible (see Figure 1).

Qatar's research system is centralized around the Qatar National Vision 2030 (QNV) (General Secretariat for Development Planning, 2008) document, which directs Qatar entities toward fulfilling Qatar's national development plans, and clearly enforces a centralization around the government, even for non-government entities. For example, when talking about educational institutions, the QNV demands "Well-developed, independent, self-managing and accountable educational institutions operating under centrally-determined guidelines" (p. 16). Though independent from the government, institutions are still urged to follow general guidelines and priorities that the government determines. The government uses the QNV to centralize Qatar entities and their activities, creating a robust network of entities all working towards Qatar's national development goals.

Qatar Foundation (QF), a non-government entity, was "charged with overseeing and channeling funds to the country's science plans" (Shetty, 2011, p.1453) upon its creation, and "was to become the spearhead of the implementation of the QNV" (Crist, 2017, p. 230). Francisco Marmolejo, President of Higher Education and Education Advisor in QF, has himself described QF's vision as "dedicated to meeting the needs of Qatar" ("Carnegie Mellon University", 2025, n.p.). QF's association with national development plans implies that all entities under QF follow government priorities, which is significant considering that QF oversees many entities involved in research, including the country's only research funding agency, Qatar National Research Fund (QNRF)—now part of Qatar Research, Development, and Innovation (QRDI) Council. QRDI Council explicitly highlights national RDI prioty areas on their website. For individual researchers within QF, applying for grants from institutions like QRDI implies that they must align their research with Qatar's national priorities. QRDI Council's proposal review policy transparently establishes that QRDI Council selects to fund projects of "high scientific and technological merit and that align with Qatar's R&D and Innovation Strategy" (QRDI Council, 2023, p. 4). QF and its institutions demonstrate

FIGURE 1. US and Qatar Research Ecosystems. This original schema highlights health research ecosystems in (left) the US as a complex, dynamic system with decentralized players, and (right) in Qatar as a centralized system with key players under one national vision.



how Qatar centralizes research entities around national goals, guiding their activities to work on national research priorities which focus on the population's needs.

Because Qatar centralizes its institutions around national goals, the institutional players and their funding priorities are clear; consequently, tracking the way these institutions represent cancer is a more feasible task and an interesting case study. Within its priorities, Qatar gives the "greatest priority to those cancers with the highest incidence in Qatar" (MOPH, 2011, p. 12) including breast cancer. Breast cancer is highly prevalent—the most prevalent in Qatar according to the Qatar National Cancer Registry (QNCR)[2] and national cancer strategies anticipate its prevalence to increase over time, making it a significant research focus in Qatar. Within breast cancer research, Qatar specifically prioritizes translational research, research that develops results from the bench into applicable outcomes at the patients' bedside, which Qatar's national cancer strategies consistently emphasize by calling for research that produces tangible benefits for Qatar's population.

Methods

To investigate and characterize cancer representations in Qatar, I analyzed public representations of breast and ovarian cancer. I chose breast and ovarian cancer because both cancers are typically regarded as women's issues, yet breast cancer is an explicit priority in Qatar while ovarian cancer is not. Moreover, breast cancer research witnessed a drastic increase in funding due to global funding advocacy, but advocacy did not have the same impact on ovarian cancer funding. Therefore, since breast and ovarian cancer have clear differences in funding yet share a gendered social perception, they provide suitable case studies for this project.

Following previous research which analyzed cancer representations in media via content analysis (Biancovilli et al., 2021; Jenkins et al., 2020), this study uses content analysis to analyze cancer representations in Qatar. Content analysis is a technique researchers typically use to analyze media by tracking the presence of concepts or features across a data corpus. This study utilizes content analysis quantitively (counting the instances of certain concepts) and qualitatively (interpreting the representations based on concepts and features detected). In content analysis, researchers create coding schemes that include codes (or tags) to identify and track concepts of interest across their data. These codes can track specific words, themes, visual elements, etc. and depend on the data collection.

