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GLOBAL DISTRIBUTION OF INCIDENCE, MORTALITY, AND BURDEN OF STOMACH CANCERS AND ITS RELATIONSHIP WITH THE SOCIODEMOGRAPHIC INDEX

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Abstract – *Objective:* *Stomach cancer ranked sixth among the most common cancers in 2020, with approximately 1.1 million new cases and approximately 76,900 deaths. Therefore, estimations of the incidence and mortality, and burden of stomach cancers are needed to plan for cancer control. In this study, the updated distribution of incidence, mortality, and global burden of stomach cancer based on different classifications was investigated according to the Global Burden of Disease (GBD) 2019 Study.*

Materials and Methods: *Epidemiological data have been derived from the study of the GBD in 2019. Data were extracted globally for 204 countries and groups based on a sociodemographic index (SDI), world health organization (WHO) regions, continents, World Bank regions, and 21 GBD regions. The correlations with SDI were investigated by Spearman's rho correlation coefficient and SPSS 2016 software.*

Results: *The global distribution of incidence, mortality, and burden of stomach cancers varies in different geographical areas. Mortality and burden of stomach cancer are related to sociodemographic indicators of countries. No correlation was detected between the incidence of stomach cancer and SDI. Gender is also one of the effective factors in the death and incidence of stomach cancer.*

Conclusions: *Estimating the cancer burden, taking into account both mortality and morbidity, is a key step in prioritizing research and policy. It can also be used to prioritize when combined with data on the cost of cancer interventions.*

KEYWORDS: *Stomach Cancer, Epidemiology, Incidence, Death, Burden.*

INTRODUCTION

Stomach cancer ranked sixth among the most common cancers in 2020, with approximately 1.1 million new cases (5.6% of the total) and approximately 76,900 deaths (7.7% of the total)[1] and is expected to increase to 1.3 million by 2070[2]. Stomach cancer is more common in men[3-5], the 4th most common cancer and the cause of cancer death[1]; and in developed countries, males are 2.2 times more likely to be diagnosed with stomach cancer than females[3]. It is also the seventh most common cancer in wom-

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en and ranks fifth among cancer deaths[1]. The epidemiology of stomach cancer presents a significant geographic heterogeneity, and its incidence varies between 5 and 10 times between high-risk and low-risk countries[6]. In addition, over 50% of stomach cancer cases occur in developing countries[7], with the highest incidence reported in East and Central Asia and Latin America[3,8,9]. Low socioeconomic development is considered a potential risk factor for the occurrence and prognosis of gastric cancer[10,11]; as a positive relationship between the human development index (HDI) and the incidence[9] and mortality rate of gastric cancer rate has been reported. Also, these rates are very high in countries with high HDI[12]. Stomach cancer incidence also varies widely across regions and cultures[3,13], and is one of the cancers that is affected by lifestyle and individual behaviors; therefore, this is one of the avoidable cancers[14].

Although the standardized rates of stomach cancer decreased in most countries[10]; because of the lack of rapid diagnosis and poor prognosis of the disease, it still has a major cancer burden worldwide[15,16].

Possible reasons for the reduction of gastric cancer, especially in Western countries, can be increased access to fresh fruits and vegetables, reduced consumption of canned foods, reduced smoking, treatment of *Helicobacter pylori* infection[17,18], and improved socioeconomic status and noted medical advances[14,19]. While survival rates have generally improved in recent decades, the prognosis remains poor. The five-year survival rate is around 20%, except in countries like Japan and South Korea, where screening is done[6]. The high mortality rate of stomach cancer in developing countries reflects the absence of effective prevention and treatment strategies[20].

Stomach cancer, in addition to death and disability, causes many issues for society and the individual. Problems such as anxiety, depression, and stress are common among patients with gastric cancer[21-24]. Patients suffer less well-being; worse nausea, vomiting, and constipation than patients with other gastrointestinal diseases. Illness management also increases the economic burden on individuals and society relative to other cancers, and these costs are increasing[17].

The main reason for the difference in epidemiological indicators of disease across regions and countries is differences in the socioeconomic status of societies. Thus, the analysis of cancers in different populations and economic regions around the world can help researchers in conducting clinical and related research. Knowledge of the epidemiological indicators of the disease and its geographical distribution is also essential for effective health planning[25]. Therefore, this study provided the latest information on the geographical distribution of incidence, mortality, and burden of stomach cancer based on various classifications including the SDI, WHO regions, continents, World Bank regions, GBD regions, and countries in 2019. In addition, the correlation of these indices with the SDI as a development indicator was presented.

MATERIALS AND METHODS

Data sources

Age-standardized rate (ASR) incidence, deaths, years of life lost (YLLs), years lived with disability (YLDs), and disability-adjusted life years (DALYs) of stomach cancer were extracted from the online GBD data in 2019. In the GBD, epidemiologic indicators for 369 diseases and injuries in both genders in 204 countries and territories were estimated based on various country divisions: continents, WHO regions, World Bank income level, GBD region, etc.[26,27].

In this study, data were extracted for global, and 204 countries data based on the SDI index, WHO regions, continents, World Bank regions, 21 GBD regions and 7 super regions by sex in 2019 from the Global Health Data Exchange (GHDx). Since this is the calendar year for which the most up-to-date incidence and mortality data are available[28]. These data are available at http://ghdx.healthdata.org. Stomach cancer was defined according to the International Classification of Diseases (ICD)-10 code as C16.0-C16.9[29].

The present study aimed to determine the morbidity, mortality, and burden of stomach cancer to compare these data based on different classifications, and to determine the correlation between age-standardized rates of these indices with the SDI.

SDI is a summary measure that identifies where countries or other geographic areas sit on the spectrum of development. Expressed on a scale from 0 to 1, SDI is a composite average of the rankings of the incomes per capita, average educational attainment, and fertility rates of all areas in the GBD study[30,31]. The World Bank assigns the world's economies to four income groups including low, lower-middle, upper-middle, and high-income countries. The classifications are updated each year on July 1 and are based on gross national income (GNI) per capita in current USD (using the Atlas method exchange rates) of the previous year (i.e. 2020 in this case)[32].

This study was approved by the Ethics Committee of the Birjand University of Medical Sciences (Ethics Committee approval code IR.BUMS.REC.1400.414).

Because we used anonymous electronic data collected on a routine basis, patient consent was not necessary. All procedures were carried out following applicable guidelines and regulations, and no personal information was released or published.

Statistical analysis

Data were expressed as values with a 95% confidence interval (CI). Incidence, deaths, DALYs, YLLs, YLDs, and age-standardized rates were expressed as numbers per 100000population. Selected indicators were described separately for the individual classifications. Using the SPSS software (version 16; SPSS Inc., Chicago, IL, USA) and Spearman's correlation coefficient, we determined the correlation between SDI and age-standardized rates of incidence, death, and DALYs (per 100000 population) to eliminate the influence of different ages in the patient population and ensure the comparability of statistical indicators. Definitions of the terms used are available at https://www.healthdata.org/terms-defined and https://www.healthdata.org/gbd/. A p-value less than 0.05 was considered statistically significant.

RESULTS

Global morbidity of stomach cancer

In 2019, 1269806 (95% CI 1150487_1399817) new cases of stomach cancer were reported worldwide, of which 846872 (95% CI: 748217_963059) among males and 422934 (95% CI: 377415_467083) among females. The age-standardized incidence rate (ASIR) of stomach cancer worldwide was 15.59 (95% CI: 14.11_17.15) per 100000 inhabitants; 22.39 (95% CI: 19.8_25.34) in males and 9.71 (95% CI: 8.67_10.72) in females.

The highest ASIR per 100000 people for stomach cancer has been reported in Mongolia (43.7), Bolivia (Plurinational State of) (34.02), China (30.63), Republic of Korea (28.67, Japan (28.30), Afghanistan (27.69), Guatemala (27.21), San Marino (26.16), Tajikistan (24.01) and Cabo Verde (23.79), respectively.

The lowest ASIR per 100000 peoples for stomach cancer have been reported in Malawi (3.28), Namibia (3.48), Maldives (3.79), Nigeria (3.91), Kuwait (3.94), Philippines (4.38), Saudi Arabia (4.40), Trinidad and Tobago (4.87), Morocco (4.60) and Syrian Arab Republic (4.97), respectively.

Statistics show that the highest ASIR for stomach cancer occurs in countries with High-middle SDI (18.77 per 100000) worldwide and middle SDI (18.68 per 100000). The lowest ASIR occurs in countries with Low SDI (8.38 per 100000). In men, the highest ASIR for stomach cancer occurs in countries with High-middle SDI (28.91 per 100000) and middle SDI (27.24 per 100000). The lowest ASIR occurs in countries with Low SDI (9.89 per 100000). In women, the highest ASIR for stomach cancer occurs in countries with middle SDI (10.98 per 100000) and High-middle SDI (10.45 per 100000). The lowest ASIR occurs in countries with Low SDI (6.97 per 100000).

According to the World Bank classification, the ASIR for stomach cancer is highest in the upper-middle-income category [22.90 (95% CI: 19.98_26.27) per 100000 population] worldwide; 34.82 (95% CI: 29.1_41.35) in males and 12.58 (95% CI: 10.74_14.73) in females. The lowest rates were observed in lower-middle-income countries [7.69 (95% CI: 7.03_8.34) per 100000 population] worldwide; 8.92 (95% CI: 8.05_9.82) in males and 6.59 (95% CI: 5.81_7.42) in females.

Among the continents, the highest ASIR was reported in Asia, then in Europe, while the lowest was observed in Africa worldwide and among men and women.

The highest ASIR for stomach cancer among WHO regions was found in the Western Pacific region (28.43 per 100000 population). The lowest was reported in the South-East Asia Region (7.16 per 100000). For men, the highest ASIR was seen in the Western Pacific region (43.65 per 100000 population) and the lowest was reported in the South-East Asia Region (7.82 per 100000). For women, the highest ASIR was seen in the Western Pacific region (15.10 per 100000 population) and the lowest was reported in the African Region (5.91 per 100000).

In the GBD regions, the highest ASIR is seen in East Asia (30.24 per 100000) and the lowest in the Asia Pacific (28.30 per 100000). For men, the highest ASIR was seen in the Western Pacific region (46.67 per 100000 population) and the lowest was reported in the South-East Asia Region (7.53 per 100000). For women, the highest ASIR was seen in the Andean Latin America region (18.88 per 100000 population) and the lowest was reported in High-income North America (4.20 per 100000). Details are presented in Tables 1, 2 and 3.

Global mortality of stomach cancer

In 2019, 957185 (95% CI: 870949_1034646) death due to stomach cancer was reported worldwide, of which 611504 (95% CI: 543997_678088) among males and 345681 (95% CI: 308388_382491) among females.

