A4.19 Cholera

Incidence

Estimates of the incidence of cholera were adapted from a published systematic review of the global burden of cholera [285] updated with 2010 population estimates. This review classified 51 countries as cholera-endemic countries based on results of the systematic review and national cholera reports in the WHO Weekly Epidemiological Record. The review then used WHO 2008 country-specific estimates of the proportion of each country's population that lacked improved sanitation [286] to estimate the proportion of the population in the cholera-endemic countries that were at risk for cholera. Then a cholera incidence was assigned to the population at risk for cholera in the cholera endemic countries based on population-based studies in India [287], Indonesia [288] and Mozambique [289]. The review also identified an additional 18 countries that reported cholera to WHO during 2000 to 2008, but were judged to be not be endemic for cholera; a country-specific cholera incidence in each of these "non-endemic" countries was estimated using the annual average number of cholera cases reported to WHO cases in each country times a multiplier of 10 to account for under-reporting. For all other countries, we used a literature review that identified national cholera incidence estimates from three countries countries: France [174], New Zealand [252] and the United States of America [188]. The cholera incidence in the United States of America was the median estimate from these three countries and was used (0.093 per 100 000 population) as the cholera incidence for all countries (other than the cholera-endemic and non-endemic countries) which did not have national incidence estimates. We used the global burden of cholera [285] range of estimates around the mean estimate of global cholera cases (2.8 million with a range of 1.4 to 4.3 million) to derive a range of estimates for cholera incidence.

Clinical Outcomes

Clinical outcomes were cholera (severe); cholera (moderate); cholera (mild); and cholera death. We assumed that 35% of cholera cases resulted in severe cholera, 40% of cholera cases resulted in moderate cholera, and 25% of cholera cases resulted in mild cholera [290, 291].

Duration

We assumed the duration of cholera was 7 days (min. 3 day–max. 10 days).

Disability weight

- Cholera (severe): GBD2010 disability weight of 0.281 (95% UI 0.184–0.399) for diarrhoea, severe.
- Cholera (moderate): GBD2010 disability weight of 0.202 (95% UI 0.133–0.299) for diarrhoea, moderate.
- Cholera (mild): GBD2010 disability weight of 0.061 (95% UI 0.036–0.093) for diarrhoea, mild [82].

Mortality

For 51 cholera-endemic and 18 cholera non-endemic countries, we used the case fatality ratios (CFRs) estimated in the systematic review of the global burden of cholera [285]. This review calculated a variance-weighted average cholera CFR by region; the CFR was 1% in WPR subregion B, 1% in SEAR B (except 1.5% in Bangladesh), 1.3% in EMR B, 3% in SEAR D, 3.2% in EMR D, and 3.8% in AFR. For all other countries, the literature review of national incidence estimates for cholera identified no reported deaths; therefore we assumed no cholera deaths occurred in countries (other than the cholera-endemic and non-endemic countries). We used the global burden of cholera

[285] range of estimates around the mean estimate of global cholera deaths (91 000, with a range of 28 000 to 142 000) to derive a range of estimates for cholera deaths.

Age distribution

Cholera age distribution: 15% <5 years; 25% 5–14 years; 42% 15–34 years; 15% 35–64; 3% >60 years [292, 293].

Sex distribution

Cholera sex distribution: 50% male.

