

Gastric Cancer Disparities in the United States: Overcoming the Barriers

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Abstract

In this narrative review, we highlight the disparities in the incidence and mortality of gastric cancer across various racial and ethnic populations in the United States (US). Despite the low and decreasing trend in the incidence of gastric cancer in the US, the incidence remains significantly high among Asian and Hispanic Americans, showing a striking racial and ethnic disparity. The low survival rate of gastric cancer further accentuates the magnitude of this disparity. In addition, there is a marked funding disparity among different cancers in the US, reflecting the significantly lower level of support for cancers, such as gastric cancer, which are more prevalent in minority populations, compared to the cancers more prevalent among non-Hispanic Whites (NHW). Moreover, the economic burden from health disparities remains high. Although studies from the US and Asia suggest that screening for stomach cancer may be cost-effective, there is no currently available guideline for screening high-risk populations in the US. A multidimensional framework involving the community, physicians, and policymakers is proposed to tackle these gastric cancer disparities and to develop population-based screening and surveillance programs to reduce the burden of gastric cancer.

Keywords

Gastric (Stomach) Cancer, Epidemiology, Prevention, Health Disparity, Immigrants, Minority Health, Endoscopic Screening

1. Introduction

Gastric cancer is the fifth most common cancer worldwide, with around 1.1 million new cases reported in 2020, the most recent year for which data are available, and remains a leading cause of cancer deaths [1]. A large percentage of gastric cancer cases is found in Asia, followed by Latin America, central and eastern

Europe, and other countries. At only 20%, the five-year survival rate from gastric cancer is a severe global public health concern [2] [3] [4]. By 2040, projections suggest 1.8 million cases and 1.3 million deaths, which are 66% and 71% higher, respectively, than the estimates made in 2020 [5]. These data identify countries and regions with increased incidence and mortality of gastric cancer, highlighting the need for cancer control initiatives consisting of primary prevention and screening.

Cardia Gastric Cancer (CGC) and Non-Cardia Gastric Cancer (NCGC)

There are two main anatomical subtypes of gastric cancer: cardia gastric cancer (CGC) and non-cardia gastric cancer (NCGC). Their incidences vary between regions and sexes [6] [7]. While both types share risk factors, such as smoking and alcohol consumption, they also have unique risk factors. CGC, often associated with gastroesophageal reflux disease (GERD) and obesity, develops near the gastroesophageal junction and behaves like esophageal adenocarcinoma. On the other hand, NCGC is strongly associated with *Helicobacter pylori* infection and a high salt diet [8] [9] [10]. Some studies have shown a worse prognosis in early CGC compared to NCGC, although there are controversies on the clinical outcome of these two types [9].

While exact global incidence estimates by subsite are lacking, there are significantly more NCGC cases than CGC. CGC and NCGC have a higher incidence in men than in women, and the sex difference is more significant in CGC [6]. In the US, the incidence of NCGC, primarily adenocarcinomas, is higher in minority groups (Asian Americans and Pacific Islanders (AAPI), Hispanics, Blacks, and American Indian natives) than in NHW. On the other hand, the incidence of CGC is higher in the NHW than in minority groups [9]. The epidemiology of gastric cancer changes over time, however, depending on ethnic group, sex, and age. For instance, among NHWs in the US, NCGC incidence has been rising in younger persons and falling in older persons. These increases were more pronounced among women than men, so female incidence may exceed male incidence rates in the future [7] [11].

Gastric Cancer in the US Minority Populations

While the incidence of gastric cancer is low in the US, with an estimated 26,500 cases in 2023 [12], it varies significantly between different ethnicities and races. For instance, the incidence is substantially higher in specific minority populations than in NHW. The highest number of cases of gastric cancer in the US occurs among Asian and Hispanic Americans [13] [14]. Looking at the subjects aged 50 and older, the incidence of NCGC adenocarcinoma was at least 1.8-fold to 7.3-fold higher in non-white groups than in NHW. Compared to NHW, the incidence of NCGC was as much as 14.5-fold higher in Korean American men and women [15].

