

Age-Standardized Disability-Adjusted Life Years (DALYs) of Colorectal Cancer in Brunei Darussalam, 2002–2020: A Population-Based Registry Study

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Abstract

Purpose

Colorectal cancer (CRC) incidence is rising in Brunei Darussalam, but its overall health burden has not been quantified using Disability-Adjusted Life Years (DALYs). We estimated the national CRC DALY burden for 2002–2020 by sex, disease stage, and age at onset, and tested sensitivity to the disability-weighting method.

Methods

In this retrospective, population-based study of 1,373 CRC patients diagnosed 2002–2020, DALYs were calculated as Years of Life Lost (YLL) plus Years Lived with Disability (YLD) via a phase-based model using stage-specific Global Burden of Disease weights. Rates were age-standardized and stratified by sex, stage, age group, and onset age; sensitivity analysis compared stage-specific versus generic weighting.

Results

CRC caused 17,234.3 DALYs (YLL 95.1%, YLD 4.9%; age-standardized rate 285.5 per 100,000 population per year), higher in males (9,574.1) than females (7,660.3). Distant-stage disease was almost entirely mortality-driven (95.2% YLL) versus localised disease (91.0% YLL). Early-onset cases (< 50 years, 21.5% of the cohort) contributed 19.5 DALYs per case versus 10.6 for common-onset, and 45.9 years of life lost per death versus 22.4. Annual DALYs rose significantly (+ 4.4%/year, $p = 0.036$) to a 2015 peak before declining; an age-standardized period analysis confirmed this pattern was not explained by population aging. A generic disability weight increased total DALYs by 5.9%, more than phase-duration assumptions (-0.4% to + 0.7%).

Conclusion

CRC imposes a substantial, mortality-dominated burden in Brunei Darussalam, disproportionately concentrated in early-onset cases. The disability-weighting method materially affects burden estimates, supporting stage-specific over generic weights and providing a baseline for evaluating Brunei's CRC screening programme.

1. Introduction

Cancer represents a major and growing public health challenge worldwide, and Brunei Darussalam is no exception, where it is currently the second leading cause of death after cardiovascular disease [1], [2]. According to GLOBOCAN 2020, colorectal cancer (CRC) is among the most prevalent cancers globally

(age-standardized incidence rate, ASR, of 19.5 per 100,000 worldwide and 17.6 in Asia) [3]; Brunei's ASR of 22.6 per 100,000 exceeds both, with CRC the most common cancer among males (20.3% of new diagnoses) and second most common among females (11.1%) in 2020 [3]. A previous national analysis confirmed a significant, sustained rise in CRC incidence in Brunei from 2002–2020, disproportionately driven by early-onset disease (< 50 years)[4].

Incidence and mortality statistics capture only part of a disease's true impact. Disability-Adjusted Life Years (DALYs) combine premature mortality (Years of Life Lost, YLL) with non-fatal morbidity (Years Lived with Disability, YLD) into a single comparable burden measure, where one DALY equates to one lost year of full health [5], [6]. YLD estimates are highly sensitive to disability weights (DWs) applied. Although generic, single value weights are simpler to apply, they may misrepresent morbidity compared with phase-specific DWs that reflect the natural history of disease (e.g., diagnosis/treatment, controlled/metastatic, and terminal phases)[7]. Moreover, the age standardized DALYs represent the number of healthy years lost per 100,000 people, adjusted to a standard population age structure to enable precise, unbiased comparisons across various geographical areas, time periods, and demographics [8].

Globally, CRC caused over 24 million DALYs in 2021, with rising absolute burden despite declining age-standardized rates in many regions from earlier detection and improved treatment [9], [10], [11]. CRC is the gastrointestinal cancer with the greatest burden in Southeast Asia (~ 2.17 million DALYs in 2021, projected to rise through 2050) [12], while East Asia shows rising incidence alongside declining age-standardized DALY and mortality rates, attributed partly to organized screening [13]. DALY estimates specific to Brunei, a small, high-income nation with a national registry, have not been reported, and GBD modelled estimates may not fully capture country-specific case-mix, staging, or registry completeness for small populations.

This study estimates the age-standardized DALY burden of CRC in Brunei from 2002 to 2020 using patient-level registry data and a stage- and phase-specific GBD weighting model, to complement incidence-based surveillance, establish a national baseline, and inform evaluation of Brunei's CRC screening programme [14]. Specifically, we: quantify overall DALY burden and its age-standardized rate; examine variation by sex, age group, stage, and calendar year; compare early-onset (< 50 years) versus common-onset burden; and assess sensitivity of estimates to disability-weighting method and phase-duration assumptions.