Table 1. Stomach cancer incidence cases, age-standardized incidence rate, deaths, age-standardized mortality rate, DALYs, age-standardized DALY rates, YLLs, age-standardized YLLs rates, YLDs, and age-standardized YLDs rates in 2019 (**Both Sexes**).

	Incidence Cases (95% CI)	Incidence ASR per 10^5 (95% CI)	Deaths Cases (95% CI)	Deaths ASR per 10^5 (95% CI)	DALYs Number (95% CI)	DALYs ASR per 10^5 (95% CI)	YLLs Number (95% CI)	YLLs ASR per 10^5 (95% CI)	YLDs Number (95% CI)	YLDs ASR per 10^5 (95% CI)
Global	**1269806** (1150487_1399817)	**15.59** (14.11_17.15)	**957185** (870949_1034646)	**11.88** (10.82_12.82)	**22220980** (20301494_24071758)	**268.40** (245.49_290.61)	**21872432** (19972705_23712517)	**264.15** (241.47_286.03)	**348549** (252331_457637)	**4.25** (3.08_5.57)
SDI										
High SDI	**237763** (209737_260861)	**12.40** (11.06_13.58)	**144790** (128823_154025)	**7.18** (6.5_7.59)	**2579957** (2390872_2704467)	**145.30** (136.59_151.74)	**2509770** (2326769_2628362)	**141.52** (133.16_147.74)	**70187** (50920_90847)	**3.79** (2.76_4.91)
High-middle SDI	**381074** (337343_427240)	**18.77** (16.63_21.04)	**280955** (251409_308752)	**13.85** (12.41_15.21)	**6352750** (5662394_7023401)	**314.06** (280.11_346.89)	**6247741** (5556193_6913601)	**308.87** (274.88_341.87)	**105009** (75749_137812)	**5.18** (3.74_6.81)
Middle SDI	**458221** (398799_527440)	**18.68** (16.35_21.36)	**345270** (305025_387653)	**14.63** (12.98_16.34)	**8273270** (7276662_9296057)	**323.39** (285.17_362.95)	**8147601** (7151107_9182608)	**318.39** (280.47_357.79)	**125669** (89940_167593)	**5.00** (3.59_6.65)
Low-middle SDI	**149186** (136148_163373)	**10.96** (10.01_11.98)	**141956** (130153_154604)	**10.79** (9.86_11.75)	**3773511** (3441556_4132697)	**259.64** (237.33_283.81)	**3736467** (3407394_4089296)	**256.98** (235.16_280.48)	**37044** (26095_48267)	**2.66** (1.89_3.46)
Low SDI	**43188** (38645_48095)	**8.38** (7.57_9.26)	**43876** (39312_48902)	**8.94** (8.09_9.89)	**1233251** (1093359_1390347)	**211.99** (189.09_237.06)	**1222706** (1083908_1377372)	**210.02** (187.28_234.84)	**10545** (7460_13975)	**1.97** (1.41_2.59)
World Bank Income Level										
World Bank High Income	**282306** (249934_310219)	**12.28** (11.01_13.43)	**180396** (161019_191195)	**7.47** (6.78_7.87)	**3230540** (2997837_3381817)	**152.37** (143.75_158.84)	**3148728** (2927126_3287727)	**148.69** (140.62_154.61)	**81811** (59701_105792)	**3.69** (2.66_4.8)
World Bank Upper Middle Income	**770957** (670381_886914)	**22.90** (19.98_26.27)	**563637** (492407_634659)	**17.11** (15.02_19.2)	**13174828** (11463390_14917630)	**384.76** (335.27_435.01)	**12961517** (11260676_14695740)	**378.50** (329.63_428.5)	**213312** (153372_285957)	**6.27** (4.51_8.39)
World Bank Lower Middle Income	**181032** (165895_196723)	**7.69** (7.03_8.34)	**177502** (162431_193898)	**7.83** (7.17_8.53)	**4827340** (4407305_5287577)	**188.89** (172.75_206.55)	**4782544** (4373276_5251077)	**187.04** (171.25_204.8)	**44795** (31821_58379)	**1.85** (1.31_2.41)
World Bank Low Income	**35136** (30309_40115)	**11.31** (9.87_12.78)	**35310** (30607_40201)	**11.90** (10.43_13.4)	**979987** (837653_1134871)	**280.87** (242.61_321.35)	**971452** (829483_1123881)	**278.22** (240.42_318.45)	**8535** (5985_11452)	**2.65** (1.86_3.52)
continents										
Africa	**44283** (39415_49497)	**7.35** (6.57_8.14)	**45172** (40369_50349)	**7.89** (7.11_8.7)	**1203487** (1058246_1357913)	**175.76** (156.46_196.28)	**1192647** (1047819_1344611)	**174.03** (154.74_194.57)	**10841** (7576_14509)	**1.73** (1.22_2.3)
America	**119450** (107218_132960)	**9.45** (8.48_10.52)	**98400** (89928_106385)	**7.73** (7.07_8.35)	**2210281** (2042508_2402062)	**178.82** (165.13_194.59)	**2178733** (2012975_2367945)	**176.30** (162.9_191.8)	**31548** (22351_41352)	**2.51** (1.78_3.29)
Asia	**930100** (821898_1052240)	**19.77** (17.54_22.28)	**672825** (596995_746918)	**14.67** (13.04_16.23)	**15889630** (14119891_17684444)	**324.66** (288.65_360.64)	**15629803** (13874305_17423067)	**319.24** (283.26_354.93)	**259827** (188776_345060)	**5.43** (3.94_7.2)
Europe	**175128** (159372_190013)	**11.58** (10.59_12.54)	**140044** (129205_148256)	**8.98** (8.33_9.5)	**2901766** (2709793_3071790)	**206.13** (193.04_218.36)	**2855652** (2668111_3022639)	**203.00** (190.1_214.9)	**46115** (33440_59604)	**3.13** (2.27_4.06)
WHO Regions										
African Region	**35516** (31359_40398)	**7.56** (6.76_8.51)	**36542** (32299_41283)	**8.18** (7.33_9.14)	**977535** (848659_1122591)	**182.47** (160.35_207.27)	**968877** (840170_1112973)	**180.70** (158.67_205.22)	**8658** (6070_11721)	**1.77** (1.26_2.38)
Eastern Mediterranean Region	**37808** (34127_41790)	**9.30** (8.46_10.21)	**36449** (32798_40518)	**9.46** (8.56_10.4)	**971649** (860851_1097599)	**208.92** (187.36_233.22)	**962293** (852158_1088118)	**206.72** (185.43_231.08)	**9357** (6462_12191)	**2.20** (1.54_2.86)
European Region	**183845** (167875_199161)	**11.70** (10.71_12.64)	**148183** (137230_156764)	**9.19** (8.52_9.71)	**3130625** (2928602_3309267)	**213.07** (199.78_225.35)	**3082329** (2885049_3261766)	**209.92** (196.55_222.17)	**48296** (34961_62488)	**3.15** (2.28_4.08)
Region of the Americas	**119450** (107218_132960)	**9.45** (8.48_10.52)	**98400** (89928_106385)	**7.73** (7.07_8.35)	**2210281** (2042508_2402062)	**178.82** (165.13_194.59)	**2178733** (2012975_2367945)	**176.30** (162.9_191.8)	**31548** (22351_41352)	**2.51** (1.78_3.29)
South-East Asia Region	**123247** (110093_138188)	**7.16** (6.4_7.98)	**121763** (108697_135928)	**7.31** (6.53_8.13)	**3334210** (2950486_3739269)	**181.04** (160.61_202.69)	**3303676** (2924360_3704881)	**179.30** (158.95_200.66)	**30534** (21584_40317)	**1.73** (1.23_2.28)
Western Pacific Region	**767265** (664232_886463)	**28.43** (24.62_32.76)	**513652** (443850_586521)	**19.25** (16.69_21.91)	**11551207** (9885314_13323333)	**423.36** (363.13_486.78)	**11331755** (9665496_13089232)	**415.27** (354.53_478.29)	**219452** (156720_293977)	**8.09** (5.8_10.84)
GBD Region										
East Asia & Pacific - WB	**798492** (696147_919492)	**25.77** (22.47_29.6)	**543546** (473906_617337)	**17.81** (15.53_20.17)	**12313304** (10620376_14082644)	**390.33** (337.62_445.95)	**12085996** (10389546_13887703)	**383.06** (330.57_437.93)	**227308** (162335_304474)	**7.27** (5.21_9.71)
East Asia	**626489** (526591_741267)	**30.24** (25.55_35.54)	**432991** (364163_504145)	**21.51** (18.23_24.95)	**10102781** (8469057_11888734)	**477.93** (402.48_560.38)	**9925742** (8292104_11718757)	**469.50** (393.81_551.74)	**177039** (124502_238367)	**8.43** (5.96_11.38)
Oceania	**937** (715_1187)	**12.88** (10.1_15.85)	**908** (694_1144)	**13.40** (10.57_16.47)	**28669** (21580_36725)	**335.01** (255.86_422.08)	**28437** (21413_36409)	**331.99** (253_418.71)	**232** (150_336)	**3.01** (1.99_4.29)
Southeast Asia	**40055** (35465_44828)	**6.72** (5.97_7.5)	**38207** (34167_42456)	**6.68** (6_7.39)	**987321** (874362_1105379)	**153.52** (136.49_171.65)	**977155** (866737_1093819)	**151.86** (135.18_169.84)	**10166** (7173_13496)	**1.66** (1.17_2.2)
Sub-Saharan Africa - WB	**37417** (33115_42058)	**8.08** (7.21_9.01)	**38493** (34172_43196)	**8.75** (7.84_9.7)	**1037852** (908080_1181073)	**196.17** (173.23_220.94)	**1028755** (899375_1171256)	**194.29** (171.54_218.87)	**9098** (6396_12191)	**1.88** (1.33_2.5)
Central Sub-Saharan Africa	**4250** (3379_5307)	**7.95** (6.49_9.82)	**4279** (3422_5309)	**8.47** (6.95_10.43)	**125499** (97759_157846)	**204.11** (163.1_253.38)	**124446** (97010_156541)	**202.23** (161.56_251.19)	**1053** (699_1512)	**1.89** (1.27_2.67)
Eastern Sub-Saharan Africa	**11755** (10230_13419)	**7.19** (6.35_8.15)	**12082** (10581_13749)	**7.78** (6.88_8.78)	**345779** (298174_399764)	**184.39** (160.88_210.64)	**342865** (295499_396596)	**182.68** (159.4_208.79)	**2913** (2041_3908)	**1.71** (1.21_2.29)
Southern Sub-Saharan Africa	**3610** (3282_3971)	**6.52** (5.97_7.13)	**3657** (3349_4009)	**6.86** (6.32_7.47)	**95721** (86515_106655)	**158.41** (144.27_175.05)	**94838** (85733_105614)	**156.86** (142.87_173.23)	**883** (630_1171)	**1.55** (1.1_2.04)
Western Sub-Saharan Africa	**14962** (12911_17366)	**8.65** (7.53_9.84)	**15664** (13590_17950)	**9.54** (8.33_10.78)	**396231** (337138_463233)	**199.71** (172.02_229.87)	**392666** (334035_459223)	**197.74** (169.94_227.54)	**3565** (2454_4827)	**1.97** (1.38_2.64)
South Asia - WB	**104425** (92095_118206)	**7.17** (6.31_8.11)	**103927** (91426_117521)	**7.38** (6.48_8.32)	**2917667** (2554430_3308854)	**186.09** (163.44_210.79)	**2891910** (2529722_3283360)	**184.36** (161.86_208.95)	**25757** (18096_34282)	**1.73** (1.21_2.29)
South Asia	**99399** (87310_113633)	**7.01** (6.16_7.97)	**99072** (86310_112442)	**7.24** (6.32_8.23)	**2774513** (2413908_3168197)	**182.05** (158.68_207.51)	**2749980** (2392190_3140356)	**180.36** (157.03_205.74)	**24533** (17249_32668)	**1.69** (1.19_2.24)
Latin America & Caribbean - WB	**82312** (73014_93049)	**12.43** (11.02_14.05)	**76467** (69288_84140)	**11.64** (10.53_12.8)	**1771134** (1604534_1958974)	**262.43** (237.92_290.16)	**1750797** (1588421_1934902)	**259.38** (234.84_286.55)	**20337** (14243_26844)	**3.05** (2.14_4.03)
Andean Latin America	**12374** (10070_15032)	**22.43** (18.3_27.24)	**11791** (9647_14224)	**21.51** (17.55_25.91)	**263028** (212831_321879)	**461.18** (373.9_562.48)	**260082** (210229_317158)	**455.88** (369.52_555.54)	**2946** (1984_4123)	**5.30** (3.55_7.4)
Caribbean	**4355** (3761_4970)	**8.44** (7.28_9.63)	**4118** (3564_4717)	**7.97** (6.9_9.13)	**97702** (82770_113470)	**189.55** (160.41_220.08)	**96615** (81981_111939)	**187.45** (158.81_217.11)	**1087** (745_1477)	**2.11** (1.44_2.86)
Central Latin America	**30509** (25952_35821)	**13.01** (11.08_15.25)	**27302** (23371_31869)	**11.79** (10.11_13.75)	**647870** (550777_763649)	**268.37** (228.66_315.56)	**640178** (545363_754108)	**265.13** (226.03_311.82)	**7692** (5353_10290)	**3.24** (2.25_4.33)
Tropical Latin America	**24537** (23065_25654)	**10.20** (9.57_10.67)	**23450** (21816_24582)	**9.85** (9.11_10.33)	**556713** (530256_581239)	**225.67** (214.3_235.87)	**550675** (524152_575267)	**223.18** (212.14_233.22)	**6038** (4342_7764)	**2.49** (1.79_3.19)
Middle East & North Africa - WB	**26299** (23856_29007)	**8.62** (7.79_9.46)	**24671** (22380_27040)	**8.50** (7.71_9.27)	**610469** (548727_676671)	**178.58** (161.54_196.66)	**603885** (543483_669545)	**176.51** (159.86_194.41)	**6584** (4627_8606)	**2.07** (1.46_2.7)
North Africa and Middle East	**42259** (38242_46713)	**10.10** (9.14_11.14)	**39606** (35880_43876)	**9.89** (8.91_10.89)	**1011450** (904537_1132984)	**218.12** (196.87_242.38)	**1000919** (895990_1120114)	**215.70** (194.65_239.85)	**10531** (7297_13915)	**2.43** (1.71_3.19)
Europe & Central Asia - WB	**182383** (166639_197436)	**11.72** (10.74_12.67)	**146943** (135965_155471)	**9.20** (8.53_9.72)	**3104960** (2905099_3281840)	**213.51** (200.34_225.82)	**3057043** (2860840_3235917)	**210.36** (197.1_222.52)	**47917** (34738_61913)	**3.15** (2.29_4.08)
Central Asia	**12127** (10990_13403)	**16.37** (14.95_17.94)	**11641** (10555_12809)	**16.33** (14.91_17.86)	**324971** (294104_359728)	**400.85** (364.02_442.66)	**322002** (290988_356927)	**396.97** (360.5_438.31)	**2969** (2084_3967)	**3.89** (2.75_5.16)
Central Europe	**21716** (19111_24411)	**10.29** (9.03_11.58)	**20112** (17722_22593)	**9.38** (8.25_10.54)	**428299** (374968_482886)	**215.06** (187.81_242.35)	**422961** (370371_476359)	**212.48** (185.31_240.07)	**5338** (3802_7013)	**2.58** (1.83_3.39)
Eastern Europe	**54119** (48785_59786)	**16.07** (14.47_17.76)	**45009** (40630_49867)	**13.17** (11.9_14.6)	**1081234** (971542_1201164)	**330.40** (297.06_366.6)	**1067264** (959819_1188288)	**326.19** (293.08_362.58)	**13969** (10074_18091)	**4.21** (3.03_5.46)
High Income										
Australasia	**3449** (2788_4206)	**7.00** (5.66_8.53)	**2046** (1837_2224)	**4.01** (3.64_4.32)	**38906** (35984_41628)	**84.50** (78.68_89.98)	**37869** (35074_40395)	**82.34** (76.78_87.64)	**1037** (699_1444)	**2.16** (1.45_2.99)
Asia Pacific	**128168** (108454_147685)	**28.20** (24.2_32.29)	**69856** (59749_75611)	**13.99** (12.38_14.96)	**1161348** (1046331_1234335)	**284.70** (262.8_300.26)	**1122336** (1010283_1191689)	**275.60** (255.53_290.03)	**39013** (27739_51477)	**9.09** (6.51_12.07)
North America	**37585** (32974_42693)	**6.12** (5.38_6.95)	**22316** (20680_23321)	**3.51** (3.29_3.66)	**446189** (426861_461362)	**77.38** (74.42_79.93)	**434862** (416067_449225)	**75.49** (72.78_77.87)	**11327** (7974_14790)	**1.89** (1.32_2.48)
Southern Latin America	**10694** (8558_13335)	**12.83** (10.24_16.01)	**9953** (9295_10524)	**11.83** (11.07_12.51)	**209269** (198034_220237)	**256.51** (242.93_269.83)	**206655** (195773_217357)	**253.35** (240.52_266.21)	**2614** (1724_3683)	**3.16** (2.08_4.45)
Western Europe	**86455** (75199_97340)	**9.45** (8.23_10.67)	**63125** (57057_66790)	**6.48** (5.97_6.81)	**1097486** (1030850_1149166)	**131.98** (125.26_137.7)	**1073884** (1005119_1123720)	**129.27** (122.76_134.94)	**23602** (16809_30877)	**2.71** (1.92_3.58)

