International pooled study on diet and bladder cancer: the bladder cancer, epidemiology and nutritional determinants (BLEND) study: design and baseline characteristics

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Abstract

**Background:** In 2012, more than 400,000 urinary bladder cancer cases occurred worldwide, making it the 7th most common type of cancer. Although many previous studies focused on the relationship between diet and bladder cancer, the evidence related to specific food items or nutrients that could be involved in the development of bladder cancer remains inconclusive. Dietary components can either be, or be activated into, potential carcinogens through metabolism, or act to prevent carcinogen damage.

**Methods/design:** The BLadder cancer, Epidemiology and Nutritional Determinants (BLEND) study was set up with the purpose of collecting individual patient data from observational studies on diet and bladder cancer. In total, data from 11,261 bladder cancer cases and 675,532 non-cases from 18 case–control and 6 cohort studies from all over the world were included with the aim to investigate the association between individual food items, nutrients and dietary patterns and risk of developing bladder cancer.

**Discussion:** The substantial number of cases included in this study will enable us to provide evidence with large statistical power, for dietary recommendations on the prevention of bladder cancer.

**Keywords:** Bladder cancer, Diet, Risk, Pooled analysis
Background

In 2012, more than 400,000 urinary bladder cancer (UBC) cases occurred worldwide, making it the 7th most common type of cancer [1]. Due to lifetime ongoing cystoscopies and recurrent treatment episodes, UBC is the most expensive malignancy in terms of healthcare expenditure in the USA and in most Western countries [2, 3]. The effect of diet in the prevention of UBC could be more pronounced compared to other types of cancer as dietary components are often excreted through the urine. Dietary components can either be, or be activated into, potential carcinogens through metabolism, or act to prevent carcinogen damage [4].

Although many previous studies focused on the relationship between diet and UBC, the evidence related to specific food items or nutrients that could be involved in the development of UBC remains inconclusive. The World Cancer Research Fund (WCRF) concluded in their most recent WCRF/AICR expert report [5] that there is some evidence for an decreased risk of bladder cancer with greater consumption of vegetables, fruit and tea and strong evidence that drinking water containing arsenic increases the risk of bladder cancer. A potential reason for the absence of evidence between specific foods and nutrients and the risk of UBC is that associations between cancer risk and dietary intake are usually weak and most previous studies may have had insufficient sample size and thus missed adequate statistical power for detailed analyses on individual food items, for subgroup analyses and for food-food interactions. Pooling of individual data of existing epidemiological studies on diet and UBC might therefore be an effective way to increase the current knowledge on the influences of foods, nutrients and dietary patterns on UBC risk. The influence of occupational risk and pollutants in the water, such as arsenic, are not part of this investigation. Occupational risk factors were identified as risk factors for bladder cancer [6]. However, as the frequency of having a high-risk occupation is very low (<3 %) this could not importantly confound the results. For this reason, the BLEND study as well as most previous bladder cancer epidemiological studies have not corrected for occupation in their analyses.

Within the BLadder cancer, Epidemiology and Nutritional Determinants (BLEND) study, we aim to investigate comprehensively the association between individual food items, nutrients, and dietary patterns and risk of developing UBC. The results of this study will likely aid in developing and reviewing current dietary recommendations for the prevention of UBC. In this paper we report on the methodology and baseline characteristics of the BLEND study.

Methods/design

Included epidemiological studies

Possible eligible epidemiological studies reporting on diet and UBC have been identified by a computerized search of Medline (National Library of Medicine, Bethesda, Maryland) (1966-Sept 2009), and Embase (Elsevier B. V., Amsterdam, the Netherlands (1974-Sept 2009) using the medical subject headings (MeSH; National Library of Medicine, Bethesda, Maryland) “urinary bladder neoplasms” and “risk” and the free-text word “risk”. The search was restricted to the MeSH term “humans”. All articles from peer-reviewed journals, reporting on the association between diet and risk of UBC were selected. Within these articles, we identified the eligible studies that used a case–control or a cohort design, had data on diet and a minimum number of cases of 40 patients. The principal investigators of these eligible studies were contacted and invited to participate in our collaborative project. There was no restriction about the amount of available diet items, however, data on confounders, especially, smoking, had to be available.

