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Increasing Incidence and Prevalence of the Inflammatory Bowel Diseases With Time, Based on Systematic Review

NATALIE A. MOLODECKY,[*,‡] ING SHIAN SOON,[‡,§] DOREEN M. RABI,[*,‡] WILLIAM A. GHALI,[*,‡] MOLLIE FERRIS,[*] GREG CHERNOFF,[‖] ERIC I. BENCHIMOL,[¶,#] REMO PANACCIONE,[*] SUBRATA GHOSH,[*] HERMAN W. BARKEMA,[‡,**] and GILAAD G. KAPLAN[*,‡]

*Departments of *Medicine, ‡Community Health Sciences, §Pediatrics, and **Production Animal Health and ‖Miistakis Institute, University of Calgary, Calgary, Alberta; and ¶Division of Gastroenterology, Hepatology & Nutrition, Children's Hospital of Eastern Ontario, and #Department of Pediatrics and Epidemiology & Community Medicine, University of Ottawa, Ottawa, Ontario, Canada*

This article has an accompanying continuing medical education activity on page e30. Learning Objective: Upon completion of this assessment, successful learners will be able to understand epidemiological factors of the inflammatory bowel diseases.

BACKGROUND & AIMS: We conducted a systematic review to determine changes in the worldwide incidence and prevalence of ulcerative colitis (UC) and Crohn's disease (CD) in different regions and with time. **METHODS:** We performed a systematic literature search of MEDLINE (1950–2010; 8103 citations) and EMBASE (1980–2010; 4975 citations) to identify studies that were population based, included data that could be used to calculate incidence and prevalence, and reported separate data on UC and/or CD in full manuscripts (n = 260). We evaluated data from 167 studies from Europe (1930–2008), 52 studies from Asia and the Middle East (1950–2008), and 27 studies from North America (1920–2004). Maps were used to present worldwide differences in the incidence and prevalence of inflammatory bowel diseases (IBDs); time trends were determined using joinpoint regression. **RESULTS:** The highest annual incidence of UC was 24.3 per 100,000 person-years in Europe, 6.3 per 100,000 person-years in Asia and the Middle East, and 19.2 per 100,000 person-years in North America. The highest annual incidence of CD was 12.7 per 100,000 person-years in Europe, 5.0 person-years in Asia and the Middle East, and 20.2 per 100,000 person-years in North America. The highest reported prevalence values for IBD were in Europe (UC, 505 per 100,000 persons; CD, 322 per 100,000 persons) and North America (UC, 249 per 100,000 persons; CD, 319 per 100,000 persons). In time-trend analyses, 75% of CD studies and 60% of UC studies had an increasing incidence of statistical significance ($P < .05$). **CONCLUSIONS: Although there are few epidemiologic data from developing countries, the incidence and prevalence of IBD are increasing with time and in different regions around the world, indicating its emergence as a global disease.**

Keywords: Epidemiology; IBD; Inflammatory Disease; Pattern; Rate.

The inflammatory bowel diseases (IBDs), consisting of ulcerative colitis (UC) and Crohn's disease (CD), are characterized by chronic inflammation of the gastrointestinal tract in genetically susceptible individuals exposed to environmental risk factors.[1–3] The etiology of IBD has been extensively studied in the past few decades[3]; however, disease pathogenesis is not fully understood.[1,4] Considerable variation in the epidemiology of IBD has been observed around the world, with a wide range of estimates both within and between geographic regions. IBD is believed to be associated with industrialization of nations, with the highest incidence rates and prevalence of IBD in North America and Europe.[5] The incidence of IBD may be rising in developing nations as they have become industrialized.[6,7] However, population-based epidemiologic data of IBD collected in a standardized fashion in developing nations are sparse. Several studies have reported that the incidence of IBD has increased markedly over the latter part of the 20th century,[8,9] while other studies have suggested a plateau or even decline in incidence in certain geographic regions.[8,9]

To properly interpret the incidence or prevalence data and evaluate time trends, a systematic review of all population-based studies that describes the incidence and/or prevalence of IBD is needed. Insight into the worldwide epidemiology of IBD is important for the identification of geographic patterns and time trends. This information may help researchers study environmental risk factors of IBD, describe the burden of IBD, assist with international health resource utilization planning, and direct research initiatives in countries lacking incidence data on IBD. The objectives of our study were to conduct a systematic review of the worldwide incidence and prevalence of UC and CD and to evaluate the change in incidence across different geographic regions and time periods.

Materials and Methods

Search Strategy

We conducted a systematic literature search using a predetermined protocol and in accordance with the quality of reporting meta-analyses of observational studies (MOOSE).[10] We searched 2 computer-stored databases, MEDLINE (1950 to

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December 2010) and EMBASE (Excerpta Medica Database; 1980 to December 2010) for studies investigating the epidemiology of IBD. The detailed search strategy was developed in consultation with a research librarian and is outlined in Appendix 1. The search was not limited by language or human subjects to ensure capture of all appropriate papers. The reference lists of relevant articles were also reviewed.

Selection Criteria

Two reviewers (N.A.M. and I.S.S.) independently conducted an initial screen of identified abstracts and titles. Abstracts were eliminated in this initial screen if they were not observational and did not investigate the epidemiology of IBD. Studies that did not report original data (eg, review articles) were also excluded. Abstracts meeting these criteria were eligible for full-text review, and articles were independently considered for inclusion in the review if they reported an incidence rate and/or prevalence of UC and/or CD or adequate information to calculate incidence rates or the prevalence. UC and CD were required to be reported separately for inclusion in the systematic review. Reports describing the incidence or prevalence of only pediatric-onset IBD (ie, age of diagnosis younger than 16 years) were excluded because a systematic review on the incidence of pediatric-onset IBD has been published.[11] Disagreement between reviewers was resolved by consensus with third party experts (D.M.R. and G.G.K.).

Data Extraction

Prevalence studies were identified to highlight the burden of IBD globally, whereas studies reporting incidence assessed the temporal evolution of disease diagnosis as well as patient characteristics at diagnosis, including age and sex. Two reviewers independently completed data extraction forms for each study. Data on prevalence per 100,000 population with 95% confidence intervals for the overall study period were collected. The incidence rates per 100,000 person-years with 95% confidence intervals for the overall study time period as well as incidence rates for the following were documented: (1) time trends, (2) age groups, and (3) sex ratios.

Summarization of Data

The incidence of IBD was summarized using incidence rates, defined as the number of cases in a population over the person-years at risk in the population. When incidence rates were adjusted for confounding factors, these estimates were reported. An average incidence rate was calculated when incidence rates were reported separately for male and female subjects, for race/ethnicity, or over multiple years. Prevalence of IBD was defined as the number of prevalent cases in a defined region per 100,000 population. All studies were organized by geographic region. Geographic maps were created using ArcMap version 9.3 (Geosoft Inc, Toronto, Canada) to evaluate worldwide differences in incidence and prevalence of IBD. Choropleth maps displaying differences in incidence rates and prevalence with changes in color intensity were used. Division of color shades was determined using quintiles of incidence and/or prevalence in a single map. Additionally, maps specific for incidence and prevalence were created separately. Incidence rates or prevalence values for local jurisdictions in Canada, the United States, the United Kingdom, and Spain were extrapolated to the entire province/state. For other countries where incidence rates or prevalence values were provided for local jurisdictions, the estimates were averaged and assigned to the entire country's jurisdictions. When incidence or prevalence for a region was reported in multiple studies, an average was calculated. Maps were divided into 3 periods: (1) before 1960, (2) 1960 to 1979, and (3) 1980 to 2006. Meta-analyses were not performed due to variability in study design of included studies.

We conducted time-trend analyses for studies that reported incidence rates for periods spanning at least a 10-year period with at least 3 time points. When the incidence rate was reported for a multi-year period, the midpoint of the time interval was selected. Temporal trends were calculated with joinpoint regression analysis whereby a series of permutations were used to assess whether the addition of joinpoints resulted in statistically significant linear changes in the direction or magnitude of the rates in comparison with a linear line.[12] Two joinpoints at most were considered. The parameter estimate used to summarize the trend over the fixed interval was the average annual percentage change according to a generalized log-linear model that assumed a Poisson distribution.

Results

The search strategy retrieved 8444 unique citations; 8103 were identified from MEDLINE and 4975 from EMBASE. Of these, 7938 citations were excluded after the first screening based on titles and abstracts, leaving 506 articles for full text review (Figure 1). The observed agreement between reviewers for eligibility of articles on this first screening was 97%, corresponding to a κ statistic of 0.77. On full text review of 506 articles, 246 were excluded for the reasons listed in Figure 1, leaving 260 studies (238 incidence studies and 122 prevalence studies) for final inclusion in the systematic review. Of the 238 incidence studies, 185 investigated the incidence of CD and 161 investigated the incidence of UC. Of the 122 prevalence studies, 96 investigated the prevalence of CD and 79 investigated the prevalence of UC. The agreement between reviewers for eligibility of articles was 100%, corresponding to a κ of 1. Characteristics of the 238 included incidence studies and 122 prevalence studies, including references, are shown in Appendixes 2 and 3, respectively. The incidence studies were conducted in different geographic regions, with 159 studies from Europe, 41 studies from Asia and the Middle East, and 25 studies from North America. The remainder of the countries, comprising Brazil, Argentina, Panama, South Africa, Australia, and New Zealand, consisted of approximately 5% of the included studies. Of the 122 prevalence studies, 63 studies were conducted in Europe, 38 studies in Asia and the Middle East, and 18 studies in North America. The remainder of the countries, comprising Argentina, Australia, and New Zealand, consisted of less than 5% of the included studies.

The annual incidence rates varied by geographic region, with UC estimates ranging from 0.6 to 24.3 per 100,000 in Europe, 0.1 to 6.3 per 100,000 in Asia and the Middle East, and 0 to 19.2 per 100,000 in North America and CD estimates ranging from 0.3 to 12.7 per 100,000 in Europe, 0.04 to 5.0 per 100,000 in Asia and the Middle East, and 0 to 20.2 per 100,000 in North America. These included incidence rates ranging from 1930 to 2008 for European

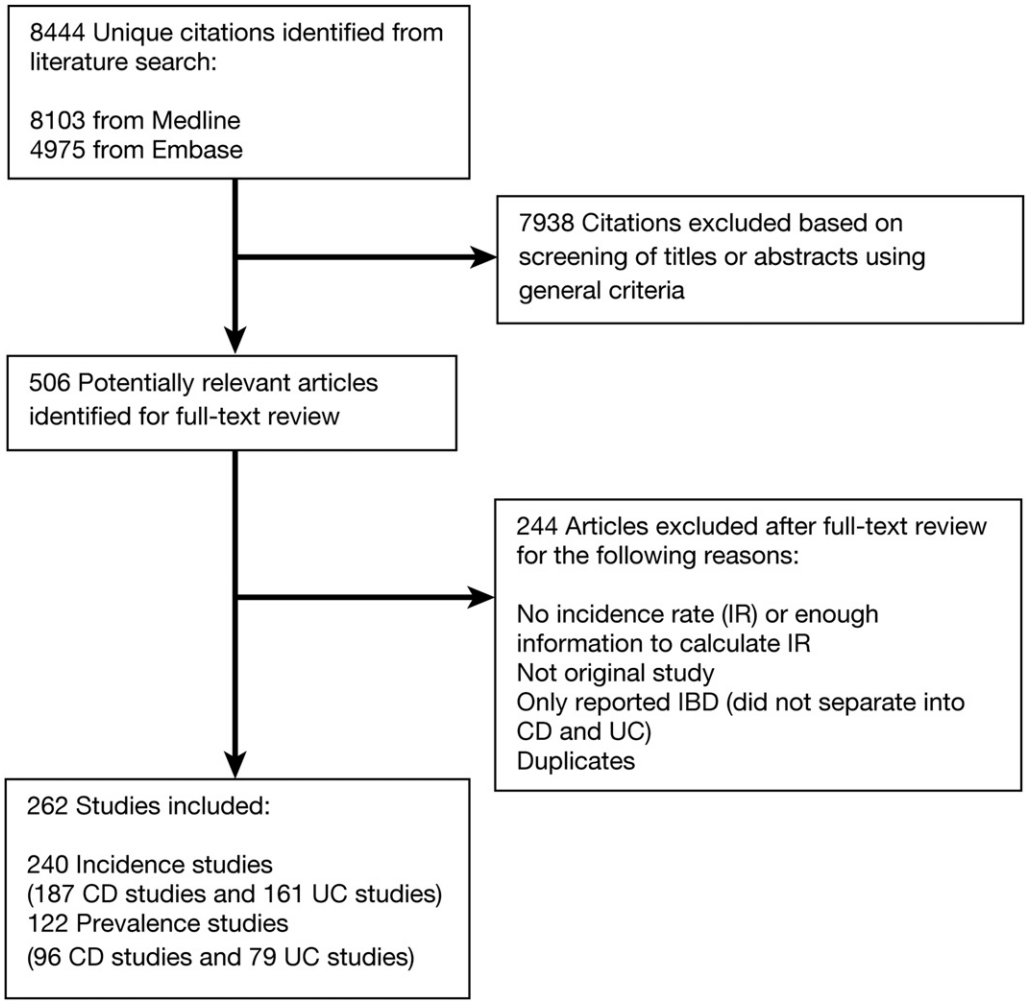

Figure 1. Literature search results.

studies, 1950 to 2008 for Asian and Middle Eastern studies, and 1920 to 2004 for North American studies. For prevalence studies, the UC estimates ranged from 4.9 to 505 per 100,000 in Europe, 4.9 to 168.3 per 100,000 in Asia and the Middle East, and 37.5 to 248.6 per 100,000 in North America, and the CD estimates ranged from 0.6 to 322 per 100,000 in Europe, 0.88 to 67.9 per 100,000 in Asia and the Middle East, and 16.7 to 318.5 per 100,000 in North America. Incidence rates and/or prevalence values, including references, for each specific study are presented in Appendixes 2 and 3, respectively.

Incidence rates stratified by sex were reported in 50 UC and 59 CD studies. The female to male ratio varied from 0.51 to 1.58 for UC studies and 0.34 to 1.65 for CD studies, suggesting that the diagnosis of IBD was not sex specific. Exact sex-stratified incidence rates and ratios, including references, are reported in Appendix 4. Additionally, 108 studies reported incidence rates stratified by age, with 69 studies (50 CD studies and 47 UC studies) stratifying incidence by decade. Most CD and UC studies showed peak incidence in the second to fourth decade, with 78.0% of CD studies and 51.1% of UC studies reporting the highest incidence among 20 to 29 year olds. A second modest rise in incidence in latter decades of life was reported in less than one third of CD and UC studies. The age distributions for incidence of CD and UC stratified by sex, including references, are reported in Appendix 5.

Table 1. Incidence and Prevalence Ranges Stratified Into Quintiles for CD and UC

	CD		UC	
Quintile rank (percentile)	Incidence per 100,000	Prevalence per 100,000	Incidence per 100,000	Prevalence per 100,000
0 to 19th (*dark blue*)	0.0–0.80	0.6–6.75	0.0–1.85	2.42–21.0
20th to 39th (*light blue*)	0.81–1.94	6.76–25.0	1.86–3.09	21.1–44.3
40th to 59th (*green*)	1.95–3.76	25.1–48.0	3.10–4.97	44.4–100.9
60th to 80th (*yellow*)	3.77–6.38	48.1–135.6	4.98–7.71	101.0–198.0
80th to 100th (*red*)	6.39–29.3	135.7–318.5	7.72–19.2	198.1–298.5

NOTE. Ranges (as denoted by color) correspond to ranking of incidence and/or prevalence in Figures 2 and 3. Quintile ranges were developed from 260 published studies on incidence and/or prevalence of IBD (references in Appendixes 2 and 3).

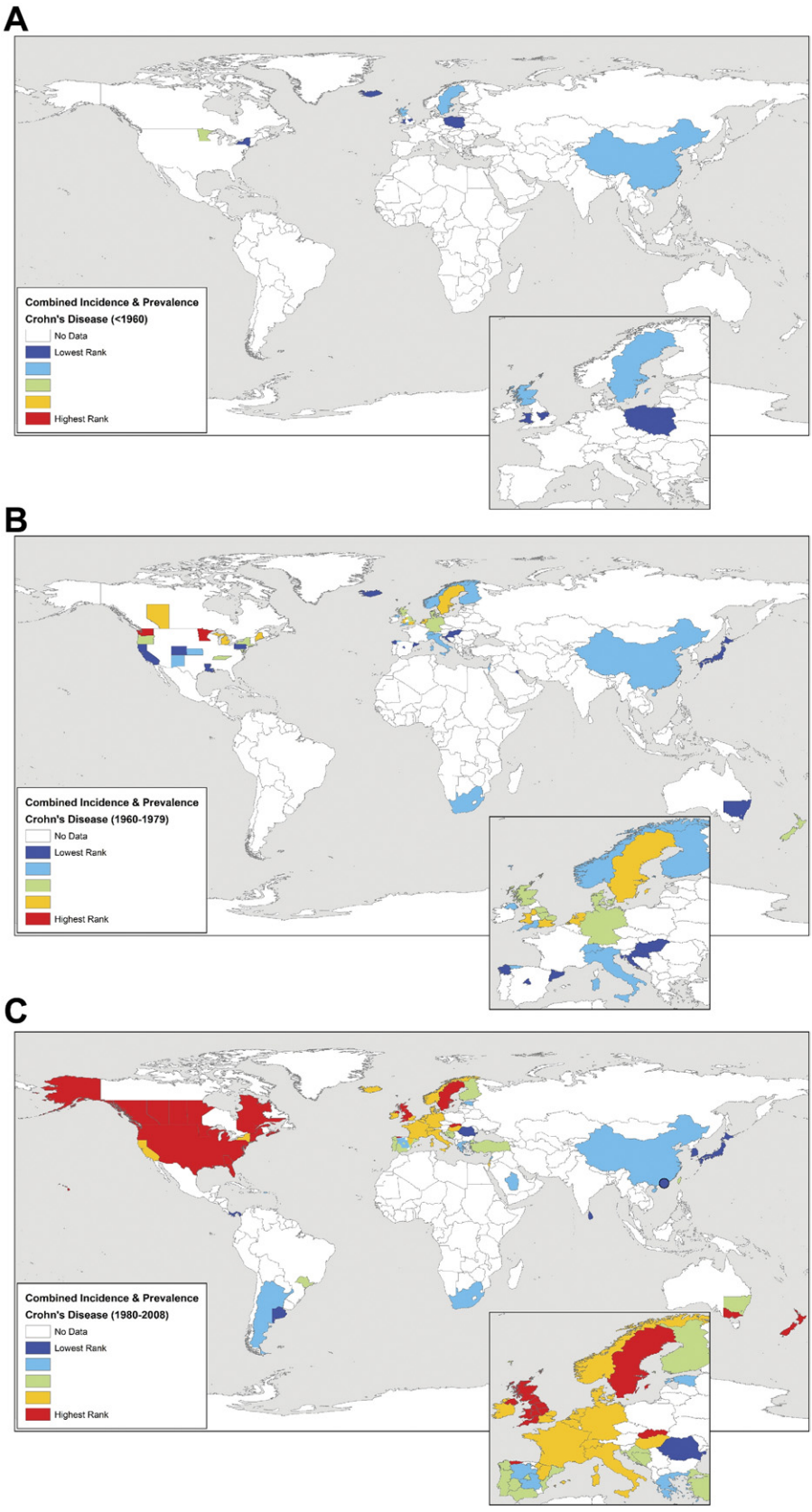

Figure 2. Worldwide CD incidence rates and/or prevalence for countries reporting data (*A*) before 1960, (*B*) from 1960 to 1979, and (*C*) after 1980. Incidence and prevalence values were ranked into quintiles representing low (*dark and light blue*) to intermediate (*green*) to high (*yellow and red*) occurrence of disease.