Table 2. Stomach cancer incidence cases, age-standardized incidence rate, deaths, age-standardized mortality rate, DALYs, age-standardized DALY rates, YLLs, age-standardized YLLs rates, YLDs, and age-standardized YLDs rates in 2019 (**Men**)

	Incidence Cases (95% CI)	Incidence ASR per 10^5 (95% CI)	Deaths Cases (95% CI)	Deaths ASR per 10^5 (95% CI)	DALYs Number (95% CI)	DALYs ASR per 10^5 (95% CI)	YLLs Number (95% CI)	YLLs ASR per 10^5 (95% CI)	YLDs Number (95% CI)	YLDs ASR per 10^5 (95% CI)
Global	**846872** (748217_963059)	**22.39** (19.8_25.34)	**611504** (543997_678088)	**16.59** (14.8_18.34)	**14521172** (12880915_16213114)	**368.85** (328.19_410.33)	**14283659** (12662988_15951751)	**362.68** (322.15_403.44)	**237513** (169741_312803)	**6.17** (4.43_8.11)
SDI										
High SDI	**152326** (136154_170195)	**17.78** (15.9_19.81)	**88712** (81311_93239)	**10.23** (9.39_10.74)	**1673297** (1577005_1746238)	**202.38** (191.63_211.22)	**1627313** (1536761_1697478)	**196.94** (186.62_205.38)	**45984** (33493_59300)	**5.44** (3.95_7.04)
High-middle SDI	**264754** (226607_310111)	**28.91** (24.82_33.68)	**187473** (161327_214280)	**20.99** (18.1_23.9)	**4390835** (3775849_5041136)	**467.74** (403.32_535.23)	**4316504** (3708426_4973228)	**459.74** (395.26_527.78)	**74331** (52582_99520)	**8.01** (5.68_10.7)
Low SDI	**24535** (21568_27682)	**9.89** (8.77_11.06)	**24996** (21904_28379)	**10.62** (9.39_11.92)	**689981** (599115_790638)	**245.86** (214.92_279.89)	**684008** (593968_783505)	**243.55** (212.82_277.36)	**5973** (4195_7860)	**2.31** (1.63_3.02)
Low-middle SDI	**85883** (76896_95537)	**13.19** (11.86_14.58)	**79786** (72118_88629)	**12.74** (11.54_14.11)	**2122402** (1912421_2369924)	**303.16** (273.87_337.61)	**2100756** (1891530_2344375)	**299.93** (270.86_333.98)	**21646** (15363_28466)	**3.23** (2.31_4.25)
Middle SDI	**319144** (265032_379253)	**27.24** (22.94_32.17)	**230332** (196185_266782)	**20.64** (17.7_23.68)	**5639538** (4786318_6555404)	**456.68** (389.54_529.03)	**5550017** (4701333_6463761)	**449.26** (381.68_521.71)	**89521** (62246_120883)	**7.41** (5.2_9.93)
World Bank Income Level										
World Bank High Income	**178501** (160369_197638)	**17.50** (15.77_19.35)	**109346** (100798_114865)	**10.58** (9.77_11.1)	**2078678** (1966236_2169803)	**211.82** (201.17_220.98)	**2025791** (1915214_2112431)	**206.56** (196.22_215.32)	**52887** (38346_68370)	**5.26** (3.79_6.79)
World Bank Low Income	**20387** (17437_23454)	**14.26** (12.35_16.21)	**20411** (17562_23396)	**15.06** (13.1_17)	**564414** (477705_656842)	**348.82** (299.14_400.87)	**559459** (473502_651590)	**345.50** (295.93_397.4)	**4954** (3522_6629)	**3.32** (2.34_4.39)
World Bank Lower Middle Income	**100347** (90456_110727)	**8.92** (8.05_9.82)	**97652** (87874_108457)	**9.06** (8.19_10.03)	**2656587** (2389217_2966058)	**215.25** (193.71_239.18)	**2631646** (2362196_2936208)	**213.10** (191.53_236.91)	**24941** (17597_32739)	**2.15** (1.52_2.8)
World Bank Upper Middle Income	**547406** (452558_654664)	**34.82** (29.1_41.35)	**383889** (320165_448720)	**25.40** (21.4_29.48)	**9216343** (7684324_10818084)	**566.02** (474.67_660.65)	**9061672** (7550367_10674201)	**556.39** (464.17_650.69)	**154671** (107966_210074)	**9.63** (6.74_12.99)
continents										
Africa	**26216** (23227_29614)	**9.09** (8.12_10.16)	**26668** (23681_30109)	**9.74** (8.72_10.87)	**708981** (620128_812706)	**216.64** (191.57_245.3)	**702571** (614416_805465)	**214.51** (189.77_243.28)	**6410** (4488_8562)	**2.13** (1.51_2.81)
America	**71904** (64047_80107)	**12.49** (11.12_13.9)	**57924** (53399_62538)	**10.10** (9.3_10.91)	**1338846** (1239335_1450666)	**231.44** (214.05_250.8)	**1319686** (1220582_1431207)	**228.12** (211.08_247.29)	**19160** (13664_25157)	**3.32** (2.36_4.36)
Asia	**642250** (546642_756066)	**28.75** (24.62_33.56)	**443843** (379854_509606)	**20.70** (17.83_23.58)	**10640023** (9057419_12271049)	**449.18** (384.56_514.94)	**10456393** (8893569_12072134)	**441.18** (376.55_506.73)	**183630** (130194_246266)	**8.00** (5.7_10.65)
Europe	**105989** (96603_115580)	**16.25** (14.82_17.73)	**82628** (76561_87974)	**12.59** (11.65_13.4)	**1823560** (1693505_1946129)	**287.59** (267.35_307.35)	**1795381** (1666401_1917787)	**283.23** (263.04_302.52)	**28179** (20262_36434)	**4.36** (3.14_5.66)
WHO Regions										
African Region	**20734** (18088_23827)	**9.47** (8.33_10.78)	**21249** (18599_24284)	**10.24** (9.07_11.58)	**570203** (489827_660521)	**227.60** (198.51_260.84)	**565149** (485249_655368)	**225.39** (196.39_258.21)	**5053** (3523_6732)	**2.21** (1.57_2.91)
Eastern Mediterranean Region	**23584** (21169_26133)	**11.38** (10.32_12.52)	**22815** (20379_25533)	**11.59** (10.44_12.79)	**590757** (519768_667175)	**250.63** (223.22_281.07)	**584943** (514459_661763)	**247.95** (220.57_278.1)	**5814** (3992_7597)	**2.68** (1.86_3.48)
European Region	**111468** (101850_121307)	**16.42** (15.01_17.86)	**87732** (81510_93242)	**12.89** (11.97_13.69)	**1968580** (1831877_2097874)	**296.75** (276.29_316.38)	**1939036** (1804362_2067484)	**292.37** (272.24_312.05)	**29544** (21250_38256)	**4.38** (3.16_5.68)
Region of the Americas	**71904** (64047_80107)	**12.49** (11.12_13.9)	**57924** (53399_62538)	**10.10** (9.3_10.91)	**1338846** (1239335_1450666)	**231.44** (214.05_250.8)	**1319686** (1220582_1431207)	**228.12** (211.08_247.29)	**19160** (13664_25157)	**3.32** (2.36_4.36)
South-East Asia Region	**64811** (56231_74320)	**7.82** (6.8_8.92)	**63518** (55353_72995)	**7.97** (7_9.12)	**1736115** (1507465_2005189)	**193.61** (168.31_223.06)	**1719923** (1489102_1987715)	**191.71** (166.44_221.24)	**16193** (11447_21547)	**1.90** (1.35_2.52)
Western Pacific Region	**552712** (459047_667532)	**43.65** (36.46_52.16)	**356955** (294204_423123)	**29.18** (24.36_34.22)	**8288789** (6771326_9931382)	**631.09** (518.23_751.95)	**8127484** (6590410_9763279)	**618.58** (506.05_738.85)	**161304** (112966_218311)	**12.51** (8.78_16.89)
GBD Region										
East Asia & Pacific - WB	**571522** (477340_686706)	**39.45** (33.23_46.87)	**374630** (312316_440735)	**26.83** (22.63_31.27)	**8751688** (7220942_10381910)	**578.71** (480.57_683.3)	**8585614** (7069769_10219950)	**567.48** (469.41_672.47)	**166073** (116736_224649)	**11.22** (7.9_15.09)
East Asia	**460279** (366685_567233)	**46.67** (37.62_56.82)	**305789** (244865_371819)	**32.73** (26.48_39.29)	**7319970** (5810573_8992985)	**713.07** (570.7_867.76)	**7187095** (5692195_8830879)	**699.96** (559.66_851.58)	**132875** (90497_183883)	**13.11** (8.99_18.01)
