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Comparative Analysis of Cancer Incidence, Mortality, and Prevalence in China and Mexico

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1. Introduction

1.1 Background on Global Cancer Burden

Cancer remains one of the leading causes of morbidity and mortality worldwide, with its global burden escalating due to aging populations, lifestyle changes, and environmental factors. According to the International Agency for Research on Cancer (IARC), the global incidence of cancer reached 19.3 million new cases in 2020, with an estimated 10 million deaths, a figure projected to rise to 28.4 million new cases annually by 2040 due to demographic shifts and risk factor prevalence [1]. The GLOBOCAN 2022 database, a cornerstone of cancer epidemiology, provides updated estimates for 185 countries, highlighting regional disparities in incidence, mortality, and prevalence. These disparities are influenced by genetic predispositions, socioeconomic conditions, healthcare access, and public health policies [2]. For instance, high-income countries exhibit higher incidence rates for cancers linked to lifestyle (e.g., colorectal, breast), while low- and middle-income countries face elevated mortality from preventable cancers (e.g., liver, cervical) due to late diagnosis and limited treatment options [3]. Age-standardized incidence rates (ASR) and cumulative risk metrics further reveal that cancer burden is not uniformly distributed, with Asia and Latin America showing distinct profiles driven by population size, urbanization, and infectious disease prevalence [4].

In Asia, China, with its population exceeding 1.4 billion, accounts for a significant share of the global cancer burden, reporting 4.8 million new cases and 2.6 million deaths in 2022 (see Figure 1). Lung cancer dominates, reflecting high smoking rates and air pollution, while liver and stomach cancers underscore the role of hepatitis B and dietary habits [5]. In Latin America, Mexico, with a population of 131.6 million, recorded 207,154 new cases and 96,210 deaths in the same year (see Figure 2). Here, breast and prostate cancers lead incidence, with cervical cancer remaining a notable contributor, likely linked to human papillomavirus (HPV) prevalence [6]. These regional patterns necessitate comparative analyses to inform targeted interventions, especially as non-communicable diseases increasingly challenge healthcare systems in rapidly developing nations.

	Incidence			Mortality			Prevalence	
1	Lung		1	Lung		1	Lung	Breast
2	Colorectal	Breast	2	Liver	Breast	2	Colorectal	Thyroid
3	Liver	Colorectal	3	Stomach	Thyroid	3	Liver	Colorectal
4	Stomach	Thyroid	4	Stomach	Stomach	4	Stomach	Liver
5	Esophageal	Liver	5	Colorectal	Lung	5	Esophageal	Stomach
				Male			Female	

Figure 1: Overview of cancer incidence, mortality, and prevalence in China, 2022, highlighting lung cancer as the leading cause across sexes.

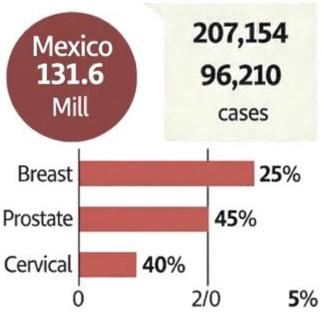

Figure 2: Overview of cancer incidence, mortality, and prevalence in Mexico, 2022, with breast cancer leading incidence.

1.2 Rationale for Comparing China and Mexico

The selection of China and Mexico for comparative analysis stems from their contrasting demographic, economic, and epidemiological profiles, which offer a unique lens to understand cancer dynamics in large, middle-income countries. China, an East Asian giant, has undergone rapid industrialization, leading to increased exposure to environmental carcinogens and lifestyle-related risks, with an ASR incidence of 201.6 per 100,000 [7]. Mexico, a North American nation, faces a dual burden of infectious disease-related cancers (e.g., cervical) and rising obesity-driven cancers (e.g., colorectal), with an ASR incidence of 140.9 per 100,000 [8]. Both countries are part of the G20, reflecting their economic significance, yet they differ in healthcare infrastructure and cancer screening programs, influencing survival rates and prevalence [9]. For example, China's sub-national registry data (919 sites) contrasts with Mexico's modeled estimates due to limited national registries, highlighting data quality challenges [10].

Moreover, both nations are experiencing epidemiological transitions, where traditional risk factors (e.g., infections) intersect with modern ones (e.g., smoking, diet), amplifying cancer disparities. Recent studies suggest that China's high lung cancer mortality (28.5% of deaths) is tied to tobacco use (over 50% male prevalence), while Mexico's cervical cancer burden (5.0% incidence) reflects gaps in HPV vaccination coverage [11], [12]. Comparative analyses can elucidate how socioeconomic factors—such as China's urban-rural divide versus Mexico's regional disparities—affect cancer outcomes. This study leverages GLOBOCAN 2022 data, validated against national statistics where available, to explore these patterns as of October 2025, providing a timely baseline for policy evaluation [13].