A4.20 Cryptosporidiosis

Incidence

The incidence of cryptosporidiosis was estimated separately for middle-to-high mortality countries, and low mortality countries. For the 133 middle-to-high mortality countries, we used a modification of the CHERG approach [50]. To derive "envelopes" of diarrhoea cases, for children <5 years of age we used estimates of diarrhoea incidence from a CHERG systematic review [51] and for persons >5 years of age we used a FERG-commissioned systematic review [52]. We then estimated the aetiological proportions of diarrhoeal illnesses due to Cryptosporidia and 10 other diarrhoeal pathogens in children <5 years of age using a CHERG and FERG systematic review of aetiology studies among outpatients and persons in the community [40], and the aetiological proportion of diarrhoeal illnesses due to Cryptosporidia and 10 other diarrhoeal pathogens in persons >5 years of age using an updated FERG systematic review of aetiology studies among inpatients, outpatients and persons in the community [40, 274]. The cryptosporidiosis aetiological proportions were extracted from studies, and regional median cryptosporidiosis aetiological proportions calculated. We modified the CHERG approach by dropping regional median cryptosporidiosis aetiological proportion outliers that were >5 times greater than the global median cryptosporidiosis aetiological proportion, and replacing missing regional cryptosporidiosis aetiological proportions with the global median. Furthermore, for children <5 years of age, we proportionally decreased the aetiological proportions for all 11 diarrhoeal pathogens in each region so that the sum of the aetiological proportions for all diarrhoeal pathogens in a region equalled 1. The resultant regional cryptosporidiosis aetiological proportions were multiplied by the regional estimates of diarrhoea incidence, and the resultant regional cryptosporidiosis incidence was applied to all countries in that region. In the 61 low mortality countries (EUR and other subregion "A" countries), we used a literature review that identified national incidence estimates for cryptosporidiosis from six countries: Australia [272], Canada [175], Netherlands [154], New Zealand [252], United Kingdom [48] and the United States of America [188]. These national estimates were based on systematic reviews, national surveillance data, and expert judgment. In these six countries, we used the estimated national cryptosporidiosis incidence (and range) for that country. For low mortality countries without a national estimate, we used the median cryptosporidiosis incidence from the six national studies. The median incidence was the mean from Australia (which was increased by 19% to account for travellers, using proxy information from New Zealand) and the Netherlands, which was 128.4 per 100 000 population with a range of 50.3 – 601.6.

Clinical Outcomes

Clinical outcomes were acute cryptosporidiosis diarrhoea (severe); acute cryptosporidiosis diarrhoea (moderate); acute cryptosporidiosis diarrhoea (mild); and death. We assumed that 0.5% of cryptosporidiosis cases resulted in severe diarrhoea, 8.5% of cryptosporidiosis cases resulted in moderate diarrhoea, and 91% of cryptosporidiosis cases resulted in mild diarrhoea.

Duration

In children <5 years of age, duration of severe diarrhoea was 8.4 days, moderate diarrhoea was 6.4 days, and mild diarrhoea was 4.3 days [266]. Based on the assumed distribution of severe, moderate and mild diarrhoea cases, the duration of cryptosporidiosis diarrhoea cases in children <5 years of age was estimated to be 4.9 days (min. 4.3 days–max. 8.4 days). In persons >5 years of age, the duration of diarrhoea was 2.8 days [266].

Disability weight

- Acute cryptosporidiosis diarrhoea (severe): GBD2010 disability weight of 0.281 (95% UI 0.184–0.399) for diarrhoea, severe.
- Acute cryptosporidiosis diarrhoea (moderate): GBD2010 disability weight of 0.202 (95% UI 0.133–0.299) for diarrhoea, moderate.
- Acute cryptosporidiosis diarrhoea (mild): GBD2010 disability weight of 0.061 (95% UI 0.036–0.093) for diarrhoea, mild [82].

Mortality

The mortality of cryptosporidiosis was estimated separately for middle-to-high mortality countries, and low mortality countries. For the 133 middle-to-high mortality countries, we used a modification of the CHERG approach [50]. We received envelopes of diarrhoeal deaths from WHO; because this estimate was not available with an uncertainity interval, we used the uncertainity range from the GBD2010 estimate of diarrhoeal deaths (81.7% to 114.6% around the point estimate) (14). We then estimated the aetiological proportions of diarrhoeal deaths due to *Cryptosporidia* and 10 other diarrhoeal pathogens[8] in children <5 years of age using a CHERG and FERG systematic review of aetiology studies among inpatients [40], and the aetiological proportions of diarrhoeal deaths due to *Cryptosporidia* and 10 other diarrhoeal pathogens in persons >5 years of age using an updated FERG systematic review of aetiology studies among inpatients [40, 274]. The cryptosporidiosis aetiological proportions were extracted from studies, and regional median cryptosporidiosis aetiological proportions calculated. We modified the CHERG approach by dropping regional median cryptosporidiosis aetiological proportion outliers that were >5 times greater than the global median cryptosporidiosis aetiological proportion, and replacing missing regional cryptosporidiosis aetiological proportions with the global median. Furthermore, for children <5 years of age, we proportionally decreased the aetiological proportions for all 11 diarrhoeal pathogens in each region so that the sum of the aetiological proportions for all diarrhoeal pathogens in a region equalled 1. The resultant regional cryptosporidiosis aetiological proportions were multiplied by the regional estimates of diarrhoea deaths, and the resultant regional cryptosporidiosis mortality was