Oceania	**632** (472_814)	**16.57** (12.6_21.04)	**606** (453_781)	**17.09** (13.07_21.54)	**19476** (14383_25281)	**437.05** (329.07_562.19)	**19319** (14267_25061)	**433.17** (325.9_557.13)	**157** (101_227)	**3.88** (2.53_5.55)
Southeast Asia	**24484** (21460_27831)	**8.94** (7.92_10.07)	**22951** (20195_25700)	**8.85** (7.88_9.83)	**608361** (529239_688963)	**201.59** (176.34_226.33)	**602117** (524208_681633)	**199.40** (174.56_223.83)	**6244** (4346_8309)	**2.19** (1.54_2.88)
Sub-Saharan Africa - WB	**21933** (18941_24890)	**10.21** (8.95_11.45)	**22496** (19506_25547)	**11.06** (9.67_12.41)	**606843** (521191_697690)	**246.18** (213.43_279.76)	**601517** (515456_691555)	**243.82** (210.87_277.41)	**5326** (3714_7114)	**2.37** (1.68_3.13)
Central Sub-Saharan Africa	**2613** (2066_3299)	**10.93** (8.87_13.59)	**2620** (2072_3294)	**11.70** (9.53_14.46)	**78028** (60623_100108)	**277.20** (220.13_347.73)	**77381** (60109_99347)	**274.64** (218.01_344.37)	**647** (424_939)	**2.56** (1.7_3.64)
Eastern Sub-Saharan Africa	**6850** (5795_7999)	**8.94** (7.64_10.32)	**7011** (5988_8164)	**9.66** (8.29_11.1)	**198595** (167605_234422)	**225.52** (192.44_263.27)	**196903** (165892_232515)	**223.41** (190.55_260.82)	**1691** (1184_2276)	**2.11** (1.47_2.86)
Southern Sub-Saharan Africa	**2043** (1877_2248)	**8.76** (8.08_9.54)	**2034** (1869_2229)	**9.19** (8.49_10)	**56382** (51513_62382)	**214.19** (196.59_234.67)	**55877** (51021_61827)	**212.11** (194.68_232.72)	**505** (356_663)	**2.08** (1.47_2.71)
Western Sub-Saharan Africa	**8631** (7332_10043)	**10.43** (8.98_11.98)	**9028** (7742_10454)	**11.48** (9.94_13.07)	**228377** (192639_269804)	**242.41** (207.13_282.39)	**226320** (190446_267498)	**240.03** (204.84_279.73)	**2057** (1394_2747)	**2.38** (1.63_3.18)
South Asia - WB	**53434** (45157_62972)	**7.52** (6.38_8.83)	**53082** (44871_62115)	**7.77** (6.58_9.06)	**1472121** (1241606_1724509)	**191.07** (161.57_223.52)	**1458853** (1231094_1711126)	**189.25** (160.04_221.94)	**13267** (9214_17948)	**1.82** (1.27_2.45)
South Asia	**50867** (42630_60683)	**7.35** (6.19_8.73)	**50594** (42377_59602)	**7.60** (6.42_8.9)	**1401802** (1173478_1659136)	**186.78** (156.83_220.3)	**1389159** (1162510_1645559)	**185.00** (154.91_218.51)	**12643** (8730_17134)	**1.78** (1.23_2.39)
Latin America & Caribbean - WB	**48808** (43326_55209)	**16.25** (14.44_18.37)	**44928** (40768_49469)	**15.17** (13.72_16.69)	**1065936** (966309_1179213)	**341.29** (309.76_376.97)	**1053884** (956762_1164363)	**337.33** (306.71_372.88)	**12052** (8339_15989)	**3.96** (2.75_5.24)
Andean Latin America	**6895** (5546_8431)	**26.36** (21.26_32.23)	**6257** (5053_7643)	**23.96** (19.43_29.18)	**142785** (113696_176670)	**519.99** (415.49_643.06)	**141115** (112317_174516)	**513.65** (409.61_634.08)	**1670** (1113_2368)	**6.34** (4.23_8.96)
Caribbean	**2628** (2237_3014)	**10.87** (9.29_12.47)	**2448** (2103_2803)	**10.19** (8.78_11.65)	**59198** (50015_68575)	**241.14** (204.09_278.89)	**58541** (49431_67792)	**238.43** (201.63_275.32)	**657** (452_895)	**2.70** (1.86_3.68)
Central Latin America	**16607** (14053_19657)	**15.40** (13.02_18.21)	**15064** (12759_17810)	**14.21** (12.05_16.74)	**364244** (304348_434752)	**324.82** (271.91_386.54)	**360084** (300852_429575)	**321.02** (268.47_381.82)	**4159** (2857_5676)	**3.80** (2.62_5.17)
Tropical Latin America	**15835** (14868_16692)	**14.67** (13.73_15.46)	**14947** (14014_15780)	**14.13** (13.17_14.94)	**363064** (344294_382684)	**320.92** (304.04_338.2)	**359183** (340846_378536)	**317.39** (300.38_334.39)	**3882** (2789_5042)	**3.53** (2.55_4.57)
Middle East & North Africa - WB	**16685** (15121_18483)	**10.64** (9.63_11.72)	**15657** (14197_17281)	**10.47** (9.5_11.48)	**382501** (343544_425302)	**218.27** (196.89_241.6)	**378332** (339723_421395)	**215.72** (194.93_238.82)	**4168** (2866_5453)	**2.55** (1.78_3.33)
North Africa and Middle East	**26529** (23907_29359)	**12.57** (11.32_13.85)	**24810** (22345_27505)	**12.28** (11.06_13.55)	**624420** (561040_700011)	**267.28** (240.38_297.5)	**617819** (554666_692877)	**264.27** (237.71_293.89)	**6601** (4572_8755)	**3.01** (2.09_3.96)
Central Asia	**7703** (6957_8538)	**24.08** (21.82_26.57)	**7368** (6655_8163)	**24.21** (21.94_26.71)	**209473** (188404_232662)	**581.18** (524.77_641.72)	**207594** (186665_230987)	**575.56** (519.62_635.73)	**1879** (1314_2524)	**5.63** (3.97_7.45)
Central Europe	**13898** (12118_15734)	**15.31** (13.35_17.34)	**12719** (11111_14418)	**14.08** (12.32_15.96)	**285189** (247966_325106)	**318.02** (276.23_362.07)	**281797** (244974_321335)	**314.27** (272.92_358.24)	**3392** (2402_4473)	**3.75** (2.66_4.95)
Eastern Europe	**31973** (27612_36670)	**24.29** (21.04_27.76)	**26125** (22652_29884)	**20.31** (17.67_23.14)	**665999** (574453_761958)	**497.31** (430.3_567.98)	**657755** (566531_753521)	**491.11** (424.23_561.46)	**8244** (5824_11008)	**6.20** (4.39_8.25)
Europe & Central Asia - WB	**110552** (101072_120250)	**16.46** (15.06_17.89)	**86968** (80756_92433)	**12.91** (11.99_13.72)	**1952233** (1815834_2080959)	**297.46** (276.96_317.17)	**1922927** (1788908_2051042)	**293.07** (272.78_312.78)	**29306** (21111_37907)	**4.39** (3.17_5.69)
High Income	**168404** (150830_187455)	**17.76** (15.95_19.73)	**101133** (92861_106010)	**10.47** (9.65_10.96)	**1895809** (1791265_1971994)	**209.50** (199.08_217.66)	**1845599** (1746948_1918310)	**204.11** (193.86_212)	**50211** (36372_65082)	**5.39** (3.9_6.99)
Australasia	**2193** (1755_2708)	**9.58** (7.7_11.85)	**1251** (1152_1346)	**5.39** (4.97_5.78)	**24641** (22941_26311)	**112.37** (105.01_119.81)	**23971** (22358_25592)	**109.40** (102.54_116.52)	**670** (446_941)	**2.97** (1.98_4.15)
Asia Pacific	**84159** (70845_99597)	**41.91** (35.58_49.4)	**44163** (39473_47146)	**21.15** (19.02_22.5)	**779494** (716852_823663)	**411.82** (383.69_434.85)	**753292** (692872_795632)	**398.39** (371.42_420.03)	**26203** (18549_35185)	**13.43** (9.45_18)
North America	**23363** (19770_27783)	**8.38** (7.09_9.95)	**13218** (12514_13708)	**4.70** (4.45_4.88)	**277208** (266930_286488)	**102.26** (98.54_105.74)	**270031** (259988_279134)	**99.67** (96.17_103.01)	**7178** (4883_9593)	**2.60** (1.76_3.47)
Southern Latin America	**6939** (5508_8703)	**19.09** (15.17_23.9)	**6300** (5933_6670)	**17.51** (16.45_18.53)	**138752** (131377_146337)	**377.25** (357.42_397.55)	**137044** (129954_144328)	**372.58** (353.3_391.86)	**1708** (1107_2441)	**4.67** (3.04_6.65)
Western Europe	**51750** (44937_58615)	**12.84** (11.12_14.59)	**36202** (33716_37969)	**8.74** (8.17_9.15)	**675713** (641830_706055)	**177.33** (168.86_185.14)	**661262** (627297_689976)	**173.65** (165.5_181.07)	**14452** (10281_18993)	**3.68** (2.6_4.87)