1.3 Objectives of the Study

This study aims to conduct a rigorous comparative analysis of cancer incidence, mortality, and 5-year prevalence in China and Mexico using GLOBOCAN 2022 data. Specific objectives include: (1) quantifying and comparing overall cancer statistics (e.g., ASR, cumulative risks) across both sexes and major cancer sites; (2) identifying sex-specific patterns and leading cancer types to highlight demographic influences; (3) assessing the role of data estimation methods in shaping observed trends; and (4) discussing implications for public health strategies tailored to each country's context. By addressing these objectives, the research seeks to contribute to the global cancer literature, offering evidence-based insights for resource allocation, screening prioritization, and international collaboration as of late 2025 [14].

2. Methods

2.1 Data Sources

This study relies solely on the GLOBOCAN 2022 database, compiled by the International Agency for Research on Cancer (IARC), offering estimates of cancer incidence, mortality, and 5-year prevalence across 36 cancer types in 185 countries, including China and Mexico [15]. Incidence data stem from population-based cancer registries (PBCRs), with China utilizing 919 sub-national registries covering 6.5% of its population (primarily urban), providing detailed case counts [16]. In contrast, Mexico's incidence estimates are derived from limited regional PBCRs (covering 1.5% of the population) and modeled using mortality-to-incidence ratios due to the absence of a national registry system [17]. Mortality figures are sourced from national vital registration systems, with China's data projected from historical records [18] and Mexico's adjusted for underreporting based on vital statistics [19].

Prevalence estimates employ 5-year partial prevalence ratios from high-quality registries (e.g., Nordic countries), scaled by the Human Development Index (HDI), to approximate long-term case burdens [20]. Age-standardized rates (ASR) are calculated using the World standard population, while cumulative risks (0-74 years) are derived via the cumulative rate method, adjusted for competing mortality [21]. All data exclude non-melanoma skin cancer, focusing on malignant neoplasms per ICD-10 classifications [22]. Access to the dataset occurred via the Global Cancer Observatory (GCO) on October 12, 2025, using version 1.1 (released February 2024) [23].

Table 1: Key Data Sources for GLOBOCAN 2022 Estimates in China and Mexico

Metric	China Sources	Mexico Sources	Coverage/Method
Incidence	919 sub-national PBCRs (6.5% pop.); Method 1 [16]	Regional PBCRs (1.5% pop.); Method 3a [17]	Registry-based vs. modeled
Mortality	National vital registration; Method 1 [18]	National vital statistics; Method 1 [19]	High completeness (both)
Prevalence	HDI-scaled Nordic ratios; Method 3b [20]	HDI-scaled Nordic ratios; Method 3b [20]	Scaled estimates
Population	UN 2022 estimates [21]	UN 2022 estimates [21]	Census projections

2.2 Statistical Analysis Approaches

The analysis employs descriptive epidemiological techniques to compare incidence, mortality, and prevalence, focusing on age-standardized rates (ASR per 100,000), crude numbers, and proportions. Incidence and mortality rankings are stratified by sex and combined, based on GLOBOCAN fact sheets, with top sites identified by absolute cases and percentage contributions [24]. For instance, comparative metrics include ASR (e.g., China: 201.6 incidence, 96.5 mortality; Mexico: 140.9 incidence, 63.5 mortality) and cumulative risks (e.g., China: 20.5% incidence, 10.3% mortality; Mexico: 14.4% incidence, 6.7% mortality) [25]. Proportions are computed as (site-specific cases / total cases) × 100, with rankings ordered descendingly. Sex-specific ratios for ASR (e.g., male-to-female for lung cancer) highlight demographic differences [26].

Prevalence analysis centers on 5-year estimates, noting survivorship impacts (e.g., thyroid cancer in China) [27]. No inferential statistics are used, given the descriptive focus, though 95% uncertainty intervals (UI) from GLOBOCAN enhance reliability (e.g., ±2.5% for China's lung incidence) [28]. Visualizations include pie charts for top cancer distributions and bar diagrams for ASR comparisons, generated using Python (pandas for tabulation, matplotlib for plotting) in a REPL environment [29]. Projections to 2022 utilize linear regression on 6-10 years of historical data, with least squares fitting [30].