I first collected the cancer representations systematically into two corpora, one for social media posts and the other for information sheets. The first corpus contained posts from the official X accounts (formerly known as Twitter) of three Qatar institutions: Hamad Medical Corporation (HMC), PHCC, and Ministry of Public Health (MOPH). These institutions constitute the primary resources for cancer care and information in Qatar and are the main institutions that produce outward-facing cancer content in Qatar's public sphere. At the time of corpus collection, these institutions did not have any posts on ovarian cancer, and instead included it within gynecological cancer content, so the corpus was adapted to collect gynecological cancer content in place of ovarian cancer, but the analysis considered the ovarian cancer focus within these posts. I searched each account for "breast cancer" and "gynecological cancer," then filtered posts that contained pictures. I also searched through their content on cancer and included posts that talked about cancer in general[3] and contained pictures. Because these entities had a relatively low number of total posts, I collected all relevant posts since the creation of the X accounts (2009-2023 for MOPH; 2012-2023 for HMC and PHCC) except for two types: posts which showcased events that had already happened and posts that contained news, because those two types were mainly displayed on the institutions' websites news pages, and social media was not their main platform. Both the post and the picture associated with it were considered a single unit in the corpus, and the corpus contained a total of 95 units.

For the second corpus, I collected information sheets, which were informative documents that provided facts and/or resources about cancer. These information sheets were typically long and detailed compared to social media posts and were made available on the websites of Qatar institutions. I looked through the official websites of the same three Qatar institutions for information sheets regarding breast cancer, gynecological cancer, and cancer in general, and the corpus had a total of 9 units. All the samples for both corpora were collected in June 2023.

After I collected samples into the two corpora, I created coding schemes for each corpus to account for differences

[2] The QNCR, available on Qatar Cancer Information Centre (QCIC), provides annual reports on cancer statistics in Qatar.

[3] Content about cancer generally without specifics regarding distinct types.

in content type and genre. The codes tracked visual themes (such as colors and icons used), content type and purpose, and audience engagement including calls for action. For information sheets, additional codes tracked how services were promoted and discussed, and how clinical aspects of cancer (such as risk, detection, and treatment) were discussed. These coding schemes are outlined in Tables 1 and 2 in the Appendix. I used Nvivo software to assign the codes to the samples and afterwards studied the content analysis results to consider how cancer representations may be functioning within Qatar's social context, especially in considering how they may relate to healthcare and research.

I studied Qatar's funding patterns through the QNV and national strategy documents regarding research/ healthcare/cancer to guide my analysis of cancer representations in relation to research funding in Qatar.

Representation and Research in Qatar: A Cycle Between the Bench and the Bedside

My content analysis shows that cancer representations in Qatar differ in quantity, early detection attention, and gendered content. Breast cancer representations encourage early detection for local audiences compared to ovarian or general cancer. This suggests that breast cancer representations may have more reach and influence on audiences, and, through an early detection focus, could impact prevalence rates.

The Quantity of Cancer Content

Qatar institutions post more breast cancer content than ovarian cancer or cancer in general, which may increase the reach of breast cancer content to local audiences. When compared to content on gynecological cancer and cancer in general, breast cancer content accounted for most of the corpus content for both X posts and information sheets. Breast cancer content formed 68/95 X posts and 7/9 information sheets, and much of this breast cancer content focused on detection of breast cancer, specifically directing the audience—Qatar's population—to national screening resources/programs. In fact, the bulk of these representations were driven by campaigns dedicated to breast cancer screening.

In contrast, Qatar institutions rarely represented ovarian cancer on social media or their websites, and in fact, only mention ovarian cancer within representations of gynecological cancer. There were only four posts about gynecological cancer, and only one mention of ovarian cancer within them. These results imply that the Qatar population is rarely exposed to ovarian cancer and its detection through national sources.