Table 1 describes the ranges in incidence and prevalence stratified into quintiles for CD and UC. Figure 2*A–C* and Figure 3*A–C* show the incidence rates and/or prevalence for CD and UC stratified by quintile levels (Table 1) for geographic regions in the following periods: (1) before 1960, (2) 1960 to 1979, and (3) 1980 to 2006. Before 1960, the only published incidence rates were from Europe and North America, with the exception of one study from

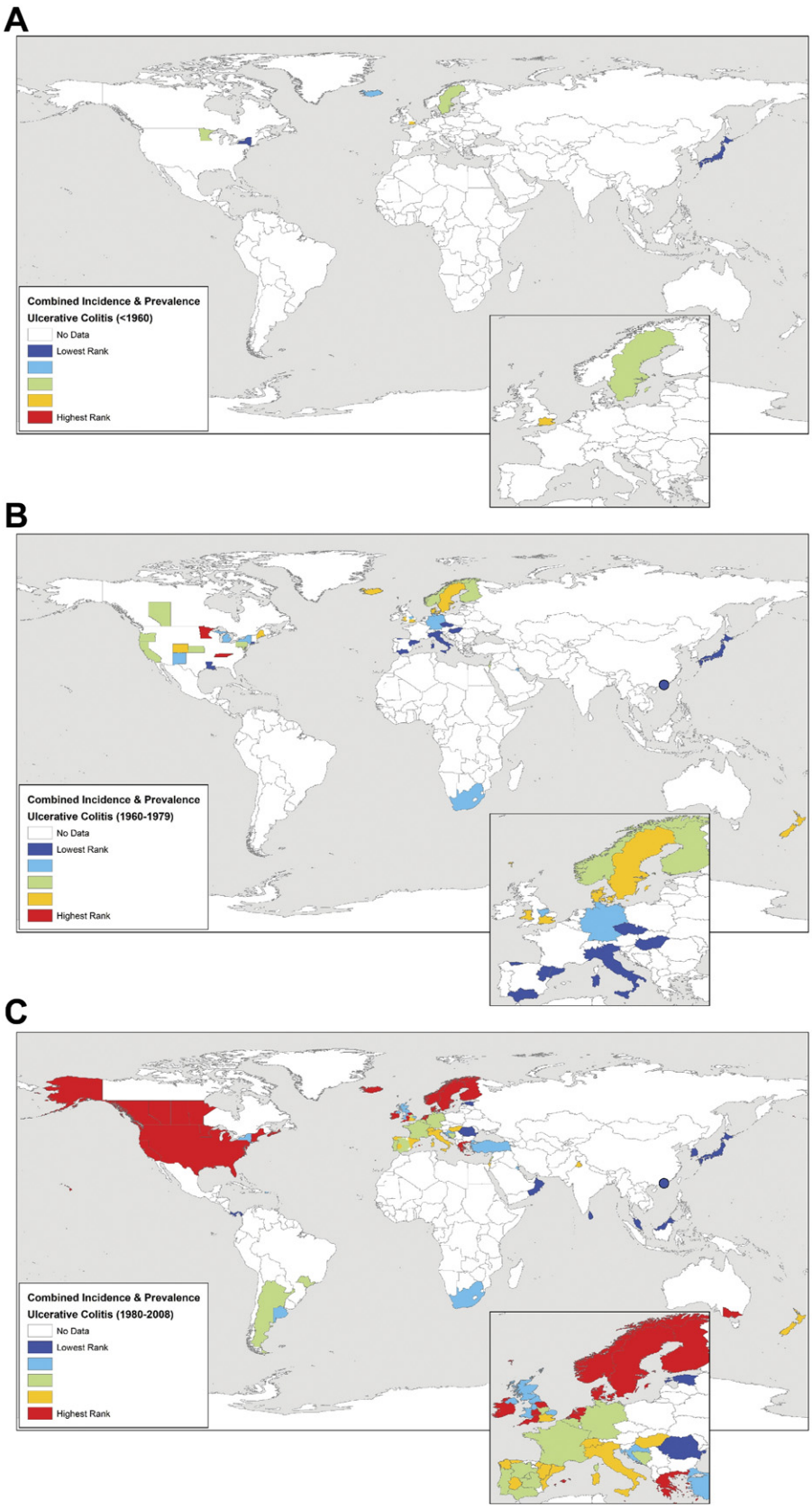

Figure 3. Worldwide UC incidence rates and/or prevalence for countries reporting data (*A*) before 1960, (*B*) from 1960 to 1979, and (*C*) after 1980. Incidence and prevalence values were ranked into quintiles representing low (*dark and light blue*) to intermediate (*green*) to high (*yellow and red*) occurrence of disease.

Japan. After 1980, a number of studies were published from Asia, South America, and Africa; however, incidence and prevalence data were lacking from many developing nations. Global maps illustrating only incidence rates and only prevalence values are presented in Appendixes 6 and 7, respectively.

Temporal trends of incidence rates in the 57 CD and 50 UC studies that reported at least 10 years of data and with

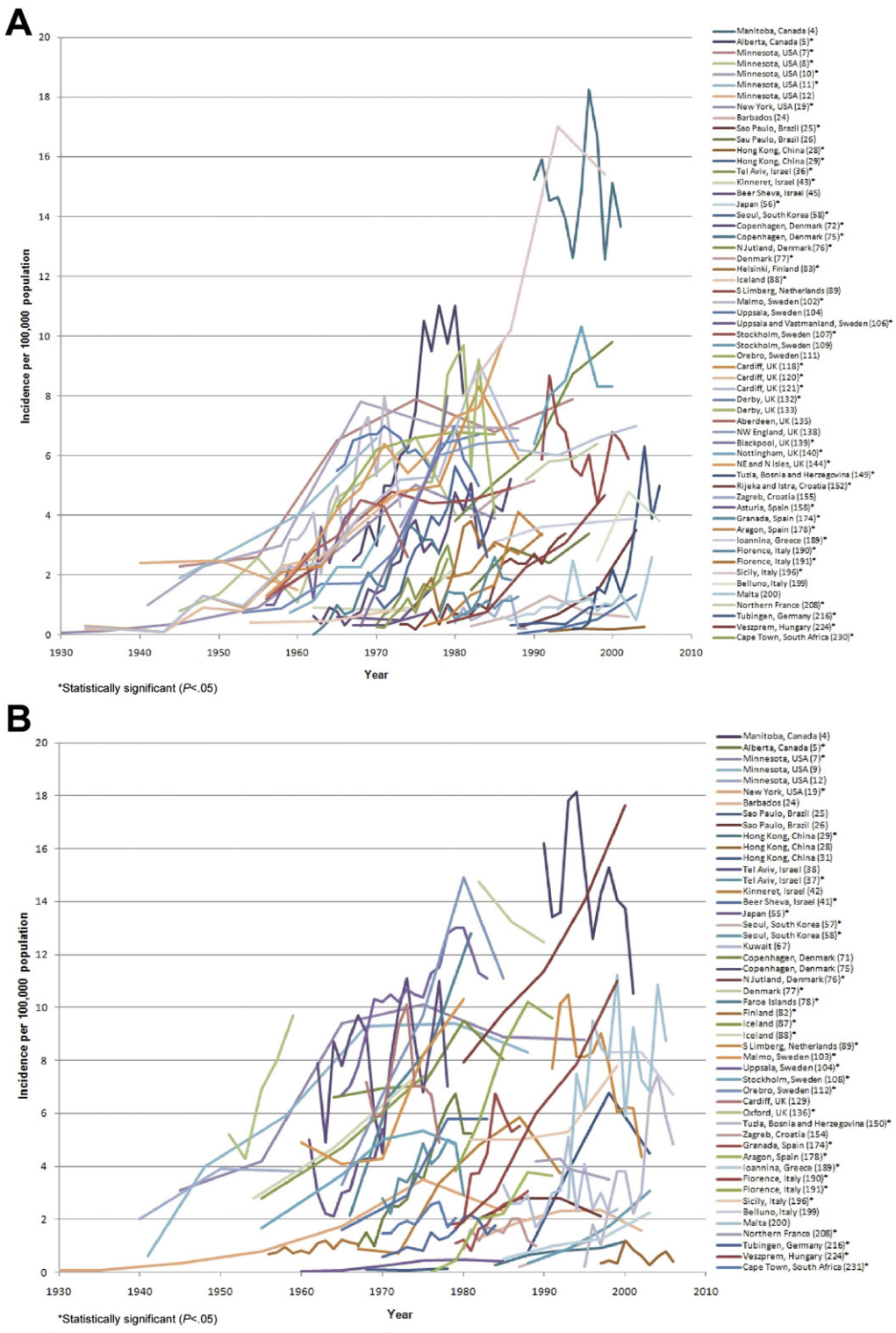

Figure 4. Temporal trends of incidence rates for studies that reported at least 10 years of data and with at least 3 time points for (*A*) CD and (*B*) UC.

at least 3 incidence rate estimates are presented in Figure 4*A* and *B*, respectively. Of these studies, 43 (75%) and 30 (60%) had statistically significant ($P < .05$) increasing incidence rates for CD and UC, respectively. Among studies that showed a significant rise in incidence, the average annual percentage change ranged from 1.2% to 23.3% in CD and 2.4% to 18.1% in UC (Appendix 2). In contrast, 0 CD and 3 (6.0%) UC studies showed statistically significant decreasing incidence rates. Among studies conducted after 1980, 56% of CD studies and 29% of UC studies had increased incidence rates that were statistically significant ($P < .05$). Studies from Cardiff in the United Kingdom and Olmsted County in the United States showed a significantly consistent increasing incidence of IBD with estimates reported from the 1930s to the end of the 20th century.

Discussion

We present a comprehensive review of the worldwide incidence and prevalence of IBD. This review will help researchers estimate the global public health burden of IBD and the allocation of appropriate health care resources and research in specific geographic regions. Furthermore, by collating more than 200 reports on the incidence and/or prevalence of IBD, we anticipate that this report will serve as an essential resource for gastroenterologists and epidemiologists. Considerable differences were observed in the incidence of IBD across different geographic regions and over time. The majority of studies were conducted in European countries, whereas population-based data on the incidence and prevalence of IBD in developing countries were lacking. The highest prevalence of IBD worldwide was reported in Canada and Europe, whereas Asia had a lower prevalence of IBD. Studies that explored temporal trends showed that the incidence of IBD continues to increase in many regions of the world. Consequently, IBD appears to be emerging as a global disease.

The incidence and prevalence of IBD were highest in westernized nations, with the highest reported incidence rates in Canada (19.2 per 100,000 for UC[13] and 20.2 per 100,000 for CD[13,14]), Northern Europe (UC was 24.3 per 100,000 in Iceland[15] and 10.6 per 100,000 for CD in the United Kingdom[16]), and Australia (17.4 per 100,000 for UC and 29.3 per 100,000 for CD[17]). Similarly, prevalence was highest in Europe (505 per 100,000 for UC in Norway[18] and 322 per 100,000 for CD in Italy[19]) and Canada (248 per 100,000 for UC and 319 per 100,000 for CD[20]). Based on these estimates, approximately 0.6% of the population of Canada has IBD.[21] A North-South gradient has long been reported for IBD[9]; however, since the 1980s, this geographic distinction has been less prominent, with some of the highest incidence rates of IBD occurring in Southern Australia and New Zealand.[17,22] Sex differences were inconsistent, suggesting that the disease occurred equally among both sexes. Universally, incidence rates for both CD and UC were highest among the second to the fourth decade of life. Thus, IBD affects individuals in the most formidable and productive years of life, resulting in long-term cost to the patient, health care system, and society.[23]

The few studies that evaluated race/ethnicity reported the greatest incidence of IBD among white and Jewish people. However, the incidence of IBD in Hispanic and Asian people has been shown to be increasing,[24] and studies have shown that individuals emigrating from low prevalent regions (eg, Asia) to higher prevalent countries (eg, England) are at increased risk for developing IBD, particularly among first-generation children.[25] A lack of population-based studies evaluating race/ethnicity in developed nations and the paucity of data from developing countries highlight an important gap in the literature to be addressed in future studies.

In developing nations, IBD was a rare occurrence; however, as these nations have become more industrialized, the incidence of IBD has increased.[6,7] The emergence of IBD in traditionally low prevalent regions (eg, Asia) suggests that the development of IBD may be influenced by environmental risk factors. The geographic distribution of IBD provides clues for researchers to investigate possible environmental determinants of IBD. For example, IBD occurs more commonly in urban versus rural regions.[26–29] Individuals raised in urban areas of industrialized nations are exposed to considerably different environmental risk factors than those living outside these regions. Industrialization and urbanization of societies are associated with changes to microbial exposures, sanitation, occupations, diet, lifestyle behaviors, medications, and pollution exposures, which have all been implicated as potential environmental risk factors for IBD.[30] However, the exact relationship between genetic susceptibility and the role of the environment in the pathogenesis of IBD still largely remains a mystery. To advance our understanding of the key determinants of IBD in the developed and developing world, future population-based studies should focus on reporting incidence and/or prevalence of IBD stratified by gene-environment-phenotype interactions.

A statistically significant increase in the incidence of IBD was shown in 75% of CD and 60% of UC studies. Since 1980, 56% of CD and 29% of UC studies have shown a statistically significant increasing incidence. A significant decrease in the incidence of UC was only reported in 6.0% of studies, and none for CD. Thus, the incidence of IBD is increasing or stable in virtually every region of the world that has been studied. Because mortality in IBD is low[31] and the disease is most often diagnosed in the young,[32] these findings suggest that the global prevalence of IBD will continue to increase substantially. The rising incidence of IBD during the 20th century may be explained by environmental exposures that result from increasing urbanization; however, this increase could be due to increased awareness of IBD by physicians and the public, as well as advancements in diagnostic methods for IBD. Greater access to medical services, such as colonoscopies, in the latter part of the 20th century may have contributed to the increase in incidence of IBD. For example, the incidence and prevalence of ulcerative colitis in Punjab, North India, was only determined by conducting a house survey and performing sigmoidoscopy/colonoscopy among suspected cases.[33] Additionally, increased utilization of colonoscopy in developing countries may have led to greater differentiation of CD from UC, leading to relatively more diagnoses of CD. Future studies should adjust incidence rates by diagnostic procedure (eg, colonoscopy) utilization.

We conducted a comprehensive systematic review of the published literature on the incidence of IBD, but we did not perform a meta-analysis due to considerable variability between studies. There are multiple sources of heterogeneity, some of which include differences in population characteristics, study methodologies, and

access to medical services and advancement of diagnostic procedures between countries. As a result, incidence rates and prevalence values are likely underestimated in studies published early in the observation period and in developing countries. Study quality was not used as an exclusion criterion and therefore likely contributed to differences in incidence estimates in the same geographic region. For example, the diagnostic criteria for IBD were not uniform across geographic regions and time.[34,35] Case ascertainment was different between studies, with some studies identifying IBD cases through administrative databases while others used patient registries. Some studies reported crude incidence rates, while others reported age- and/or sex-adjusted incidence rates. Furthermore, in the developing world, defining incidence and prevalence is considerably more difficult because many countries lack health care systems that compile health outcomes into administrative databases. In many developing nations, care is centralized in hospitals; thus, hospitalization records may more accurately reflect prevalence of disease as compared with hospitalization records from the developed world, where outpatient management of IBD is more common.

Limitations of the systematic review also include the exclusion of unpublished manuscripts and abstracts from conference proceedings. Studies that only evaluated the incidence of pediatric-onset IBD were excluded because of a previous report.[11] Further, when the incidence rates were reported separately for male and female subjects, an average was calculated. Similarly, an overall estimate was calculated when incidence rates for different races were reported and when the estimates were provided over multiple years. In the assessment of time trends, many studies only reported figures without specifying the numeric incidence rates over time. The incidence rates were extrapolated from these figures.

Despite these limitations, this systematic review provides a comprehensive overview of the incidence and prevalence of IBD across time and geography. The burden of IBD varied by geography and appears to be increasing over time. Definitive reasons for the increasing incidence rates of IBD are largely unknown. Despite more than 200 publications in the literature, our systematic review highlights the need for incidence and prevalence data in many regions of the world, particularly from developing countries. Future studies in these regions are required to provide further insight into the geographic patterns and time trends of IBD and will provide important insights into the etiology of IBD.

Supplementary Material

Note: To access the supplementary material accompanying this article, visit the online version of *Gastroenterology* at www.gastrojournal.org, and at doi: 10.1053/j.gastro.2011.10.001.