Based on the Surveillance, Epidemiology, and End Results (SEER) data from people diagnosed with gastric cancer between 2012 and 2018, the five-year survival rate in the US in all stages combined remains low at 33% [16]. There is also a disparity in mortality rates between the various racial and ethnic groups. For

instance, analysis of the age-standardized mortality attributable to gastric cancer between 2000 and 2019 was highest in specific Asian and black groups while it was the lowest among NHW [13]. Although mortality declined in these groups, disparities compared to the NHW persisted across the entire two decades, further highlighting crucial differences in the burden of gastric cancer among racial-ethnic groups in the US [9] [10].

Despite these alarming statistics, there is no structured system in the US to screen gastric cancer in high-risk populations. The mechanisms that make these minority populations so vulnerable must be understood to overcome the barriers responsible for these disparities. It may be crucial to combat poverty and lack of built-in infrastructure in political and social systems, which, by various mechanisms, place minority populations at increased risk for developing gastric cancer [10] [13].

2. Gastric Cancer Disparities in the US

The high incidence of NCGC among minority groups and a persistently high mortality rate demand immediate attention. Among all the minority groups, including Korean, Japanese, Southeast Asian, Chinese, Hispanics, non-Hispanic Blacks (NHB), Filipino, and South Asian Americans, Korean Americans had the highest incidence rate of 49 cases per 100,000 [15]. Meanwhile, NHW had the lowest incidence rate, with only 3.7 cases per 100,000 people, revealing a 13-fold difference between Korean Americans and NHW. The incidence of NCGC was also substantially higher in other minority groups compared to NHW: Vietnamese (6.5×), Japanese (5.2×), Chinese (4.8×), Hispanics (3.8×), and NHB (3.0×).

Some of the ethnic groups exhibit significant sex differences in NCGC. For instance, in Korean and Japanese Americans, the male-to-female incidence was more than twice as high: Korean men and women had incidences of 70 and 33.5 per 100,000, respectively, while the corresponding incidences among Japanese men and women were 33.6 and 11.4 per 100,000. It should be noted that these incidence rates are similar to the current incidence of colon cancer in Asian Americans [17]. For comparison, the colorectal cancer incidence between 2015 and 2019 in those aged 45 - 49 of the US population, for which universal screening was recently initiated, was 33.4 per 100,000 [18].

Lack of a Structured Strategy for Screening High-risk Populations

In the US, gastric cancer is typically identified when symptoms such as weight loss, bleeding, and persistent epigastric pain are experienced rather than through routine screening. As a result, many gastric cancers are diagnosed at advanced stages, sharply reducing the chance for a cure. The survival of gastric cancer patients depends on the stage of cancer progression at diagnosis. According to the American Cancer Society, the five-year survival rate for individuals diagnosed with gastric cancer in the United States between 2012 and 2018 varied based on the extent of the disease: 72% for localized, 33% for regional, and 6% for distant [16].

In contrast to the US, South Korea and Japan, which have high incidences of gastric cancer, have implemented nationwide screening programs for gastric cancer, facilitating early diagnosis. In Korea, the National Cancer Screening Program (NCSP) was launched in 1999 and recommended that people aged 40 years and older undergo biennial upper endoscopy [19]. Similarly, a national screening program for gastric cancer began in Japan in 2014, approving gastroscopy in population-based screening [20].

These population-based screenings significantly reduced gastric cancer mortality compared with no screening. A meta-analysis of 6 cohort studies and four nested case-control studies comprising 342,013 individuals from Asia indicated that endoscopic screening was associated with a 40% reduction in gastric cancer mortality [21], shedding light on the opportunity to reduce the burden of gastric cancer through effective screening policy [22]. More recently, a study from South Korea revealed that the age-standardized mortality of GC per 100,000 persons declined from 29.0 in 2000 to 7.9 in 2020 [23]. This reduction in gastric cancer mortality was attributable to endoscopies, especially in people aged over 40 years [19]. As a result, these population-based screenings significantly increased survival rates in Korea (71.5%) and Japan (65.0%) compared to other countries [20].

Is Endoscopic Screening Cost-effective?