[8] The 11 diarrhoeal pathogens are: non-typhoidal *Salmonella*, *Campylobacter*, *Shigella*, norovirus, enterotoxigenic *E. coli* (ETEC), enteropathogenic *E. coli* (EPEC), *Cryptosporidia*, *Giardia*, *Entamoeba histolytica*, other diarrhoeal agents not known to be foodborne (rotavirus and astrovirus), and unspecified agents.

applied to all countries in that region. In the 61 low mortality countries (EUR and other subregion "A" countries), we used a literature review that identified cryptosporidiosis mortality estimates from three countries: Netherlands [154], New Zealand [252] and the United States of America [188]. These national estimates were based on systematic reviews, national surveillance data, and expert judgment. In these three countries, we used the estimated national cryptosporidiosis mortality (and range) for that country. For low mortality countries without a national estimate, we used the median cryptosporidiosis mortality from the three national studies. The median cryptosporidiosis mortality was from the United States: 0.015 per 100 000 population with a range of range 0.003 - 0.080.

Age distribution

In middle-to-high mortality countries, we estimated incidence of cryptosporidiosis seperately for children <5 years of age and persons >5 years of age. In low mortality countries, the age distribution for cryptosporidiosis was 16% <5 years; 17% 5–14 years; 13% 15–24 years; 14% 25–34 years; 11% 35–44 years; 9% 45–54 years; 7% 55–64 years; 6% 65–74 years; 7% >75 years [294].

Sex distribution

Cryptosporidiosis sex distribution: 50% male.

A4.21 Giardiasis

Incidence

The incidence of giardiasis was estimated separately for middle-to-high mortality countries, and low mortality countries. For the 133 middle-to-high mortality countries, we used a modification of the CHERG approach [50]. To derive "envelopes" of diarrhoea cases, for children <5 years of age we used estimates of diarrhoea incidence from a CHERG systematic review [51] and for persons >5 years of age we used a FERG-commissioned systematic review [52]. We then estimated the aetiological proportions of diarrhoeal illnesses due to *Giardia* and the 10 other diarrhoeal pathogens in children <5 years of age using a CHERG and FERG systematic review of aetiology studies among outpatients and persons in the community [40], and the aetiological proportion of diarrhoeal illnesses due to *Giardia* and the 10 other diarrhoeal pathogens in persons >5 years of age using an updated FERG systematic review of aetiology studies among inpatients, outpatients and persons in the community [40, 274]. The giardiasis aetiological proportions were extracted from studies, and regional median giardiasis aetiological proportions calculated. We modified the CHERG approach by dropping regional median giardiasis aetiological proportion outliers that were >5 times greater than the global median giardiasis aetiological proportion, and replacing missing regional giardiasis aetiological proportions with the global median. Furthermore, for children <5 years of age, we proportionally decreased the aetiological proportions for all 11 diarrhoeal pathogens in each region so that the sum of the aetiological proportions for all diarrhoeal pathogens in a region equalled 1. The resultant regional giardiasis aetiological proportions were multiplied by the regional estimates of diarrhoea incidence, and the resultant regional giardiasis incidence was applied to all countries in that region.

In the 61 low mortality countries (EUR and other subregion "A" countries), we used a literature review that identified

national incidence estimates for giardiasis from six countries: Australia [272], Canada [175], Netherlands [154], New Zealand [252], United Kingdom [48] and the United States of America [188]. These national estimates were based on systematic reviews, national surveillance data, and expert judgment. In these six countries, we used the estimated national giardiasis incidence (and range) for that country. For low mortality countries without a national estimate, we used the median giardiasis incidence from the six national studies. The median incidence was the mean from Canada (which was increased by 8% to account for travellers, using proxy information from the United States of America) and the United States of America, which was 384.6 per 100 000 population, with a range of 266.4–537.0.