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Reprint requests

Address requests for reprints to: Gilaad G. Kaplan, MD, MPH, Departments of Medicine and Community Health Sciences, Teaching Research and Wellness Center, University of Calgary, 3280 Hospital Drive Northwest, 6th Floor, Room 6D56, Calgary, Alberta T2N 4N1, Canada. e-mail: ggkaplan@ucalgary.ca; fax: (403) 592–5090.

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Conflicts of interest

The authors disclose no conflicts.

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Appendix 1. Detailed Search Strategy for Systematic Review

MEDLINE search strategy

1. Inflammatory Bowel Diseases/
2. Colitis, Ulcerative/
3. Crohn Disease/
4. Epidemiology/
5. epidemiolog*.tw.
6. (crohn* or (ulcerative adj5 colitis) or inflammatory bowel*).tw.
7. 1 or 2 or 3 or 6
8. incidence.mp. or *Incidence/
9. prevalence.mp. or *Prevalence/
10. 4 or 5 or 8 or 9
11. 7 and 10
12. limit 11 to (comment or editorial or letter)
13. 11 not 12

EMBASE search strategy

1. *enteritis/
2. *Crohn disease/
3. *ulcerative colitis/
4. Epidemiology/
5. epidemiolog*.tw.
6. (inflammatory bowel disease* or IBD or crohn or (ulcerative adj5 colitis)).tw.
7. 1 or 2 or 3 or 6
8. incidence.mp. or *Incidence/
9. prevalence.mp. or *Prevalence/
10. 4 or 5 or 8 or 9
11. 7 and 10
12. limit 11 to (comment or editorial or letter)
13. 11 not 12

Appendix 2. Summary of Studies Reporting Incidence of UC and/or CD, Stratified by Geographic Region

Lead author	Year	Country	Region	Study period	CD incidence rate (10^5)	UC incidence rate (10^5)	Annual average percent change	
							CD	UC
North America								
Lowe AM[1]	2009	Canada	Quebec	1998–2000	20.2			
Bernstein CN[2]	1999	Canada	Manitoba	1984–1995	14.6	14.3		
Blanchard JF[3]	2001	Canada	Manitoba	1987–1996	15.6	15.6		
Green C[4]	2006	Canada	Manitoba	1990–2001	14.83	13.45	−0.2	−2.0
Pinchbeck BR[5]	1988	Canada	Alberta	1966–1981	6.56	3.31	9.2[a]	10.7[a]
Bernstein CN[6]	2006	Canada	Canada	1998–2000	13.4	11.8		
			British Columbia		8.8	9.9		
			Alberta		16.5	11.0		
			Saskatchewan		13.5	10.4		
			Manitoba		15.4	15.4		
			Nova Scotia		20.2	19.2		
Loftus CG[7]	2007	United States	Olmsted County, Minnesota	1940–2000	6.3[b]	8.1[b]	2.1[a]	2.4[a]
				1990–2000	7.9 (6.3, 9.5)	8.8 (7.2, 10.5)		
Gollop JH[8]	1988	United States	Olmsted County, Minnesota	1943–1982	4.0		4.7[a]	
Loftus EV[9]	2000	United States	Olmsted County, Minnesota	1940–1993		7.6	3.1[a]	2.2
Loftus EV[10]	1998	United States	Olmsted County, Minnesota	1940–1993	5.8 (5.0, 6.5)			
Sedlack RE[11]	1980	United States	Olmsted County, Minnesota	1935–1975	4.2		5.1[a]	
Sedlack RE[12]	1972	United States	Olmsted County, Minnesota	1935–1964	2.1	3.4	−2.1	2.8
Calkins BM[13]	1984	United States	Baltimore	1977–1979	2.8	1.83		
Garland CF[13c]	1984	United States	Baltimore	1973	3.01	3.16		
Monk M[14]	1968	United States	Baltimore	1960–1963	3.32	7.05		
Kurata JH[15]	1992	United States	Fontana and Sunset, California	1982–1988	3.6			
Herrinton LJ[16]	2008	United States	Northern California	1996–2002	6.3 (5.6, 7.0)	12.0 (11.0, 13.0)		
Garland CF[17]	1981	United States	Total	1973	2.38 (1.4, 3.36)	3.52 (2.32, 4.72)		
			Portland, Maine		4.87 (−0.45, 10.2)	6.50 (0.012, 7.70)		
			Bridgeport		4.07 (0.80, 7.34)	0.64 (−0.61, 1.89)		
			Ithaca, New York		1.23 (−1.18, 2.46)	0		
			York, Pennsylvania		0	3.63 (−1.58, 8.84)		
			Lansing, Michigan		4.29 (0.51, 8.07)	2.25 (−0.34, 4.84)		
			Topeka, Kansas		1.89 (−0.74, 4.52)	4.97 (0.99, 8.95)		
			Winona, Minnesota		2.70 (−2.57, 7.97)	8.09 (−3.87, 20.0)		
			Clarksville, Tennessee		4.84 (−4.65, 14.33)	0		
			Maryville, Tennessee		0	14.3 (−5.52, 34.1)		
			Eunice, Louisiana		0	0		
			Albuquerque, New Mexico		0.82 (−0.32, 1.96)	3.09 (0.58, 5.60)		
			Boulder, Colorado		0.67 (−0.64, 1.98)	6.38 (−1.05, 13.81)		
			Banning, California		0	4.19 (−4.0, 12.38)		
			Eureka, California		0	4.76 (−4.57, 14.09)		
			Medford, Oregon		3.76 (−3.59, 5.07)	3.72 (−3.57, 11.01)		
Nunes GC[18]	1983	United States	Spokane	1971–1981	7.3			
Stowe SP[19]	1990	United States	Rochester, New York	1920–1989	2.33	1.55	4.6[a]	5.0[a]
Stonnington CM[20]	1987	United States	Rochester, Minnesota	1960–1979		15.0		
Spencer RJ[21]	1974	United States	Rochester, Minnesota	1935–1964		11.6		
Ognubi[22]	1998	United States	Georgia	1986–1995	8.8			
Appleyard CB[23]	2004	Puerto Rico	Southwestern	1996–2000	1.18	2.50		
Edwards CN[24]	2008	Barbados	Nationwide	1980–2004	0.7 (0.51, 0.95)	1.85 (1.53, 2.22)	1.4	1.1
South America								
Victoria CR[25]	2009	Brazil	São Paulo	1986–2005	1.48	3.96		
Souza MHLP[26]	2002	Brazil	Ribeirao Preto, Sao Paulo	1980–1999	2.55	2.43	4.0	0.2
Linares de la Cal JA[27]	1999	Panama	District of Colon	1987–1993	0	1.2		
		Argentina	Partido General Pueyrredon	1987–1993	0.06	2.17		
Asia and the Middle East								
Lok KH[28]	2007	China	Hong Kong	1991–1906	0.19		4.9[a]	−0.1
Leong RWL[29]	2004	China	Hong Kong	1986–2001	0.6	0.87	10.8[a]	6.3[a]
Lok KH[30]	2008	China	Hong Kong	1997–2006		0.59		
Lai CL[31]	1985	China	Hong Kong	1966–1980		0.11		3.8
Chow DKL[32]	2009	China	Hong Kong	2006		2.1 (1.1, 3.7)		
Zheng JJ[33]	2005	China	Nationwide	1950–2002	0.28			
Zheng[34]	2010	China	Nationwide	1950–2007	0.85			
Niv Y[35]	1990	Israel	Upper Galilee	1967–1986		2.33		
Fireman Z[36]	1989	Israel	Tel Aviv Jafo	1970–1980	1.55		14.3[a]	
Grossman A[37]	1989	Israel	Tel Aviv Jafo	1970–1980		3.86		4.7[a]
Gilat T[38]	1974	Israel	Tel Aviv Jafo	1961–1970		3.66		1.2
Rozen P[39]	1979	Israel	Tel Aviv Jafo	1970–1976	1.28			
Odes HS[40]	1994	Israel	Southern Israel	1968–1992	4.2			
Odes HS[41]	1987	Israel	Southern Israel	1961–1985		2.98 (2.42, 3.54)		
Shapira M[42]	1998	Israel	Kinneret Subdistrict	1965–1994		3.5		5.5
Shapira M[43]	1994	Israel	Kinneret Subdistrict	1960–1990	1.96		5.8[a]	
Odes HS[44]	1987	Israel	Beer Sheva	1961–1985		2.87 (2.31, 3.42)		7.5[a]
Krawiec J[45]	1984	Israel	Beer Sheva	1961–1980	1.1		9.7	
Jacobsohn WZ[46]	1986	Israel	Jerusalem	1973–1978		6.3		

Appendix 2. Continued

Lead author	Year	Country	Region	Study period	CD incidence rate (10^5)	UC incidence rate (10^5)	Annual average percent change	
							CD	UC
Niv Y[47]	1999	Israel	Kibbutz residents	1987–1997	5.0			
Niv Y[48]	2000	Israel	Kibbutz residents	1987–1997		5.04		
Odes HS[49]	1989	Israel	Beer Sheva	1979–1987	2.1	5.4		
Sood A[50]	2003	India	Punjab	1999–2000		6.02 (1.2, 17.6)		
Abdul-Baki H[51]	2007	Lebanon	Nationwide	2000–2004	1.4	4.1		
Utsunomiya T[52]	1983	Japan	Nationwide	1955–1980		0.16		9.1[a]
Morita N[53]	1995	Japan	Nationwide	1991	0.51	1.95		
Yoshida Y[54]	1990	Japan	Nationwide	1965–1979	0.40	0.28		
Kitahora T[55]	1995	Japan	Nationwide	1960–1985		0.28		10.0[a]
Yao T[56]	2000	Japan	Nationwide	1986–1998	0.9		7.2[a]	
Yang SK[57]	2000	South Korea	Songpa-Kangdong, Seoul	1986–1997		0.68		18.1[a]
Yang SK[58]	2008	South Korea	Songpa-Kangdong, Seoul	1986–2005	0.53 (0.44, 0.62)	1.51 (1.34, 1.67)	21.4[a]	14.4[a]
Al-Ghamdi AS[59]	2004	Saudi Arabia	Riyadh	1983–2002	0.94			
Lee SK[60]	1974	Singapore	Nationwide (Chinese)	1965–1970	0.04			
Fung WP[61]	1971	Singapore	Nationwide (Chinese and Indians)	1956–1970		0.11		
Niriella MA[62]	2010	Sri Lanka	Colombo and Gampaha	2007–2008	0.09 [0.002–0.18]	0.69 [0.44–0.94]		
Wei S-C[63]	2009	Taiwan	Nationwide	1988–2008	2			
Tozun N[64]	2009	Turkey	Nationwide	2000–2003	2.2	4.4		
Tezel A[65]	2003	Turkey	Trakya	1998–2001		0.77		
Radhakrishnan S[66]	1997	Oman	Nationwide	1987–1994		1.35		
Al-Shamali M[67]	2003	Kuwait	Nationwide	1985–1999		2.8 (1.7, 4.1)		0.3
Al-Nakib[68]	1984	Kuwait	Nationwide	1977–1982	0.45	2.27		
Europe[d]								
Shivananda S[69]	1996	Europe		1991–1993	5.0	9.8		
		Iceland	Reykjavik		8.2	24.3		
		Norway	Oslo		6.9	15.6		
		Denmark	Copenhagen		6.6	10		
		Ireland	Dublin		5.9	14.8		
		United Kingdom	Leicester (nonimmigrants)		3.2	9.2		
		United Kingdom	Leicester (immigrants)		4.7	15.1		
		The Netherlands	Maastricht		7.7	13.1		
		Germany	Essen		3.5	4.3		
		France	Amiens		8.1	5.6		
		Italy	Milan-Varese		3.2	10		
		Italy	Crema-Cremona		2.7	7.5		
		Italy	Reggio Emilia		4	7.5		
		Italy	Florence		2.7	8.1		
		Italy	Palermo, Sicily		5.8	8.5		
		Spain	Vigo		4.8	7		
		Spain	Sabadell		4.9	9		
		Portugal	Braga		3.7	5.5		
		Portugal	Almada		2.3	1.7		
		Greece	Northwest Greece (Ioannina)		1	8.5		
		Greece	Heraklion, Crete		3.9	16.6		
		Israel	Beer Sheva		4.3	8.5		
Northern Europe								
Bonnevie O[70]	1968	Denmark	Copenhagen and Gentofte	1961–1967		7.3		
Langholz E[71]	1991	Denmark	Copenhagen	1962–1987		8.1		1.4
Munkholm P[72,73]	1992	Denmark	Copenhagen	1979–1987	4.1		10.2[a]	
Vind I[74]	2006	Denmark	Copenhagen	2003–2005	8.6 (7.5, 9.8)	13.4 (11.9, 14.9)		
Binder V[75]	1982	Denmark	Copenhagen	1962–1978	1.9	8.1	12.3[a]	1.1
Jacobsen BA[76]	2006	Denmark	North Jutland	1978–2002	6.73	12.16	4.9[a]	4.0[a]
Fonager K[77]	1997	Denmark	Nationwide	1981–1992	4.6	13.2	3.4[a]	−2.1[a]
Berner J[78]	1986	Faroe Islands	Nationwide	1964–1983	1.94	7.8		9.5[a]
Roin F[79]	1989	Faroe Islands	Nationwide	1981–1988	3.6	20.3		
Salupere R[80]	2001	Estonia	Tartu County	1993–1998	1.4	1.7		
Linden G[81]	1971	Finland	Nationwide	1967		4.8		
Moller C[82]	1971	Finland	Nationwide	1956–1967		0.93		4.4[a]
Halme L[83]	1989	Finland	Helsinki	1975–1985	2.3		11.4[a]	
Manninen P[84]	2010	Finland	Tampere	1986–1999	7.2	16.5		
Björnsson S[85]	2000	Iceland	Nationwide	1990–1994	5.5	16.5		
Björnsson S[86]	1998	Iceland	Nationwide	1980–1989	3.1	11.7		
Bjornsson S[87]	1983	Iceland	Nationwide	1950–1979		4.97		4.9[a]
Bjornsson S[88]	1989	Iceland	Nationwide	1950–1979	0.6	5.0	4.5[a]	5.0[a]
Romberg-Camps MJL[89]	2008	The Netherlands	South Limburg	1991–2003	6.21	7.72	−1.8	−5.1[a]
Russel MG[90]	1998	The Netherlands	South Limburg	1991–1994	6.9 (5.9, 7.9)	10 (8.7, 11.2)		
Shivananda S[91]	1987	The Netherlands	Leiden	1979–1983	3.9			
Shivananda S[92]	1987	The Netherlands	Leiden	1979–1983		6.8		
Haug K[93]	1989	Norway	Western Norway	1984–1985	5.3			
Haug K[94]	1988	Norway	Western Norway	1984–1985		14.8		
Kildebo S[95]	1989	Norway	Total Northern region	1983–1986	5.8			
			Nordland		3.9			
			Troms		5.4			

Appendix 2. Continued

Lead author	Year	Country	Region	Study period	CD incidence rate (10^5)	UC incidence rate (10^5)	Annual average percent change	
							CD	UC
			Finnmark		6.7			
Kildebo S[96]	1990	Norway	Total Northern region	1983–1986		13.2		
			Nordland			13.5		
			Troms			12.1		
			Finnmark			11.6		
Myren J[97]	1971	Norway	Nationwide	1964–1969	1.05	3.29		
Moum B[98]	1996	Norway	Southeast	1990–1993		13.6		
Moum B[99]	1996	Norway	Southeast	1990–1993	5.8			
Bengtson MB[100]	2009	Norway	Southeast (Oslo)	1990–1993	6	12.8		
Moum B[101]	1995	Norway	Southeast	1990	5.1	10.6		
Brahme F[102]	1975	Sweden	Malmo	1958–1973	4.8		6.4[a]	
Stewenius J[103]	1994	Sweden	Malmo	1958–1982		6.3		4.7[a]
Ekbom A[104]	1991	Sweden	Uppsala Health Care Region	1965–1983	6.1	10.4	−0.5	3.1[a]
Bergman L[105]	1975	Sweden	Uppsala and Västmanland	1968–1973	5.0			
Norlen BJ[106]	1970	Sweden	Uppsala and Västmanland	1956–1967	2.5		11.6[a]	
Lapidus A[107]	1997	Sweden	Stockholm	1955–1989	3.7		3.8[a]	
Nordenvall B[108]	1985	Sweden	Stockholm	1955–1979		1.7		4.4[a]
Lapidus A[109]	2006	Sweden	Stockholm	1990–2001	8.3		2.1	
Nyhlin H[110]	1986	Sweden	Umea	1974–1981	4.97			
			Northern Sweden	1974–1981	4.45			
Lindberg E[111]	1991	Sweden	Örebro Medical Center Hospital catchment area	1963–1987	6.1		1.7[a]	
Tysk C[112]	1992	Sweden	Orebro	1963–1987		13.1		5.5[a]
Ronnblom A[113]	2010	Sweden	Uppsala	1945		2.0		
				2005–2007		17.5		
Keighley A[114]	1976	United Kingdom	Nottingham	1958–1973	2.33			
Smith IS[115]	1975	United Kingdom	Clydesdale, Scotland	1961–1970	3.12			
Kyle J[116]	1971	United Kingdom	Aberdeen	1955–1968	1.98			
Yapp TR[117]	2000	United Kingdom	Cardiff	1930–1995	3.29[b]			
				1991–1995	5.6 (4.4,6.8)			
Thomas GA[118]	1995	United Kingdom	Cardiff	1931–1990	3.24[b]		5.2[a]	
				1986–1990	5.9 (4.7, 7.3)			
Srivastava ED[119]	1992	United Kingdom	Cardiff	1968–1987		6.3		
Mayberry J[120]	1979	United Kingdom	Cardiff	1934–1977	1.73		8.1[a]	
Gunesh S[121]	2008	United Kingdom	Cardiff	1931–2005	3.79 (3.01, 4.86)		3.9[a]	
Rubin GP[122]	2000	United Kingdom	North Tees	1990–1994	8.3 (3.4, 13.2)	13.9 (7.5, 20.3)		
Devlin HB[123]	1980	United Kingdom	Stockton on Tees	1971–1977	5.3	10.4		
Tsironi E[124]	2004	United Kingdom	Tower Hamlets (Bangledashis)	1981–1989	8.2	2.4		
				1997–2001	7.3	2.3		
Probert CS[125]	1992	United Kingdom	Tower Hamlets	1972–1989	3.86			
Jayanthi V[126]	1992	United Kingdom	Tower Hamlets	1972–1989		4.03		
Probert CS[127]	1992	United Kingdom	Leicestershire	1972–1989		6.77		
Jayanthi V[128]	1992	United Kingdom	Leicestershire	1972–1989	3.7			
Morris T[129]	1984	United Kingdom	Cardiff	1968–1977		7.2		−0.7
Carr I[130]	1999	United Kingdom	Leicester City	1991–1994		9.1		
Farrokhyar F[131]	2001	United Kingdom	Wolverhampton, Salisbury, and Swindon	1978–1986	4.98	9.20		
Fellows IW[132]	1990	United Kingdom	Derby	1951–1985	3.01		8.4[a]	
Fellows IW[133]	1988	United Kingdom	Derby	1976–1985	6.91		0.9	
García Rodríguez LA[134]	2005	United Kingdom	Nationwide	1995–1997	8.0	2.0		
Kyle J[135]	1980	United Kingdom	Aberdeen	1955–1975	2.94		4.7	
Evans JG[136]	1965	United Kingdom	Oxford	1951–1960		6.5 (6.0, 7.0)		9.7[a]
De Dombal FT[137]	1971	United Kingdom	Leeds	1963–1968	3.50			
Lee FI[138]	1994	United Kingdom	Northwest England	1971–1990	5.8 (5.2, 6.3)		3.2	
Lee FI[139]	1985	United Kingdom	Blackpool	1968–1980	4.0		20.3[a]	
Miller DS[140]	1974	United Kingdom	Nottingham	1958–1971	1.99		12.7[a]	
Tresadern JC[141]	1973	United Kingdom	Gloucester	1966–1970	1.5			
Thompson NP[142]	1998	United Kingdom	England and Wales	1991–1992	10.6			
Brown JS[143]	1988	United Kingdom	Northern Ireland	1966–1981	1.82			
Kyle J[144]	1992	United Kingdom	Northeastern and Northern Isles, Scotland	1955–1988	5.54		6.7[a]	
Kyle J[145]	1965	United Kingdom	Northeast Scotland	1955–1963	1.3			
Rose[146]	1988	United Kingdom	Wales - Cardiff	1981–1985	8.3 (7–10.1)			
Humphreys WG[147]	1990	United Kingdom	Northern Ireland	1966–1981	1.83			
Seagroatt V[148]	2003	United Kingdom	Southern England	1979–1998	5.9	6.1		
Mediterranean/Southern Europe								
Pavlovic-Calic N[149]	2008	Bosnia and Herzegovina	Tuzla	1995–2006	2.3		24.0[a]	
Salkic NN[150]	2010	Bosnia and Herzegovina	Tuzla	1995–2006		3.43 [2.97–3.89]		14.7[a]
Jojic N[151]	2000	Serbia	Zvezdara, Belgrade	1988–1998	1.84	1.31		
Jovanovic Z[152]	1999	Croatia	Rijeka and Istra	1973–1994	1.52		11.4[a]	