Table 3. Stomach cancer incidence cases, age-standardized incidence rate, deaths, age-standardized mortality rate, DALYs, age-standardized DALY rates, YLLs, age-standardized YLLs rates, YLDs, and age-standardized YLDs rates in 2019 (**Women**).

	Incidence Cases (95% CI)	Incidence ASR per 10^5 (95% CI)	Deaths Cases (95% CI)	Deaths ASR per 10^5 (95% CI)	DALYs Number (95% CI)	DALYs ASR per 10^5 (95% CI)	YLLs Number (95% CI)	YLLs ASR per 10^5 (95% CI)	YLDs Number (95% CI)	YLDs ASR per 10^5 (95% CI)
Global	**422934** (377415_467083)	**9.71** (8.67_10.72)	**345681** (308388_382491)	**7.92** (7.07_8.76)	**7699808** (6929814_8502733)	**178.25** (160.52_196.94)	**7588772** (6818761_8387969)	**175.70** (157.9_194.11)	**111036** (1150487_1399817)	**2.55** (1.83_3.35)
SDI										
High SDI	**85437** (72087_96543)	**7.91** (6.83_8.83)	**56078** (46893_61323)	**4.74** (4.12_5.11)	**906660** (808642_967575)	**95.53** (88.12_100.68)	**882457** (787071_940238)	**93.15** (86.24_97.97)	**24204** (1150487_1399817)	**2.38** (1.71_3.14)
High-middle SDI	**116320** (101504_133773)	**10.45** (9.16_12.02)	**93482** (82376_105997)	**8.22** (7.24_9.31)	**1961915** (1749245_2226180)	**182.21** (163.04_206.86)	**1931237** (1721243_2193994)	**179.40** (160.05_203.68)	**30678** (1150487_1399817)	**2.81** (1.99_3.68)
Low SDI	**18653** (16480_21228)	**6.97** (6.19_7.92)	**18880** (16747_21497)	**7.40** (6.59_8.42)	**543270** (475640_622822)	**179.52** (158.46_204.72)	**538698** (471274_617987)	**177.87** (156.96_202.69)	**4572** (1150487_1399817)	**1.65** (1.18_2.19)
Low-middle SDI	**63303** (55865_71576)	**8.94** (7.91_10.07)	**62170** (54490_70582)	**9.03** (7.93_10.2)	**1651108** (1431438_1891748)	**219.38** (190.73_250.26)	**1635711** (1418509_1873476)	**217.25** (188.76_248.16)	**15398** (1150487_1399817)	**2.13** (1.49_2.8)
Middle SDI	**139077** (119521_160591)	**10.98** (9.41_12.64)	**114937** (99176_131851)	**9.35** (8.06_10.72)	**2633732** (2281545_3019562)	**200.72** (174.2_229.64)	**2597584** (2246251_2982777)	**197.92** (171.44_226.84)	**36148** (1150487_1399817)	**2.80** (1.98_3.73)
World Bank Income Level										
World Bank High Income	**103805** (88082_116548)	**7.96** (6.89_8.83)	**71050** (60154_77080)	**4.98** (4.37_5.34)	**1151862** (1037156_1224328)	**100.81** (93.64_105.9)	**1122938** (1009093_1192098)	**98.46** (91.44_103.23)	**28924** (1150487_1399817)	**2.36** (1.69_3.07)
World Bank Low Income	**14749** (12487_17479)	**8.81** (7.52_10.35)	**14899** (12631_17517)	**9.29** (7.96_10.87)	**415573** (347940_494399)	**221.28** (186.74_260.97)	**411993** (345274_489409)	**219.21** (185.17_258.47)	**3580** (1150487_1399817)	**2.07** (1.41_2.81)
World Bank Lower Middle Income	**80685** (71060_91132)	**6.59** (5.81_7.42)	**79850** (69150_90285)	**6.74** (5.86_7.61)	**2170753** (1869253_2467332)	**164.58** (142.06_186.55)	**2150898** (1849263_2444209)	**163.00** (140.55_184.73)	**19855** (1150487_1399817)	**1.59** (1.1_2.09)
World Bank upper Middle Income	**223551** (190913_262179)	**12.58** (10.74_14.73)	**179748** (154612_208076)	**10.18** (8.74_11.77)	**3958486** (3414930_4600697)	**222.53** (191.96_258.2)	**3899845** (3357652_4537731)	**219.23** (188.78_254.71)	**58641** (1150487_1399817)	**3.30** (2.3_4.38)
continents										
Africa	**18067** (15935_20714)	**5.75** (5.13_6.56)	**18504** (16293_21155)	**6.20** (5.52_7.04)	**494506** (427573_571179)	**137.77** (120.42_158.19)	**490076** (422869_566316)	**136.41** (119.14_157.02)	**4431** (1150487_1399817)	**1.36** (0.95_1.8)
America	**47545** (42042_52908)	**6.91** (6.13_7.69)	**40477** (36384_44275)	**5.75** (5.19_6.28)	**871435** (796139_956546)	**132.89** (121.49_146.52)	**859047** (784686_943771)	**131.06** (119.79_144.53)	**12388** (1150487_1399817)	**1.83** (1.3_2.42)
Asia	**287850** (249021_327156)	**11.76** (10.15_13.36)	**228982** (198549_261516)	**9.48** (8.22_10.82)	**5249607** (4581016_6016801)	**209.70** (183.24_239.92)	**5173410** (4512821_5925572)	**206.62** (180.31_236.84)	**76197** (1150487_1399817)	**3.08** (2.18_4.04)
Europe	**69139** (61618_76331)	**7.89** (7.07_8.7)	**57416** (51615_61793)	**6.18** (5.64_6.65)	**1078206** (994027_1161496)	**138.06** (127.44_149.1)	**1060271** (976529_1140328)	**135.92** (125.5_146.62)	**17935** (1150487_1399817)	**2.14** (1.55_2.79)
WHO Regions										
African Region	**14782** (249021_327156)	**5.91** (10.15_13.36)	**15294** (198549_261516)	**6.43** (8.22_10.82)	**407333** (4581016_6016801)	**142.44** (183.24_239.92)	**403728** (4512821_5925572)	**141.05** (180.31_236.84)	**3605** (1150487_1399817)	**1.39** (2.18_4.04)
Eastern Mediterranean Region	**14225** (12350_16259)	**7.09** (6.23_7.99)	**13634** (11799_15475)	**7.19** (6.33_8.07)	**380893** (318877_443498)	**164.16** (140.84_187.81)	**377350** (315936_440075)	**162.47** (139.61_185.8)	**3543** (1150487_1399817)	**1.69** (1.16_2.22)
European Region	**72376** (64547_79802)	**7.98** (7.17_8.76)	**60451** (54516_64990)	**6.33** (5.78_6.8)	**1162046** (1074367_1249605)	**143.19** (132.47_154.18)	**1143293** (1057616_1226995)	**141.04** (130.71_151.67)	**18752** (1150487_1399817)	**2.15** (1.56_2.81)
Region of the Americas	**47545** (42042_52908)	**6.91** (6.13_7.69)	**40477** (36384_44275)	**5.75** (5.19_6.28)	**871435** (796139_956546)	**132.89** (121.49_146.52)	**859047** (784686_943771)	**131.06** (119.79_144.53)	**12388** (1150487_1399817)	**1.83** (1.3_2.42)
South-East Asia Region	**58436** (49487_68214)	**6.56** (5.57_7.64)	**58246** (48476_68180)	**6.72** (5.61_7.83)	**1598094** (1325652_1889842)	**169.59** (140.81_199.9)	**1583753** (1309596_1874401)	**168.00** (139.01_198.03)	**14341** (1150487_1399817)	**1.58** (1.09_2.15)
Western Pacific Region	**214553** (180139_252815)	**15.10** (12.66_17.78)	**156697** (130345_184608)	**10.94** (9.1_12.89)	**3262418** (2696451_3894469)	**232.76** (192.41_277.73)	**3204271** (2652284_3835861)	**228.63** (188.83_273.58)	**58147** (1150487_1399817)	**4.13** (2.9_5.51)
GBD Region										
East Asia & Pacific - WB	**226971** (191210_265356)	**13.88** (11.68_16.21)	**168916** (142340_197078)	**10.30** (8.66_12)	**3561616** (3019173_4192606)	**219.04** (185.59_257.79)	**3500382** (2956147_4136646)	**215.28** (181.81_254.27)	**61234** (1150487_1399817)	**3.76** (2.63_5.02)
East Asia	**166209** (135846_202482)	**15.65** (12.8_19.05)	**127203** (103832_154707)	**12.13** (9.89_14.73)	**2782812** (2246374_3413187)	**260.28** (209.93_318.7)	**2738647** (2204820_3372400)	**256.14** (206.24_314.92)	**44165** (1150487_1399817)	**4.14** (2.84_5.65)
Oceania	**306** (232_407)	**9.00** (6.99_11.85)	**303** (231_403)	**9.58** (7.53_12.6)	**9194** (6697_12300)	**226.58** (172.27_302.12)	**9118** (6651_12212)	**224.48** (170.19_299.62)	**75** (1150487_1399817)	**2.09** (1.35_3.06)