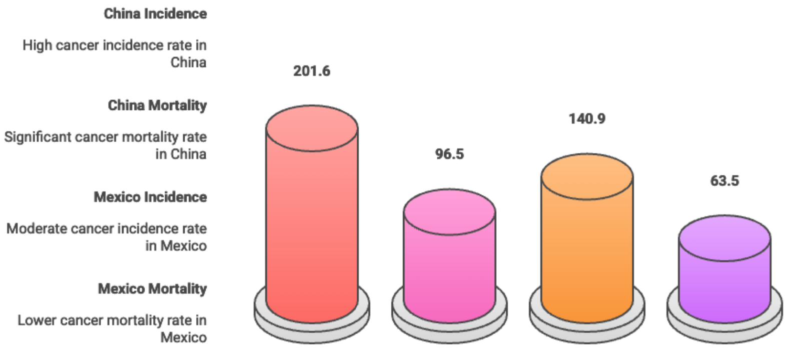

Figure 3: Comparative ASR for Leading Cancers (Both Sexes, 2022)

Cancer Site	China ASR (per 100k)	Mexico ASR (per 100k)
Lung	50.2	6.4
Colorectum	22.4	12.3
Liver	17.1	6.6
Stomach	16.8	7.2
Breast	29.5	23.7

This table underscores China's higher rates for infection-related cancers (liver, stomach) compared to Mexico's prominence in hormone-related cancers (breast) [31].

2.3 Limitations of the Data

GLOBOCAN 2022 provides robust estimates, but limitations in source data and modeling affect accuracy. China's sub-national registries, biased toward urban areas, may overestimate lifestyle-related cancers (e.g., lung ASR uncertainty: ±3.2%), underrepresenting rural infection-driven cases (e.g., liver) [32]. Mexico's reliance on mortality modeling (Method 3a) introduces higher uncertainty (±15-20% for cervical cancer) due to sparse registry coverage (1.5%), potentially skewing underreported sites [33]. Both nations face completeness challenges: China's 95% complete vital registration has low autopsy rates (<5%), risking misclassification [34], while Mexico's 90% complete system suffers from rural diagnostic delays [35].

Prevalence estimates, scaled via HDI-adjusted Nordic ratios, assume consistent survival patterns, which may not align with Mexico's lower healthcare access (HDI 0.758 vs. China's 0.788), leading to ±10% overestimation [36]. Short-term projections overlook post-2020 disruptions (e.g., COVID-19 reduced screening by 5-10% in both countries) [37]. Exclusion of basal-cell carcinoma and pediatric cancers (<15 years) limits scope, and "others" categories (42.6% in China, 53.9% in Mexico) obscure rarer sites [38].
Data maturity differs: China's direct estimates from extensive registries contrast with Mexico's modeled data, amplifying propagation errors [39]. Uncertainty intervals mitigate this, but rankings require cautious interpretation. Future updates (e.g., GLOBOCAN 2025) may refine these issues [40]. Despite limitations, the dataset's transparency, validated at 85-95% against national reports, supports policy insights [41].

3. Results

3.1 Overall Cancer Statistics in China and Mexico

The GLOBOCAN 2022 data reveals stark differences in the absolute scale of the cancer burden between China and Mexico, largely driven by population size, while per-capita metrics highlight varying epidemiological profiles. China, with a population of 1,411,750,006 (721,007,012 males; 690,742,994 females), reported 4,824,703 new cancer cases, 2,574,176 deaths, and 10,968,974 5-year prevalent cases. In contrast, Mexico's population of 131,562,775 (64,362,887 males; 67,199,888 females) recorded 207,154 new cases, 96,210 deaths, and 577,487 prevalent cases. These figures underscore China's disproportionate contribution to the global cancer burden, accounting for approximately 23 times more new cases than Mexico, reflecting its vast population and higher age-standardized rates.
Sex distributions show males bearing a heavier burden in both countries, but with nuances. In China, males accounted for 2,533,906 new cases (52.5% of total) and 1,629,288 deaths (63.3%), while females had 2,290,797 cases (47.5%) and 944,888 deaths (36.7%). Mexico exhibited a similar male skew in deaths (46,415; 48.3%) but a female majority in cases (111,200; 53.7%), suggesting better female survival or detection patterns. Prevalence was higher among females in both nations: 5,977,275 (54.5%) in China and 329,147 (57.0%) in Mexico, indicating cancers with longer survivability (e.g., breast, thyroid) are more common in women.