Data harmonization

To harmonize our data, a common codebook was created based on the Eurocode 2 Core classification version 99/2 [7]. The Eurocode 2 Food Coding System was originally developed to serve as a standard instrument for nutritional surveys in Europe and to serve the need for food intake comparisons within the European FLAIR Eurofoods-Enfant Project [8]. The Eurocode 2 classification System unambiguously defines which types of food are covered or not within each food category so that the potential for misclassification is limited. The System provides coding for food items consumed all over the world. Coding has been done centrally by the researchers of the Blend team. One part of the team did the coding, while the other part of the team checked for possible errors. Translation of the questionnaires in English was provided by the principle investigator for studies in other languages. Apart from the variables on diet, we collected non-dietary data such as, study design, age, gender, ethnic group, TNM Classification of Malignant Tumors (TNM), smoking status, smoking frequency and duration, and family history. Each participant was assigned a random and unique identification number. Analyses were restricted to adults, i.e. participants younger than 18 years were excluded. Categorical data have been checked by producing frequency tables to identify inaccurate coding while continuous data have been checked performing descriptive statistics. Possible coding errors and missing data within the provided data of each study were discussed with the principal investigator and updated accordingly. Outliers, defined as values outside the general distribution of the data, were identified after visual inspection of the resultant scatterplots and omitted [9].

Baseline characteristics

In total 67 potentially eligible studies from 156 retrieved articles were identified (Fig. 1). Thirty-eight investigators...
agreed to participate and 24 [10–34] provided data (Table 1). Reasons for non-participation after initially agreement were: no data on diet or the minimum set of confounders available, the workload that was already too high and the wish to publish the results on nutrition first before participating in a pooled study. With some investigators, we lost communication after initial contact. The first datasets and codebooks were collected in March 2009 while the last dataset was included in March 2016. Another two new studies, one case–control and one cohort study are available for inclusion.

More than 2/3 of the case–control studies [11, 13–15, 17, 18, 20–22, 24–27] had a hospital-based case–control design. Ten studies [12, 16, 19–21, 24–28] were also part of the International Bladder Cancer Consortium that was formed in 2005 as an open scientific forum for genetic-epidemiologic researchers in the field of UBC. Most of the studies [12, 15, 16, 18, 20–22, 24, 28–30, 33, 34] were from Europe, eight studies [10, 11, 17, 19, 23, 26, 27, 32] were from the USA and Canada, and four [13, 14, 25, 31] studies were from Asia.

After excluding participants with unknown age (n = 5), unknown case–control status (n = 214) and unknown smoking status (n = 14,028) data of 686,793 participants were available for analyses of which 11,261 cases and 675,532 non-cases. The Brescia bladder cancer study [21] contained only male participants, while the Women’s
Table 1 Characteristics of the studies included in the pooled analysis of the Bladder cancer Epidemiology and Nutritional Determinants study (BLEND)