2. Methods

2.1 Study Design, Setting, and Data Source

We conducted a retrospective, population-based burden-of-disease study using de-identified, patient-level data from the Brunei Darussalam Cancer Registry (BDCR), compiling data from institutional pathology, oncology, and electronic health records, and the national death registry. All 1,373 patients

diagnosed with a first primary CRC (ICD-10 C18–C20) between 1 January 2002 and 31 December 2020 were included; only citizens and permanent residents were included, and follow-up for vital status was fixed at 31 December 2021. Patients without a recorded date of death were treated as alive at this date. Variables extracted included age at diagnosis, sex, year and date of diagnosis, date of death (where applicable), and cancer stage (localised, regional, distant, in situ, or unknown). Population denominators for age-standardisation and for the annual crude-rate calculation were obtained from the Department of Economic Planning and Statistics, Brunei Darussalam.

2.2 Case Definitions and Stratification

Cases were stratified by six age groups (< 30, 30–39, 40–49, 50–59, 60–69, ≥ 70 years), sex, stage at diagnosis, calendar year, and age at onset. Early-onset CRC was defined as diagnosis before 50 years (n = 295, 21.5%) and common-onset as ≥ 50 years (n = 1,078, 78.5%). Stage-specific DALY reporting includes only localised, regional, and distant stages; in situ and unknown-stage cases are retained in overall and sex-stratified totals only.

2.3 Disability-Adjusted Life Years (DALY) Calculation

DALYs were calculated at the individual patient level as:

$$DALY = YLL + YLD$$

YLL was calculated as the remaining years of life lost due to premature mortality, using the GBD 2019 theoretical minimum-risk reference life table [15]. For each CRC-related death, YLL was assigned based on the standard remaining life expectancy corresponding to the patient's age at death, linearly interpolated between the reference ages reported in that life table.

YLD was calculated using a four-state, phase-specific disease-natural-history model, comprising diagnosis/primary therapy, controlled, metastatic, and terminal phases, matching the states and disability weights specified for colorectal cancer in the GBD 2019 Disability Weights data release [16], originally measured in Salomon et al.'s GBD 2013 disability weight study [17]. Because the registry recorded stage at diagnosis but not a date of disease progression, each patient's intermediate-phase state was fixed by stage at diagnosis for its entire duration rather than updated if disease progressed later: patients diagnosed at localised, regional, in situ, or unknown stage were assigned the "controlled" weight (DW = 0.049), and those diagnosed at distant stage were assigned the "metastatic" weight (DW = 0.451). Each patient's course therefore comprised at most three of the four phases in sequence: (i) a 6-month diagnosis/primary-therapy phase (DW = 0.288); (ii) the intermediate controlled or metastatic phase described above; and (iii) for decedents, a terminal phase covering the 6 months preceding death (DW = 0.540), which replaced the intermediate-phase weight for that period. Intermediate-phase duration was time from diagnosis to death, or to the 31 December 2021 censoring date for survivors, net of the diagnosis and terminal phases.

DALYs were expressed per 100,000 population. The age-standardized rate was calculated as:

$$\text{Age} - \text{Standardized DALY rate} = \sum [(DALY_i / Population_i) \times W_i]$$

where DALY_i and Population_i are DALYs and population in age group *i*, and W_i is the WHO World Standard Population weight [18], using the six age-group categorisation described in Section 2.2. For the annual trend, crude DALY rates (total DALYs / annual Citizens and Permanent Residents population) were regressed log-linearly against calendar year to estimate an annual percent change (APC), consistent with joinpoint methodology [19].

2.4 Sensitivity Analysis

A one-way sensitivity analysis assessed the influence of the disability-weighting approach (stage- and phase-specific model vs. a single generic weight of 0.288) and phase-duration assumptions (3, 6, 12 months) on total DALYs; full scenario results are reported in Supplementary Table S1.

3. Results

3.1 Overall Burden of Disease and Annual Trend, 2002–2020

Between 2002 and 2020, CRC resulted in 17,234.3 DALYs among 1,373 patients (604 deaths, 44.0%), of which 95.1% was attributable to YLL and 4.9% to YLD, indicating mortality was the dominant driver of health loss. The overall age-standardized DALY rate was 285.5 per 100,000 population per year.

The crude annual DALY rate rose significantly across 2002–2020, peaking in 2015 before declining through 2020 (Fig. 2), with an annual percent change of + 4.4% (*p* = 0.036), broadly consistent with the rising incidence reported in the companion study [4]. This pattern was driven largely by a single outlier year: 2015 recorded 10 deaths among patients diagnosed before age 40, against an average of 2.2 per year across all other years, a genuine registry cluster whose young deaths carry disproportionate YLL weight.