Appendix 2. Continued

Lead author	Year	Country	Region	Study period	CD incidence rate (10^5)	UC incidence rate (10^5)	Annual average percent change	
							CD	UC
Sincic BM[153]	2006	Croatia	Primorsko-goranska County	2000–2004	6.5 (5.3, 7.8)	4.6 (3.5, 5.7)		
Vucelic B[154]	1991	Croatia	Zagreb	1980–1989		1.5 (0.8, 2.2)		−2.8
Vucelic B[155]	1991	Croatia	Zagreb	1980–1989	0.7 (0.2, 1.2)		3.7	
Saro Gismera C[156]	2003	Spain	Liege, Asturias	1954–1997	2.08 (0.76, 3.39)	2.84 (1.30, 4.37)		
Saro Gismera C[157]	2000	Spain	Gijon, Asturias	1954–1997	2.33 (0.34, 4.32)	3.14 (0.83, 5.45)		
Martinez G[158]	1983	Spain	Asturias	1965–1980	0.49		9.4[a]	
Sebastian Domingo JJ[159]	1989	Spain	Madrid	1983–1988	1.3	2.37		
Pajares Garcia JM[160]	1987	Spain	Madrid	1976–1983	0.51			
Mate-Jimenez J[161]	1994	Spain	Madrid	1981–1988	1.61	3.16		
Garrido A[162]	2004	Spain	Huelva	1996–2003	6.6	5.2		
Lopez-Serrano[163]	2009	Spain	Madrid	1998–2005	7.3	7.1		
Ruiz V[164]	1989	Spain	Galicia	1976–1982	0.82			
Ruiz Ochoa V[165]	1984	Spain	Galicia	1976–1983	0.8			
Rivera Irigoin R[166]	2007	Spain	Costa del Sol	2000–2001		7.26		
Sola Lamoglia R[167]	1992	Spain	Cataluna (Barcelona and Gerona)	1978–1987	0.4	0.6		
Martinez Sabater A[168]	2005	Spain	La Safor (Valencia)	1994–2003		7.8		
Arin Letamendia A[169]	1999	Spain	Pamplona	1983–1993	2.47 (1.51,3.43)	3.71 (2.25, 5.25)		
Brullet E[170]	1998	Spain	Total	1991–1993	5.5	8.0 (6.3, 9.7)		
			Sabadell		5.2 (2.2, 8)	9.8 (5.8, 13.7)		
			Vigo		5.0 (2.7, 7.2)	7.7 (4.7, 10.6)		
			Mallorca		5.8 (3.4, 8.3)	7.8 (5, 10.7)		
			Motril		6.5 (1, 12)	4.3 (0, 8.8)		
Brullet E[171]	1991	Spain	Sabadell	1985–1989		5.26		
Alonso P[172]	1992	Spain	Soria	1981–1990	1.3	3.2		
Monferrer Guardiola R[173]	1999	Spain	Castellon	1992–1996	1.9	6.8		
Martinez-Salmeron JF[174]	1993	Spain	Granada	1979–1988	0.9	2.0	6.1[a]	13.5[a]
Hinojosa J[175]	1990	Spain	Sagunto	1983–1989	3.1	4.0		
Yanguela JM[176]	1991	Spain		1975–1990	0.7	2.5		
Garcia-Cano Lizcano J[177]	1994	Spain	Cuenca	1986–1993	1.3	3.4		
Cella Lanau J[178]	1995	Spain	Aragon	1975–1992	1.7	2	16.0[a]	12.8[a]
Lopez Miguel C[179]	1999	Spain	Aragon	1992–1995	2.86	4.42		
Pozzati L[180]	2002	Spain	Merida	1996–2000	2.15	5.08		
Rodrigo L[181]	2004	Spain	Oviedo	2000–2002	7.5 (3.8, 11.2)	9.1 (5.0, 13.1)		
Arin Letamendia A[182]	2008	Spain	Navarra	2001–2003	5.85 (3.99, 8.14)	9.57 (7.27, 12.57)		
Manousos ON[183]	1996	Greece	Heraklion	1990–1994	3.0			
Manousos ON[184]	1996	Greece	Heraklion	1990–1994		8.9 (7.2, 10.4)		
Ladas SD[185]	2005	Greece	Trikala	1990–1994		10.2		
Tsianos EV[186]	1994	Greece	Northwest Greece (Ioannina)	1982–1991	0.3 (0.1, 0.8)	4 (3, 5)		16.0[a]
Tsianos EV[187]	2003	Greece	Northwest Greece	1982–1997	0.5 (0.4, 0.7)	6.6 (5.3, 6.9)		
Tsianos EV[188]	2005	Greece	Northwest Greece	1981–1997	0.5 (0.4, 0.7)	4.5 (3.9, 4.8)		
Economou M[189]	2007	Greece	Northwest Greece (Ioannina)	1983–2005	2.7 [1.7–4.1]	0.9 [0.1–1.7]	1.2[a]	8.0[a]
Trallori G[190]	1991	Italy	Florence	1978–1987	1.5	4.0	9.0[a]	14.6[a]
Trallori G[191]	1996	Italy	Florence	1978–1992	2.8	7.7	4.7[a]	7.5[a]
Lanfranchi GA[192]	1976	Italy	Bologna	1972–1973	1.85	0.75		
Tragnone A[193]	1993	Italy	Bologna	1986–1989	2.7	5.0		
Cottone M[194,195]	1991	Italy	Sicily	1987–1989	2.7			
Cottone M[196]	2006	Italy	Casteltermini (Sicily)	1979–2002	12.7	5.8	4.0[a]	2.6[a]
Ranzi T[197]	1996	Italy	Lombardia	1990–1993	3.4	7.0		
Tragnone A[198]	1996	Italy	Total	1989–1992	2.28 (1.98, 2.58)	5.17 (4.71, 5.62)		
			Padova		2.37 (1.61, 3.31)	3.79 (2.85, 4.72)		
			Modena		2.44 (1.45, 3.43)	3.44 (2.27, 4.61)		
			Bologna		2.49 (1.69, 3.30)	4.47 (3.42, 5.51)		
			Forli		2.85 (1.80, 3.90)	5.90 (4.39, 7.42)		
			Firenze		1.86 (1.15, 2.57)	6.08 (4.82, 7.35)		
			L'Aquila		2.45 (1.39, 3.52)	7.17 (5.32, 9.02)		
			Avellino		2.30 (1.27, 3.33)	5.14 (3.59, 6.69)		
			Messina		1.91 (1.07, 2.75)	7.11 (5.49, 8.74)		
Dal Pont E[199]	2010	Italy	Northeast (Belluno)	1997–2008	3.4	7.8	3.4	−2.5
Cachia E[200]	2008	Malta	Nationwide	1993–2005	1.29	7.88	4.0	2.7
Western Europe								
Latour P[201]	1998	Belgium	Liege	1993–1996	4.5	3.6		
Latour P[202]	1996	Belgium	Liege	1993–1994	5.5	3.5		
Van Gossum A[203]	1996	Belgium	Brussels	1992–1993	3.7	3.0		
Piront P[204]	2002	Belgium	Liege	1993–1996 (<60 years)	4.8	3.4		

Appendix 2. Continued

Lead author	Year	Country	Region	Study period	CD incidence rate (10^5)	UC incidence rate (10^5)	Annual average percent change	
							CD	UC
				1993–1996 (>60 years)	3.45	4.5		
Colombel JF[205]	1990	France	Nord-Pas de Calais region	1988	6.3	4.6		
Flamenbaum M[206]	1997	France	Puy-de-Dome county	1993–1994	5.7	1.9		
Gower-Rousseau C[207]	1994	France	Northern France	1988–1990	4.9	3.2		
Molinie F[208]	2004	France	Northern France	1988–1999	5.8 (5.6, 6.0)	4.0 (3.8, 4.1)	2.1[a]	−2.2[a]
Abakar-Mahamat A[209]	2007	France	Corsica	2002–2003	4.05	9.5		
Nerich V[210]	2006	France	Metropolitan France	2000–2002	8.2	7.2		
Pagenault M[211]	1997	France	Brittany	1994–1995	2.8	2.9		
Edouard A[212]	2005	France	Guadeloupe and Martinique	1997–1999	1.85	2.23		
Colombel JF[213]	1989	France	Nord-Pas-de-Calais	1988	4.23	2.96		
Loffler A[214]	1993	Germany	Cologne	1985–1986	5.1			
Goebell H[215]	1994	Germany	Total	1980–1984	4.0			
			Essen		3.5			
			Mülheim		5.9			
			Duisburg		3.8			
			Oberhausen		4.2			
Daiss W[216]	1989	Germany	Tübingen	1970–1984	3.12	1.32	8.1[a]	7.2[a]
Dirks E[217]	1994	Germany	Ruhr area, Western Germany	1980–1984		2.9		
Timmer A[218]	1999	Germany	Ruhr area, Western Germany	1980–1984		2.4 (1.8, 3.0)		
				1991–1995		3.0 (2.4, 3.7)		
Timmer A[219]	1999	Germany	Ruhr area, Western Germany	1980–1984	4.9 (4.2, 5.6)			
				1991–1995	5.2 (4.4, 6.1)			
Brandes JW[220]	1983	Germany	Marburg/Lahn, Western Germany	1964–1975	3.0			
				1962–1973		5.08		
Ott C[221]	2008	Germany	Oberpfalz	2004–2006	6.6 (5.6,7.7)	3.9		
Fahrlander H[222]	1971	Switzerland	Basle	1960–1969	1.6			
Eastern Europe								
Bitter J[223]	1980	Czech	North Bohemia	1978		1.3		
Lakatos L[224]	2004	Hungary	Veszprem Province	1977–2001	2.23 (0.5, 3.96)	5.89 (2.15, 9.63)	11.1[a]	8.9[a]
Lakatos L[225]	2009	Hungary	Western	2002–2006	8.87			
Prikazska M[226]	1996	Slovakia	Nationwide	1994	6.75			
Chojecki Z[227]	1964	Poland	First Medical Clinic, Warsaw Medical Academy	1951–1960	0.66			
Gheorghe L[228]	1997	Romania	Bucharest	1990–1997	0.42			
Gheorghe C[229]	2004	Romania	National	2002–2003	0.50	0.97		
			Northeast		0.39	0.76		
			Southeast		0.50	0.82		
			South		0.38	0.76		
			Southwest		0.44	1.05		
			West		0.58	1.10		
			Northwest		0.42	1.13		
			Centre		0.55	0.86		
			Bucharest		0.88	1.49		
Africa								
Wright JP[230]	1983	South Africa	Cape Town	1970–1979	1.14		23.3[a]	
Wright JP[231]	1983	South Africa	Cape Town	1970–1979		1.96		4.6[a]
Wright JP[232]	1986	South Africa	Cape Town	1980–1984	1.79	2.63		
Novis[233]	1975	South Africa	Cape Town	1970–1974	0.5			
Rajput HI[234]	1992	South Africa	Durban (Indian population)	1983–1987		2.7		
Australia and New Zealand								
Anseline PF[235]	1995	Australia	Hunter Valley	1967–1988	1.38			
Wilson J[236]	2010	Australia	Geelong, Victoria	2007–2008	29.3 (23.5–36.7)	17.4 (13.0–23.2)		
Eason RJ[237]	1982	New Zealand	Auckland (Caucasian)	1969–1978	1.75	5.5		
Schlup M[238]	1986	New Zealand	Dunedin	1972–1981	2.4			
Gearry RB[239]	2006	New Zealand	Canterbury	2004–2005	16.5	7.6		

NOTE. Annual average percent change in incidence for IBD studies that reported incidence rates for periods spanning at least 10 years. 95% Confidence Intervals are in the parentheses.
[a]Statistically significant (ie, $P < .05$) for time-trend analysis.
[b]Study incorporates previous data and provides update.
[c]Reference from Calkins.[13]
[d]Study contains data from many regions within Europe and can therefore not be stratified further.

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Appendix 3. Summary of Studies Reporting Prevalence of UC and/or CD, Stratified by Geographic Region

Lead author	Year	Country	Region	Study period	CD prevalence (10^5)	UC prevalence (10^5)
North America						
Lowe AM[1]	2009	Canada	Quebec	1993–2002	189.7	
Bernstein CN[2]	1999	Canada	Manitoba	1994	198.5	169.7
Green C[3]	2006	Canada	Manitoba	1990–2001	222.2	197.9
Pinchbeck BR[4]	1988	Canada	Alberta	1981	44.4	37.5
Bernstein CN[5]	2006	Canada	Canada	1998–2000	279.2	193.7
			British Columbia	1998–2000	233.7	162.1
			Alberta	1998–2000	160.7	185
			Saskatchewan	1998–2000	263.8	234.3
			Manitoba	1998–2000	271.4	248.6
			Nova Scotia	1998–2000	318.5	247.9
Loftus CG[6]	2007	United States	Olmsted County, Minnesota	2001	213.9	213.9
Gollop JH[7]	1988	United States	Olmsted County, Minnesota	1980	90.5	
Loftus EV[8]	2000	United States	Olmsted County, Minnesota	1991		229
Loftus EV[9]	1998	United States	Olmsted County, Minnesota	1991	132.7	
Sedlack RE[10]	1980	United States	Olmsted County, Minnesota	1975	105.7	
Sedlack RE[11]	1972	United States	Olmsted County, Minnesota	1965	28	117
Stonnington CM[12]	1987	United States	Rochester, Minnesota	1979		225.2
Kurata JH[13]	1992	United States	Fontana and Sunset, California	1984–1988	25.9	
Herrinton LJ[14]	2008	United States	Northern California	2002	96.3	155.8
Herrinton LJ[15]	2007	United States	Nationwide	1999–2001	129	191
Kappelman MD[16]	2007	United States	Nationwide	2003–2004	201 (197–204)	238 (234–241)
Appleyard CB[17]	2004	Puerto Rico	Southwestern	1996–2000	41.4	12.5
Edwards CN[18]	2008	Barbados	Nationwide	2004	16.7	44.3
South America						
Sobrero JM[19]	2009	Argentina	Nationwide	2009	15.0 (9.8–22.7)	76.1 (63.2–91.6)
Asia and Middle East						
Lok KH[20]	2007	China	Hong Kong	1991–2006	1.5	
Lok KH[21]	2008	China	Hong Kong	2006		7.0
Sung JJ[22]	1994	China	Hong Kong	1992	1.25	
Chow DKL[23]	2009	China	Hong Kong	1985–2006		26.5 (22.6–30.9)
Zheng JJ[24]	2005	China	Nationwide	1950–2002	1.38	
Zheng[25]	2010	China	Nationwide	1950–2007	1.13	
Niv Y[26]	1990	Israel	Upper Galilee	1986		44.58
Fireman Z[27]	1989	Israel	Tel Aviv Jafo	1970–1980	13.28	
Grossman A[28]	1989	Israel	Tel Aviv Jafo	1980		55.16
Gilat T[29]	1974	Israel	Tel Aviv Jafo	1970		37.4
Rozen P[30]	1979	Israel	Tel Aviv Jafo	1976	12.31	
Odes HS[31]	1994	Israel	Southern Israel	1992	50.6	
Shapira M[32]	1994	Israel	Kinneret Subdistrict	1960–1990	20.24	
Odes HS[33]	1987	Israel	Beer Sheva	1985		70.6
Krawiec J[34]	1984	Israel	Beer Sheva	1980	14.0	
Niv Y[35]	1999	Israel	Kibbutz residents	1987–1997	45.3	
Niv Y[36]	2000	Israel	Kibbutz residents	1987–1997		144.1
Odes HS[37]	1989	Israel	Beer Sheva	1987	30 (23–38)	89 (77–103)
Niv Y[38]	1991	Israel	Kibbutz	1987		121.08
Odes HS[39]	1991	Israel	Southern Israeli (Arab population)	1990	3.2	9.8
Birkenfeld S[40]	2009	Israel	Kibbutz	1987–2007		168.3
Zvidi I[41]	2009	Israel	Kibbutz	1987–2007	67.9	
Sood A[42]	2003	India	Punjab	2000		44.3
Abdul-Baki H[43]	2007	Lebanon	Nationwide	2000–2004	53.1	106.2
Morita N[44]	1995	Japan	Nationwide	1991	5.85	18.12
Yao T[45]	2000	Japan	Nationwide	1986–1998		7.6
Higashi A[46]	1988	Japan	Nationwide	1985	1.86	7.85
Asakura K[47]	2009	Japan	Nationwide	2003–2005	18.6	57.3
Yoshida Y[48]	1990	Japan	Nationwide	1975	0.88	5.5
Yang SK[49]	2000	South Korea	Songpa-Kangdong, Seoul	1997		7.57 (5.95–9.19)
Yang SK[50]	2008	Korea	Songpa-Kangdong District, Seoul	2005	11.24	30.87
Tan Y-M[51]	2005	Malaysia	Kuala Lumpur	1985–1998		9.11
Lee YM[52]	2000	Singapore	Nationwide	1985–1996	3.6	6