| Study                                      | Country         | Recruitment period | Study design                          | Cases N | Controls N |
|--------------------------------------------|-----------------|--------------------|---------------------------------------|---------|------------|
|                                            |                 |                    |                                       | men     | women      | total      |
| Los-Angeles bladder cancer Case–control study [10] | USA             | 1987–1999          | Population based case–control         | 1,307   | 353        | 1,660      |
| Roswell Park Cancer Institute [11]         | USA             | 1982–1998          | Hospital-based case–control           | 164     | 53         | 217        |
| Belgian Case–control study on bladder cancer [12] | Belgium         | 1999–2004          | Population based case–control         | 172     | 28         | 200        |
| Aichi Prefecture Case–control study [13]    | Japan           | 1996–1999          | Hospital-based case–control           | 245     | 58         | 303        |
| Kaohsiung [14]                             | Taiwan          | 1996–1997          | Hospital-based case–control           | 31      | 9          | 40         |
| Hessen Case–control study on bladder cancer [15] | Germany         | 1989–1992          | Hospital-based case–control           | 239     | 61         | 300        |
| Stockholm Case–control study [16]          | Sweden          | 1985–1987          | Population based case–control         | 204     | 67         | 271        |
| Roswell Park Memorial Institute Case–control study on bladder cancer [17] | USA             | 1957–1965          | Hospital-based case–control           | 415     | 138        | 553        |
| Reina Sofia University Hospital [18]       | Spain           | 1997               | Hospital-based case–control           | 74      | 11         | 85         |
| New Hampshire bladder cancer study [19]     | USA             | 1994–2001          | Population based case–control         | 286     | 104        | 390        |
| Italian Case–control study on bladder cancer [20] | Italy           | 1985–1993          | Hospital-based case–control           | 617     | 110        | 727        |
| Brescia bladder cancer study [21]          | Italy           | 1997–2000          | Hospital-based case–control           | 200     | 0          | 200        |
| Dortmund Hörde study [22]                  | Germany         | 2009–2010          | Hospital-based case–control           | 145     | 48         | 193        |
| National Enhanced Cancer Surveillance System (NESCSC) [23] | Canada          | 1994–1997          | Population based case–control         | 600     | 311        | 911        |
| French INSERM study [24]                   | France          | 1984–1987          | Hospital-based case–control           | 166     | 33         | 199        |
| South and East China Case–control study on bladder and prostate cancer [25] | China           | 2005–2008          | Hospital-based case–control           | 390     | 93         | 483        |
| Molecular Epidemiology of Bladder Cancer and Prostate Cancer [26] | USA             | 1993–1997          | Hospital-based case–control           | 149     | 45         | 194        |
| North Carolina case control study [27]     | USA             | 1987–1991          | Hospital-based case–control           | 188     | 56         | 244        |
| Swedish Mammography Cohort (SMC) & the Cohort of Swedish Men [28] | Sweden          | 1987–1990          | Population based cohort               | 538     | 119        | 657        |
| Netherlands Cohort Study on diet and cancer [29] | The Netherlands | 1986–2003          | Population based cohort               | 779     | 161        | 940        |
| Women’s Lifestyle and Health Study [30]    | Norway, Sweden  | 1991–2006          | Population based cohort               | 0       | 49         | 49         |
| RERF atomic bomb survivors Study [31]      | Japan           | 1950–2000          | Population based cohort               | 216     | 85         | 301        |
| VITamins and Lifestyle Study (VITAL) [32]  | USA             | 2000–2008          | Population based cohort               | 338     | 106        | 444        |
| European Prospective Investigation into Cancer and Nutrition (EPIC) [33, 34] | Europe          | 1993–2006          | Population based cohort               | 1,227   | 525        | 1,752      |
| TOTAL                                      |                 |                    |                                       | 8,657   | 2,604      | 11,313     |