3.2 Burden by Sex

Burden was higher among males (9,574.1 DALYs) than females (7,660.3 DALYs), though YLL:YLD composition was nearly identical between sexes (~ 95% YLL, Table 1), indicating the sex difference reflects case counts and mortality rather than a differing severity profile.

Table 1
Overall DALYs and YLL/YLD proportional distribution, by sex and disease stage, colorectal cancer, Brunei Darussalam, 2002–2020.

Category	Group	Period	YLL	YLD	DALYs
Overall	Total	2002–2020	95.1%	4.9%	17,234.3
Sex	Female	2002–2020	95.1%	4.9%	7,660.3
Sex	Male	2002–2020	95.2%	4.8%	9,574.1
Stage	Localised	2002–2020	91.0%	9.0%	1,783.0
Stage	Regional	2002–2020	95.9%	4.1%	5,366.9
Stage	Distant	2002–2020	95.2%	4.8%	8,371.6

YLL = Years of Life Lost; YLD = Years Lived with Disability; DALYs = Disability-Adjusted Life Years. Overall and sex-stratified totals include in situ and unknown-stage cases; stage-stratified rows report only localised, regional, and distant stages.

3.3 Burden by Disease Stage

Burden rose sharply with stage, from 1,783.0 DALYs (91.0% YLL, 9.0% YLD) at localised stage to 5,366.9 DALYs (95.9% YLL) at regional stage and 8,371.6 DALYs (95.2% YLL) at distant stage. The localised-stage composition was the least mortality-dominated, consistent with better prognosis and a longer low-weight “controlled phase” for survivors, whereas regional- and distant-stage disease were both almost entirely mortality-driven by case-fatality rather than weighting choice.

3.4 Burden by Age Group and Age at Onset

Age-specific DALY rates increased monotonically with age: 9.6 per 100,000 population per year (< 30), 78.3 (30–39), 277.6 (40–49), 516.8 (50–59), 637.0 (60–69), and 2,664.9 (≥ 70), the highest group by a wide margin (Supplementary Fig. S1), consistent with the companion incidence study's finding of highest incidence in the ≥ 70 group [4].

Early-onset CRC (< 50 years) accounted for 295 of 1,373 cases (21.5%) but contributed a disproportionate share of per-case burden (Table 2, Fig. 3). Case-fatality was broadly similar (41.0% early-onset vs. 44.8% common-onset; not statistically significant, Supplementary Table S2), yet DALYs per case were roughly 1.8-fold higher for early-onset disease (19.5 vs. 10.6), and years of life lost per death roughly 2-fold higher (45.9 vs. 22.4 years), reflecting the greater remaining life expectancy lost when death occurs at a younger age. YLL contribution was also higher for early-onset (96.4%) than common-onset disease (94.5%).

Table 2
DALY burden by age at onset, colorectal cancer, Brunei Darussalam, 2002–2020.

Onset group	Cases (%)	Deaths (%)	YLL	YLD	DALYs	YLL (%)	DALYs per case	YLL per death (years)
Early-onset (< 50 years)	295 (21.5%)	121 (41.0%)	5,552.2	206.6	5,758.8	96.4%	19.5	45.9
Common-onset (≥ 50 years)	1,078 (78.5%)	483 (44.8%)	10,843.0	632.5	11,475.5	94.5%	10.6	22.4

YLL = Years of Life Lost; YLD = Years Lived with Disability; DALYs = Disability-Adjusted Life Years. Case-fatality reflects deaths recorded by 31 December 2021 among cases diagnosed 2002–2020.

4. Discussion

This study presents the first national estimate of the age-standardized DALY burden of colorectal cancer in Brunei Darussalam, reporting a rate of 285.5 per 100,000 population per year for 2002–2020, with mortality (YLL, 95.1%) overwhelmingly dominant over morbidity (YLD, 4.9%) as the driver of overall health loss.

4.1 Burden Relative to Global and Regional Estimates

Brunei’s age-standardized CRC DALY rate of 285.5 per 100,000 population per year is broadly comparable to published global and regional benchmarks: close to GBD’s global estimate of approximately 235.7 per 100,000 per year [11], similar to China’s locally-weighted estimate of 229.8 per 100,000 in 2017 [20], closely matching a Taiwan four-cancer county-level analysis reporting an average CRC rate of 285 per 100,000 population between 2010 and 2020 [21], and below the high-middle-Socio-Demographic Index (SDI) stratum, which recorded the highest regional age-standardized DALY rate of any SDI group globally [8]. This is a notable finding given that Brunei has one of the highest reported age-standardized CRC incidence rates in the region (22.6 per 100,000, exceeding both global and Asian averages) [3] and has been flagged in prior literature for both rising incidence [4] and declining survival over the study period [22]: despite this high incidence, Brunei’s overall disease burden as measured by DALYs sits within the range typically reported for high-income and high-middle-SDI settings, rather than exceeding it. This pattern, high incidence without a correspondingly extreme DALY rate, is consistent with Southeast Asia’s broader gastrointestinal cancer burden trajectory [12], and may reflect Brunei’s universal healthcare access moderating case-fatality even as incidence continues to rise, though this study cannot directly test that mechanism.