Appendix 3. Continued

Lead author	Year	Country	Region	Study period	CD prevalence (10^5)	UC prevalence (10^5)
Tan CC[53]	1992	Singapore	Nationwide	1981–1990	1.3	8.6
Law N-M[54]	1998	Singapore	Nationwide - Chinese Singaporeans	1986–1993	15.1	
Niriella MA[55]	2010	Sri Lanka	Colombo and Gampaha	2007–2008	1.2 (1.0–1.4)	5.3 (5.0–5.6)
Tezel A[56]	2003	Turkey	Trakya	2002		4.9
Al-Shamali M[57]	2003	Kuwait	Nationwide	1985–1999		41.7
Northern Europe						
Bonnevie O[58]	1968	Denmark	Copenhagen and Gentofte	1967		44.1
Langholz E[59]	1991	Denmark	Copenhagen	1987		161.2
Munkholm P[60,61]	1992	Denmark	Copenhagen	1987	54	
Jacobsen BA[62]	2006	Denmark	North Jutland	2002	151	294
Binder V[63]	1982	Denmark	Copenhagen	1978	34	117
Berner J[64]	1986	Faroe Islands	Nationwide	1983	31.8	157.3
Manninen P[65]	2010	Finland	Tampere	1986–1999	82	205
Bjornsson S[66]	1983	Iceland	Nationwide	1950–1979		52.6
Bjornsson S[67]	1989	Iceland	Nationwide	1950–1979	6	72
Shivananda S[68]	1987	The Netherlands	Leiden	1979–1983	48	
Shivananda S[69]	1987	The Netherlands	Leiden	1979–1983	48	58.4
Haug K[70]	1988	Norway	Western Norway (Sogn and Fjordane, Hordaland, and Rogaland)	1984–1985		92
Bengtson MB[71]	2009	Norway	Southeast (Oslo)	1990–1993	262 (196–328)	505 (420–599)
Brahme F[72]	1975	Sweden	Malmo	1965–1973	48.1	
				1968		89
Bergman L[73]	1975	Sweden	Uppsala and Västmanland	1967–1973	38.5	
Norlen BJ[74]	1970	Sweden	Uppsala and Västmanland	1967	27	
Lapidus A[75]	2006	Sweden	Stockholm	2001	213	
Lindberg E[76]	1991	Sweden	Immediate catchment area of Örebro Medical Center Hospital	1987	146	
Lindgren A[77]	1996	Sweden	Goteborg	1990	94 (84–104)	
Tysk C[78]	1992	Sweden	Orebro	1987		198
Keighley A[79]	1976	United Kingdom	Nottingham	1971	34.99	
Evans JG[80]	1965	United Kingdom	Oxford	1960	9	65.7
Rubin GP[81]	2000	United Kingdom	North Tees	1994	144.8	243.4
Fellows IW[82]	1990	United Kingdom	Derby	1985	85	
Fellows IW[83]	1988	United Kingdom	Derby (West Indians)	1986	60.6	
De Dombal FT[84]	1971	United Kingdom	Leeds	1968	25	
Lee FI[85]	1985	United Kingdom	Blackpool	1980	47	
Miller DS[86]	1974	United Kingdom	Nottingham	1958–1971	26.5	
Kyle J[87]	1992	United Kingdom	Northeastern and Northern Isles, Scotland	1988	147	
Mayberry JF[88]	1980	United Kingdom	Wales Nationwide	1967–1976	40.2	
Penny WJ[89]	1985	United Kingdom	Britain and Ireland (Mormons)	1981	79	389
Montgomery SM[90]	1998	United Kingdom	England Nationwide 26 year olds	1996	21.4 (12.3–30.6)	12.2 (5.3–19.2)
Stone MA[91]	2003	United Kingdom	Central England (Trent)	2002	130 (107–157)	243 (211–278)
Probert CSJ[92]	1993	United Kingdom	England - Leicestershire	1990	European 75.8 South Asian 33.2 Hindu 31.9 Sikh 30.8 Muslim 53.8	European 90.8 South Asian 136.0 Hindu 151.5 Sikh 138.4 Muslim 107.6
Mediterranean/Southern Europe						
Pavlovic-Calic N[93]	2008	Bosnia and Herzegovina	Tuzla	2006	28.2	
Salkic NN[94]	2010	Bosnia and Herzegovina	Tuzla	2006		43.1 (37.3–48.8)
Vucelic B[95]	1991	Croatia	Zagreb	1989	8.3	
Jovanovic Z[96]	1999	Croatia	Rijeka and Istra	1973–1994	11.5	

Appendix 3. Continued

Lead author	Year	Country	Region	Study period	CD prevalence (10^5)	UC prevalence (10^5)
Azevado LF[97]	2010	Portugal	Nationwide	2003–2007	58	57
Saro Gismera C[98]	2003	Spain	Province of Liege, Asturias	1997	87.45	109.96
Saro Gismera C[99]	2000	Spain	Gijon, Asturias	1997	116.47	121.79
Mate-Jimenez J[100]	1994	Spain	Madrid	1988	19.8	43.4
Ruiz Ochoa V[101]	1984	Spain	Galicia	1982	5.2	
Brullet E[102]	1991	Spain	Sabadell	1985–1989		3.95
Alonso P[103]	1992	Spain	Soria	1990	13	32
Martinez-Salmeron JF[104]	1993	Spain	Granada	1979–1988	9	21
Hinojosa J[105]	1990	Spain	Sagunto	1983–1989	21.4	28.87
Pajares Garcia JM[106]	1987	Spain	Madrid	1976–1983	3.5	
Trallori G[107]	1996	Italy	Florence	1992	40	121
Cottone M[108]	2006	Italy	Casteltermini (Sicily)	1979–2002	322 (290–383)	142 (117–167)
Dal Pont E[109]	2010	Italy	Northeast (Belluno)	2008	45	93
Western Europe						
Tsianos EV[110]	2005	Greece	(Ioannina, Arta, Preveza, Thesprotia, Corfu and Lefkas) Northwest Greece	1981–1997	0.6	4.9
Loffler A[111]	1993	Germany	Cologne	1986	30.67	
Goebell H[112]	1994	Germany	Total	1984	36	
Daiss W[113]	1989	Germany	Tübingen	1984	54.6	24.8
Dirks E[114]	1994	Germany	Ruhr area, Western Germany	1984		27.3
Brandes JW[115]	1983	Germany	Marburg/Lahn, Western Germany	1975	30.5	
				1973		48.8
Juillerat P[116]	2008	Switzerland	Vaud	2003–2004	100.7 (98.2–103.4)	105.0 (102.3–107.7)
Bitter J[117]	1980	Czech	North Bohemia	1968–1978		17.6
Eastern Europe						
Lakatos L[118]	2004	Hungary	Veszprem Province	1991–2001	35	101
Prikazska M[119]	1996	Slovakia	Nationwide	1994	6.75	
Chojecki Z[120]	1964	Poland	First Medical Clinic, Warsaw Medical Academy	1951–1960	66	
Gheorghe C[121]	2004	Romania	National	2002–2003	1.51	2.42
Australia and New Zealand						
Anseline PF[122]	1995	Australia	Hunter Valley	1988	34	
Gearry RB[123]	2006	New Zealand	Canterbury	2004	155.2	145

Note: 95% Confidence Intervals are in the parentheses.

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Appendix 4. Summary of Studies Reporting Incidence of UC and/or CD, Stratified by Geographic Region and Including Female to Male Ratio

					CD			UC		
Lead author	Year	Country	Region	Study period	Male IR (10^5)	Female IR (10^5)	IRR (female/male)	Male IR (10^5)	Female IR (10^5)	IRR (female/male)
North America										
Lowe AM[1]	2009	Canada	Quebec	1998–2000	18.5	27.9	1.51			
Bernstein CN[2]	1999	Canada	Manitoba	1989–1994	12.3	16.9	1.37	14.3	14.4	1.0
Loftus CG[3]	2007	United States	Olmsted County, Minnesota	1940–2000	6.7	6.1	0.91	9.8	6.5	0.66
Gollop JH[4]	1988	United States	Olmsted County, Minnesota	1943–1982	3.8	4.6	1.21			
Sedlack RE[5]	1980	United States	Olmsted County, Minnesota	1935–1975	4.2	4.4	1.05			
Kurata JH[6]	1992	United States	Fontana and Sunset, California	1982–1988	6.0	8.3	1.38			
Herrinton LJ[7]	2008	United States	Northern California	1996–2002	5.8	6.8	1.17	13.1	10.9	0.83
Stonnington CM[8]	1987	United States	Rochester, Minnesota	1960–1979				18.2	11.9	0.65
Spencer RJ[9]	1974	United States	Rochester, Minnesota	1935–1964				13.2	10.5	0.80
Edwards CN[10]	2008	Barbados	Nationwide	1980–2004	0.66	0.85	1.29	1.44	2.2	1.53
Asia and the Middle East										
Lok KH[11]	2007	China	Hong Kong	1991–2006	0.24	0.15	0.63			
Leong RWL[12]	2004	China	Hong Kong	1986–2001	1.3	0.6	0.46			
Fireman Z[13]	1989	Israel	Tel Aviv Jafo	1970–1980	1.82	1.34	0.74			
Grossman A[14]	1989	Israel	Tel Aviv Jafo	1970–1980				3.94	3.79	0.96
Gilat T[15]	1974	Israel	Tel Aviv Jafo	1961–1970				1.94	1.67	0.86
Odes HS[16]	1994	Israel	Southern Israel	1968–1992	4.2	6.0	1.43			
Morita N[17]	1995	Japan	Nationwide	1991	0.71	0.32	0.45	2.23	1.68	0.75
Kitahora T[18]	1995	Japan	Nationwide	1960–1985				0.28	0.28	1.0
Yang SK[19]	2000	South Korea	Songpa-Kangdong, Seoul	1986–1997				0.66	0.71	1.08
Yang SK[20]	2008	South Korea	Songpa-Kangdong District, Seoul	1986–2005	0.79	0.27	0.34	1.50	1.51	1.0
Tezel A[21]	2003	Turkey	Trakya	1998–2001				0.92	0.54	0.59
Northern Europe										
Bonnevie O[22]	1968	Denmark	Copenhagen and Gentofte	1961–1967				6.7	7.6	1.13
Langholz E[23]	1991	Denmark	Copenhagen	1962–1987				7.7	8.5	1.10
Munkholm P[24,25]	1992	Denmark	Copenhagen	1979–1987	2.11	2.83	1.34			
Vind I[26]	2006	Denmark	Copenhagen	2003–2005	8.6	9.1	1.06	13.4	13.3	0.99
Binder V[27]	1982	Denmark	Copenhagen	1962–1978	1.42	2.25	1.58	6.96	9.08	1.58
Jacobsen BA[28]	2006	Denmark	North Jutland	1978–2002	5.22	7.16	1.37	12.08	11.76	0.97
Fonager K[29]	1997	Denmark	Nationwide	1981–1992	3.7	5.4	1.5	13.0	13.4	1.03
Berner J[30]	1986	Faroe Islands	Nationwide	1964–1983				8.6	6.5	0.76
Bjornsson S[31]	1983	Iceland	Nationwide	1950–1979				5.4	4.7	0.87
Romberg-Camps MJL[32]	2008	The Netherlands	South Limburg	1991–1903	4.84	7.58	1.57	8.51	6.92	0.81
Shivananda S[33]	1987	The Netherlands	Leiden	1979–1983	3.8	4.0	1.05			
Kildebo S[34]	1990	Norway	Northern region	1983–1986				15.1	10.4	0.69
Moum B[35]	1996	Norway	Southeast	1990–1993				14.8	12.1	0.81
Brahme F[36]	1975	Sweden	Malmo	1958–1973	4.6	5.1	1.11			
Stewenius J[37]	1994	Sweden	Malmo	1958–1982				7.7	4.9	0.64
Bergman L[38]	1975	Sweden	Uppsala and Västmanland	1968–1973	4.3	5.7	1.33			
Norlen BJ[39]	1970	Sweden	Uppsala and Västmanland	1956–1967	2.6	2.4	0.92			
Lapidus A[40]	2006	Sweden	Stockholm	1990–2001	8.1	8.6	1.06			
Lapidus A[41]	1997	Sweden	Stockholm	1955–1989	3.6	3.8	1.06			
Smith IS[42]	1975	United Kingdom	Clydesdale, Scotland	1961–1970	1.2	1.9	1.58			
Srivastava ED[43]	1992	United Kingdom	Cardiff	1968–1987				6.1	6.6	1.08
Rubin GP[44]	2000	United Kingdom	North Tees	1990–1994	8.7	7.8	0.90	15.2	12.5	0.82
Fellows IW[45]	1990	United Kingdom	Derby	1951–1985	13.5	16.6	1.23			
Evans JG[46]	1965	United Kingdom	Oxford	1951–1960	0.8	0.8	1.0	4.5	5.9	1.31
Miller DS[47]	1974	United Kingdom	Nottingham	1958–1971	2.5	3.3	1.33	7.8	10.9	1.40
Tresadern JC[48]	1973	United Kingdom	Gloucester	1966–1970	1.61	1.39	0.86			
Brown JS[49]	1988	United Kingdom	Northern Ireland	1966–1981	1.47	2.16	1.47			
Kyle J[50]	1992	United Kingdom	Northeastern and Northern Isles, Scotland	1955–1988	Urban 5.3 Rural 3.4	Urban 8.1 Rural 5.6	Urban 1.53 Rural 1.65			
Humphreys WG[51]	1990	United Kingdom	N Ireland	1966–1981	1.57	2.12	1.35			
Seagroatt V[52]	2003	United Kingdom	Southern England	1979–1998	4.6	7.3	1.59	5.9	6.4	1.08

Appendix 4. Continued

					CD			UC		
Lead author	Year	Country	Region	Study period	Male IR (10^5)	Female IR (10^5)	IRR (female/male)	Male IR (10^5)	Female IR (10^5)	IRR (female/male)
Mediterranean/ Southern Europe										
Pavlovic-Calic N[53]	2008	Bosnia and Herzegovina	Tuzla	1995–2006	2.6	2.1	0.81			
Salkic NN[54]	2010	Bosnia and Herzegovina	Tuzla	1995–2006				3.91	3.29	1.13
Sincic BM[55]	2006	Croatia	Primorsko-goranska County	2000–2004	7.7	5.4	0.70	4.6	4.5	0.98
Vucelic B[56]	1991	Croatia	Zagreb	1980–1989	3.06	3.49	1.14			
Lopez-Serrano[57]	2009	Spain	Madrid	1998–2005	8.0	7.0	0.87	6.3	7.3	1.15
Ruiz Ochoa V[58]	1984	Spain	Galicia	1968–1982	0.58	0.34	0.59			
Brullet E[59]	1998	Spain	Total	1991–1993	6.0	5.0	0.83	9.5	6.4	0.67
Lopez Miguel C[60]	1999	Spain	Aragon	1992–1995	15–64	15–64	15–64	15–64	15–64	15–64
					4.6	3.16	0.69	9.2	7.2	0.78
Pozzati L[61]	2002	Spain	Merida	1996–2000	2.30	1.99	0.87	6.91	3.18	0.46
Manousos ON[62]	1996	Greece	Heraklion	1990–1994	4.4	1.7	0.39			
Manousos ON[63]	1996	Greece	Heraklion	1990–1994				12.7	6.5	0.51
Ladas SD[64]	2005	Greece	Trikala	1990–1994				9.3	11.4	1.23
Tsianos EV[65]	1994	Greece	Northwest Greece (Ioannina)	1982–1991				4.6	3.5	0.76
Tsianos EV[66]	2003	Greece	Northwest Greece	1982–1997	6.76	3.80	0.56			
Trallori G[67]	1996	Italy	Florence	1978–1992	3.0	2.6	0.87	9.7	5.8	0.60
Cottone M[68,69]	1991	Italy	Sicily	1987–1989	3.3	2.3	0.70			
Tragnone A[70]	1996	Italy	Nationwide	1989–1992	2.26	2.30	1.02	6.59	3.85	0.58
Cachia E[71]	2008	Malta	Nationwide	1993–2005	0.96	1.62	1.69	8.16	7.59	0.93
Western Europe										
Flamenbaum M[72]	1997	France	Puy-de-Dome County	1993–1994	7.4	5.8	0.78	2.4	2.4	1.0
Gower-Rousseau C[73]	1994	France	Northern France	1988–1990	4.2	5.6	1.33	3.6	2.8	0.78
Molinie F[74]	2004	France	Northern France	1988–1999	5.3	6.4	1.21	4.6	3.4	0.74
Nerich V[75]	2006	France	Metropolitan France	2000–2002	7.1	9.4	1.32	7.7	6.8	0.88
Loffler A[76]	1993	Germany	Cologne	1985–1986	4.3	5.82	1.35			
Goebell H[77]	1994	Germany	Essen, Mülheim, Duisburg, Oberhausen	1980–1984	3.6	4.3	1.19			
Dirks E[78]	1994	Germany	Ruhr area, Western Germany	1980–1984				3.5	2.4	0.69
Timmer A[79]	1999	Germany	Ruhr area, Western Germany	1980–1984				3.0	1.8	0.69
				1991–1995				2.8	3.4	1.21
Timmer A[80]	1999	Germany	Ruhr area, Western Germany	1980–1984	4.2	5.5	1.31			
				1991–1995	4.3	5.9	1.37			
Fahrlander H[81]	1971	Switzerland	Basle	1960–1969	1.8	1.4	0.78			
Eastern Europe										
Lakatos L[82]	2004	Hungary	Veszprem Province	1977–2001	2.31	2.17	0.94	6.19	5.65	0.91

IR, incidence rate.