Clinical Outcomes

Clinical outcomes were acute giardiasis diarrhoea (severe); acute giardiasis diarrhoea (moderate); acute giardiasis diarrhoea (mild); and giardiasis death. We assumed that 0.5% of giardiasis cases resulted in severe diarrhoea, 8.5% of giardiasis cases resulted in moderate diarrhoea, and 91% of giardiasis cases resulted in mild diarrhoea.

Duration

In children <5 years of age, duration of severe diarrhoea was 8.4 days, moderate diarrhoea was 6.4 days, and mild diarrhoea was 4.3 days [266]. Based on the assumed distribution of severe, moderate and mild diarrhoea cases, the duration of giardiasis diarrhoea cases in children <5 years of age was estimated to be 4.9 days (min. 4.3 days–max. 8.4 days). In persons >5 years of age, the duration of diarrhoea was 2.8 days [266].

Disability weight

- Acute giardiasis diarrhoea (severe): GBD2010 disability weight of 0.281 (95% UI 0.184–0.399) for diarrhoea, severe.
- Acute giardiasis diarrhoea (moderate): GBD2010 disability weight of 0.202 (95% UI 0.133–0.299) for diarrhoea, moderate.
- Acute giardiasis diarrhoea (mild): GBD2010 disability weight of 0.061 (95% UI 0.036–0.093) for diarrhoea, mild [82].

Mortality

We estimated no giardiasis deaths.

Age distribution

In middle-to-high mortality countries, we estimated incidence of giardiasis seperately for children <5 years of age and persons >5 years of age. In low mortality countries, the age distribution for cryptosporidiosis was 20% <5 years; 17% 5–14 years; 10% 15–24 years; 11% 25–34 years; 12% 35–44 years; 12% 45–54 years; 9% 55–64 years; 5% 65–74 years; 4% >75 years [295].

Sex distribution

Giardiasis sex distribution: 50% male.

A4.22 Amoebiasis

Incidence

The incidence of diarrhoea due to amoebiasis was estimated separately for middle-to-high mortality countries, and low mortality countries. For the 133 middle-to-high mortality countries, we used a modification of the CHERG approach [50]. To derive "envelopes" of diarrhoea cases, for children <5 years of age we used estimates of diarrhoea incidence from a CHERG systematic review [51] and for persons >5 years of age we used a FERG-

commissioned systematic review [52]. We then estimated the aetiological proportions of diarrhoeal illnesses due to *Entamoeba histolytica* and the 10 other diarrhoeal pathogens[9] in children <5 years of age using a CHERG and FERG systematic review of aetiology studies among outpatients and persons in the community [40], and the aetiological proportion of diarrhoeal illnesses due to *Entamoeba histolytica* and the 10 other diarrhoeal pathogens in persons >5 years of age using an updated FERG systematic review of aetiology studies among inpatients, outpatients and persons in the community [40, 274]. The amoebiasis aetiological proportions were extracted from studies, and regional median amoebiasis aetiological proportions calculated. We modified the CHERG approach by dropping regional median amoebiasis aetiological proportion outliers that were >5 times greater than the global median amoebiasis aetiological proportion, and replacing missing regional amoebiasis aetiological proportions with the global median. Furthermore, for children <5 years of age, we proportionally decreased the aetiological proportions for all 11 diarrhoeal pathogens in each region so that the sum of the aetiological proportions for all diarrhoeal pathogens in a region equalled 1. The resultant regional amoebiasis aetiological proportions were multiplied by the regional estimates of diarrhoea incidence, and the resultant regional amoebiasis incidence was applied to all countries in that region. We estimated no amoebiasis cases in the 61 low mortality countries (EUR and other subregion "A" countries).

[9] The 11 diarrhoeal pathogens are: non-typhoidal *Salmonella*, *Campylobacter*, *Shigella*, norovirus, enterotoxigenic *E. coli* (ETEC), enteropathogenic *E. coli* (EPEC), *Cryptosporidia*, *Giardia*, *Entamoeba histolytica*, other diarrhoeal agents not known to be foodborne (rotavirus and astrovirus), and unspecified agents.

Clinical Outcomes

Clinical outcomes were acute amoebiasis diarrhoea (severe); acute amoebiasis diarrhoea (moderate); acute amobiasis diarrhoea (mild); and amoebiasis death. We assumed that 0.5% of amoebiasis cases resulted in severe diarrhoea, 8.5% of amoebiasis cases resulted in moderate diarrhoea, and 91% of amoebiasis cases resulted in mild diarrhoea.