This comparison should still be read cautiously. Our patient-level, phase-specific disability-weighting model, using standard GBD disability weights, differs from how GBD models sequela prevalence at the population level, though it draws on the same underlying weight values [16], [17]. Our own sensitivity

analysis found a generic flat weight increased total DALYs by 5.9% relative to the stage-specific base case (Supplementary Table S1), underscoring that the choice of weighting structure materially affects DALY estimates. Because this study uses the same GBD 2019 reference life table for YLL as GBD's own estimates, rather than a Brunei-specific standard, differences in reference life expectancy do not explain any remaining gap between Brunei's rate and the global comparators; the modest remaining difference more likely reflects genuine differences in stage distribution, case-fatality, and the disability-weighting approach described above.

A further, more direct check comes from comparing this registry-based estimate against GBD's own country-specific modelled estimate for Brunei. GBD 2021 estimates an age-standardized CRC DALY rate for Brunei of 397.75 per 100,000 (95% UI 335.62–468.20) [23], driven almost entirely by YLL (386.82 per 100,000); YLD contributes comparatively little in both estimates (10.93 per 100,000 in GBD's model versus approximately 14.0 per 100,000 implied by this study's rate), so disability-weighting methodology cannot explain the gap. GBD's modelled estimate is therefore approximately 39% higher than the registry-based rate reported here (397.75 vs. 285.5 per 100,000), a considerably larger gap than seen against the global or China comparators above. Because YLL, not YLD, drives this difference, it more likely reflects differences in the underlying incidence and mortality inputs GBD uses to model Brunei's burden, commonly derived in small countries partly through spatiotemporal modelling and regional borrowing of strength given comparatively sparse local vital registration data, rather than a difference in DALY calculation method. This divergence between a direct national registry count and GBD's indirect model illustrates the value of registry-based national estimates for small countries, where global model outputs may not closely track locally observed data.

The YLL proportion found here (95.1%) closely matches the 95.6% YLL share reported for colorectal cancer globally under GBD 2019 [11], confirming that CRC burden, in Brunei as globally, is overwhelmingly mortality-driven rather than disability-driven. This reflects the substantial proportion of regional- and distant-stage cases in the registry cohort [4], where the controlled-phase weight (0.049) contributes comparatively little YLD relative to the terminal and metastatic weights that apply once disease progresses or a patient dies.

As additional context, GBD 2017 estimated that roughly a third of global colon and rectum cancer YLDs occurred in the metastatic phase [24], a population-level distribution that is not directly comparable to our patient-level calculation but is illustrative of why stage-specific weighting materially affects YLD estimates.

4.2 Annual Trend, 2002–2020

Beyond this cross-sectional comparison, the burden also showed a temporal pattern within the study period. The crude annual DALY rate (Fig. 2) rose from 2002 to a peak in 2015, driven substantially by a single year with an unusually high number of deaths among patients diagnosed before age 40, before declining through 2020. Because Brunei's population aged considerably over the same period, with the proportion aged 50 and above nearly doubling from 11.7% in 2002 to 22.2% in 2020, a natural concern is

whether this pattern is partly a demographic artefact rather than a genuine change in CRC burden, since population aging alone would be expected to push the crude rate upward, not downward, over time. An age-standardized period analysis (Fig. 1), aggregating the 19 annual observations into four 5-year periods to keep age-band case counts stable, addresses this directly: the age-standardized rate rose from 276.6 per 100,000 in 2002–2006 to a plateau of 456.9–495.4 during 2007–2016, before falling to 235.1 in 2017–2020, below even the 2002–2006 level. Because this decline occurred despite, rather than because of, Brunei's aging population, it is unlikely to be explained by demographic drift and more plausibly reflects a genuine reduction in age-specific CRC burden toward the end of the study period.