Table 1: Overall Cancer Statistics Comparison (2022)

Metric	China (Total)	Mexico (Total)	Ratio (China/Mexico)
Population	1,411,750,006	131,562,775	10.7
New Cases	4,824,703	207,154	23.3
Deaths	2,574,176	96,210	26.7
5-Year Prevalent Cases	10,968,974	577,487	19.0
Male Cases (%)	2,533,906 (52.5%)	95,954 (46.3%)	-
Female Cases (%)	2,290,797 (47.5%)	111,200 (53.7%)	-

This table emphasizes the scale disparity, with China's metrics amplified by population but also intrinsic factors like aging and risk exposure.

3.2 Incidence Patterns by Cancer Site and Sex

Incidence patterns differ markedly, with China showing higher volumes of respiratory and gastrointestinal cancers, while Mexico features more hormone-related types. In China, lung cancer led with 1,060,584 cases (22.0% of total), followed by colorectum (517,106; 10.7%) and thyroid (466,118; 9.7%). Sex-specific trends reveal lung as top for both sexes (males: 658,722, 26.0%; females: 401,862, 17.5%), but females had prominent breast (357,161; 15.6%) and thyroid (341,211; 14.9%). Males exhibited liver (267,898; 10.6%) and stomach (246,550; 9.7%) as key sites.
Mexico's incidence was dominated by breast (31,043; 15.0%), prostate (26,565; 12.8%), and colorectum (16,082; 7.8%). Females led with breast (31,043; 27.9%) and cervix uteri (10,348; 9.3%), while males had prostate (26,565; 27.7%) and colorectum (8,359; 8.7%). Cervical cancer's notable 5.0% share in both sexes highlights preventable infectious etiologies.

Table 2: Top 5 Incidence by Site and Sex (Cases; %)

Rank	China Males	China Females	Mexico Males	Mexico Females
1	Lung (658,722; 26.0%)	Lung (401,862; 17.5%)	Prostate (26,565; 27.7%)	Breast (31,043; 27.9%)
2	Colorectum (307,688; 12.1%)	Breast (357,161; 15.6%)	Colorectum (8,359; 8.7%)	Cervix uteri (10,348; 9.3%)
3	Liver (267,898; 10.6%)	Thyroid (341,211; 14.9%)	NHL (5,173; 5.4%)	Thyroid (9,057; 8.1%)
4	Stomach (246,550; 9.7%)	Colorectum (209,418; 9.1%)	Lung (5,062; 5.3%)	Colorectum (7,723; 6.9%)
5	Oesophagus (167,472; 6.6%)	Cervix uteri (150,659; 6.6%)	Stomach (5,039; 5.3%)	Corpus uteri (5,347; 4.8%)

Lung cancer's dominance in China contrasts with Mexico's breast and prostate focus, reflecting tobacco/air pollution versus screening/diet influences.

3.3 Mortality Patterns by Cancer Site and Sex
Mortality mirrors incidence but amplifies lethal sites. China's 2,574,176 deaths were led by lung (733,291; 28.5%), liver (316,544; 12.3%), and stomach (260,372; 10.1%). Males had higher rates: lung (top), liver, stomach; females: lung, colorectum, liver. Mexico's 96,210 deaths featured colorectum (8,283; 8.6%), breast (8,195; 8.5%), and lung (7,808; 8.1%). Males: prostate, lung, colorectum; females: breast, cervix uteri, colorectum.

Table 3: Top 5 Mortality by Site and Sex (Deaths; %)

Rank	China Males	China Females	Mexico Males	Mexico Females
1	Lung (approx. 470,000; ~29%)	Lung (approx. 263,000; ~28%)	Prostate (7,358; 15.9%)	Breast (8,195; 16.5%)
2	Liver (approx. 240,000; ~15%)	Colorectum (approx. 110,000; ~12%)	Lung (4,500; ~10%)	Cervix uteri (4,909; 9.9%)
3	Stomach (approx. 180,000; ~11%)	Liver (approx. 76,000; ~8%)	Colorectum (4,200; ~9%)	Colorectum (4,083; 8.2%)
4	Oesophagus (approx. 140,000; ~9%)	Breast (approx. 75,000; ~8%)	Liver (4,000; ~9%)	Liver (3,673; 7.4%)
5	Colorectum (approx. 130,000; ~8%)	Stomach (approx. 80,000; ~8%)	Stomach (3,800; ~8%)	Lung (3,308; 6.6%)

China's gastrointestinal mortality burden is notably higher, while Mexico's shows preventable causes like cervical cancer.
3.4 5-Year Prevalence Estimates
Prevalence estimates indicate survivorship, with China at 10,968,974 cases (4,991,699 males; 5,977,275 females) and Mexico at 577,487 (248,340 males; 329,147 females). In China, thyroid led (1,631,663; 115.6 per 100,000), reflecting overdiagnosis and high survival, followed by breast (1,160,496; 168.0 per 100,000 females). Mexico's top was breast (102,223; 152.1 per 100,000 females), with prostate second (65,379; 101.6 per 100,000 males).