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| Characteristic                        | Total                  | Cases       | Controls     | Cases       | Controls     | Cases       | Controls     |
|--------------------------------------|------------------------|-------------|--------------|-------------|--------------|-------------|--------------|
|                                     | N          | (%)         | N           | (%)         | N           | (%)         | N           | (%)         |
| **Gender**                          |            |             |             |             |             |             |             |             |
| Male                                 | 5,592      | (77.9)      | 2,269       | (71.0)      | 3,109       | (74.6)      | 8,044       | (50.7)      |
| Female                               | 1,578      | (22.1)      | 927         | (29.0)      | 1,060       | (25.4)      | 7,808       | (49.3)      |
| **Age (mean, SD)**                   |            |             |             |             |             |             |             |             |
| < 50                                 | 1,832      | (25.6)      | 787         | (24.6)      | 1,261       | (30.2)      | 3,549       | (22.4)      |
| 50–59                                | 1,399      | (19.5)      | 555         | (17.4)      | 929         | (22.3)      | 2,138       | (13.5)      |
| ≥ 70                                 | 1,856      | (25.9)      | 734         | (17.6)      | 2,794       | (17.6)      | 352         | (42.6)      |
| **Ethnic group**                     |            |             |             |             |             |             |             |             |
| Caucasian                            | 4,438      | (61.9)      | 3,845       | (92.2)      | 14,226      | (89.2)      | 782         | (94.7)      |
| Mixed                                | 9          | (0.1)       | 9           | (0.1)       | 9           | (0.1)       | 10          | (0.1)       |
| Asian                                | 788        | (11.0)      | 6           | (0.1)       | 128         | (0.8)       | –           | –           |
| Black                                | 52         | (0.7)       | 52          | (1.2)       | 748         | (4.7)       | –           | –           |
| Any other ethnic group               | 64         | (0.9)       | 21          | (0.5)       | 72          | (0.5)       | 43          | (5.2)       |
| Unknown                              | 1,819      | (25.4)      | 236         | (42.2)      | 668         | (4.2)       | 1           | (0.1)       |
| **Tobacco smoking status**           |            |             |             |             |             |             |             |             |
| Current smoker                       | 2,956      | (41.1)      | 1,022       | (32.0)      | 1,564       | (37.5)      | 5,695       | (35.9)      |
| Former smoker                        | 2,703      | (37.7)      | 1,025       | (32.1)      | 1,731       | (41.5)      | 3,943       | (24.9)      |
| Never smoker                         | 1,517      | (21.2)      | 874         | (21.0)      | 6,214       | (39.2)      | 253         | (30.6)      |
| **Staging**                          |            |             |             |             |             |             |             |             |
| Non–invasive                         | 2,246      | (31.3)      | 1,149       | (36.0)      | 874         | (17.6)      | 2,794       | (17.6)      |
| Invasive                             | 609        | (8.5)       | 366         | (8.8)       | –           | –           | 170         | (20.6)      |
| Unknown                              | 4,315      | (60.2)      | 2,197       | (52.7)      | –           | –           | 527         | (63.8)      |
| **Continent**                        |            |             |             |             |             |             |             |             |
| Europe                               | 2,175      | (30.3)      | 119         | (17.9)      | 73          | (4.7)       | –           | –           |
| America                              | 4,169      | (58.1)      | 502         | (8.8)       | 947         | (16.2)      | 85          | (15.1)      |
| Asia                                 | 826        | (11.5)      | 482         | (7.3)       | 1,591       | (25.0)      | 832         | (16.2)      |
| **Cohort studies**                   |            |             |             |             |             |             |             |             |
| Gender                               |            |             |             |             |             |             |             |             |
| Male                                 | 2,866      | (69.2)      | 146,333     | (74.9)      | 338         | (76.1)      | 39,983      | (52.3)      |
| Female                               | 1,277      | (30.8)      | 146,333     | (74.9)      | 338         | (76.1)      | 39,983      | (52.3)      |
| Age (mean, SD)                       |            |             |             |             |             |             |             |             |
| < 50                                 | 1,305      | (31.5)      | 131         | (34.7)      | 1,545       | (39.4)      | 1,199       | (34.6)      |
| 50–59                                | 1,114      | (26.9)      | 121         | (30.9)      | 1,199       | (39.4)      | 1,199       | (34.6)      |
| ≥ 70                                 | 587        | (14.2)      | 732         | (19.9)      | 12,014      | (32.7)      | 14,760      | (40.7)      |
| **Ethnic group**                     |            |             |             |             |             |             |             |             |
| Caucasian                            | 3,815      | (92.1)      | 531,457     | (100)       | 417         | (93.9)      | 70,959      | (92.8)      |
| Asian                                | 314        | (7.6)       | 301         | (60.0)      | 7          | (1.6)       | 17          | (2.0)       |
| Black                                | 7          | (0.2)       | 7           | (1.3)       | 936         | (18.7)      | –           | –           |
| Any other ethnic group               | 1          | (0.0)       | 1           | (0.2)       | 475         | (0.6)       | –           | –           |
Table 2: Characteristics of the study population of the Bladder cancer Epidemiology and Nutritional Determinants study (BLEND) (Continued)

| Unknown | 6 (0.1) | 994 (0.2) | – | – | – | 6 (1.4) | 994 (1.3) | – | – | – | – |
|---------|---------|-----------|---|---|---|---------|-----------|---|---|---|---|
| Tobacco smoking status | | | | | | | | | | | | |
| Current smoker | 1,677 (40.5) | 156,467 (23.9) | 1,418 (41.7) | 130,871 (24.6) | 61 (13.7) | 6,411 (8.4) | 198 (65.8) | 19,185 (40.3) | | | | |
| Former smoker | 1,594 (38.5) | 185,006 (28.2) | 1,296 (38.1) | 149,472 (28.1) | 280 (63.1) | 33,651 (44.0) | 18 (6.0) | 1,883 (4.0) | | | | |
| Never smoker | 872 (21.0) | 314,032 (47.9) | 684 (20.1) | 251,114 (47.3) | 103 (23.2) | 36,375 (47.6) | 85 (28.2) | 26,543 (55.7) | | | | |

| Staging | | | | | | | | | | | | |
| Non–invasive | 1,196 (28.9) | – | – | 1,196 (35.2) | – | – | – | – | – | – | – | – |
| Invasive | 661 (16.0) | – | – | 661 (19.5) | – | – | – | – | – | – | – | – |
| Unknown | 2,286 (55.2) | – | – | 1,541 (45.4) | – | – | 444 (100) | – | – | 301 (100) | – | – |

| Continent | | | | | | | | | | | | |
| Europe | 3,398 (82.0) | 531,457 (81.1) | – | – | – | – | – | – | – | – | – | – |
| America | 444 (10.7) | 76,437 (11.7) | – | – | – | – | – | – | – | – | – | – |
| Asia | 301 (7.3) | 47,611 (7.3) | – | – | – | – | – | – | – | – | – | – |