Duration

In children <5 years of age, duration of severe diarrhoea was 8.4 days, moderate diarrhoea was 6.4 days, and mild diarrhoea was 4.3 days [266]. Based on the assumed distribution of severe, moderate and mild diarrhoea cases, the duration of amoebiasis diarrhoea cases in children <5 years of age was estimated to be 4.9 days (min. 4.3 days–max. 8.4 days). In persons >5 years of age, the duration of diarrhoea was 2.8 days [266].

Disability weight

- Acute amoebiasis diarrhoea (severe): GBD2010 disability weight of 0.281 (95% UI 0.184–0.399) for diarrhoea, severe.
- Acute amoebiasis diarrhoea (moderate): GBD2010 disability weight of 0.202 (95% UI 0.133–0.299) for diarrhoea, moderate.
- Acute amoebiasis diarrhoea (mild): GBD2010 disability weight of 0.061 (95% UI 0.036–0.093) for diarrhoea, mild [82].

Mortality

The mortality of amoebiasis was estimated separately for middle-to-high mortality countries, and low mortality countries. For the 133 middle-to-high mortality countries, we used a modification of the CHERG approach [50]. We received envelopes of diarrhoeal deaths from WHO; because this estimate was not available with an uncertainity

interval, we used the uncertainity range from the GBD2010 estimate of diarrhoeal deaths (81.7% to 114.6% around the point estimate) [58]. We then estimated the aetiological proportions of diarrhoeal deaths due to *Entamoeba histolytica* and the 10 other diarrhoeal pathogens in children <5 years of age using a CHERG and FERG systematic review of aetiology studies among inpatients [40], and the aetiological proportions of diarrhoeal deaths due to *Entamoeba histolytica* and the 10 other diarrhoeal pathogens in persons >5 years of age using an updated FERG systematic review of aetiology studies among inpatients [40, 274]. The amoebiasis aetiological proportions were extracted from studies, and regional median amoebiasis aetiological proportions calculated. We modified the CHERG approach by dropping regional median amoebiasis aetiological proportion outliers that were >5 times greater than the global median amoebiasis aetiological proportion, and replacing missing regional amoebiasis aetiological proportions with the global median. Furthermore, for children <5 years of age, we proportionally decreased the aetiological proportions for all 11 diarrhoeal pathogens in each region so that the sum of the aetiological proportions for all diarrhoeal pathogens in a region equalled 1. The resultant amoebiasis aetiological proportions were multiplied by the regional estimates of diarrhoea deaths, and the resultant regional amobiasis mortality was applied to all countries in that region. We estimated no amoebiasis deaths in the 61 low mortality countries (EUR and other subregion "A" countries).

Age distribution

The incidence of amoebiasis diarrhoea was estimated separately for children <5 years of age and persons >5 years of age. No other information on age distribution for diarrhoea cases.

Sex distribution

Amoebiasis sex distibution: 50% male.

A4.23 Congenital Toxoplasmosis

Incidence

Full details of how estimates of congenital toxoplasmosis was estimated are available in [76] and online appendixes (available at: www.vetepi.uzh.ch/research/Diseaseburden/Burden_CT-Appendices.pdf).

Clinical Outcomes

Based on data in [296, 297], the following probabilities were assigned to clinical outcomes: neonatal death probability 0.7% (UI 0.4%–1.2%); chorioretinitis in first year of life probability 13% (UI 12%–15%); chorioretinitis later in life probability 16% (UI 5%–52%); chorioretinitis in first year of life (AMR) probability 80% (UI 70%–90%); chorioretinitis later in life (AMR) probability 10% (UI 5%–15%); intracranial calcification probability 11% (UI 7.9%–12%); hydrocephalus probability 2.0% (UI 1.0%–3.0%); CNS abnormalities 2.9% (UI 1.0%–6.0%).

Duration

Lifelong (i.e. life expectancy at birth), except chorioretinitis later in life, which has duration the same as the life expectancy at age 10 years (mean age of onset is 10 years)

Disability weight

Suitable DWs were selected from GBD2010 [82]. These were

- *chorioretinitis* 0.033,
- intracranial calcification 0.01,
- hydrocephalus 0.36. and
- other CNS abnormalities 0.36.