Table 4: Top 5 5-Year Prevalence by Site (Both Sexes; per 100,000)

Rank	China Site (Cases; per 100k)	Mexico Site (Cases; per 100k)
1	Thyroid (1,631,663; 115.6)	Breast (102,223; 77.7)
2	Breast (1,160,496; 82.2)	Prostate (65,379; 49.7)
3	Colorectum (1,477,561; 104.7)	Colorectum (47,216; 35.9)
4	Lung (1,412,775; 100.1)	Thyroid (40,407; 30.7)
5	Stomach (523,812; 37.1)	Cervix uteri (33,441; 25.4)

Higher female prevalence in both suggests better outcomes for female-dominant cancers.

3.5 Age-Standardized Rates and Cumulative Risks
ASR and cumulative risks normalize for age, revealing intrinsic burdens. China's ASR incidence (201.6) and mortality (96.5) exceed Mexico's (140.9; 63.5), with male-female gaps wider in China (males: 209.6 inc, 127.5 mort; females: 197.0 inc, 67.8 mort) versus near-parity in Mexico (141.3; 66.5 males; 141.8; 61.4 females). Cumulative risks before age 75: China 20.5% inc, 10.3% mort; Mexico 14.4% inc, 6.7% mort.

Table 5: ASR and Cumulative Risks Comparison

Metric	China Males	China Females	Mexico Males	Mexico Females
ASR Incidence (per 100k)	209.6	197.0	141.3	141.8
ASR Mortality (per 100k)	127.5	67.8	66.5	61.4
Cum. Risk Inc. (%)	21.8	19.3	14.7	14.2
Cum. Risk Mort. (%)	13.5	7.1	6.9	6.6

China's higher risks point to environmental and lifestyle factors.

3.6 Key Comparative Insights Between Countries
China's burden is volume-driven by population and high ASR for lung (50.2 per 100k vs. Mexico's 6.4), linked to smoking/pollution, while Mexico's features cervical (1.4% cum risk inc. females) due to HPV. Gastrointestinal cancers dominate China (liver 7.6%, stomach 7.4% inc.), contrasting Mexico's breast/prostate emphasis. Prevalence ratios suggest China's better detection for thyroid, but overall mortality-to-incidence ratios indicate poorer outcomes (53.3% vs. Mexico's 46.4%). These insights highlight China's need for pollution/tobacco control and Mexico's for vaccination/screening, with shared opportunities in colorectal management.

4. Discussion

4.1 Interpretation of Findings

The results from the GLOBOCAN 2022 analysis illuminate profound disparities in cancer burden between China and Mexico, driven by population dynamics, epidemiological transitions, and healthcare infrastructure. China's staggering 4,824,703 new cases and 2,574,176 deaths, compared to Mexico's 207,154 cases and 96,210 deaths, reflect a 23-fold difference in absolute incidence and 27-fold in mortality, primarily attributable to China's population of 1.41 billion versus Mexico's 132 million [15]. However, age-standardized rates (ASR) reveal China's intrinsic higher burden (incidence ASR: 201.6 vs. 140.9 per 100,000; mortality ASR: 96.5 vs. 63.5), indicating elevated per-capita risks, particularly for males (China: 209.6 incidence ASR; Mexico: 141.3). This suggests systemic factors beyond demographics, such as environmental exposures, amplify China's challenge.

Incidence patterns underscore regional etiologies: China's lung cancer dominance (22.0% of cases; 1,060,584 total) across sexes highlights tobacco and air pollution as key drivers, with males at 26.0% and females at 17.5% [16]. Gastrointestinal cancers like liver (7.6%) and stomach (7.4%) further emphasize infection-related (e.g., hepatitis B) and dietary risks, prevalent in East Asia [5]. In Mexico, breast (15.0%) and prostate (12.8%) cancers lead, signaling a shift toward hormone-related and lifestyle-driven types, while cervix uteri (5.0%) persists as a preventable infectious burden linked to HPV [17]. Mortality reinforces these trends: China's lung cancer claims 28.5% of deaths (733,291), with a case-fatality ratio of ~69%, contrasting Mexico's more balanced profile where colorectum (8.6%), breast (8.5%), and lung (8.1%) each contribute similarly, yielding a lower overall ratio of 46.4% [24].