Southeast Asia	**15571** (13124_17956)	**4.89** (4.13_5.63)	**15256** (12902_17509)	**4.94** (4.18_5.65)	**378960** (316956_442465)	**112.09** (94.16_130.08)	**375038** (313306_438168)	**110.89** (92.93_128.84)	**3922** (1150487_1399817)	**1.21** (0.83_1.64)
Sub-Saharan Africa - WB	**15483** (13541_18028)	**6.26** (5.54_7.21)	**15997** (14005_18486)	**6.80** (6.01_7.77)	**431009** (369657_503949)	**152.01** (132.35_176.31)	**427237** (366479_500086)	**150.54** (131.1_174.62)	**3772** (1150487_1399817)	**1.47** (1.03_1.96)
Central Sub-Saharan Africa	**1637** (1244_2143)	**5.66** (4.33_7.48)	**1659** (1264_2177)	**6.04** (4.64_8.06)	**47471** (35769_62578)	**143.86** (109.4_188.21)	**47065** (35487_61998)	**142.51** (108.29_186.27)	**406** (1150487_1399817)	**1.35** (0.87_1.99)
Eastern Sub-Saharan Africa	**4905** (4167_6397)	**5.64** (4.85_7.36)	**5071** (4327_6692)	**6.14** (5.3_8.04)	**147184** (123348_196826)	**146.77** (124.62_193.51)	**145962** (122300_194953)	**145.41** (123.54_192.12)	**1222** (1150487_1399817)	**1.35** (0.94_1.91)
Southern Sub-Saharan Africa	**1567** (1373_1810)	**4.93** (4.34_5.65)	**1622** (1424_1867)	**5.25** (4.63_6.01)	**39339** (33633_46447)	**116.33** (100.22_136.1)	**38960** (33270_46109)	**115.16** (99.33_134.92)	**379** (1150487_1399817)	**1.17** (0.81_1.58)
Western Sub-Saharan Africa	**6331** (5331_7394)	**7.04** (6_8.13)	**6636** (5620_7748)	**7.78** (6.67_8.96)	**167854** (138749_201339)	**160.71** (135.08_189.68)	**166345** (137498_199571)	**159.11** (133.39_187.54)	**1509** (1150487_1399817)	**1.60** (1.09_2.16)
South Asia - WB	**50991** (41936_60703)	**6.84** (5.64_8.15)	**50845** (41180_60722)	**7.03** (5.71_8.39)	**1445547** (1165247_1726589)	**181.71** (146.91_217.02)	**1433057** (1152146_1713755)	**180.06** (145.47_215.53)	**12490** (1150487_1399817)	**1.64** (1.12_2.24)
South Asia	**48533** (39533_58530)	**6.71** (5.48_8.1)	**48478** (39054_58365)	**6.91** (5.57_8.29)	**1372711** (1099620_1655689)	**177.83** (142.83_214.67)	**1360821** (1089980_1645584)	**176.22** (141.21_213.29)	**11890** (1150487_1399817)	**1.61** (1.09_2.21)
Latin America & Caribbean - WB	**33503** (29363_37991)	**9.27** (8.12_10.5)	**31539** (28100_35022)	**8.71** (7.76_9.68)	**705197** (633925_790870)	**194.72** (175.04_218.44)	**696913** (627614_781469)	**192.43** (173.29_215.78)	**8285** (1150487_1399817)	**2.29** (1.61_3.05)
Andean Latin America	**5479** (4478_6592)	**18.88** (15.41_22.71)	**5533** (4530_6625)	**19.23** (15.73_22.99)	**120243** (97062_146437)	**406.11** (329.54_492.67)	**118967** (95942_144740)	**401.76** (325.26_487.54)	**1276** (1150487_1399817)	**4.36** (2.94_6.05)
Caribbean	**1727** (1485_2032)	**6.28** (5.4_7.41)	**1669** (1439_1961)	**6.02** (5.2_7.1)	**38504** (31900_46182)	**142.86** (117.85_171.66)	**38073** (31624_45636)	**141.28** (116.77_169.88)	**431** (1150487_1399817)	**1.57** (1.06_2.14)
Central Latin America	**13902** (11739_16308)	**10.97** (9.27_12.85)	**12238** (10464_14397)	**9.73** (8.34_11.46)	**283627** (241955_333762)	**219.45** (187.46_258.09)	**280094** (238835_329359)	**216.68** (184.87_254.78)	**3533** (1150487_1399817)	**2.77** (1.94_3.75)
Tropical Latin America	**8702** (7981_9273)	**6.57** (6.03_7.01)	**8503** (7676_9059)	**6.42** (5.8_6.84)	**193648** (180624_204606)	**145.68** (135.87_153.92)	**191493** (178634_202237)	**144.06** (134.37_152.18)	**2156** (1150487_1399817)	**1.63** (1.16_2.11)
Middle East & North Africa - WB	**9614** (8520_10787)	**6.48** (5.78_7.2)	**9014** (8058_10031)	**6.41** (5.72_7.09)	**227968** (199876_257234)	**136.33** (120.96_152.98)	**225553** (197594_254605)	**134.76** (119.68_150.93)	**2415** (1150487_1399817)	**1.56** (1.1_2.05)
North Africa and Middle East	**15730** (13757_17757)	**7.59** (6.7_8.53)	**14796** (12973_16667)	**7.46** (6.57_8.35)	**387030** (327359_445218)	**167.54** (144.62_190.59)	**383100** (324221_440533)	**165.71** (143_188.5)	**3931** (1150487_1399817)	**1.83** (1.26_2.42)
Europe & Central Asia - WB	**71830** (64063_79214)	**8.00** (7.19_8.78)	**59976** (54059_64506)	**6.34** (5.79_6.8)	**1152728** (1065930_1239908)	**143.46** (132.68_154.49)	**1134116** (1048578_1217313)	**141.30** (130.92_151.97)	**18612** (1150487_1399817)	**2.16** (1.56_2.82)
Central Asia	**4424** (4016_4904)	**10.76** (9.81_11.87)	**4272** (3886_4728)	**10.73** (9.75_11.81)	**115498** (103932_129052)	**261.49** (236.71_290.35)	**114407** (102859_127636)	**258.90** (234.5_287.37)	**1090** (1150487_1399817)	**2.59** (1.84_3.44)
Central Europe	**7818** (6803_8901)	**6.42** (5.6_7.33)	**7394** (6448_8341)	**5.84** (5.09_6.61)	**143110** (124998_163233)	**129.98** (113.22_148.68)	**141164** (123295_161117)	**128.33** (111.7_146.93)	**1946** (1150487_1399817)	**1.65** (1.15_2.19)
Eastern Europe	**22146** (19269_25371)	**10.80** (9.39_12.48)	**18884** (16396_21632)	**8.79** (7.61_10.07)	**415235** (358988_477775)	**216.24** (185.8_250.47)	**409509** (353560_471683)	**213.35** (183.24_247.15)	**5726** (1150487_1399817)	**2.89** (2.02_3.85)
High Income	**97947** (82649_110218)	**8.05** (6.95_8.94)	**66163** (55714_71793)	**4.94** (4.33_5.29)	**1057389** (948703_1121869)	**99.71** (92.5_104.32)	**1030008** (925001_1091102)	**97.31** (90.32_101.66)	**27381** (1150487_1399817)	**2.40** (1.72_3.15)
Australasia	**1257** (1015_1518)	**4.71** (3.81_5.7)	**796** (676_875)	**2.82** (2.46_3.07)	**14265** (12856_15373)	**59.21** (54.23_63.28)	**13898** (12556_14979)	**57.79** (53.1_61.7)	**366** (1150487_1399817)	**1.43** (0.95_2.02)
High-income Asia Pacific	**44010** (34536_52091)	**16.97** (13.95_19.98)	**25693** (20160_28845)	**8.44** (7.09_9.21)	**381854** (324792_416041)	**175.92** (159.27_186.87)	**369044** (314270_401160)	**170.48** (154.76_180.82)	**12810** (1150487_1399817)	**5.44** (3.75_7.48)
High-income North America	**14222** (11991_16855)	**4.20** (3.52_5)	**9098** (8155_9671)	**2.54** (2.32_2.67)	**168981** (158707_176440)	**55.50** (52.74_57.66)	**164832** (154929_171613)	**54.23** (51.6_56.26)	**4149** (1150487_1399817)	**1.27** (0.89_1.73)
Southern Latin America	**3754** (3011_4650)	**7.89** (6.32_9.82)	**3654** (3317_3913)	**7.46** (6.82_7.98)	**70517** (65683_74928)	**156.62** (146.29_166.06)	**69611** (64839_73911)	**154.68** (144.54_163.83)	**905** (1150487_1399817)	**1.94** (1.27_2.77)
Western Europe	**34705** (29478_39766)	**6.59** (5.67_7.54)	**26923** (23435_29025)	**4.63** (4.16_4.93)	**421773** (384214_447304)	**92.03** (86.11_96.8)	**412622** (375465_436916)	**90.17** (84.38_94.54)	**9151** (1150487_1399817)	**1.86** (1.3_2.46)

The age-standardized death rate (ASDR) of stomach cancer worldwide was 11.88 (95% CI: 10.82_12.82) per 100000 inhabitants; 16.59 (95% CI: 14.8_18.34) in males and 7.92 (95% CI: 7.07_8.76) in females.