Early Detection in Breast and Gynecological Cancer Content

27 of the 68 breast cancer instances included mentions of detection. The availability and nature of breast cancer representations may motivate the population to pursue

FIGURE 2. Samples of Breast Cancer Representations from Social Media of Qatar Institutions. Both samples serve to urge the population to seek breast cancer screening. Left: A sample posted on HMC's X account as part of a breast cancer awareness month campaign in 2022, tells the audience "Symptom free is not disease free... Screen to be sure!" (HMC, 2022b). Right: A sample posted on HMC's X account as part of a breast cancer awareness month campaign in 2021, tells the audience that "Early detection is the key" (HMC, 2021). The sample advertises breast cancer screening through mammograms available in national institutions and provides a phone number to call to book an appointment for screening.



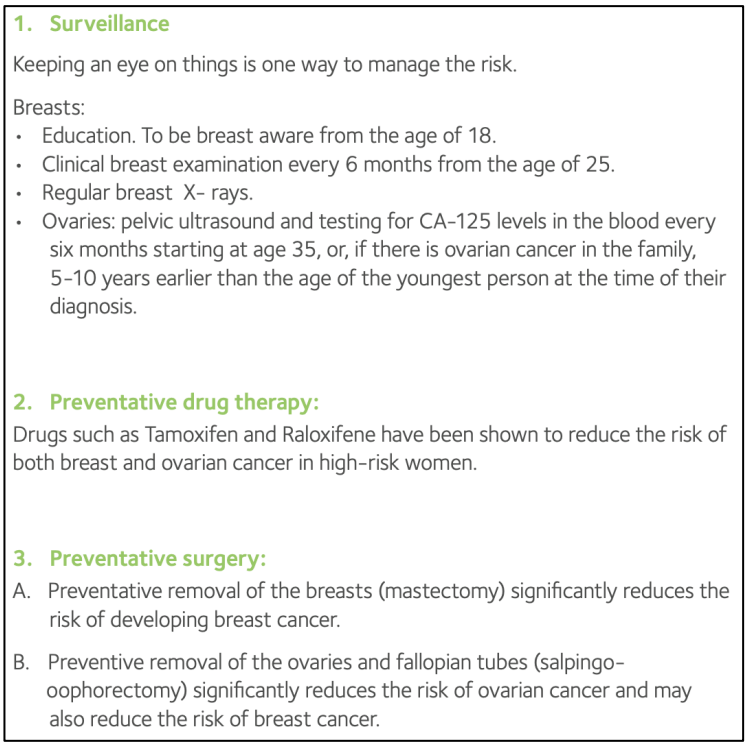


screening for early detection, which may consequently drive prevalence rates up. Typically, people seek cancer screening when noticing symptoms of the cancer in the body, namely changes in morphology or general wellness. At the stage where the changes are noticeable, the cancer would have likely developed to a later stage when it is more difficult to treat. Conversely, if the cancer was detected early, it would be easier to treat. Accordingly, Qatar breast cancer representations preach early detection, providing national resources for screening and including direct calls to action, both of which urge the population to do screening tests even without presence of symptoms or risk factors as "symptom free is not disease free" (Figure 2).

The language within gynacological cancer representations does not encourage the population to seek detection opportunities for ovarian cancer, which may decrease early detection rates and consequently decrease documented prevalence rates. Within the four gynecological cancer X posts, there was only one mention of a detection method for gynecological cancer, pap smears, which are not used to screen for ovarian cancer but rather for cervical cancer. There are two information sheets mentioning ovarian cancer, one of which is about all gynecological cancers and that describes gynecological cancer and ovarian cancer as particularly hard to detect. For example, that "[ovarian cancer] often goes undetected until it has spread within the pelvis and abdomen" (National Center for Cancer Care and Research [NCCCR], n.p., n.d), which indicates that ovarian cancer is mostly detected once it has reached later stages when it is more noticeable but more difficult to treat. While this information is alarming—presumably inducing a sense of worry in people to detect ovarian cancer before it spreads—the information sheet does not encourage the population to seek detection opportunities. For example, when recommending pap smears as a means of detection, this information sheet describes these tests as "one of the most effective and reliable tests to screen for cervical cancer" (NCCCR, n.p., n.d.). This information sheet does not provide means to detect ovarian cancer despite the significance of detecting it before it spreads, and despite the availability of ovarian cancer screening tests in the country. These instances exemplify how ovarian cancer detection is deprioritized not only compared to breast cancer, but even among other gynecological cancers.