4.3 Stage-Dependent Burden Composition

Absolute burden rose sharply with stage, from 1,783.0 DALYs at localised to 8,371.6 at distant stage, but once weighted, YLL:YLD composition converged across regional and distant stage (~ 95% YLL), with only localised disease showing a materially different profile (91.0% YLL), since case-fatality dominates burden once disease reaches regional or distant stage, largely independent of the intermediate-phase weight applied (which mainly affects the smaller pool of long-term survivors concentrated at localised stage). This localised-stage share (91.0%) sits below the aggregate global CRC YLL proportion of 95.6% reported under GBD 2019 [11], consistent with the low controlled-phase weight (0.049) applied here: localised-stage survivors, who spend the longest time in this low-weight controlled phase, accumulate more YLD relative to their YLL than the regional- or distant-stage majority, a structural feature of the patient-level phase-specific model rather than a stage-mix effect, since stage is already held constant in this comparison. This is consistent with the established stage-prognosis relationship in CRC [25] and a Brunei-specific survival analysis reporting a 7.12-fold higher death hazard at distant versus localised stage [26]. Interventions shifting stage distribution earlier, including the screening programme, would therefore be expected to reduce DALYs primarily by averting deaths rather than by changing survivors' morbidity profile, though this cross-sectional, stage-stratified pattern cannot itself demonstrate that causal mechanism.

4.4 Disproportionate Burden of Early-Onset CRC

The companion incidence study reported early-onset CRC (< 50 years) rising more than twice as fast as common-onset disease in Brunei (7.03% vs. 3.10% APC) [4]. Independent corroboration comes from a regional GBD 2019 analysis of early-onset CRC (15–49 years) across the Asia-Pacific, which found Brunei had both the highest age-standardized incidence rate (9.86 per 100,000) and the highest age-standardized death rate (4.19 per 100,000) of any country assessed in 2019 [27]. The present findings add a burden dimension: although early-onset cases were only 21.5% of the cohort, each contributed nearly twice as many DALYs as a common-onset case (19.5 vs. 10.6 per case), and each early-onset death represented roughly twice as many years of life lost (45.9 vs. 22.4 years), an arithmetic consequence of the YLL formulation (a death at a younger age carries more remaining life expectancy under the GBD reference life table than a death at an older age) but one with real policy relevance, since it quantifies why a rising early-onset trend translates into disproportionate burden despite remaining a minority of caseload. Case-fatality was broadly similar between groups (41.0% vs. 44.8%; not statistically

significant), so the burden differential is driven by age at death rather than a different risk of dying once diagnosed, reinforcing the rationale for lowering screening initiation age and for risk-stratification tools, including machine-learning approaches using non-invasive predictors, to identify elevated CRC risk in adults under 50 not currently captured by Brunei's screening programme.

4.5 Implications for Policy and Screening

Age-standardized DALYs give policymakers a burden metric comparable across time, making it trackable to assess the national CRC screening programme's impact. Since CRC burden in Brunei is dominated by mortality rather than morbidity, and this holds once disease progresses beyond localised stage, continued investment in early detection should reduce DALYs primarily through averted deaths, consistent with the 7.12-fold higher death hazard at distant versus localised stage reported in a Brunei-specific survival analysis [26] and the stage-dependent burden pattern described in Section 4.3. This 2002–2020 baseline, using a stage- and phase-specific model consistent with international best practice [20], provides a reference point for formally evaluating the screening programme's impact. As post-2020 data accumulate, future work could test whether Brunei's incidence-burden pattern decouples as in East Asia, rising incidence with declining DALY rates, offering direct evidence of the screening programme's impact.

4.6 Limitations

Several limitations apply. First, intermediate-phase duration was approximated as time to death or censoring net of the diagnosis and terminal phases; this had a modest effect (-0.4% to + 0.7%) relative to weighting-method choice (+ 5.9%). Second, because the registry recorded stage at diagnosis but not a date of disease progression, each patient's intermediate-phase state (controlled or metastatic) was fixed by stage at diagnosis for the entire intermediate phase; patients diagnosed at localised or regional stage who later progressed to metastatic disease before death would therefore remain classified under the lower controlled-phase weight (0.049) rather than the metastatic weight (0.451) for that time, likely underestimating YLD for this subset. Third, the controlled-phase weight (0.049) was applied uniformly without distinguishing patients with a permanent stoma, for whom GBD specifies a higher weight (0.139); this likely underestimates YLD for stoma patients (chiefly those undergoing abdominoperineal resection). Fourth, disability weights were generic GBD values rather than Brunei- or Southeast Asia-derived, which may not fully capture local disease experience; these values remain GBD's standard reference weight set for cancer sequelae and have not been superseded by a more recent measurement study, including in the current GBD 2021 round. Fifth, the annual trend was analysed descriptively rather than via formal joinpoint regression, given the small number of observations and a high-leverage year. Finally, risk-factor data (smoking, diet, family history, screening participation) were unavailable in the registry.