The highest ASDR per 100000 people for stomach cancer has been reported in Mongolia (46.04), Bolivia (Plurinational State of) (36.11), Afghanistan (29.31), Guatemala (27.97), Cabo Verde (25.65), Tajikistan (25.26), Solomon Islands (23.87), Democratic People's Republic of Korea (23.87), Azerbaijan (22.48) and Ecuador (21.48), respectively.

The lowest ASDR per 100000 people for stomach cancer have been reported in the United States of America (3.40), Kuwait (3.45), Malawi (3.60), Maldives (3.60), Sweden (3.67), Namibia (3.80), Australia (3.89), Switzerland (4.03), Saudi Arabia (4.10), Denmark (4.33), respectively.

Statistics show that the highest ASDR for stomach cancer occurs in countries with Middle SDI (14.63 per 100000) worldwide and High-middle SDI (13.85 per 100000). The lowest ASDR occurs in countries with High SDI (7.18 per 100000). In men, the highest ASIR for stomach cancer occurs in countries with High-middle SDI (20.99 per 100000) and middle SDI (20.64 per 100000), and the lowest ASDR occurs in countries with High SDI (10.23 per 100000). In women, the highest ASDR for stomach cancer occurs in countries with middle SDI (9.35 per 100000) and Low-middle SDI (9.03 per 100000), and the lowest ASDR occurs in countries with High SDI (4.74 per 100000).

According to the World Bank classification, the ASDR for stomach cancer is highest in the upper-middle-income category (17.11 (95% CI: 15.02_19.2) per 100000 population) worldwide; 25.40 (95% CI: 21.4_29.48) in males and 10.18 (95% CI: 8.74_11.77) in females. The lowest rates were seen in high-income countries (7.47 (95% CI: 6.78_7.87) per 100000 population) worldwide; in men, the lowest rate was observed in lower middle income with 9.06 (95% CI: 8.19_10.03) and in women in high-income countries with 4.98 (95% CI: 4.37_5.34) per 100000 population.

Among the continents, the highest ASDR was reported in Asia, while the lowest was observed in America. For men, the highest ASDR was reported in Asia and the lowest rate in Africa. For women, the highest ASDR was reported in Asia and the lowest rate in America.

The highest ASDR for stomach cancer among WHO regions was found in the Western Pacific region (19.25 per 100000 population). The lowest was reported in the South-East Asia Region (7.31 per 100000). For men, the highest ASDR was seen in the Western Pacific region (29.18 per 100000 population) and the lowest was reported in the South-East Asia Region (7.97 per 100000). For women, the highest ASDR was seen in the Western Pacific region (10.94 per 100000 population) and the lowest was reported in the American Region (5.75 per 100000).

In the GBD regions, the highest ASDR is seen in East Asia and Andean Latin America region (21.51 per 100000 for each region) and the lowest in North America (3.51 per 100000). For men, the highest ASDR was seen in the East Asia region (32.73 per 100000 population) and the lowest was reported in the North America Region (4.70 per 100000). For women, the highest ASDR was seen in the Andean Latin America region (19.23 per 100000 population) and the lowest was reported in High-income North America (2.54 per 100000). Details are presented in Tables 1, 2 and 3.

Global burden of stomach cancer

In 2019, 22220980 (95% CI: 20301494_24071758) DALYs due to stomach cancer were reported worldwide, of which 21872432 cases (95% CI: 19972705_23712517) were related to YLLs and 348549 cases (95% CI: 252331_457637) were related to YLDs.

The number of DALYs due to stomach cancer in men was reported at 14521172 (95% CI: 12880915_16213114), of which 14283659 (95% CI: 12662988_15951751) cases were related to YLLs and 237513 (95% CI: 169741_312803) cases were related to YLDs.

For women, the number of DALYs due to stomach cancer was reported at 7699808 (95% CI: 6929814_8502733), of which 7588772 (95% CI: 6818761_8387969) cases were related to YLLs and 111036 (95% CI: 1150487_1399817) cases were related to YLDs.

Worldwide, the highest ASR of DALYs has been reported in Mongolia (1059.24), Bolivia (Plurinational State of) (749.11), Afghanistan (728.70), Solomon Islands (665.01), Guatemala (615.86), Tajikistan (590.16), Democratic People's Republic of Korea (577.22), Azerbaijan (502.49), Cabo Verde (502.33) and China (481.15), respectively. The lowest ASR of DALYs has been observed in Kuwait (64.88), Maldives (68.10), Sweden (73.50), United States of America (75.73), Malawi (77.34), Namibia (79.73), Australia (81.42), Switzerland (83.37), Nigeria (85.70) and Saudi Arabia (86.23), respectively.

In men, the highest ASR of DALYs have been reported in Mongolia (1577.24), Solomon Islands (859.42), Democratic People's Republic of Korea (856.33), Cabo Verde (821.98), Bolivia (Plurinational State of) (808.23), Afghanistan (784.67), Tajikistan (749.13), Azerbaijan (731.28), Kiribati (725.87) and China (718.79), respectively. The lowest ASR of DALYs has been observed in Maldives (71.95), Kuwait (78.41), Sweden (90.36), Saudi Arabia (97.90), United States of America (99.94), Nigeria (101.02), Australia (108.78), Malawi (109.71), Norway (110.86), Switzerland (111.16), respectively.

In women, the highest ASR of DALYs has been reported in Bolivia (Plurinational State of) (696.37), Afghanistan (690.40), Mongolia (665.19), Guatemala (610.40), Solomon Islands (464.66), Tajikistan (445.18), Mali (375.72), Ecuador (369.74), Democratic People's Republic of Korea (360.56) and Yemen (353.39), respectively. The lowest ASR of DALYs has been observed in Kuwait (44.38), Bermuda (48.00), Malawi (52.46), United States of America (54.46), Iceland (55.38), Namibia (55.49), Australia (56.52), Sweden (57.90), Switzerland (58.02) and France (60.22), respectively.

Statistics show that the highest ASR of DALYs for stomach cancer occurs in countries with Middle SDI worldwide and the lowest rates occur in countries with High SDI. In men, the highest ASR of DALYs for stomach cancer occurs in countries with High-middle SDI and middle SDI and the lowest rates occur in countries with High SDI. In women, the highest ASR of DALYs for stomach cancer occurs in countries with Low-middle SDI and the lowest rates occur in countries with High SDI.

According to the World Bank classification, the ASR of DALYs for stomach cancer is highest in the upper-middle-income category worldwide, and also in males and females. The lowest rates were seen in high-income countries worldwide, among men and women.

Among the continents, the highest ASR of DALYs was reported in Asia, while the lowest was observed in Africa worldwide. For men, the highest ASR of DALYs was reported in Asia and the lowest rate was in Africa. For women, the highest ASDR was reported in Asia and the lowest rate in America.

The highest ASR of DALYs for stomach cancer among WHO regions were found in the Western Pacific region. The lowest was reported in the Region of the Americas. For men, the highest ASR of DALYs was seen in the Western Pacific region and the lowest was reported in the South-East Asia Region. For women, the highest ASR of DALYs was seen in the Western Pacific region and the lowest was reported in America.

In the GBD regions, the highest ASR of DALYs is seen in East Asia and the lowest in North America. For men, the highest ASR of DALYs was seen in the East Asia region and the lowest was reported in the North America Region. For women, the highest ASR of DALYs was seen in the Andean Latin America region and the lowest was reported in High-income North America. Details are presented in Tables 1, 2 and 3.

Correlation between SDI and global stomach cancer incidence, mortality, and burden

The age-standardized death and DALY rates of stomach cancer show a moderate negative linear correlation with the SDI (r=-0.369 and r=0.402, respectively; $p<0.001$) (Figure 1A, B, C). No statistically significant correlation was detected between age-standardized incidence rates of stomach cancer and SDI. (r=-0.107, $p>0.05$).

DISCUSSION

Stomach cancer is one of the leading causes of death in many parts of the world and has a heavy impact on health systems (6). In this regard, this study examined the incidence, mortality rates, and disease burden of stomach cancer according to various classifications and the relationship between disease and SDI in 2019. In the following, the epidemiological indicators of stomach cancer by classification will be discussed.