Several studies have demonstrated that endoscopic screening may be cost-effective in high-risk populations. A Japanese study showed that an endoscopic screening program would be cost-effective when implemented among patients between 50 and 75 years of age, underscoring Japan's need for gastric cancer screening [22]. A large-scale, population-based study conducted using the Korean National Health Insurance Big Data Base also showed similar results. This study included information on the treatment of gastric cancer and the costs incurred for patients aged 40 and above between 2004 and 2013. Patients with gastric cancer who participated in the NCSP at least once (*i.e.*, the screening group) were compared with those who did not undergo screening. The study revealed that the screening group had notably lower medical expenses and demonstrated a significantly better prognosis compared to the non-screening group. The cost-effectiveness analysis, based on the GDP per capita, showed that the NCSP for gastric cancer was cost-effective [24].

A US study using modeled data estimates showed that it was cost-effective to bundle an upper endoscopy for NCGC screening with colonoscopy for average-risk colorectal cancer screening in specific ethnic groups aged 50 years or older. This was particularly true for NHB, Hispanic, and Asian Americans, considered as an aggregated group, but not cost-effective for the NHW population [25]. These findings suggest that it may be cost-effective to implement targeted screening for ethnic groups at high risk of developing gastric cancer in the US, similar to the screening model in Korea and Japan [21] [22] [23]. However, there are many barriers to implementing such screenings in the United States, including issues with healthcare infrastructure and insurance coverage.

The argument for cost-effectiveness may be stronger if one considers the increasing population of affected ethnic groups. The projected increase in the population of minority ethnic groups with a high risk for gastric cancer could provide a more accurate evaluation of the economic burden of health disparities. Between 2000 and 2019, for instance, Asian Americans had the highest population growth rate among all racial and ethnic groups in the United States [26]. Moreover, the Asian population could grow by as much as 162 percent between 2016 and 2060, going from 5.7 percent of the total U.S. population to 10.8 percent. The Hispanic community witnessed the second-fastest population growth in the United States. As of 2021, the Hispanic American population has reached 62.5 million, which accounts for 19% of the total population of the United States, a significant increase from 13% in 2000. Since then, it has been the most critical contributor to population growth in the United States, accounting for 54% of overall growth. According to the projections, by 2060, the Hispanic American population is expected to increase to 111.2 million, making up 28% of the total U.S. population [27]. In contrast, the NHW population is projected to decrease such that by 2060, it will no longer be the majority [26]. When projecting future cost-effectiveness studies, it is essential to consider these surges in Asian and Hispanic populations and the potential financial losses stemming from disparities unless they are resolved.

3. Cancer Funding Disparity

The differences in the incidence and mortality of gastric cancer could be linked to the disparity in federal funding for different types of cancers in the US. A recent study, which analyzed funding allocation for 19 cancer types by the National Cancer Institute (NCI) between 2014 and 2018, revealed disparities compared to disease burden [28]. This study utilized a Funding-to-Lethality (FTL) score to identify funding disparities in cancer research [29].

Significant differences in the level of funding were observed across cancer types, with breast cancer receiving the highest annual funding of \$542.2 million and lung cancer receiving \$292.9 million. In contrast, gastric cancer received the lowest funding, with an average of only \$13.2 million. The FTL score for breast cancer, the highest-funded cancer, was 179.65, while gastric cancer, the lowest-funded, had an FTL score of only 1.78. This shows a 100-fold difference in FTL score between the two types of cancers [28].

Based on their observations, the researchers found a strong correlation between cancer incidence and the FTL score for NHW. This correlation was not present for other racial and ethnic groups, however. Additionally, they noticed a strong correlation between mortality and FTL score in NHW but only a weak one for other ethnic groups. The study also revealed that NCI funding was highly associated with cancers primarily affecting NHW, such as breast cancer, leukemia, and lymphoma. In contrast, cancers that had a high incidence rate among minority populations, such as gastric, uterine, and liver cancers, received much

less funding [28]. More recent data on NCI funding between 2019 and 2021 demonstrate that the funding pattern has not appreciably changed, and funding for gastric cancer remains at the lowest of all cancer sites [30]. In support of these findings, another report demonstrated that NCI and non-profit funding increased proportionately as incidence increased for NHW patients, whereas cancers with higher incidence in the ethnic minority populations were relatively underfunded [31].