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Appendix 5. Summary of Studies Reporting Incidence of UC and/or CD, Stratified by Age

						CD			UC		
Lead author	Year	Country	Region	Study period	Age (*y*)	Male IR	Female IR	Total IR	Male IR	Female IR	Total IR
Lowe AM[1]	2009	Canada	Quebec	1998–2000	0–19			13.9			
					20–29			35.5			
					30–39			24.3			
					40–54			21.7			
					≥55			20.6			
Bernstein CN[2]	1999	Canada	Manitoba	1989–1994	0–9	0.8	0.6	0.7	0.2	0.2	0.2
					10–19	14.1	11.1	12.7	7.8	5.7	6.7
					20–29	21.1	35.8	28.4	18.9	21.9	20.4
					30–39	14.4	20.9	17.6	18.4	22.1	20.3
					40–49	13.7	20.9	17.3	17.3	18.2	17.7
					50–59	13.5	16.7	15.1	20.2	18.7	19.5
					≥60	8.4	12.4	10.7	19.4	14.2	16.5
Bernstein CN[3]	2006	Canada	Canada	1998–2000	0–9	2.5	2		1	1.5	
					10–19	13	14		6	7.5	
					20–29	19	27.5		15.5	17.5	
					30–39	15	21		14	16.5	
					40–49	12	15		13	13	
					50–59	11	14		15	12.5	
					60–69	10	14		18	15	
					70–79	9.5	10		17	14.5	
					≥80	5	9		11	8	
			British Columbia		0–9			1			1.5
					10–19			9			5
					20–29			13			14
					30–39			12			12.5
					40–49			9			12.5
					50–59			8			12
					60–69			9			12.5
					70–79			7.5			14.5
					≥80			7.5			10
			Alberta		0–9			2			2
					10–19			16			7
					20–29			28			18
					30–39			23			14
					40–49			17.5			11
					50–59			18			12
					60–69			13			17.5
					70–79			9			14
					≥80			7			3
			Saskatchewan		0–9			1			1
					10–19			14			7.5
					20–29			24			13
					30–39			18			16
					40–49			14			13.5
					50–59			11			13
					60–69			13			9
					70–79			11			10
					≥80			5.5			6
			Manitoba		0–9			1			1
					10–19			13			8
					20–29			32			23
					30–39			22.5			18
					40–49			13			15
					50–59			13			20
					60–69			16			22
					70–79			9			25
					≥80			8			13
			Nova Scotia		0–9			1			1
					10–19			22			10
					20–29			42			22.5
					30–39			24.5			28
					40–49			18			23
					50–59			16			23
					60–69			14.5			32
					70–79			22			23
					≥80			8			18
Loftus CG[4]	2007	United States	Olmsted County, Minnesota	1940–2000	0–19	3.4	3.4	3.4	3.4	1.3	2.4
					20–29	13	14.2	13.7	16.2	12.1	13.9
					30–39	9.1	7	8	12.4	11.5	12
					40–49	5.7	6.1	5.9	11.4	7.1	9.2
					50–59	5.3	4.1	4.7	13.1	7.2	10.1
					60–69	7.1	4.3	5.6	10	5.5	7.6
					≥70	6.1	4.2	4.9	7	4.7	5.6

Appendix 5. Continued

						CD			UC		
Lead author	Year	Country	Region	Study period	Age (*y*)	Male IR	Female IR	Total IR	Male IR	Female IR	Total IR
Gollop JH[5]	1988	United States	Olmsted County, Minnesota	1943–1982	0–14	1	0.5				
					15–24	5.9	9.6				
					25–34	5.3	6.7				
					35–44	2.5	7.9				
					45–54	2.4	2.9				
					55–64	2.1	3.6				
					≥65	2.1	2.1				
Loftus EV[6]	2000	United States	Olmsted County, Minnesota	1940–1993	0–19				2.5	1.1	
					20–29				14.1	9.9	
					30–39				11.5	11.5	
					40–49				12.8	7.8	
					50–59				10.2	5.6	
					60–69				10.5	4.4	
					≥70				6.7	5.3	
Loftus EV[7]	1998	United States	Olmsted County, Minnesota	1940–1993	0–19			2.5			
					20–29			12.8			
					30–39			7.3			
					40–49			4.9			
					50–59			5.5			
					60–69			4			
					≥70			4.1			
Sedlack RE[8]	1980	United States	Olmsted County, Minnesota	1935–1975	0–19	2	2				
					20–29	7	10				
					30–49	6	5				
					≥50	4	4				
Kurata JH[9]	1992	United States	Fontana and Sunset, California	1982–1988	0–9	0	0	0			
				(total: 1987–1988)	10–19	5.25	3.75	13.5			
					20–29	10.7	12.5	36			
					30–39	9.25	9.75	22			
					40–49	6.5	9.5	20.5			
					50–59	7.5	13	28			
					60–69	4.5	13.5	14			
					70–79	3	11.5	4			
					≥80	8	4.5	0			
Herrinton LJ[10]	2008	United States	Northern California	1996–2002	0–4	1.2	0.9	1	0.8	0.7	0.7
					5–9	1.1	1.4	1.3	1.9	1.4	1.4
					10–14	5.7	5.2	5.4	2.1	4	3
					15–19	3.9	7.4	5.3	8.2	9.4	8.8
					20–29	8.3	8.1	8.1	15.7	13.4	14.5
					30–39	6.1	7.1	6.6	19.1	15	16.9
					40–49	6	5.5	5.7	13	13.2	13.1
					50–59	6.5	8.3	7.4	21.2	10.9	15.7
					60–69	9.5	9	9.4	21.1	14.4	17.6
					70–89	6.1	12.2	9.4	16.3	14.9	15.5
Stowe SP[11]	1990	United States	Rochester, New York	1940–1989	0–9			0.13			0.18
					10–19			4.1			1.77
					20–29			5.01			3.38
					30–39			3.44			2.11
					40–49			2.03			1.73
					50–59			1.86			1.73
					60–69			1.94			1.67
					70–79			1.88			1.94
					80–98			1.36			1.75
Stonnington CM[12]	1987	United States	Rochester, Minnesota	1960–1979	0–14				3.4	0	1.7
					15–24				25.7	17.3	20.4
					25–34				26.7	23.4	25
					35–44				18.4	10.7	14.5
					45–54				20.8	12.1	16.1
					55–64				27.4	13.4	19.4
					65–74				9.7	8.5	8.9
					≥75				15	10	11.5
Spencer RJ[13]	1974	United States	Rochester, Minnesota	1935–1964	0–9						3
					10–19						5
					20–29						21
					30–39						17
					40–49						9
					50–59						17
					60–69						14
					≥70						8
Edwards CN[14]	2008	Barbados	Nationwide	1980–2004	1–44	0.74	0.77	0.75	1.52	2.17	1.85
					45–64	0.67	1.26	1	2	3.61	2.89
					≥65	0.34	0.23	0.28	0.68	0.92	0.83

Appendix 5. Continued

						CD			UC		
Lead author	Year	Country	Region	Study period	Age (*y*)	Male IR	Female IR	Total IR	Male IR	Female IR	Total IR
Chow DKL[15]	2009	China	Hong Kong	1985–2006	15–24						1.2
					25–34						2.6
					35–44						1.5
					45–54						1.6
					55–64						1.5
					≥65						0.7
Fireman Z[16]	1989	Israel	Tel Aviv Jafo	1970–1980	0–19			0.75			
					20–29			2.75			
					30–39			1.9			
					40–49			1.8			
					50–59			1.5			
					60–69			2.25			
					≥70			2.5			
Grossman A[17]	1989	Israel	Tel Aviv Jafo	1970–1980	0–19						1
					20–29						6
					30–39						6.75
					40–49						5.25
					50–59						5.5
					60–69						6
					≥70						3.75
Odes HS[18]	1994	Israel	Southern Israel	1987–1992	0–19	3	4.3				
					20–39	4.8	6.6				
					≥40	2.5	3.9				
Shapira M[19]	1998	Israel	Kinneret Subdistrict	1965–1994	0–14						0
					15–29						4.6
					30–44						7.4
					45–64						6.1
					≥65						5.6
Utsunomiya T[20]	1983	Japan	Nationwide	1955–1980	0–4				0	0	
					5–9				0.01	0.01	
					11–14				0.11	0.08	
					15–19				0.28	0.2	
					20–24				0.32	0.27	
					25–29				0.27	0.24	
					30–34				0.23	0.23	
					35–39				0.18	0.22	
					40–44				0.15	0.23	
					45–49				0.15	0.19	
					50–54				0.12	0.17	
					55–59				0.12	0.19	
					60–64				0.15	0.16	
					65–69				0.1	0.14	
					≥70				0.08	0.08	
Yang SK[21]	2000	South Korea	Songpa-Kangdong, Seoul	1986–1997	0–9				0.1	0.1	
					10–19				0.55	0.6	
					20–29				1.1	0.95	
					30–39				1	0.9	
					40–49				0.5	1.1	
					50–59				0.8	1	
					60–69				0.6	0.8	
					≥70				0	0	
Yang SK[22]	2008	South Korea	Songpa-Kangdong District, Seoul	1986–2005	0–9	0.01	0.1		0	0.1	
					10–19	1.75	0.9		0.9	0.3	
					20–29	2	0.6		2.1	2.4	
					30–39	0.9	0.5		2.25	2.5	
					40–49	0.4	0		1.9	2.4	
					50–59	0.1	0		1.6	1.3	
					60–69	0.2	0.2		1.75	2	
					70–79	0	0.1		0.8	0	
					≥80	0	0		0	0	
Shivananda S[23]	1996	Europe		1991–1993	15–44	6	7.7		11.2	6.4	
					45–64	3.2	3		12.1	5.3	
					≥65	2.9	2		10.8	9.8	
		Iceland	Reykjavik		15–44	10.4	10		27.3	27.5	
					45–64	4.4	2.2		26.4	11.1	
					≥65	8	6.4		32.2	9.7	
		Norway	Oslo		15–44	9.8	9.6		18.7	17.5	
					45–64	2.6	5.3		14.1	8.7	
					≥65	5.1	2.6		22.3	9.9	
		Denmark	Copenhagen		15–44	5.4	12.2		8.3	11.4	

Appendix 5. Continued

						CD			UC		
Lead author	Year	Country	Region	Study period	Age (*y*)	Male IR	Female IR	Total IR	Male IR	Female IR	Total IR
					45–64	5.3	3.5		8.3	9.7	
					≥65	1.5	6.2		10.6	13.3	
		Ireland	Dublin		15–44	5.5	7.9		16.2	13.8	
					45–64	2.9	2.7		22	7.1	
					≥65	2.2	11.1		22.1	9.7	
		United Kingdom	Leicester (nonimmigrants)		15–44	2.5	9.7		10	10.9	
					45–64	0	0		13.5	5.1	
					≥65	0	0		9.8	4.3	
		United Kingdom	Leicester (immigrants)		15–44	5.4	2.5		8.1	20.4	
					45–64	17.5	0		8.8	26.2	
					≥65	0	0		28.7	0	
		The Netherlands	Maastricht		15–44	10.2	13.9		15.1	14.3	
					45–64	4	2.6		17.1	9.2	
					≥65	0	0		8.8	5.9	
		Germany	Essen		15–44	4.1	6.7		3.5	5.8	
					45–64	1.4	3.1		3.2	4	
					≥65	3.1	0		4.2	4.6	
		France	Amiens		15–44	8.2	12.8		6.3	5.2	
					45–64	7.7	6.4		9.6	5.5	
					≥65	1.6	2.2		0	1	
		Italy	Milan-Varese		15–44	1.1	5.5		15.4	6.6	
					45–64	2	0		6.1	3.8	
					≥65	14.4	2.8		28.8	8.5	
		Italy	Crema-Cremona		15–44	0.7	4.1		6	8.1	
					45–64	5.3	1.2		19.7	2.5	
					≥65	3	3.4		3	3.4	
		Italy	Reggio Emilia		15–44	5.4	5.1		9.3	9.1	
					45–64	3.7	1.8		10.2	5.5	
					≥65	5.9	1		2.9	4.1	
		Italy	Florence		15–44	3.6	4.4		10.3	7.9	
					45–64	0.6	3.4		11.4	4.6	
					≥65	1.1	0.7		11.7	2.7	
		Italy	Palermo, Sicily		15–44	10.4	7.7		15.6	7.7	
					45–64	0	2.9		17	2.9	
					≥65	6.4	0		0	0	
		Spain	Vigo		15–44	9.7	4.1		5.9	9.5	
					45–64	3.8	0.9		11.3	1.7	
					≥65	4.3	0		8.6	3.8	
		Spain	Sabadell		15–44	5.7	7.5		11.4	8.1	
					45–64	0	5.2		14.8	3.9	
					≥65	3.2	0		12.6	0	
		Portugal	Braga		15–44	3.3	7.2		5.8	8	
					45–64	2.2	1.9		6.7	3.9	
					≥65	0	0		0	0	
		Portugal	Almada		15–44	1.5	3.5		1.5	0.7	
					45–64	2.9	2.8		1.4	4.2	
					≥65	0	0		4	0	
		Greece	Ioannina prefecture, Northwest Greece		15–44	1	0.9		9.5	11.2	
					45–64	1.7	0		5	7.6	
					≥65	3.1	0		15.4	0	
		Greece	Heraklion, Crete		15–44	7.5	3.1		19.2	12.3	
					45–64	7.9	0		35.5	14.9	
					≥65	0	0		10.1	2.7	
		Israel	Beer Sheva		15–44	1.8	6.1		12	6.1	
					45–64	4.3	7.9		8.6	9.9	
					≥65	0	4.3		5.3	0	
Bonnevie O[24]	1968	Denmark	Copenhagen and Gentofte	1961–1967	0–9				1.4	0.4	0.9
					10–19				4.6	6.2	5.4
					20–29				12.3	11.6	11.9
					30–39				8.2	12.4	10.3
					40–49				7.9	7	7.4
					50–59				7.5	10.3	9
					60–69				7.8	6.7	7.2
					70–79				0	8.4	4.8
					≥80				13.9	0	5.7
Langholz E[25]	1991	Denmark	Copenhagen	1962–1987	0–10				2.1	1.7	
					11–20				7.8	10.6	
					21–30				11.3	13.6	
					31–40				10.3	12.5	
					41–50				6.5	9.2	
					51–60				9	8.4	
					61–70				10.3	6.8	
					≥71				9.8	7.8	

Appendix 5. Continued

						CD			UC		
Lead author	Year	Country	Region	Study period	Age (*y*)	Male IR	Female IR	Total IR	Male IR	Female IR	Total IR
Munkholm P[26,27]	1992	Denmark	Copenhagen	1979–1987	0–14	0.5	0.5				
					15–19	6	11				
					20–29	4.75	10.75				
					30–39	5.5	4				
					40–49	4	6.5				
					50–59	3.25	5.5				
					60–69	2.25	1.25				
					≥70	4	2				
Vind I[28]	2006	Denmark	Copenhagen	2003–2005	0–15	4	2.5	3	5	4.5	4.5
					16–25	15	23	18	20.5	18	19.5
					26–35	13	11	12.5	15	19	17
					36–45	7	10	8.5	15.5	16.5	16
					46–55	9	9	9	15	10.5	13
					56–65	4	6	5	17	8	12.5
					66–75	4.5	4.5	4.5	14	13	14
					76–85	9.5	7.5	8	12	18	16
					86–95				10	16.5	15
Binder V[29]	1982	Denmark	Copenhagen	CD: 1962–1978; UC: 1970–1978	0–14			0			2.5
					15–19			2			8.75
					20–24			3.4			15
					25–29			3.8			12
					30–34			1.9			14
					35–39			1.5			7.5
					40–44			1			9
					45–49			2.8			8.75
					50–54			2.4			7
					55–59			2.1			8.5
					60–64			2.8			8.5
					65–69			2.3			13
					70–74			1.5			8.75
					75–79			1			10
					≥80			0			9.5
Jacobsen BA[30]	2006	Denmark	North Jutland	1978–2002	0–14	1.6	1.3		2.1	3.2	
					15–29	8.8	15.4		15.6	19.2	
					30–44	6.3	8.5		15	17.9	
					45–59	5.5	6.3		14.4	11.4	
					60–74	5.1	7.2		15.6	11.1	
					≥75	7.7	3.7		13.3	7.6	
Fonager K[31]	1997	Denmark	Nationwide	1981–1992	0–14	0.9	0.6		2.1	2.9	
					15–29	5.3	9.1		12.7	16.3	
					30–44	4.2	6.2		14.4	15.6	
					45–59	3.8	5		14.7	13.1	
					60–74	4	5.3		20.1	16.5	
					≥75	3.6	4.6		25.8	18.1	
Berner J[32]	1986	Faroe Islands	Nationwide	1964–1983	0–19				2	2	
					20–29				13	16	
					30–39				11	11	
					40–49				23	5	
					50–59				10	8	
					60–69				12	3	
					≥70				9	15	
Linden G[33]	1971	Finland	Nationwide	1967	0–9					1.8	
					10–19					2.5	
					20–29					5.8	
					30–39					7.6	
					40–49					7	
					50–59					6.5	
					60–69					3.6	
					≥70					5.2	
Björnsson S[34]	2000	Iceland	Nationwide	1990–1994	0–9			0			0
					10–19			9			10
					20–29			9			28
					30–39			7			29
					40–49			8			20
					50–59			2			18
					60–69			6			18
					70–79			7.5			7.5
					≥80			0			15
Björnsson S[35]	1998	Iceland	Nationwide	1980–1989	0–9			1			0
					10–19			2			5
					20–29			5			20
					30–39			4			21
					40–49			3.5			17