INCIDENCE

The results of the study showed that 12,698,806 new cases of stomach cancer were recorded worldwide in 2019, of which two-thirds (846,872 cases) were male. Its ASIR is 15.59 cases per 100000 population, which is 2.3 times greater for males than females. Although the highest ASIR of stomach cancer was observed in the high-middle SDI and middle SDI countries and the lowest in low SDI countries, in this study, no significant correlation was observed between the standardized incidence of stomach cancer and the SDI index. The results of this study are consistent with research conducted in 2023 using data from GBD 2019[33] and other studies[7,19,34,35]. In this study, the highest ASIR of stomach cancer was reported in Asia and Europe, the Western Pacific region of WHO, and East Asia of GBD. The lowest rates were recorded in Africa, Southeast Asia (WHO), and Asia-Pacific (GBD). Underlying risk factors for stomach cancer, such as aging, lifestyle, obesity, unhealthy eating, primary prevention, and early diagnosis, vary from country to country[36]. In some Asian countries (including the Republic of Korea and Japan), high rates of screening have increased the incidence of stomach cancer and improved the diagnosis of early-stage cancer[37]. Smoking and a high-salt diet appear to play

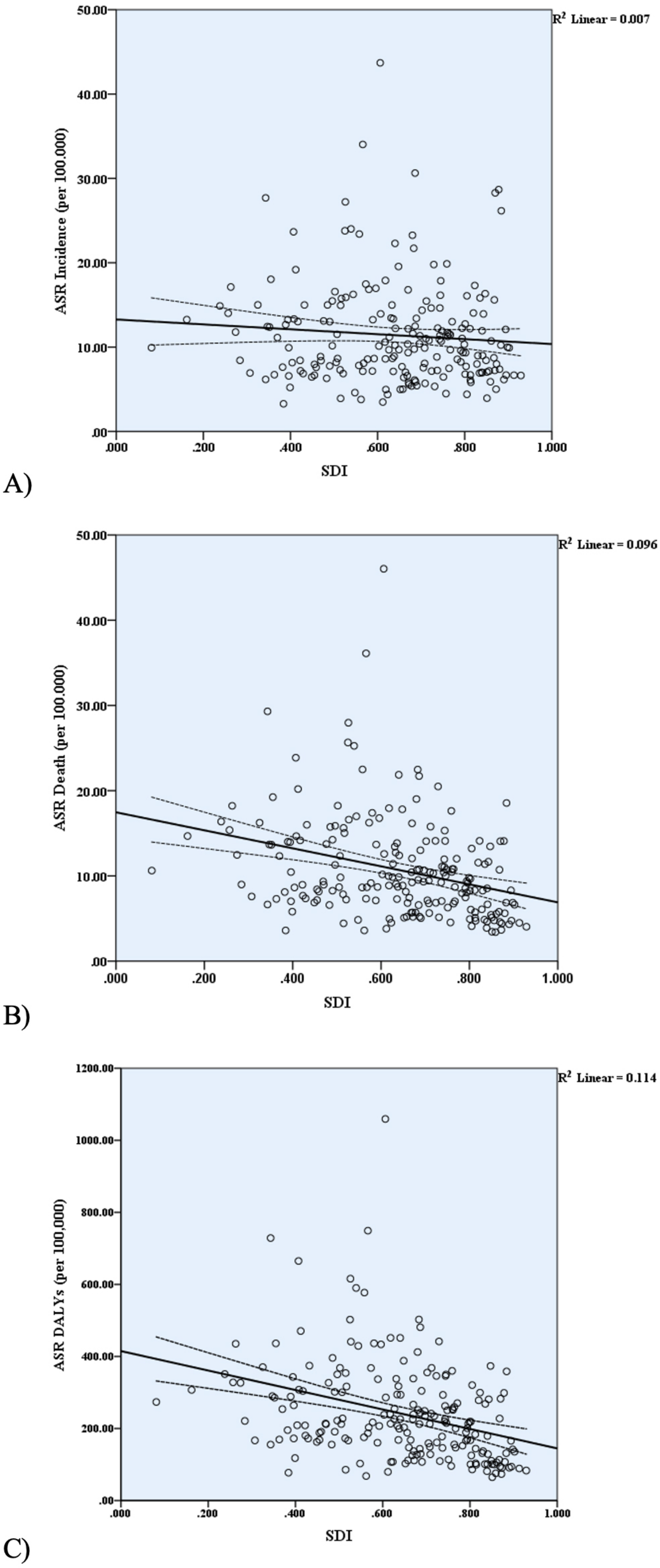

Fig. 1. A, B, C. (A) Correlation between age-standardized incidence rate of SC and SDI. (B) Correlation between age-standardized death rate of SC and SDI. (C) Correlation between DALY age-standardized rate of SC and SDI.

a significant role in the incidence of stomach cancer, especially in men and in East Asia[38]. In other words, gender differences in lifestyle may contribute to the higher incidence of stomach cancer in men; more alcohol consumption and smoking among men, more environmental exposure to risk factors in the workplace, etc.[34].

In general, due to differences in the causes of stomach cancer between different countries and regions, including differences in economic and social status[12], aging rate[19], obesity[39], early diagnosis and treatment of H.pylori infection, smoking, and alcohol consumption, implementation of screening programs, availability and consumption of fresh fruits and vegetables, consumption of canned foods, etc.[4,17,40]. The incidence of stomach cancer also varies among communities. Recently, high dietary acid load (DAL) has been considered as a potential risk factor for the development of gastric cancer[41,42]. The dietary acid load was calculated based on Potential Renal Acid Load (PRAL) score and Net Endogenous Acid Production (NEAP) score[43]. The result of one study showed that the PRAL increases the odds of gastric cancer 1.74 times (OR=1.74, 95% CI 1.13-2.66) and NEAP 1.90 times (OR=1.90, 95% CI 1.26-2.84)[43].

Consequently, efforts to reduce health inequities are necessary to reduce the incidence of stomach cancer. Recognizing the strong inverse relationship between socioeconomic statuses is also the first step in prioritizing investment in the prevention and treatment of gastric cancer. Countries with the least resources are still facing the highest-burden due to the lack of screening programs[44]. In addition, the implementation of educational programs in the area of recognition of gastric cancer risk factors and timely guidance for early diagnosis, and the benefits of participation in screening programs will increase the diagnosis and therefore the incidence of gastric cancer. What is stated in the literature for preventing stomach cancer includes lifestyle changes, smoking cessation, alcohol withdrawal, change in eating habits, reducing the consumption of canned and processed foods and increasing the consumption of fresh fruits and vegetables, treatment of *H. pylori* infection, stomach cancer screening, care and monitoring of pre-cancerous changes.

DEATH

In 2019, 957,185 deaths from stomach cancer were reported worldwide, of which 64% were among men. The ASDR from stomach cancer was 11.88 cases per 100000 population, which is 2.1 times higher in men than in women. Also, in this study, a significant negative linear correlation was observed between the ASDR of stomach cancer and the SDI index. The highest ASDR of gastric cancer death was observed in Middle SDI and High-middle SDI countries and the lowest in countries with High SDI. The results of this study are consistent with the results of a study conducted in 2021 based on data from GBD 2017[33] and other studies[7,19,34,35]. In this study, the highest ASDR of stomach cancer was reported in Asia, the Western Pacific region from WHO regions, and East Asia and Andean Latin America region from GBD regions.

The present study shows that there is variation in the distribution of mortality and cancer incidence by region depending on age and population structure. Despite many advances in the diagnosis and treatment of cancers, gastric cancer is still one of the leading causes of death. One of the most important causes is the poor prognosis and diagnosis of cancer in advanced stages[8].

The global 5-year survival rate in advanced stages is 5% to 10%, and the health-related quality of life (HRQoL) deteriorates as the disease progresses[17]. The results of a study showed that the highest number of gastric cancer deaths was in East Asia[6]. In countries with high levels of HDI (human development index), the incidence of gastric cancer is high, but patients have a longer life expectancy[45]. High stomach cancer mortality in developing countries is likely to reflect a lack of effective prevention and treatment strategies[20]. Increasing patient survival can be due to reasons such as expanding health insurance and reducing inequalities between urban and rural areas[37]. The mortality rate increases after the age of 55 and are very high in both sexes over the age of 80[34]. Globally and regionally, there is a strong correlation between improved socio-demographic index (SDI) and improved gastric cancer mortality rate. SDI is not a measure of health care, but consists of variables related to fertility, education, and income. Thus, gastric cancer mortality may be improved by indirect measures as well as specific measures[38]. Geographic and temporal variations in mortality rates are often closely correlated with incidence, but a relatively smaller share of mortality from the disease occurs in countries with very high HDI compared to countries with moderate and low HDI[36].

A global study found that mortality rates declined faster than the incidence, attributed to socio-economic development and better access to diagnostic and treatment facilities. Survival in most countries is between 20 and 40%. In two high-risk countries, Japan and the Republic of Korea, which have implemented national adult endoscopic/radiographic screening programs, patient survival has increased by over 60% as a result of increases in early diagnoses[36].

BURDEN OF DISEASE

In 2019, 22220980 DALYs were registered in the world due to stomach cancer, of which 98.4% were related to YLL and 65.4% were related to men. Also, the age-standardized rate of DALYs is 368.85 per 100000 people, which is 1.5 times higher in men than in women. In this study, a significant negative linear relationship was observed between stomach cancer burden and SDI, so the lowest stomach cancer burden was recorded in countries with High SDI. The results of this study are consistent with the results of GBD 2017[4] and Study[13]. In the GBD study, reducing the burden of stomach cancer from 1990 to 2017 was associated with an increase in the socio-demographic index.

Reasons for differences in the DALY index in different regions include differences in lifestyle, genetics, and income level[46]. In low SDI, population growth contributes significantly to the overall increase in cancer incidence, and in countries with high SDI, it is due to the aging population. 50% of cancers occur in countries with high SDI, but only 30% of deaths, 25% of DALYs, and 23% of YLL cancers. Access to public insurance coverage, covering the costs of diagnosing and treating stomach cancer, is an effective factor in justifying this event[44].

On the other hand, stomach cancer patients have more problems, and less well-being than other patients, and the costs of managing gastric cancer are higher than other cancers[17]. With the diagnosis of cancer at a more advanced stage, the costs also increase[47]. Improving socioeconomic status and medical advances[19], improving living conditions, including better hygiene, and reducing the prevalence of *H. pylori*, play an important role in reducing the burden of gastric cancer[36].

LIMITATIONS

Because this study uses data saved in a database, the information recorded may not be precise enough for some countries.

CONCLUSIONS

The summary results based on the latest GBD data in this study show that stomach cancer is a major health challenge, especially in low- and middle-income countries. The heterogeneity observed in mortality and morbidity burden is more related to the economic and social status of societies; as countries that have a high SDI, despite the higher incidence, have fewer deaths and burdens. Therefore, further investigation of the cause of these differences, including the distribution of factors affecting the incidence, mortality, and disease burden among communities, seems necessary. Also, implementation of primary prevention strategies such as education on the risk factors and benefits of early diagnosis of gastric cancer, implementation of screening programs tailored to the conditions of each community, treatment of *H. pylori* infection, increasing the level of diagnosis and treatment of gastric cancer and strengthening the implementation of smoking control policies and alcohol is recommended.

Ethics approval:

The study was approved by the Ethics Committee of the Birjand University of Medical Sciences (Ethics Committee approval code IR.BUMS.REC.1400.414). As we used routinely collected anonymized electronic data, patient consent was not required.

Informed consent:

In this study, informed consent was not necessary because of the use of an on-line database.

Availability of data and material:

The data presented in this study are available on request from the corresponding author.

Conflict of interests:

All authors declare that they have no conflicts of interest.

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Authors Contributions:

AM, HS, SG and FBH designed and conceived the study. AM and NB collected the data. LA, FBH, HS, and IA analyzed and interpreted the data. AM, SG, NB, LA, NB and FBH, drafted the manuscript. HS and IA provided administrative, technical, or material support. LA and AM provided oversight. All authors contributed to the article and approved the submitted version.

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