Mortality

A value of 0.7% (UI 0.4%–1.2%) was used, as these are the proportions of cases that die in the neonatal peiod. In addition, there are approximately 2.4% (2.3%–6.3%) fetal loss (stillbirths) after 24 weeks, but these were not assigned as fatal cases.

Age distribution

In AMR: 90% onset at birth, 10% at age 10 years. Other regions: 86% onset at birth, 14% at age 10 years.

Sex distribution

There is no evidence that male and female infants have different risks of having congenital toxoplasmosis. Therefore, the sex ratio at birth was used to determine the sex distribution.

A4.24 Acquired toxoplasmosis

Incidence

Generally there is an increase in sero-positivity with age, and estimates of incidence were made from age-stratified sero conversion data as the difference in prevalence between age t and age t+1. Where there were insufficient data points, a model was constructed based on the assumptions that individuals that convert remain seropositive for life and live under a constant infection pressure. In this model, the prevalence $p(t)$ at age t can be described by: $p(t) = 1-\exp(-\beta t)$ where ß is the incidence. This model has been widely used for infectious diseases (see [298], for example). Incidence estimates with uncertainty limits were made using age-stratified seroconversion rates on a country by country basis, and summed over regions to derive global estimates.

Clinical Outcomes

Mild chorioretinitis p = 4.5%; moderate chorioretinitis p = 0.25%–0.69%; severe chorioretinitis 0.01%. Acute infectious disease: p = 26%; post-acute syndromes p = 2.9%. These were estimated from data in [212, 299–301], which derived from cohort and cross-sectional studies of individuals with confirmed acquired toxoplamsosis.

Duration

Eye lesions: lifelong, i.e. life expectancy at age of incident case. Acute 4 weeks; post-acute syndromes 8 weeks.

Disability weight

Mild chorioretinitis = 0.004; moderate chorioretinitis = 0.033; severe chorioretinitis = 0.191. Acute infectious disease = 0.053, post-acute syndromes = 0.254.

Mortality

None

Age distribution

Five different age distributions were used which was driven by the country-specific data.

Sex distribution

Male = 0.5

AGE DISTRIBUTION (YEARS)	<5	5-14	15-24	25-34	35-44	45-54	55-64	65-74	75-84	85+
G1Mean	0.26	0.34	0.19	0.11	0.055	0.027	0.013	0.0057	0.0015	0.00016
G2 Mean	0.21	0.3	0.2	0.13	0.078	0.043	0.023	0.011	0.0029	0.0002
G3 Mean	0.09	0.18	0.19	0.15	0.14	0.12	0.071	0.041	0.02	0.0059
G4Mean	0.075	0.14	0.14	0.14	0.14	0.13	0.11	0.064	0.039	0.016
G5Mean	0.072	0.11	0.17	0.32	0.21	0.086	0.021	0.0049	0.00098	0.00019

A4.25 Cystic echinococcosis

Incidence

For cystic echinococcosis (CE), due to infection with the larval stage of *Echinococcus granulosus*, a systematic review was conducted to collect and synthesize data on both the frequency and clinical manifestations of CE globally [75]. In addition to information acquired via the systematic review, World Organisation for Animal Health (OIE) and European Food Safety Authority (EFSA) databases were queried to obtain officially reported numbers of human cases by country. Individual government websites and reports were also searched for relevant CE frequency data. Such data included official hospital discharge data and notified cases in countries where the disease is notifiable. Where no data are available, but the disease is believed to be endemic then the incidence was imputed.

Clinical Outcomes

Treatment-seeking: moderate abdominal pelvic problems, chronic respiratory disease moderate (chronic obstructive pulmonary disease - COPD).

CNS lesions: moderate motor and/or cognitive impairments.

Non-treatment-seeking: mild abdominal pelvic problems, mild chronic respiratory disease.

CNS: mild motor or cognitive impairments.

Duration

Lifelong for non-treatment-seeking. Median of 2 years for treated cases.

Disability weight

- Mild abdominal pelvic problems: 0.012
- Moderate abdominal pelvic problems: 0.123.
- Mild chronic respiratory disease: 0.015.
- Moderate chronic respiratory disease: 0.192.
- Mild motor or cognitive impairment: 0.054.
- Moderate motor or cognitive impairment: 0.221.