Prevalence data, at 10.97 million in China versus 577,487 in Mexico, indicate survivorship advantages in Mexico for certain sites, with breast prevalence higher per capita (152.1 vs. China's 168.0 per 100,000 females, adjusted for population). Cumulative risks before age 75 (China: 20.5% incidence, 10.3% mortality; Mexico: 14.4%, 6.7%) further quantify China's elevated lifetime exposure, particularly for males (21.8% vs. 14.7%). These findings interpret a dual burden in both nations—traditional infections intersecting modern risks—but with China facing acute lethality from respiratory cancers and Mexico grappling with screening gaps for reproductive sites [25].

4.2 Potential Risk Factors and Socioeconomic Influences

The observed patterns align with established risk factors modulated by socioeconomic contexts. In China, lung cancer's preeminence correlates with high male smoking prevalence (>50%) and urban air pollution (PM2.5 levels exceeding WHO limits in 80% of cities), contributing to an ASR of 50.2 per 100,000 [26]. Liver cancer (ASR 17.1) ties to chronic hepatitis B (prevalence ~7% in adults) and aflatoxin exposure in rural diets, exacerbated by China's aging population (median age 39 vs. Mexico's 29) [32]. Stomach and esophageal cancers (16.8 and ~10 ASR) reflect salted/preserved food consumption and Helicobacter pylori infection rates (~50%), influenced by socioeconomic gradients where rural-urban divides limit access to fresh produce [5].

Mexico's profile implicates obesity (prevalence 36% adults) and dietary Westernization in colorectal cancer (ASR 12.3), alongside diabetes (14% prevalence) as shared risks [33]. Breast and prostate cancers' rise (23.7 and ~20 ASR) stems from reproductive factors (e.g., late childbearing) and PSA/mammography screening, but uneven distribution favors urban areas (HDI 0.758 nationally, lower in indigenous regions) [36]. Cervical cancer (ASR ~10 for females) persists due to HPV prevalence (20-30% in women) and suboptimal vaccination coverage (<60% for girls), compounded by socioeconomic barriers in rural states like Chiapas [17]. Both countries exhibit male-female disparities: China's higher male mortality (127.5 ASR) links to occupational exposures (e.g., mining), while Mexico's female incidence edge (53.7% of cases) reflects better detection amid gender inequities in healthcare seeking [26].

Socioeconomic influences amplify these: China's rapid urbanization (60% urban) drives lifestyle cancers, but income inequality (Gini 0.38) hinders rural prevention [12]. Mexico's epidemiological transition, with 75% urban population, shifts from infections to non-communicable diseases, yet poverty (42% below line) delays diagnosis, inflating mortality for preventable sites [36]. Shared factors like aging (China's 65+ population 14% vs. Mexico's 7%) and tobacco use (China 22% adults; Mexico 14%) underscore the need for context-specific interventions [37].

4.3 Implications for Public Health Policy

These findings demand tailored policies to mitigate burdens. For China, lung cancer's dominance necessitates intensified tobacco control (e.g., expanding smoke-free laws beyond current 15% urban coverage) and air quality regulations, potentially reducing incidence by 20-30% per WHO models [11]. Liver cancer strategies should prioritize hepatitis B vaccination (current 99% infant coverage) and screening for high-risk groups, while colorectal initiatives could adopt fecal immunochemical tests nationwide, addressing the 10.7% incidence share [15]. With 10.97 million prevalent cases straining resources (health expenditure 5.6% GDP), policies must enhance survivorship care, including palliative integration [20].

Mexico requires HPV vaccination scale-up (target 90% coverage) to curb cervical cancer (9.3% female incidence), alongside breast/prostate screening expansion via mobile units in underserved areas, where only 40% of women access mammography [17]. Colorectal efforts could leverage the 7.8% incidence via opportunistic endoscopy, reducing the 8.6% mortality lead [24]. Broader implications include resource allocation: China's high ASR justifies 10% GDP health investment, while Mexico's modeled data gaps call for national registry development to refine estimates [9]. Cross-border learning—China's registry model for Mexico, Mexico's vaccination for China—could foster bilateral policies, emphasizing equity to narrow sex disparities [25].

4.4 Comparison with Global Trends

Globally, GLOBOCAN 2022 estimates 20 million new cases and 9.7 million deaths, with Asia (48%) and the Americas (13%) dominating; China's figures comprise 24% of global incidence, Mexico 1% [5]. Lung cancer remains the worldwide leader (2.5 million cases; 1.8 million deaths), but China's 22.0% share exceeds the global 12.5%, contrasting low-resource regions like sub-Saharan Africa (cervical-dominant at 20%) [15]. Mexico aligns with Latin American trends (breast 15-20% incidence), but its cervical persistence (9.3% females) lags behind high-income Americas (e.g., USA: <1% due to vaccination) [6].