5. Conclusions

This study provides the first national estimate of the DALY burden of colorectal cancer in Brunei Darussalam, reporting an age-standardized DALY rate of 285.5 per 100,000 population per year for 2002–2020, broadly in line with global and regional benchmarks, with premature mortality (YLL) accounting for over 95% of total burden. Burden rose sharply with disease stage, with regional- and distant-stage disease almost entirely mortality-driven, while localised-stage disease showed a more balanced YLL:YLD composition. Early-onset CRC, while only 21.5% of cases, contributed nearly twice as many DALYs per case and roughly twice as many years of life lost per death as common-onset disease, reinforcing the policy case for earlier detection and risk stratification in adults under 50. Sensitivity analysis showed that the choice of disability-weighting method (stage- and phase-specific versus generic) had a substantially larger effect on total DALYs than assumptions about disease-phase duration, relevant to future burden-of-disease work in similarly small national registries. These findings establish a population-level baseline for future evaluation of Brunei's national CRC screening programme. Full sensitivity-analysis results are reported in Supplementary Table S1.

Declarations

Competing interests:

The authors declare no competing interests.

Consent to publish:

Not applicable. This study used only de-identified, aggregate registry data; it does not include any individual patient images, case reports, or identifying information.

Ethics approval and consent to participate:

Ethical approval was granted by the Ministry of Health Research and Ethics Committee (MHREC), Brunei Darussalam (Ref. No: MHREC/MOH/2022/1(1) and MHREC/MOH/2022/1(2)). Patient consent was not required as all data were de-identified and no patient contact was involved.

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Author Contribution

US led the study and contributed to conceptualisation, methodology, formal analysis, and writing – original draft. HMT contributed to conceptualization and writing – review & editing. LN, EL, OSK and HAR provided supervision and writing – review & editing. All authors read and approved the final manuscript.

Data Availability

The data that support the findings of this study are held by the Ministry of Health, Brunei Darussalam. Restrictions apply to the availability of these data and they are not publicly available. Requests for data access may be directed to the corresponding author.