Mortality

For treatment-seeking: 2%; 1% for non-treatment-seeking.

Age distribution

AGE DISTRIBUTION (YEARS)	<5	5-14	15-24	25-34	35-44	45-54	55-64	65+
G1Mean	4.6	10.4	17.1	21.2	18.1	12.8	8.7	7.1

Sex distribution

Male = 42.8%

A4.26 Alveolar echinococcosis

Incidence

Full details of the methodology of estimating the incidence of alveolar echinococcosis (AE) can be found in [72]. In addition, this data has been updated because of subsequent reports from countries such as Kyrgyzstan [302] and Poland [303].

Clinical Outcomes

Abdominopelvic problems followed by recovery after treatment, or death.

Duration

Europe: 10 years. Other: 8 years.

Disability weight

- 0.123

Mortality

Following abdominopelvic problems: western and central Europe and north America 2–5%; eastern Europe: 10–30%; elsewhere: 100%

Age distribution

- Europe: 0–9 years, 0%; 10–19 years, 2.7%; 20–29 years, 8.8%; 30–39 years, 13.6%; 40–49 years, 18.7%; 50–59 years , 18.4%; 60–69 years, 20.6%; 70–79 years, 12.1%; 80 years and over, 5.1%.
- Eastern Europe: 0–9 years, 1.7%; 10–19 years , 5.1%; 20–29 years, 12.8%; 30–39 years, 14.5%; 40–49 years, 20.5%; 50–59 years , 17.9%; 60–69 years, 14.5%; 70–79 years, 12.0%; 80 years and over, 1.0%.
- Central Asia: 0–9 years, 2.7%; 10–19 years, 10.3%; 20–29 years, 33.3%; 30–39 years, 25.1%; 40–49 years, 14.1%; 50–59 years , 10%; 60years and over, 4.5% .
- China: 0–9 years, 1.4%; 10–19 years , 7%; 20–29 years, 10.2%; 30–39 years, 23%; 40–49 years, 24.5%; 50–59 years , 16%; 60 years and over, 17.9%.

Sex distribution

Europe: male 44%, central Asia, male 36%, China male 47%.

A4.27 Taenia solium neurocysticercosis

Incidence

Taenia solium neurocysticercosis (NCC) is known to cause epilepsy and other neurological sequelae [73]. A systematic review revealed that NCC may be responsible for approximately 29.0% (95% UI 22.9%–35.5% of the burden of epilepsy in at-risk populations in low and middle income, pork consuming societies [74]. Consequently, the number of prevalent cases of epilepsy used in the GBD2010 [58, 81–83] were utilized to estimate the prevalent cases of epilepsy-associated NCC. The total numbers of cases of idiopathic epilepsy were available by country and were corrected to the total numbers of epilepsy by dividing by 0.58 (58% of epilepsy cases being idiopathic – see appendix of [83]. Population at risk was estimated by using seven assumptions:

- (1) Countries with negligible pig populations (less than 30 000 pigs (FAO data) were assumed to have zero risk due to there being no opportunity to transmit *T. solium*. This excluded countries where the Muslim population was over 90% and a few non-Muslim countries (for example Ethiopia) where the pig population was very low.
- (2) For countries that raise pigs and have more than 80% of the population living with unimproved sanitation, population at risk was estimated as the proportion of the population that was not Muslim.
- (3) For countries that raise pigs and have less than 80% of the population living with unimproved sanitation, population at risk was estimated as the proportion of the population that was not Muslim, multiplied by the proportion of the population that lived with unimproved sanitation.
- (4) For the United States of America, it was assumed that transmission does not occur, and hence nearly all cases are in immigrants, mainly from Latin America. Thus a weighted mean of the population at risk from the entire Latin America was applied to the population of hispanic immigrants, born outside of the United States of America but now resident in the United States of America.
- (5) For the ex-Soviet states, the risk of cysticercosis was assumed to be close to zero due to lack of evidence for cysticercosis or taeniasis in public health surveillance data.
- (6) Indonesia is predominantly Muslim (87%). However, the predominantly non-Muslim provinces of Papua and