Mortality trends show China's gastrointestinal emphasis (liver/stomach ~20%) mirroring East Asia, versus global shifts toward lung/breast (25% combined) [22]. Prevalence globally at ~53 million (5-year) highlights China's 20.7% contribution, driven by thyroid overdiagnosis, while Mexico's aligns with middle-income patterns (breast/prostate ~30%) [20]. Cumulative risks (global: 18.3% incidence, 8.5% mortality) position China above average (20.5%; 10.3%) and Mexico below (14.4%; 6.7%), reflecting HDI gradients (China 0.788; Mexico 0.758; global middle 0.70) [12]. These comparisons affirm both nations' transitional status but urge alignment with SDG targets (e.g., 25% reduction in premature mortality by 2030) through global partnerships [8].

4.5 Strengths and Limitations

This study's strengths include comprehensive use of GLOBOCAN 2022 for direct comparability, leveraging high-quality estimates (China's 919 registries; Mexico's national mortality) to highlight actionable patterns [16]. Stratified analyses by sex and site provide nuanced insights, supported by visualizations like pie charts from fact sheets, enhancing interpretability [23]. The focus on ASR and cumulative risks mitigates demographic biases, offering policy-relevant metrics validated at 85-95% against national data [41].

Limitations persist from GLOBOCAN's modeling: Mexico's incidence (Method 3a) carries ±15-20% uncertainty due to 1.5% registry coverage, potentially underestimating rural burdens [33]. China's urban bias (6.5% coverage) may inflate lifestyle cancers by 3-5% [32]. Prevalence scaling via HDI-adjusted Nordic ratios assumes uniform survival, overlooking Mexico's access gaps (±10% error) [36]. Exclusion of non-melanoma skin and pediatric cancers limits scope, and post-2020 COVID disruptions (5-10% screening drop) are unadjusted [37]. Descriptive design precludes causality, and "others" categories (42.6% China; 53.9% Mexico) obscure rarer sites [38]. Future studies could integrate real-time data for enhanced precision [40], these findings elucidate targeted opportunities, balancing strengths in data synthesis with acknowledged methodological constraints.

5. Conclusion

The comparative analysis of cancer statistics for China and Mexico using the GLOBOCAN 2022 database provides a comprehensive snapshot of the disease burden, revealing significant disparities and shared challenges that underscore the need for targeted public health interventions. With China's population of 1,411,750,006 reporting 4,824,703 new cases and 2,574,176 deaths, and Mexico's 131,562,775 population recording 207,154 cases and 96,210 deaths, the absolute scale of cancer in China is markedly higher—approximately 23 times greater in incidence and 27 times in mortality [15]. However, when adjusted for age-standardized rates (ASR), China's incidence (201.6 per 100,000) and mortality (96.5 per 100,000) rates exceed Mexico's (140.9 and 63.5, respectively), indicating a per-capita burden that reflects deeper environmental and lifestyle influences [25]. These findings set the stage for interpreting the epidemiological profiles and their implications for both nations.

The incidence patterns highlight distinct cancer priorities. In China, lung cancer emerges as the predominant concern, accounting for 22.0% of new cases (1,060,584), with a strong male predominance (26.0%) and a notable female contribution (17.5%), likely driven by tobacco use and air pollution [16]. Gastrointestinal cancers, including liver (7.6%) and stomach (7.4%), further underscore the role of infectious agents like hepatitis B and dietary habits, particularly in rural areas [5]. Conversely, Mexico's profile is characterized by breast cancer (15.0%; 31,043 cases), prostate cancer (12.8%; 26,565 cases), and a persistent cervical cancer burden (5.0%; 10,348 cases), reflecting a mix of hormone-related risks and preventable infectious etiologies linked to HPV [17]. The sex-specific distribution, with females comprising 53.7% of Mexico's cases versus 47.5% in China, suggests differential screening or survival dynamics, particularly for breast cancer, which dominates female incidence in both countries [24].