The second information sheet does provide specific means of detecting ovarian cancer (HMC Patient and Family Education Committee, 2014), however, it reduces the significance of detecting ovarian cancer by situating it in relation to breast cancer. This information sheet is not

FIGURE 3. Excerpt from an information sheet about hereditary breast and ovarian cancer. In one of two information sheets mentioning ovarian cancer, ovarian cancer is situated in relation to breast cancer, specifically common genes that influence both cancers' risk (HMC Patient and Family Education Committee, 2014). This excerpt shows HMC's advised strategy for mitigating the risk imposed by those genes.



1. Surveillance

Keeping an eye on things is one way to manage the risk.

Breasts:
- Education. To be breast aware from the age of 18.
- Clinical breast examination every 6 months from the age of 25.
- Regular breast X- rays.
- Ovaries: pelvic ultrasound and testing for CA-125 levels in the blood every six months starting at age 35, or, if there is ovarian cancer in the family, 5-10 years earlier than the age of the youngest person at the time of their diagnosis.

2. Preventative drug therapy:

Drugs such as Tamoxifen and Raloxifene have been shown to reduce the risk of both breast and ovarian cancer in high-risk women.

3. Preventative surgery:

A. Preventative removal of the breasts (mastectomy) significantly reduces the risk of developing breast cancer.

B. Preventive removal of the ovaries and fallopian tubes (salpingo-oophorectomy) significantly reduces the risk of ovarian cancer and may also reduce the risk of breast cancer.

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about ovarian or gynecological cancer only, but it instead discusses hereditary cancer risk imposed by genes BRCA1 and BRCA2, which increase the risk of both breast and ovarian cancer. However, in their advised strategy for mitigating this risk, ovarian cancer screening is positioned under breast cancer surveillance (Figure 3). Under the preventative surgery section, the information sheet advises that ovary removal "reduces the risk of ovarian cancer and may also reduce the risk of breast cancer" (Figure 3). This information sheet provides the most notable example of how these representations don't emphasize the threat of ovarian cancer and the need for its detection, as it uses ovarian cancer to accentuate the risk of breast cancer and the need for breast cancer detection. Therefore, contrary to breast cancer rep-resentations, ovarian cancer representations may dissuade the population from screening for ovarian cancer, which may contribute to less early detection/ diagnosis of ovarian cancer, and consequently a lower documented prevalence.

Gendered and Cultural Appeals in Cancer Content

It is not the informative content of these representations alone that can drive the population's actions; Qatar institutions curate breast cancer representations to appeal to Qatari women—their main demographic—and to urge them towards getting screened for breast cancer. Breast cancer representations tend to be highly gendered, with their majority including themes and language typically regarded as feminine. While general cancer representations had neutral colors, pictures, and language, breast cancer representations used primarily pink, depictions of women, and feminine-directed language. 57 of the 68 breast cancer posts had a pink color, and 28 of 68 depicted women through visuals or language. For example, when discussing how to decrease the risk of cancer, institutions used gender-neutral icons for general cancer and feminine representations for the same risk factor; a cigarette represents the risk of smoking in general posts, while a pink silhouette of a woman smoking a cigarette represents the risk of smoking in a breast cancer campaign (Figure 4). Language followed the same trend: general cancer posts used gender-neutral language, while breast cancer posts used language clearly directed at women such as "breast feed for as long as possible" (Figure 5) or used feminine verb conjugations in Arabic (Figure 5). Therefore, while institutions maintain neutrality in representing cancer in general, they curate breast cancer posts towards women, often exclusively addressing women in those posts.