Appendix 5. Continued

						CD			UC		
Lead author	Year	Country	Region	Study period	Age (*y*)	Male IR	Female IR	Total IR	Male IR	Female IR	Total IR
					50–59			3			11
					60–69			0			11
					70–79			6			17
					80–89			0			6
Romberg-Camps MJL[36]	2008	The Netherlands	South Limburg	1991–2002	0–9	0.5	0		0	0	
					10–19	7.5	12		2.5	4.5	
					20–29	12	22		12.5	15	
					30–39	5	10		14	13	
					40–49	4.5	5.5		9.5	7.5	
					50–59	4	4		12	6	
					60–69	4.5	4.5		13	6	
					70–79	4	2.5		10	4	
					≥80	0	0		5	2	
									0	0	
Russel MG[37]	1998	The Netherlands	South Limburg	1991–1994	5–9	0	0		0	0	
					10–14	1	1		0	0.5	
					15–19	3	5.5		2	2.5	
					20–24	8.5	15		6	7.5	
					25–29	12.5	22.5		12.5	15	
					30–34	12	21		17	17.5	
					35–39	8	14		17.5	14.5	
					40–44	6	8		16	11	
					45–49	4.5	6		14.5	8	
					50–54	4	5		14	7.5	
					55–59	4	4		13.5	7.5	
					60–64	4.5	3.5		13	7	
					65–69	4	3		10	6.5	
					70–74	3	2.5		7	4.5	
					75–79	2.5	2		3	2.5	
					80–84	0.5	0.5		1	1	
Shivananda S[38]	1987	The Netherlands	Leiden	1979–1983	10–19	7	3.75				
					20–29	2.75	8				
					30–39	5.5	4				
					40–49	3.2	4.75				
					50–59	2	2				
					60–69	4.25	0				
					70–79	5	4.25				
Shivananda S[39]	1987	The Netherlands	Leiden	1979–1983	0–9			0.25			0.25
					10–19			5.25			3.75
					20–29			5.5			9.25
					30–39			4.75			9.75
					40–49			4			9.5
					50–59			2			8.75
					60–69			1.75			8.25
					≥70			5.25			8.75
Haug K[40]	1989	Norway	Western Norway	1984–1985	0–9			0			
					10–19			11.5			
					20–29			12.5			
					30–39			6			
					40–49			3.25			
					50–59			2.25			
					60–69			2.75			
					70–79			6			
					80–89			0			
Haug K[41]	1988	Norway	Western Norway (Sogn and Fjordane, Hordaland, and Rogaland)	1984–1985	5–9						3.25
					10–14						8.5
					15–19						9
					20–24						22
					25–29						25
					30–34						32.5
					35–39						27.5
					40–44						15.5
					45–49						9.5
					50–54						14
					55–59						6.5
					60–64						10
					65–69						14.5
					70–74						23.5
					75–79						18.5
					80–84						22

Appendix 5. Continued

						CD			UC		
Lead author	Year	Country	Region	Study period	Age (*y*)	Male IR	Female IR	Total IR	Male IR	Female IR	Total IR
Kildebo S[42]	1989	Norway	Total Northern region (Nordland, Troms, and Finnmark)	1983–1986	0–9	0	1	0.5			
					10–19	6	7.5	7			
					20–29	12.25	8	10			
					30–39	7	8	7.75			
					40–49	5	5.5	5.5			
					50–59	7.5	4.5	6			
					60–69	1.75	4	3			
					70–79	5	8	6.5			
Kildebo S[43]	1990	Norway	Total Northern region (Nordland, Troms, and Finnmark)	1983–1986	0–9				1	1	
					10–19				10	6	
					20–29				30	20	
					30–39				20	15	
					40–49				8	14	
					50–59				19	5	
					60–69				17	9	
					70–79				15	14	
					≥80				8	4	
Myren J[44]	1971	Norway	Nationwide	1964–1969	0–9			0.03			0.25
					10–19			0.39			1.58
					20–29			2.04			5.84
					30–39			1.55			4.75
					40–49			1.22			4.28
					50–59			0.93			3.77
					60–69			1.3			2.91
					70–79			1.16			1.76
					≥80			0.21			1.5
Moum B[45]	1996	Norway	Southeast	1990–1993	0–14				2.5	0	1
					15–24				10.5	14	12.5
					25–34				22.5	20	21
					35–44				17.5	17.5	17.5
					45–54				15	12	14
					55–64				17.5	13	16
					65–74				19	8	13
					≥75				19	9	12.5
Moum B[46]	1996	Norway	Southeast	1990–1993	0–14	1	1				
					15–24	10.5	13				
					25–34	10	10.25				
					35–44	6.5	4				
					45–54	3.75	4.75				
					55–64	4	6.75				
					65–74	3.5	4				
					≥75	2	3.75				
Bengtson MB[47]	2009	Norway	Southeast (Oslo)	1990–1993	0–14			1.2			0.6
					15–24			11.3			8.7
					25–34			7.6			15.6
					35–44			3.6			14.1
					45–54			4.9			8.7
					55–64			7			12.7
					65–74			2.1			10.4
					≥75			1.3			8.8
Moum B[48]	1995	Norway	Southeast	1990	0–14			1.2			0.6
					15–24			11.3			8.7
					25–34			7.6			15.6
					35–44			3.6			14.1
					45–54			4.9			8.7
					55–64			7			12.7
					65–74			2.1			10.4
					≥75			1.3			8.8
Brahme F[49]	1975	Sweden	Malmo	1958–1973	10–14			3			
					15–19			15.5			
					20–24			18.7			
					25–29			6.3			
					30–34			6			
					35–39			4			
					40–44			4.5			
					45–49			2.5			
					50–54			2			
					55–59			1.5			
					60–64			1			
					65–69			0.5			
					70–74			1			

Appendix 5. Continued

						CD			UC		
Lead author	Year	Country	Region	Study period	Age (*y*)	Male IR	Female IR	Total IR	Male IR	Female IR	Total IR
					75–79			2.5			
					0–9						1.5
					10–19						8
					20–29						16
					30–39						5
					40–49						6
					50–59						4.5
					60–69						2
					70–79						3
					80–89						2
Stewenius J[50]	1994	Sweden	Malmo	1958–1982	0–9				1.4	1.7	
					10–19				14.1	8.9	
					20–29				13.3	12	
					30–39				13.6	11.7	
					40–49				8.7	7.3	
					50–59				9.6	5.6	
					60–69				10.7	5.5	
					70–79				11.2	8.1	
					≥80				8	3.2	
Ekbom A[51]	1991	Sweden	Uppsala Health Care Region	1965–1983	0–4			0			0.25
					5–9			0.75			1.75
					10–14			4			9.5
					15–19			14			13.5
					20–24			18			19.5
					25–29			11			21
					30–34			8.75			15.5
					35–39			7.5			14
					40–44			5.5			10.5
					45–49			5.25			8
					50–54			2			9
					55–59			4			8
					60–64			3.5			7.5
					65–69			3.75			7.25
					70–74			3			9
					75–79			3			9
Bergman L[52]	1975	Sweden	Uppsala and Västmanland	1968–1973	10–14	0	1				
					15–19	6.5	6.5				
					20–24	15	15				
					25–29	9	12				
					30–34	7	10				
					35–39	3.5	7.5				
					40–44	0	3				
					45–49	4	0				
					50–54	1.5	6				
					55–59	2.5	5				
					60–64	4	6.5				
					65–69	0	3				
					70–74	2.5	4				
					75–79	4	2.5				
					80–84	0	4.5				
Norlen BJ[53]	1970	Sweden	Uppsala and Västmanland	1956–1967	5–9	1.1	1	0.5			
					10–14	0	3.2	1.6			
					15–19	3.9	4.2	4			
					20–24	7.3	5.4	6.3			
					25–29	8.2	3.8	6			
					30–34	1.3	1.4	1.3			
					35–39	1.2	2.4	1.8			
					40–44	2.4	2.4	2.4			
					45–49	1.2	3.7	2.4			
					50–54	2.5	2.6	2.5			
					55–59	1.4	1	1.2			
					60–64	3.3	1.6	2.4			
					65–69	2	1.8	1.9			
					70–74	2.6	6.8	4.7			
					75–79	7.9	3.3	5.6			
Nordenvall B[54]	1985	Sweden	Stockholm	1955–1979	0–10				0	0	
					11–14				1.5	2.25	
					15–19				2.5	4	
					20–24				4	6	
					15–29				7.25	5.5	
					30–34				6	6.75	
					35–39				6	5	
					40–44				3.5	3.5	
					45–49				3.75	4	

Appendix 5. Continued

						CD			UC		
Lead author	Year	Country	Region	Study period	Age (*y*)	Male IR	Female IR	Total IR	Male IR	Female IR	Total IR
					50–54				3.75	2.5	
					55–59				4	2	
					60–64				2.5	1.5	
					65–69				2.5	2	
					70–74				3	3	
					75–79				3.25	1	
					≥80				2.5	2.5	
Nyhlin H[55]	1986	Sweden	Umea	1974–1981	0–9			1.6			
					10–19			6.4			
					20–29			14.5			
					30–39			9.1			
					40–49			6.1			
					50–59			2.9			
					60–69			2.3			
					70–79			1.8			
					80–89			0			
			Northern Sweden	1974–1981	0–9			0.91			
					10–19			5.6			
					20–29			11.1			
					30–39			5.6			
					40–49			6.8			
					50–59			3.1			
					60–69			1.7			
					70–79			1.5			
					80–89			3.7			
Lindberg E[56]	1991	Sweden	Immediate catchment area of Örebro Medical Center Hospital	1963–1987	0–14			2			
					15–29			15			
					30–44			7.7			
					45–59			4.2			
					≥60			1.5			
Tysk C[57]	1992	Sweden	Orebro	1963–1987	0–9				0	0	
					10–19				7.5	4	
					20–29				17.5	20	
					30–39				24	11	
					40–49				16	6	
					50–59				9	4	
					60–69				10	5	
					≥70				7	4	
Lapidus A[58]	1997	Sweden	Stockholm	1955–1989	0–4			0.1			
					5–9			0.5			
					10–14			4			
					15–19			8.5			
					20–24			9			
					25–29			7			
					30–34			5.5			
					35–39			4.8			
					40–44			3.8			
					45–49			4			
					50–54			3			
					55–59			3.4			
					60–64			2.1			
					65–69			2.1			
					70–74			2.3			
					75–79			1.9			
					80–84			1.9			
					≥85			1.3			
Ronnblom A[59]	2010	Sweden	Uppsala	1945–2007	0–9				4	4	
					10–19				19	18	
					20–29				37	26	
					30–39				24	24	
					40–49				13	12	
					50–59				10	17	
					60–69				26	9	
					≥70				15	11	
Smith IS[60]	1975	United Kingdom	Clydesdale, Scotland	1961–1970	10–19	1	0.8				
					20–29	1.9	2.8				
					30–39	2.2	2.6				
					40–49	2.1	2.5				
					50–59	1.7	2.3				
					60–69	1	2.7				
					70–79	1.1	2.6				
					≥80	0	1.2				

Appendix 5. Continued

						CD			UC		
Lead author	Year	Country	Region	Study period	Age (*y*)	Male IR	Female IR	Total IR	Male IR	Female IR	Total IR
Thomas GA[61]	1995	United Kingdom	Cardiff	1931–1990	10–14			0.8			
					15–19			5.7			
					20–24			8.5			
					25–29			7.3			
					30–34			5.8			
					35–39			4.8			
					40–44			5			
					45–49			2.7			
					50–54			3.5			
					55–59			6			
					60–64			4.7			
					65–69			6.5			
					70–74			8			
					75–79			5.7			
					80–84			1.8			
Srivastava ED[62]	1992	United Kingdom	Cardiff	1968–1987	0–10						0
					11–20						4.5
					21–30						10.75
					31–40						12
					41–50						10
					51–60						8.25
					61–70						10
					71–80						8.5
					81–90						0.75
Mayberry J[63]	1979	United Kingdom	Cardiff	1931–1977	10–14			1.1			
					15–19			5.3			
					20–24			4			
					25–29			4.5			
					30–34			3			
					35–39			5.3			
					40–44			4.3			
					45–49			3			
					50–54			3.8			
					55–59			3.3			
					60–64			2			
					65–69			5			
					70–74			5.5			
					75–79			4.3			
					80–84			1.5			
Fellows IW[64]	1990	United Kingdom	Derby	1976–1985	0–9	0	0	0			
					10–19	8.1	4.5	6			
					20–29	7.8	13.4	11			
					30–39	7.9	7.4	7.3			
					40–49	5	9.4	7			
					50–59	6.9	5.4	5.5			
					60–69	3.8	7	5.5			
					70–79	13	11.1	12			
					≥80	0	2.5	0			
Evans JG[65]	1965	United Kingdom	Oxford	1951–1960	0–14				0.6	1.3	
					15–24				4.7	4	
					25–34				8.2	10.9	
					35–44				9.2	12.1	
					45–54				8.2	8.6	
					55–64				7.6	8.8	
					65–74				8.7	12.7	
					≥75				2.5	5.7	
Tresadern JC[66]	1973	United Kingdom	Gloucester	1966–1970	0–14			0.32			
					15–24			5.05			
					25–34			0.6			
					35–54			1.22			
					55–74			1.31			
					≥75			2.1			
Kyle J[67]	1992	United Kingdom	Northeastern and Northern Isles, Scotland	1955–1988	0–9			0.38			
					10–19			5.61			
					20–29			10.39			
					30–39			6.62			
					40–49			4.14			
					50–59			5.53			
					60–69			4.68			
					70–79			7.33			
					≥80			3.94			
Rose[68]	1988	United Kingdom	Wales - Cardiff	1981–1985	10–14			3			
					15–19			9			
					20–24			17			

Appendix 5. Continued

						CD			UC		
Lead author	Year	Country	Region	Study period	Age (*y*)	Male IR	Female IR	Total IR	Male IR	Female IR	Total IR
					25–29			13			
					30–34			9			
					35–39			8.5			
					40–44			10			
					45–49			1.5			
					50–54			3.75			
					55–59			10.25			
					60–64			8			
					65–69			18			
					70–74			17			
					75–79			7			
					80–84			3.75			
Seagroatt V[69]	2003	United Kingdom	Southern England	1979–1988	0–14			0.8			0.6
					15–24			8.3			4.4
					25–34			9.2			6.7
					35–44			6.5			6.7
					45–54			5.7			6.7
					≥55			6.6			11.1
Pavlovic-Calic N[70]	2008	Bosnia and Herzegovina	Tuzla	1995–2006	0–14	0.5	0				
					15–24	3	2.75				
					25–34	4.25	3				
					35–44	4	3.75				
					45–54	2.5	1.75				
					55–64	2.75	3				
					65–74	2.25	1.75				
					≥75	0	1.75				
Salkic NN[71]	2010	Bosnia and Herzegovina	Tuzla	1995–2006	0–14				0	0.4	
					15–24				0.6	1.9	
					25–34				2.4	4.1	
					35–44				6.1	4.5	
					45–54				5.8	5.2	
					55–64				8.2	3.6	
					65–74				10	5.3	
					≥75				2.4	3.1	
Sincic BM[72]	2006	Croatia	Primorsko-goranska County	2000–2004	0–14	14	3		2	0	
					15–24	10.5	6		2.75	3	
					25–34	8.5	13		4	5	
					35–44	7.5	8		5.5	8.5	
					45–54	7	2.5		6.5	4.75	
					55–64	2.5	4.5		4.75	4.5	
					≥65	5.5	4		7.5	5.5	
Vucelic B[73]	1991	Croatia	Zagreb	1980–1989	0–14	2	1	1.5			
					15–24	12	17	15			
					25–34	16	12	14			
					35–44	5	10	7.5			
					45–54	7	5	6			
					55–64	2.5	7.5	5			
Pajares Garcia JM[74]	1987	Spain	Madrid	1976–1983	0–9	0	0				
					10–19	0.2	0.2				
					20–29	0.6	0.5				
					30–39	0.5	0.2				
					40–49	0.45	0.4				
					50–59	0.3	0.15				
					60–69	0.3	0.25				
					≥70	0.2	0.1				
Lopez-Serrano[75]	2009	Spain	Madrid	2003–2005	15–24	24	12	16	7	4	7
					25–34	12	12	14	8	6	9
					35–44	5	8	8	12	11	13
					45–54	0	6	4	0	11	6
					55–64	0	0	1	0	6	4
					≥65	0	1	2	15	2	7.5
Ruiz Ochoa V[76]	1984	Spain	Galicia	1976–1983	0–9	0	0				
					10–19	1.2	0.75				
					20–29	2.5	1.3				
					30–39	1.25	1.5				
					40–49	0.9	0.3				
					50–59	1.25	0.4				
					60–69	0.25	0.3				
					70–79	0.3	0.2				
Brullet E[77]	1998	Spain	Sabadell, Vigo, Mallorca, Motril	1991–1993	0–14	2.5	1	1.5	0	0	0
					15–24	10	7.5	9	4	6	5