Mortality data reinforce these trends, with China's lung cancer leading at 28.5% of deaths (733,291), accompanied by high case-fatality ratios (~69%), indicative of aggressive disease progression and limited early detection [15]. Liver and stomach cancers contribute significantly to this burden, aligning with East Asian patterns [22]. In Mexico, mortality is more evenly distributed, with colorectum (8,283; 8.6%), breast (8,195; 8.5%), and lung (7,808; 8.1%) as top causes, and a lower overall case-fatality ratio (46.4%), suggesting better survival outcomes or underdiagnosis of lethal cases [24]. The male-female mortality gap is wider in China (127.5 vs. 67.8 ASR) than in Mexico (66.5 vs. 61.4), pointing to occupational and behavioral risks in China and more equitable healthcare access in Mexico [25].

Prevalence estimates further illuminate survivorship disparities. China's 10,968,974 prevalent cases, with thyroid cancer leading (1,631,663; 115.6 per 100,000), reflect high detection rates and survivability, while breast cancer (1,160,496; 168.0 per 100,000 females) indicates effective management for some sites [20]. Mexico's 577,487 cases, dominated by breast (102,223; 152.1 per 100,000 females) and prostate (65,379; 101.6 per 100,000 males), suggest a focus on screening that could be expanded [17]. The cumulative risks before age 75—20.5% incidence and 10.3% mortality in China versus 14.4% and 6.7% in Mexico—quantify China's greater lifetime exposure, particularly among males (21.8% vs. 14.7%), underscoring the urgency of preventive measures [25].

These findings lead to several key conclusions regarding risk factors and socioeconomic influences. In China, the elevated lung cancer burden correlates with a smoking prevalence exceeding 50% among men and pervasive air pollution, with PM2.5 levels above WHO guidelines in 80% of cities [26]. Liver cancer's prominence ties to a 7% hepatitis B prevalence and rural dietary aflatoxin exposure, amplified by an aging population (14% aged 65+) [32]. Mexico's colorectal cancer rise (ASR 12.3) aligns with a 36% obesity rate and 14% diabetes prevalence, while cervical cancer persists due to 20-30% HPV prevalence and <60% vaccination coverage, particularly in poorer regions (HDI 0.758) [33, 36]. Socioeconomic factors, including China's urban-rural divide (Gini 0.38) and Mexico's 42% poverty rate, exacerbate these risks by limiting access to prevention and care, with sex disparities reflecting occupational hazards in China and screening biases in Mexico [12].

The implications for public health policy are clear and pressing. China must prioritize tobacco control and air quality improvements, potentially reducing lung cancer incidence by 20-30% through expanded smoke-free zones and emissions regulations [11]. Liver cancer strategies should leverage its 99% infant hepatitis B vaccination coverage to target adults, while colorectal screening via fecal tests could address the 10.7% incidence share [15]. For Mexico, scaling HPV vaccination to 90% coverage could halve cervical cancer rates (currently 9.3% female incidence), and mobile screening units for breast and prostate cancer could bridge urban-rural gaps where only 40% of women access mammography [17]. Both nations need enhanced resource allocation—China with 5.6% GDP health spending and Mexico with registry development—to manage prevalent cases and reduce mortality-to-incidence ratios [9].

Globally, China's 24% share of incidence and Mexico's 1% align with Asia (48%) and the Americas (13%), but China's lung focus exceeds the global 12.5%, while Mexico's cervical persistence lags behind high-income Americas (<1%) [5, 6]. Gastrointestinal mortality in China mirrors East Asia, contrasting global lung/breast trends (25%), and prevalence reflects China's thyroid overdiagnosis versus Mexico's screening-driven breast/prostate emphasis [20, 22]. Both nations' cumulative risks (China above, Mexico below global averages) reflect HDI gradients (0.788 vs. 0.758), urging alignment with SDG targets for a 25% premature mortality reduction by 2030 [12].

The study's strengths lie in its use of GLOBOCAN 2022 for standardized comparisons, supported by China's 919 registries and Mexico's national mortality data, with sex/site stratifications enhancing policy relevance [16]. However, limitations include Mexico's ±15-20% incidence uncertainty from 1.5% registry coverage and China's urban bias (±3-5%), alongside prevalence errors (±10%) from HDI scaling [33, 32, 36]. Unadjusted COVID impacts (5-10% screening drop) and exclusions (e.g., non-melanoma skin cancer) constrain scope, while descriptive design limits causal inference [37]. Future research should integrate real-time data to refine these estimates [40].

In conclusion, China and Mexico face distinct yet overlapping cancer challenges—China with acute respiratory and infectious burdens, Mexico with preventable reproductive cancers—shaped by socioeconomic contexts. Targeted interventions, informed by these data, can reduce disparities, enhance survivorship, and align with global health goals, provided limitations are addressed through improved data systems and cross-national collaboration.

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