Table 3: Number of food items and portion size reported by each study within the Bladder cancer Epidemiology and Nutritional Determinants study (BLEND)

| Study | Food items (n) | Portion size |
|-------|---------------|-------------|
| Case–control studies | | |
| Los-Angeles bladder cancer Case–control study [10] | 49 | Yes |
| Roswell Park Cancer Institute [11] | 44 | Yes |
| Belgian Case–control study on bladder cancer [12] | 788 | Yes |
| Aichi Prefecture Case–control study [13] | 107 | Yes |
| Kaohsiung [14] | 41 | Yes |
| Hessen Case–control study on bladder cancer [15] | 26 | No |
| Stockholm Case–control study [16] | 188 | Yes |
| Roswell Park Memorial Institute Case–control study on bladder cancer [17] | 64 | Yes |
| Reina Sofia University [18] | 17 | No |
| New Hampshire bladder cancer study [19] | 121 | Yes |
| Italian Case–control study on bladder cancer [20] | 21 | No |
| Brescia bladder cancer study [21] | 40 | Yes |
| Dortmund Hörde study [22] | 3 | Yes |
| National Enhanced Cancer Surveillance System (NESCC) [23] | 69 | Yes |
| French INSERM study [24] | 2 | No |
| South and East China Case–control study on bladder and prostate cancer [25] | 52 | No |
| Molecular Epidemiology of Bladder Cancer and Prostate Cancer [26] | 90 | Yes |
| North Carolina case control study [27] | 9 | No |
| Cohort studies | | |
| Swedish Mammography Cohort (SMC) & the Cohort of Swedish Men [28] | 96 | No |
| Netherlands Cohort Study on diet and cancer, the Netherlands, 1986–2003 [29] | 150 | Yes |
| Women’s Lifestyle and Health Study [30] | 98 | Yes |
| RERF atomic bomb survivors Study [31] | 102 | No |
| Vital study [32] | 126 | Yes |
| European Prospective Investigation into Cancer and Nutrition (EPIC) [33, 34] | 260* | Yes |

*Dietary intake was assessed by a number of different instruments in the participating countries and the number of different food items varied from 88 (Norway) to 2443 (Sweden)
Lifestyle and Health study consisted of only female participants. Most of the cases were from America to Europe while only 10% were from Asia.

The cases of the European and Asian case-control studies had the highest male/female ratio (4:1) while their overall male/female ratio was 3:1 (Table 2). In general, controls were younger than cases, 57.0 versus 61.6 years and 51.8 versus 61.1 years, respectively for case-control studies and cohort studies with an exception for the Asian case-control studies (66.1 versus 64.9 years). Most of the participants were Caucasian, whereas only 10% of the cases were Asian. In contrast with Asia, where one third of the cases were never smoker, only one fifth of the cases never smoked in Europe and USA. Overall, 40% of the cases were smokers. Controls had significant less current and more never smokers than cases. For cohort studies, nearly half of the controls never smoked. Staging was not reported in 60 and 70% respectively for the case-control and cohort studies.

Although all of the studies used a food frequency questionnaire (FFQ), the number of food items assessed varied widely (Table 3). Two studies [22, 24] only asked three and two specific items (beer, coffee and decaffeinated coffee), while others assessed dietary intake in more