Not only were these posts curated toward women, but the representations were particularly curated for women in the region, drawing on their social, cultural and religious customs. Because Qatar's cultural and religious notions largely govern societal norms, those notions similarly

FIGURE 4. Comparison of Gendered Representations in General Cancer and Breast Cancer Posts on Qatar Institutions' X Accounts. Left: A post about reducing cancer risk factors for cancer in general including multiple risk factors in one post and using gender neutral icons (HMC, 2022a). Right: A post about smoking as a breast cancer risk factor, posted as part of a campaign consisting of many posts, and using a gendered icon depicting a woman (MOPH, 2020b).



FIGURE 5. Breast Cancer Posts use Gendered Language Exclusively Addressing Women. Left: A post about breastfeeding to lower risk of breast cancer, using language exclusively addressing women (MOPH, 2020a). Right: A post about breast cancer symptoms, using a feminine verb conjugation in Arabic: "Did you know (feminine) that..." (HMC, 2022c).



FIGURE 6. Breast Cancer Representations Account for Social and Cultural Norms Surrounding Women's Bodies in Qatar. A) A woman depicted in the traditional Qatari dress (HMC, 2021). B) Obscured icon of a woman (MOPH, 2020b). C) Objects standing in for women's bodies (HMC, 2022b). D) Depicting women through language only (PHCC, 2015).



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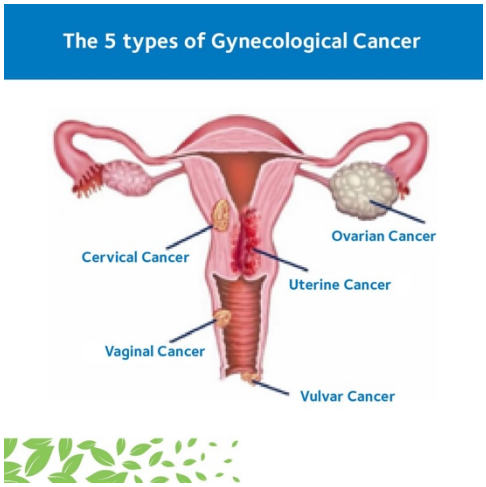
manifest in social norms regarding women and their bodies. Qatar institutions incorporate these norms in representing women's bodies, especially in public representations available to a wide audience.

When institutions create breast cancer representations, they account for and maintain the social hegemony governing women's bodies in Qatar. Therefore, institutions depict women either in the traditional dress (the abaya and sheyla) or as obscured icons (Figures 4 & 5). Otherwise, institutions don't depict women directly but may use objects to stand in for women's bodies, such as apples standing in for women's breasts (Figure 6). Most posts do not include any visual depictions of women but would refer to them directly in the text or use other linguistic cues to draw on them without visually depicting them (Figure 6).

Contrary to breast cancer posts, gynecological cancer representations are not clearly curated towards a target demographic. The gender- and culture-specific breast cancer representations above may seem expected since women are the demographic most affected by breast cancer in the country. However, Qatar institutions do not employ the same strategies to represent gynecological cancer. Breast cancer representations remained focused towards Qatari women even though breast cancer can impact both men and women. On the other hand, gynecological cancers exclusively impact women yet had

FIGURE 7. Qatar Institutions' Gynecological Cancer Posts have less Gendered Representations. Left: A post about gyecological cancer prevention and detection uses feminine verb conjugations in Arabic and no visual depictions of women or gendered themes (HMC, 2018b). Right: A scientific illustration stands in for women's bodies (HMC, 2018a).





limited and neutral representations. In gynecological cancer posts, the use of blue color (Figure 7) stands in stark contrast with how saturated breast cancer posts are with pink as a feminized color. Gynecological cancer posts address women directly using feminine verb conjugations in Arabic, but they otherwise have no personified depictions of women (Figure 7). In one instance, institutions used a scientific illustration to highlight different gynecological cancers (Figure 7), thus representing women's bodies in a distant scientific light, not associated with women as people experiencing the health systems.