While these reports showed a lower level of funding among ethnic minority groups, the data do not differentiate between the specific ethnic groups, potentially masking even more marked disparity between a specific minority group and the NHW group. At any rate, it is evident that there is a pressing need to prioritize equity across various types of cancers when allocating NCI funds. It is necessary to put in more effort to ensure that funding distribution for disease control is aligned with the lethality of the disease and addresses the historical disadvantage faced by minority groups. This is particularly critical since there have been significant differences in cancer outcomes for minorities, especially in cancers that receive less funding. For example, Black Americans, Hispanics, Asians, and Pacific Islanders are 2 - 3 times more likely to die from gastric cancer than NHW individuals [9].

Cancer research funding is crucial for improving prevention, detection, and treatment and ultimately, the quality of life for cancer survivors. New health policies could foster more equitable distribution of federal funding across all racial and ethnic groups to mitigate the cancer burden in minority populations. Not only do these disparities impose life-threatening health burdens on minority populations, but they also impose a significant financial toll on the nation. Recent research showed that America's economic burden of health disparities is unacceptably high. This study, funded by the National Institute on Minority Health and Health Disparities, demonstrated that in 2018, racial and ethnic health disparities cost the US economy \$451 billion, a 41% increase from \$320 billion in 2014 [32]. What fraction of these figures is attributable to gastric cancer is unknown. Nevertheless, reducing health disparities in minority populations will mitigate the health burden and help the national economy.

4. Overcoming the Barriers: A Multidimensional Approach

The disparities in the incidence and mortality of gastric cancer and the allocation of federal funding among different racial-ethnic groups have persisted in the US for decades without improvement. The reasons behind these disparities can be many-fold, including a continuous influx of immigrants from countries with high incidences of gastric cancer, genetic predisposition, and dietary habits. In addition, these disparities are associated with unequal social, political, and economic resource distribution and may illustrate a lack of government input or political will toward minority health. It is important that we acknowledge the existing disparities and work towards implementing new policies that can help

mitigate such issues and reduce the burden of gastric cancer.

Gastric cancer disparities are reminiscent of other minority health issues, including chronic hepatitis B (CHB), a major cause of liver cancer and cirrhosis. A significant difference in the prevalence of CHB and its complications across different racial and ethnic groups has long been recognized in the US. For example, while 5% - 10% of Asian Americans have HBV infection, only 0.2% of NHW Americans are infected [33] [34]. CHB has been significantly underdiagnosed and undertreated [35]. The obstacles to screening and treatment for CHB are numerous and complex, including a lack of awareness about the disease, language and cultural barriers, and financial challenges [36] [37]. US public health systems are often ill-equipped to cater to the needs of diverse populations [38] [39]. Moreover, poor communication exists between healthcare providers and patients from different cultural, ethnic, or racial backgrounds, causing inadequate healthcare access for minority groups. Despite extensive documentation of CHB and its complications in immigrant populations over the decades, it was not until 2014 that the USPSTF released a grade B recommendation for screening individuals at high risk for HBV infection [40].

Grassroots Action

Solving health disparities in ethnic minority populations can be challenging because of numerous obstacles at different levels, including socioeconomic, cultural, linguistic, and political. Understanding these barriers and how they relate to each other is crucial before proposing any solutions. Moreover, it is essential to consider any past experiences in addressing health disparities.

We propose that a successful gastric cancer campaign should have three following specific objectives. First, it should increase public awareness of gastric cancer and its disparities. The campaign should prioritize accessible gastric cancer screening for high-risk populations with a focus on equity. We need a multi-faceted grassroots approach involving communities, physicians and other healthcare professionals, and policymakers to achieve these goals. The primary community component would be education, increasing awareness of gastric cancer and its risk in specific populations. It is crucial to spread information to the affected ethnic minority populations, where language, culture, and financial barriers may preclude them from accessing appropriate care. Poor health literacy has been well documented as a key hindering factor in accessing care in immigrant populations [41]. As awareness increases, at-risk patients are more likely to make appropriate health decisions and request surveillance from their primary care physicians.