| Food category (number of studies) | All Countries | Europe | America | Asia |
|----------------------------------|--------------|--------|---------|------|
| Milk and milk products (13)      |              |        |         |      |
| [10–17, 19, 20, 23, 25, 26]       | 2,613        | 184,428| 1,157   | 4,868|
| Eggs and eggs products (11)      |              |        |         |      |
| [10–13, 15, 16, 19, 20, 23, 25, 26] | 2,585      | 184,284| 1,147   | 4,213|
| Meat and meat products (12)      |              |        |         |      |
| [10–13, 15–17, 19, 20, 23, 25, 26] | 2,614      | 184,420| 1,156   | 4,222|
| Fish and fish products (11)      |              |        |         |      |
| [11–13, 15–17, 19, 20, 23, 25, 26] | 2,615      | 184,424| 1,159   | 4,226|
| Fats and oils (7)                |              |        |         |      |
| [10–13, 16, 19, 26]              | 2,585      | 184,284| 1,147   | 4,213|
| Grain and grain products (11)    |              |        |         |      |
| [10–13, 16, 17, 21, 23, 25, 26]  | 2,585      | 184,284| 1,147   | 4,213|
| Pulses, seeds and nut products (8) | 2,585  | 184,284| 1,147   | 4,213|
| Vegetables (13) [10–13, 15–17, 19–21, 23, 25, 26] | 2,585 | 184,284| 1,147   | 4,213|
| Fruit and fruit products (13)    |              |        |         |      |
| [10–13, 15–17, 19–21, 23, 25, 26] | 2,585  | 184,284| 1,147   | 4,213|
| Sugar products (7)               |              |        |         |      |
| [12, 13, 16, 18, 19, 23, 26]     | 2,585      | 184,284| 1,147   | 4,213|
| Beverages (18) [10–27]           | 2,585      | 184,284| 1,147   | 4,213|

**Table 4** Numbers of cases and controls available for each food category included in the Bladder cancer Epidemiology and Nutritional Determinants study (BLEND)

Abbreviations: Ca cases, Co controls, N number
Discussion

The high number of cases (11,261) and controls (675,532) from 24 epidemiological studies included in the BLEND study makes the BLEND study the largest dataset on diet and UBC worldwide. A large sample size provides the potential to analyze in more detail food items rarely consumed [35] and allows delineating the generally weak association between UBC cancer and dietary intake for food categories. The advantage of pooling individual data compared to meta-analysis of aggregate data is multiple: it increases the power to detect the effect for food items more rarely consumed, it allows to adjust for the same confounding factors, gender, age, and smoking status, to test for interaction and to perform subgroup analyses [36, 37].

Demographic data in the BLEND study are consistent with the IARC CancerBase [1]. The male/female ratio in our dataset was 3:1. Worldwide the male/female ratio is 3.3:1. Europe is responsible for nearly 40 % of the UBC cases worldwide while the Asian population account for 28 % of the UBC incidence [1]. In our dataset, 49 % of the cases are from Europe while only 10 % of the cases are from Asia. The African and the Eastern Mediterranean region is responsible for only 9 % of the UBC incidence worldwide [1]. These regions are not represented in our dataset. In America and Europe, more than 90 % of the UBC cases are transitional cell carcinoma (TCC), while in Africa, up to 40 % of the UBC cases can be squamous cell carcinomas (SCC) [38, 39] due to infection with Schistosoma haematobium (bilharziasis) [40].

Conclusion

The available data in the very large BLEND database will allow us to test associations between individual food items of the different food items categories, even those less commonly consumed, and the risk for UBC. We will also investigate food patterns such as the Mediterranean diet and the influence of nutrients on the risk of UBC. In addition, the large sample size will allow subgroup analyses.

Abbreviations

BLEND, The Bladder cancer, Epidemiology, and Nutritional Determinants study; FFQ, food frequency questionnaire; OR, odds ratio; SCC, squamous cell carcinoma; SD, standard deviation; TCC, transitional cell carcinoma; TNM, TNM Classification of Malignant Tumors; UBC, urinary bladder cancer; WCRF, World Cancer Research Fund.

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Availability of data and material
The dataset described in this article will be available at Dataverse (https://dataverse.nd.edu/).

Authors’ contributions
MEG collected and harmonized data, performed the statistical analysis and wrote the manuscript. F.I., D.M., R.R. and A.W. harmonized the data, reviewed and edited the manuscript. M.B. collected the data and reviewed and edited the manuscript. SB, BB, MFA, KG, EG, XI, HCJ, MRK, BK, CIV, CML, JM, HP, SP, GS, LT, JT, PvdB, PNi, KW, EW, EW, AW and TZT provided the data, reviewed and edited the manuscript. FB reviewed and edited the manuscript, and MPZ supervised the study, reviewed and edited the manuscript. All authors read and approved the final manuscript.

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Each participating study has been approved by the local ethic committee.

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