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Figures

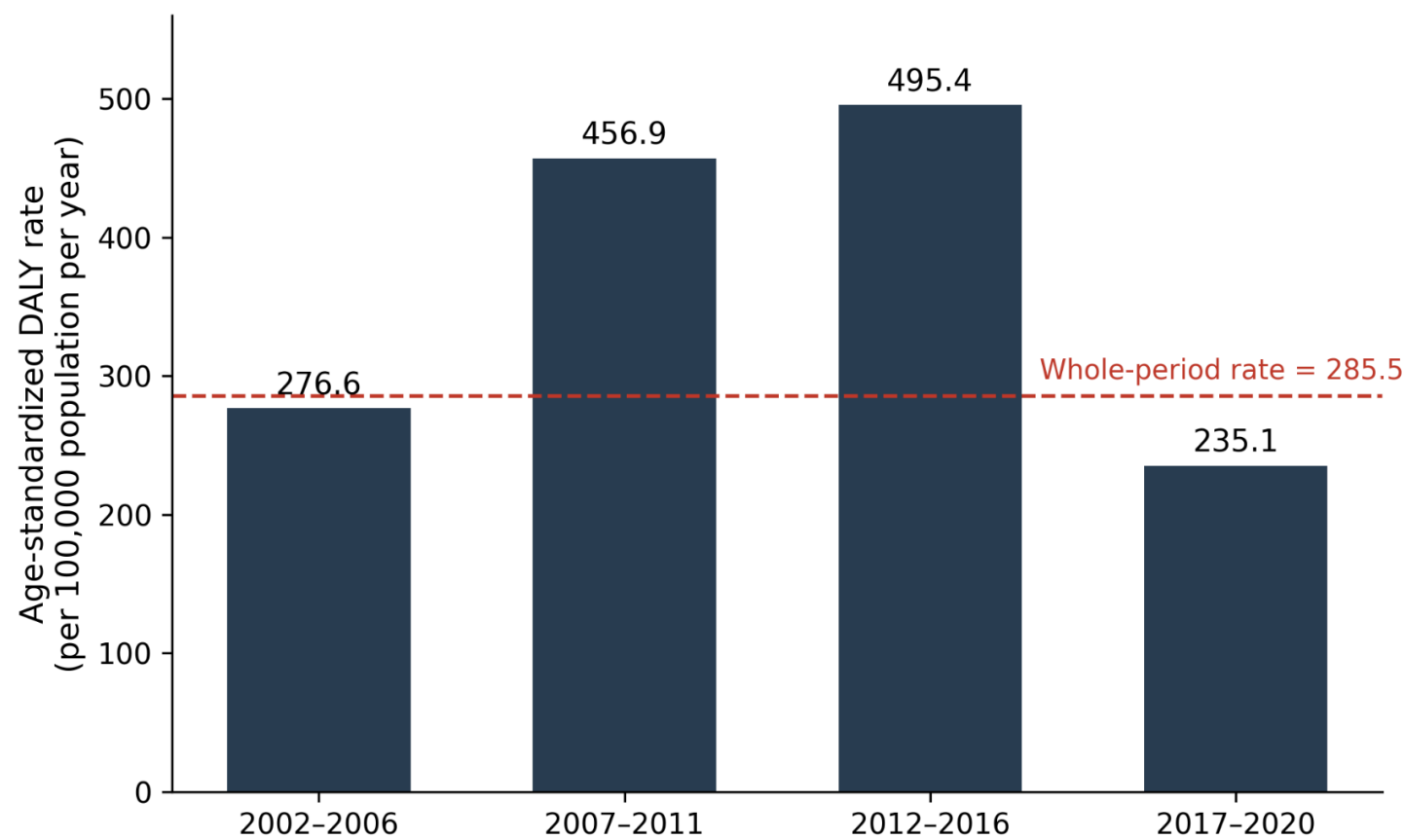


Figure 1

Age-standardized DALY rate (per 100,000 population per year) for colorectal cancer, Brunei Darussalam, 2002–2020, by 5-year calendar period, relative to the whole-period age-standardized rate of 285.5 per 100,000 (dashed line). Rates rose from 276.6 (2002–2006) to a plateau of 456.9–495.4 during 2007–2016, before declining to 235.1 in 2017–2020.