The differences in gendered content between breast and gynecological cancer posts suggests that Qatar institutions curate breast cancer content to the target audience of local women, while gynecological cancer content lacks the same targeting. In appealing to local women, breast cancer representations may have more influence in directing them towards early detection opportunities for breast cancer; in contrast, gynecological cancer content does not directly appeal to local women, which may limit early gynecological cancer detection.

Representational analysis provides insight into relying on prevalence to determine research priorities; this reliance may be problematic because of how representation may influence prevalence rates, creating a potential cycle between representation and funding. Because Qatar institutions represent breast cancer frequently and widely advertise breast cancer screening, the population is more motivated to seek out these screening opportunities, resulting in more diagnoses and a higher recorded prevalence compared to a cancer that is less advertised and whose detection is discouraged, like ovarian cancer.

Conclusions

My research characterizes cancer representation in Qatar with consideration to Qatar's social and research context, demonstrating that representation may have important implications on healthcare and research funding. In Qatar, representational analysis suggests that cancer representation may influence healthcare experiences by encouraging detection of some cancers over others, contributing to a prevalence-based need that Qatar research can address through its translational research priorities, which may itself perpetuate the construction of that need. While this relationship is posed only as a potential based on representational analysis, my research suggests that such a relationship between representation and funding should be considered, especially given the dynamic nature of representation and funding depending on a system's unique characteristics.

More research needs to be done on the relationship between representation and funding in more diverse and complicated research systems. More research on this relationship can help researchers and decision-makers navigate representation as a factor in funding, which may be especially important for complicated and diverse research hubs like the US.

To learn more about representation-funding relationships, the present study can first be expanded to analyze contexts that are similar to Qatar, but bigger and more

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diverse, before studying complicated systems like the US. Studying representation in more complicated research ecosystems allows researchers to explore the relationship of representation on funding and paves the way for investigations in highly dynamic systems. For example, using the United Arab Emirates (UAE) as another case study can provide insight on how representation interacts with funding in a bigger and more complicated system. While the UAE is within the same region as Qatar and has similar socio-political elements, it has a much larger population and consists of seven different emirates that have their own priorities and regulations all under a federal monarchy. This system that may act as a small-scale simulation of the US system in that its research must account for many different groups, albeit culturally different. The UAE can thus be used as a research model that provides more complexity, allowing for my findings in Qatar to be expanded to further contribute to the under-studied interplay between representation and funding.

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Appendix

TABLE A1: X Posts Coding Scheme.

Category	Code
Cancer Topic	Breast cancer
	Depicts women
	Pink color/theme
	Pink Ribbon
	Posted in October
	Mentions male breast cancer
	Gynecological cancer
	Depicts women
	Mentions ovarian breast cancer
	Purple color/theme
	Purple ribbon
	Posted in September
	Cancer in General
Content type or purpose	Information
	Solidarity
	Upcoming Events
	Unclear
	Mixed purposes
Miscellaneous rhetorical points of interest	Addresses individuals directly
	Call for action
	Statistics or numbers
	Shared between entities
	Includes scientific content (equipment, terminology, illustrations)
	Mentions treatment
	Mentions detection

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TABLE A2: X Information Sheet Coding Scheme.

Category	Code
Cancer Topic	Breast cancer
	Depicts women
	Pink color/theme
	Pink Ribbon
	Mentions male breast cancer
	Gynecological cancer
	Depicts women
	Mentions ovarian breast cancer
	Purple color/theme
	Purple ribbon
	Cancer in General
Miscellaneous rhetorical points of interest	Addresses individuals directly
	Call for action
	Statistics or numbers
	Shared between entities
	Includes scientific content (equipment, terminology, illustrations)
	Mentions treatment
	Mentions detection
	Mentions accessibility of service
	Mentions quality of service
	Mentions resources
	Mentions risk
	Mentions screening without symptoms or risks
	Evokes urgency

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