Appendix 5. Continued

						CD			UC		
Lead author	Year	Country	Region	Study period	Age (*y*)	Male IR	Female IR	Total IR	Male IR	Female IR	Total IR
					25–34	8	6	7.5	10	8	9
					35–44	2.5	4	3	12	8	10
					45–54	2.5	4	3	11.5	4.5	8
					55–64	6	1.5	3	11	3	6.5
					≥65	3	0.5	1.5	10.5	2.5	6
Brullet E[78]	1991	Spain	Sabadell	1985–1989	0–9				0	0	0
					10–19				1.18	1.31	1.25
					20–29				5.05	6.63	5.95
					30–39				5.53	6.35	5.94
					40–49				6.26	5.82	6.03
					50–59				7.75	3.23	5.46
					60–69				5.08	4.6	4.83
					≥70				7.49	3.05	4.73
Lopez Miguel C[79]	1999	Spain	Aragon	1992–1995	0–14	0	1		0	1	
					15–24	5	4		6	4	
					25–34	8	6		9.5	9	
					35–44	6	4		8	5.5	
					45–54	2	0.5		14	5	
					55–64	2.5	1		9.5	3	
					65–74	3	1		11	5.5	
					≥75	1	1		1	2	
Pozzati L[80]	2002	Spain	Merida	1996–2000	15–64	3.15	1.16	1.34	9.57	2.09	3.36
Rodrigo L[81]	2004	Spain	Oviedo	2000–2002	0–14	8.5	3	5.5	0	3	1.5
					15–24	9	14	12	0	2.5	1
					25–34	8.5	13	11	15.5	13	14
					35–44	4.5	4.5	4.5	6.5	10	8.5
					45–54	2.5	9	6	14.5	9	12
					55–64	7	3.5	5	14	9.5	11.5
					65–74	0	3	1.5	10	5.5	8
					≥75	0	0	0	5.5	3	4.5
Arin Letamendia A[82]	2008	Spain	Navarra	2001–2003	0–14	1.5	2	2	0.5	0.5	1
					15–24	12.5	11.5	12	4	10	7
					25–34	10.5	9.5	10	15	16	15.5
					35–44	6.5	5.5	6	21	18	20
					45–54	6	7	7	13.5	8	11
					55–64	5	3.5	5	17	10.5	14
					65–74	4	2.5	4	10	4	7
					≥75	2	0	1	4	3	3
Manousos ON[83]	1996	Greece	Heraklion	1990–1994	0–14			0.3			
					15–24			2.8			
					25–34			5.5			
					35–44			5.3			
					45–54			4.2			
					55–64			0.7			
					≥65			0.6			
Manousos ON[84]	1996	Greece	Heraklion	1990–1994	0–14				0	0.6	
					15–44				12.2	9	10.6
					45–64				18.3	6.2	12.2
					≥65				18	7.4	12.1
Ladas SD[85]	2005	Greece	Trikala	1990–1994	10–19				10.9	4	7.6
					20–29				20	17.7	18.8
					30–39				17.6	28.2	22.7
					40–49				6.6	23.9	14.8
					50–59				2	6	4
					60–69				10.7	0	5.1
					≥70				4.7	3.7	4.1
Tsianos EV[86]	1994	Greece	Ioannina prefecture, Northwest Greece	1982–1991	15–24				3.5	7.2	5.3
					25–34				3.2	4.1	3.6
					35–44				10.3	7.1	8.7
					45–54				4.2	5.7	5
					55–64				10	2.5	5.9
					65–74				7.5	1	4.2
					≥75				5.9	0	2.5
Trallori G[87]	1996	Italy	Florence	1978–1992	15–24	4.5	3		6.5	5.5	
					25–34	4	4.5		12	9	
					35–44	3	2		13	6.5	
					45–54	2	1.5		11	6	
					55–64	1	3		8	4.5	
					65–74	2	1		7.5	4	
					≥75	0.5	0.5		3	2	
Cottone M[88,89]	1991	Italy	Sicily	1987–1989	0–9	0	0	0			
					10–19	1.5	0.9	1.2			
					20–29	2.7	5.2	3.7			
					30–39	6.1	3.8	5.1			

Appendix 5. Continued

						CD			UC		
Lead author	Year	Country	Region	Study period	Age (*y*)	Male IR	Female IR	Total IR	Male IR	Female IR	Total IR
					40–49	7.5	3.2	5.2			
					50–59	3.6	1.8	2.7			
					60–69	2.3	3.8	2			
					≥70	2.6	0.6	1.4			
Ranzi T[90]	1996	Italy	Lombardia	1990–1993	0–14			1			1
					15–29			4			6.5
					30–44			3.5			11.5
					45–59			4.5			8
					60–74			3.5			8
					≥75			1			3
Tragnone A[91]	1996	Italy	Nationwide	1989–1992	0–10			0.5			1
					11–20			1.5			2.5
					21–30			4			8
					31–40			3.25			8.5
					41–50			2.75			7
					51–60			3			5.5
					61–70			1.25			5.75
					71–80			1			1.75
Latour P[92]	1996	Belgium	Liege	1993–1994	0–19			2			1.5
					20–29			13.5			6
					30–39			6			4
					40–49			7			4
					50–59			4			2
					60–69			6.5			7
					70–79			5			3
					≥80			0			3
Piront P[93]	2002	Belgium	Liege	1993–1996	<60			4.8			3.4
					>60			3.45			4.5
Colombel JF[94]	1990	France	Nord-Pas de Calais region	1988	0–9	0	0.5		0.5	0	
					10–19	6	8		1	2	
					20–29	10	13		10	9	
					30–39	8	14		8	5	
					40–49	4	8		8.5	7.5	
					50–59	3	5		6	2	
					60–69	2	4		5.5	6	
					70–79	5	3.5		6	4	
					80–89	6	0		5.5	3.5	
Flamenbaum M[95]	1997	France	Puy-de-Dome County	1993–1994	0–9	0	0	0	0	0	0
					10–19	2	4	2.5	1	0	0.5
					20–29	10	9	9	2	7.5	5
					30–39	8	6	7	5.5	2	4
					40–49	16	13	14.5	1	0	1
					50–59	7	7	7	1.5	1.5	2
					60–69	10	4.5	7.5	3.5	1.5	3
					70–79	10	5	7.5	0	5	3.5
					80–89	0	4	2.5	7.5	7	7
					≥90	0	0	0	0	0	0
Gower-Rousseau C[96]	1994	France	Northern France	1988–1990	0–9	1	1		0.5	1	
					10–19	6	7		2	2.5	
					20–29	10	13		7	6	
					30–39	5	8		6.5	5	
					40–49	4	6		5	3.5	
					50–59	4.5	3		5.5	3	
					60–69	3	2.5		5	3.5	
					70–79	3.5	4		5	2	
					80–89	4	3		3	1.5	
Molinie F[97]	2004	France	Northern France	1988–1999	0–9	0	0		0	0	
					10–19	6	7		1.5	2	
					20–29	12.5	18		7	7	
					30–39	7.5	10		7	6.75	
					40–49	5	5.5		6.75	3.5	
					50–59	4.5	3		5.5	2.5	
					60–69	3.5	2.5		5.5	2.5	
					70–79	2	4		4.5	2	
					≥80	2.5	3		3	1.75	
Abakar-Mahamat A[98]	2007	France	Corsica	2002–2003	0–19	6	10.5		0	3	
					20–29	13	21		40	12.5	
					30–49	8	13		32.5	22.5	
					50–59	12.5	0		45	20	
					60–74	0	0		22.5	20	
					≥75	0	0		12.5	0	

Appendix 5. Continued

						CD			UC		
Lead author	Year	Country	Region	Study period	Age (*y*)	Male IR	Female IR	Total IR	Male IR	Female IR	Total IR
Nerich V[99]	2006	France	Metropolitan France	2000–2002	0–4	0	0		0.25	0.25	0.25
					5–9	1	1		0.5	0.5	0.5
					10–14	5	2.5		1	1.5	1.25
					15–19	10	15		4	4	4
					20–24	17	27		8	10	8
					25–29	15	22.5		10	13	11
					30–34	11	17		10.5	14	12.25
					35–39	10	15		12	12	12
					40–44	9	12		12.25	10	11
					45–49	8	10		11	8	9.5
					50–54	7	7		11.5	7.5	9.5
					55–59	6.5	6.5		9.5	6	7.5
					60–64	6	5		10.5	5.5	8
					65–69	5.5	4.5		8.5	6	7.5
					70–74	5	5		9	5.5	7
					75–79	5	7		7.5	5.5	6
					80–84	4	6		5	5	5
					85–89	3.5	6.5		6	4.5	4.75
					90–94	3	3		4	3	3
					95–99	0	2.5				
Pagenault M[100]	1997	France	Brittany	1994–1995	0–9	1	0		0.5	0.5	
					10–19	5	2.5		0.5	1.5	
					20–29	6	9		5	3.5	
					30–39	2.5	3		9.5	5	
					40–49	2.5	2		4.5	4	
					50–59	2.5	1.5		4.5	2	
					60–69	1.5	2		4	1	
					70–79	3.5	2.5		3	1.5	
					80–89	2	1.5		0	1	
Edouard A[101]	2005	France	Guadeloupe and Martinique	1997–1999	0–9			0			0.25
					10–19			2.75			0.5
					20–29			4			4.5
					30–39			3.75			4.5
					40–49			1.25			4
					50–59			0			1.75
					60–69			1.75			2.25
					70–79			0.75			1.75
Goebell H[102]	1994	Germany	Essen, Mülheim, Duisburg, Oberhausen	1980–1984	0–9	0	1.25	0.75			
					10–19	5	6	5			
					20–29	9	13	11			
					30–39	4	6.5	5			
					40–49	2.5	3	2.5			
					50–59	4	2.5	2.5			
					60–69	1.25	1.25	1.5			
					70–79	0	1	1			
					≥80	0	1.5	1.25			
Dirks E[103]	1994	Germany	Ruhr area, Western Germany	1980–1984	0–5				0	0	0
					6–10				0	1.25	0.5
					11–15				3	1	1.75
					16–20				2.25	3.5	3
					21–25				4.5	3.5	4
					26–30				3.5	1.75	2.5
					31–35				3.5	4	3.5
					36–40				4	3.5	3.5
					41–45				4	1.75	2.75
					46–50				3.5	2.5	3
					51–55				4.25	2	3
					56–60				3.5	1.5	2.25
					61–65				7	2.25	4
					66–70				4	2	2.5
					71–75				2.25	3.25	2.75
					76–80				2	1.5	1.75
					81–85				4	0	1.5
					86–90				0	0	0
					91–95				0	0	0
Timmer A[104]	1999	Germany	Ruhr area, Western Germany	1980–1984	15–29				3.3	2.5	
					30–49				2.5	1.8	
					50–74				3.2	1.5	
				1991–1995							
Timmer A[105]	1999	Germany	Ruhr area, Western Germany	1980–1984	15–24			10.5			
					25–34			9			
					35–44			2.5			
					45–54			3.5			
					55–64			1			

Appendix 5. Continued

Lead author	Year	Country	Region	Study period	Age (*y*)	CD			UC		
						Male IR	Female IR	Total IR	Male IR	Female IR	Total IR
					65–74			0.5			
					75–84			1.5			
				1991–1995	15–24			10			
					25–34			8			
					35–44			3.5			
					45–54			4			
					55–64			3			
					65–74			4			
					75–84			1			
Ott C[106]	2008	Germany	Oberpfalz	2004–2006	0–15			2.25			1
					16–25			18.5			6.5
					26–35			10.5			4
					36–45			6.5			5
					46–55			4			5
					56–65			3.5			4
					66–75			1.75			4
					>75			1			2
Lakatos L[107]	2004	Hungary	Veszprem Province	1977–2001	0–10				0	0	0.5
					11–20	3.25	1.5	2.5	4	4.5	4.25
					21–30	5.25	6	5.5	9.5	9	9.5
					31–40	4.75	4.75	4.75	10	12	11
					41–50	1.25	1.5	1.5	7.5	6	7
					51–60	0.75	1.5	1.25	7	6	6.5
					61–70	0.5	0.5	0.5	6.5	3	4.5
					≥71	0	0.5	0.25	2	3	2.5
Lakatos L[108]	2009	Hungary	Western	2002–2006	20–30			21.4			
Wilson J[109]	2010	Australia	Geelong, Victoria	2007–2008	0–14			6			2
					15–24			43			19
					25–54			21			16
					55–64			17			14
					≥65			3			17.5
Gearry RB[110]	2006	New Zealand	Canterbury	2004–2005	0–4	15	0	8	0	0	0
					5–9	28	15	15	0	0	0
					10–14	12	12	10	0	15	5
					15–19	12	25	15	0	0	0
					20–24	12	60	30	35	20	25
					25–29	38	40	32	25	30	22.5
					30–34	55	25	35	15	12	10
					35–39	12	30	20	12	25	15
					40–44	12	30	20	18	25	18
					45–49	20	20	18	15	0	10
					50–54	15	0	12	30	15	18
					55–59	25	25	25	25	0	15
					60–64	22	30	25	32	0	18
					65–69	65	40	45	0	0	9
					70–74	30	30	25	0	15	18
					75–79	40	85	55	0	0	0
					80–84	0	0	0	40	0	25
					≥85	0	45	30	0	0	0

IR, incidence rate.

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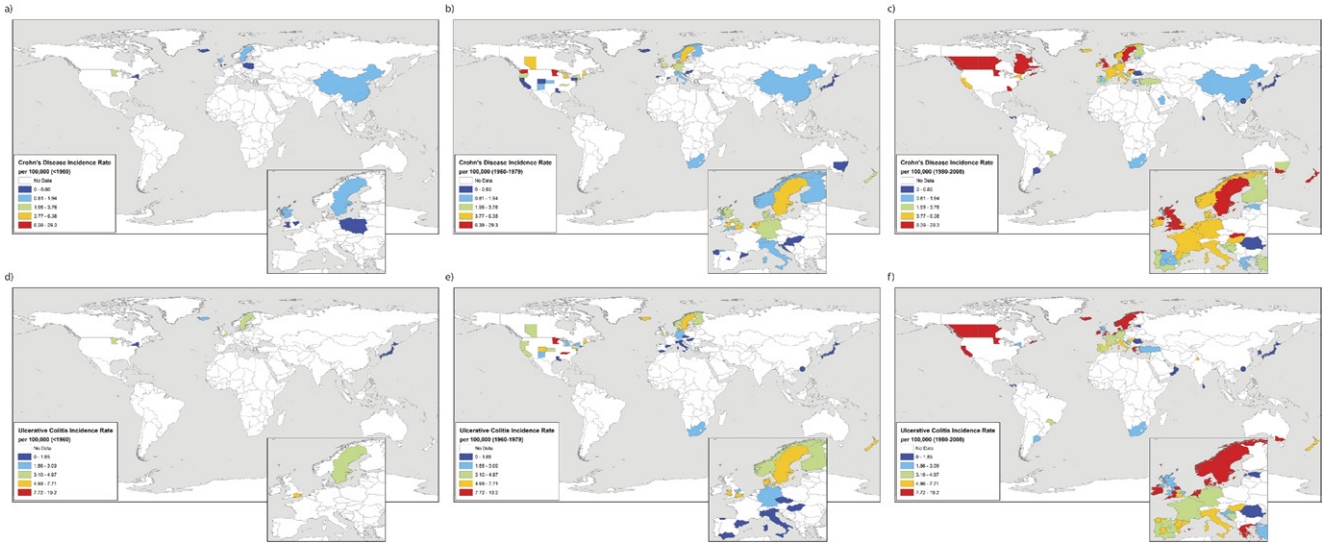
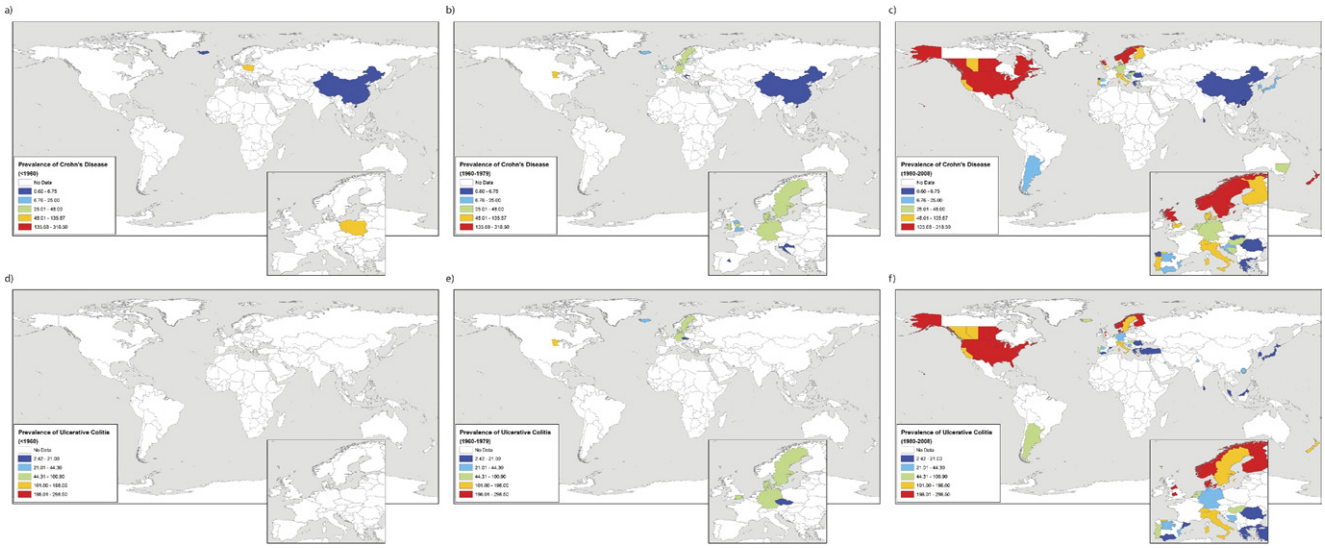


Appendix 6. Worldwide Crohn's disease incidence rates for countries reporting data before (a) 1960, (b) from 1960 to 1979, and (c) after 1980. Worldwide ulcerative colitis incidence rates for countries reporting data before (d) 1960, (e) from 1960 to 1979, and (f) after 1980. Incidence rates were ranked into quintiles representing low (dark and light blue) to intermediate (green) to high (yellow and red) incidence of disease.



Appendix 7. Worldwide Crohn's disease prevalence for countries reporting data before (a) 1960, (b) from 1960 to 1979, and (c) after 1980. Worldwide ulcerative colitis prevalence for countries reporting data before (d) 1960, (e) from 1960 to 1979, and (f) after 1980. Incidence rates were ranked into quintiles representing low (dark and light blue) to intermediate (green) to high (yellow and red) incidence of disease.