Crude annual DALY rate, CRC, Brunei 2002-2020

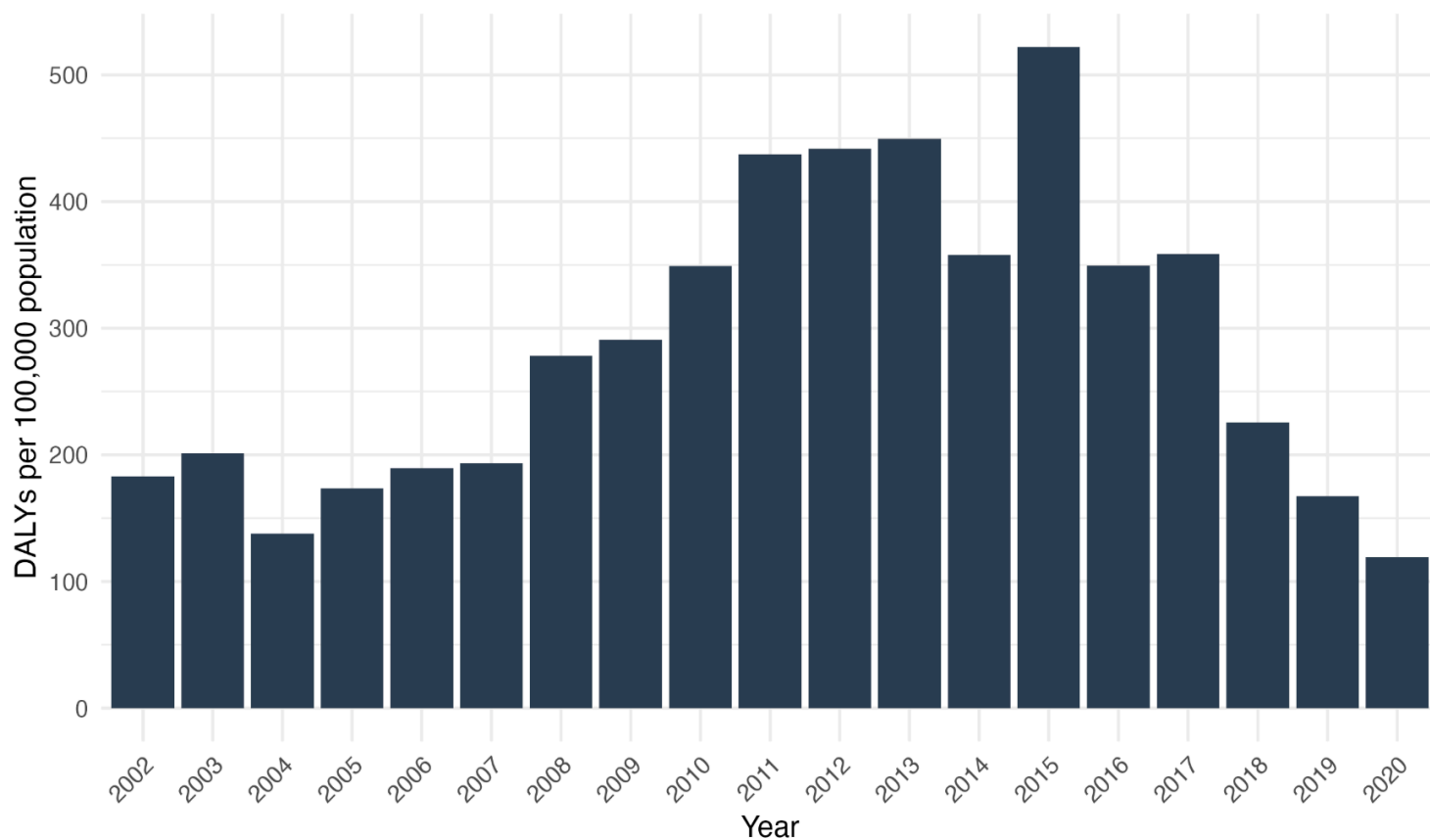


Figure 2

Crude annual DALY rate (per 100,000 population) for colorectal cancer, Brunei Darussalam, 2002–2020. Rate rises from 183.1 per 100,000 in 2002 to a peak of 522.1 in 2015 before declining to 119.3 by 2020; the underlying total-DALY linear trend is statistically significant (APC +4.4%, $p = 0.036$).

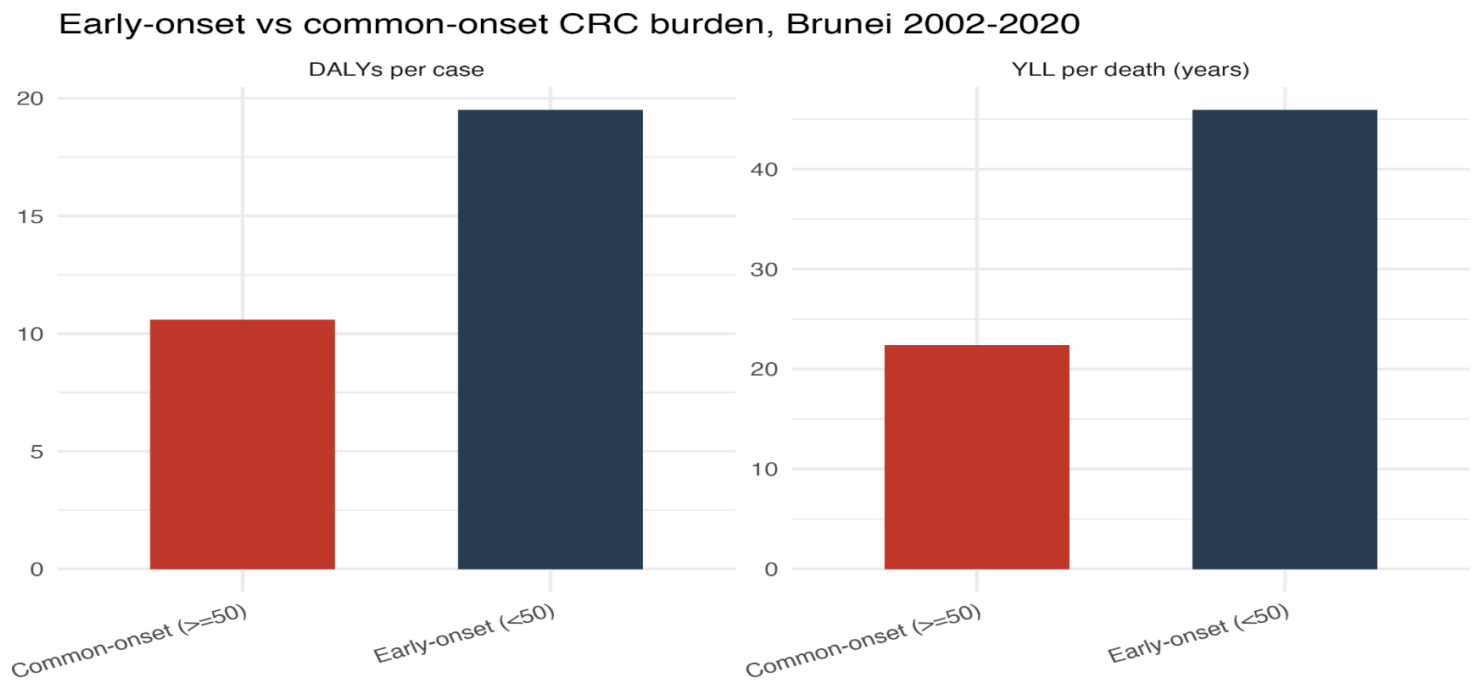


Figure 3

DALY burden per case and years of life lost (YLL) per death, early-onset (< 50 years) versus common-onset (≥ 50 years) colorectal cancer, Brunei Darussalam, 2002–2020.

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