Second, it is essential to reach out to physicians in the community. They need to know the level of risk their communities have in developing gastric cancer. This could be through seminars and forums for physicians with the most frequent contacts with at-risk ethnic communities, including Asian and Hispanic Americans. In addition to updating physicians on gastric cancer disparities, screening, treatments, and monitoring, these educational activities can help motivate providers to participate in community outreach. Updated with the heigh-

tened risk of gastric cancer in specific ethnic groups, physicians are also likely to be more attentive to the need for screening for gastric cancer in these populations. For instance, physicians can also advocate for the changes needed to promote the health of their patients, communities, and society at large.

Patient advocacy is another excellent example of how we can engage with the community. Collaborating with patient advocacy groups is crucial to support patients and their families. Such collaborations help providers gain insights into patients' conditions by better understanding their lives. Additionally, they help inform the community about advances in current therapy and work towards dispelling misinformation, stigma, and discrimination associated with gastric cancer.

To achieve these goals, it is necessary to foster strategic partnerships with key community organizations that promote community ownership and sustained campaign engagement. We have seen this approach succeed in other contexts. From 2007 to 2017, we led a community-based health screening and education campaign in NY and NJ Asian American communities, which helped to reduce CHB-related health disparities. This large-scale community-based Hepatitis B Screening and Awareness Campaign led by Center for Viral Hepatitis (CVH) [37] [42], devoted to promoting CHB screening and linkage to care in Asian American community, provided an effective model for screening and linkage to care in ethnic minority populations [43] [44]. CVH established collaborative relationships with local hospitals, community organizations, and physicians to work cooperatively in a multidisciplinary manner to foster the highest quality of care for screening, education, screening, and linkage to care for the individuals chronically infected with HBV. This concept is not confined to infectious diseases and can also be applied to the gastric cancer awareness campaign.

Thirdly, we propose involving local and federal governments in reducing these health disparities. To determine how future government legislation might affect health equity, it may be necessary to conduct an equity audit of current policies. This would involve asking several questions, such as whether the data collected on the nation's health disparities are accurate and complete and whether these data are being used to distribute the relevant portions of the budget proportionately. By doing so, we can gain insight into how previous policies may have contributed to health disparities and identify new policies that can be implemented to reduce them.

Improving health equity cannot be achieved by the government's health agencies alone. The key to achieving health equity is to engage communities by seeking their input, listening to their needs, and collaborating with them. It is crucial to incorporate community perspectives in the policy-making process.

5. Conclusions

Gastric cancer has a disproportionately negative impact on minority groups in the US, particularly Asian Americans and Hispanic Americans, as compared to NHW. The incidence of gastric cancer in some Asian American groups aged 50

and above is similar to the incidence of colon cancer in the general American population, which has access to universal screening. Despite the persistently high incidence and mortality from gastric cancer among these minority groups, the federal funding allocated to gastric cancer research is significantly lower than funding for other types of cancers found more commonly in NHW. This health disparity may increase with expected immigration-related minority population rise in the US.

Developing a strategy that focuses on facilitating more research, screening for gastric cancer, and making primary prevention more accessible in high-risk populations is a vital step in the right direction. There should also be greater transparency in the process by which research funds are distributed. It will be pivotal to allocate more funds for basic and clinical research and studies on the cost-effectiveness of regular screening for gastric cancer in high-risk populations while considering the expected increase in these populations. The goal in fund allocation is not to distribute research dollars in some manner that reflects a mathematical calculation of ratios and percentages but, in making such decisions, to factor in the vulnerabilities of patients whose risk profiles differ from those of the majority.

In addition, a multidimensional grassroots campaign involving the community, healthcare professionals, and policymakers may be required to encourage local and national governments to implement strategies for gastric cancer screening in these minority populations. Such a collective action to reduce disparity described in this report may also be effectively implemented in other ethnic populations to address their health disparities.

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Author Contributions

Both authors conceived of the study, participated in the review of the literature, and drafted the manuscript. All authors read and approved the final manuscript.

Data Availability Statement

The data used and/or analyzed in the current review are available from the references.

Conflicts of Interest

The authors declare that there are no conflicts of interest.

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