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Supplementary appendix

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Appendix

Estimation of national, regional and global prevalence of alcohol use during pregnancy and fetal alcohol syndrome: a systematic review and meta-analysis

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Methodological Details

The systematic literature searches and meta-analyses were conducted and reported according to the standards set out in Preferred Reporting Items for Systematic Reviews and Meta-Analyses.¹

Prevalence of alcohol use (any amount) during pregnancy among the general population

Critical appraisal of existing studies. We critically appraised each study using a checklist for observational studies developed a priori based on the criteria described and validated in Wong and colleagues.²

Meta-analyses. When two or more empirical studies were available for a specific country, the estimates were pooled in country-specific meta-analyses. As recommended for meta-analyses of prevalence and to prevent the overweighing of studies reporting extremely low prevalence (i.e., a prevalence approaching zero),^{3,4} the data were transformed using the Freeman-Tukey double arcsine transformation⁵ using the `escalc` command of the R metaphor package:⁶

$$p_{transformed} = 1/2 * (\text{asin}(\sqrt{x/N + 1}) + \text{asin}(\sqrt{x/N + 1}))$$

Where p is the point estimate, x is the number of reported cases (i.e., women who consumed alcohol during pregnancy), and N is the total sample size.

The transformed point estimates were combined in random-effects meta-analyses⁷ estimating between-study variance based on restricted maximum-likelihood.^{8,9} Wald-type confidence intervals (CI) were computed based on the approximate normal distribution of the transformed point estimates. The resulting combined point estimates and respective CI were back-transformed and presented in forest plots (available from the authors upon request).

Heterogeneity between estimates was assessed using the Cochrane Q test¹⁰ and the I^2 statistic.¹¹ Publication/selection bias was tested by: visually inspecting the funnel plot (the standard error plotted against the point estimate) for a skewed distribution, using a rank correlation test, evaluating the correlation between observed point estimates and corresponding sampling variances,¹² and employing a weighted regression test for disproportionate small-study influence.¹³ It was decided a priori that if publication bias were present it would not be adjusted for, since we believe that the prevalence estimates of interest would likely be published even if substantially different from previously reported estimates.

Prediction of the prevalence of alcohol use during pregnancy: Fractional response regression modelling. We employed a fractional response model, in order to predict the prevalence of alcohol use during pregnancy for those countries with either no or one available empirical studies.¹⁴ The model can be described as a generalized linear model with a binomial family and a logit link. A vector of the total sample size N and the number of women that did not drink ($N-x$) in each study were fed into the model as outcome.

The country-specific explanatory variables that we considered for inclusion were: gender inequality index,¹⁵ gross domestic product (adjusted for purchase power parity) per capita,¹⁶ percentage of Muslims in the population,¹⁷ percentage of Buddhists in the population,¹⁷ year of assessment of the study, total per capita consumption of alcohol overall and among women¹⁸ and WHO region. In regard to the WHO region, we split the WHO European Region and the WHO Region of the Americas into “high” and “low” income regions (i.e., European Union [EU]-member states vs. non-EU-member states for the WHO European Region and Canada and United States vs. all remaining countries for the WHO Region of the Americas). The final model was chosen based on goodness of fit (evaluated using pseudo R-squared) and plausibility of the predictions. The final model included gross domestic product per capita,¹⁶ the per capita consumption of alcohol among women¹⁸ and all dummy coded WHO regions (including the split of the WHO European Region and WHO Region of the Americas, as described above, using the EU-member-states as the reference category). The final model explained approximately 60% of the total variance (pseudo R-squared 0.59). Predictions were calculated based on covariate values from the year 2012. Ninety-five percent CI were calculated based on the standard deviation of the prediction and a critical value of 1.96.

Prevalence of FAS among the general population

Comprehensive systematic literature search. It should be noted that the search for studies reporting the prevalence of FAS was part of a larger search, which included the prevalence of FASD and all of the diagnostic entities that fall under the FASD umbrella.

Critical appraisal of existing studies. Each study was critically appraised using a tool specifically for use in systematic reviews addressing questions of prevalence by Munn and colleagues.¹⁹

Meta-analysis. For the primary analysis, in instances where a study reported the prevalence of FAS using a diagnostic guideline and a case definition, preference was given to the estimate obtained using an established diagnostic guideline.

Prediction of the prevalence of FAS. To estimate the prevalence of FAS for all countries with one or no empirical studies, we used the estimates of the prevalence of FAS available from those countries with a drinking pattern score of less than or equal to three (Australia, Canada, Croatia, France, Italy, Republic of Korea, and the United States). A country's drinking pattern score reflects how people in the respective country drink instead of how much they drink, and is measured on a scale from 1 (least risky pattern of drinking) to 5 (most risky pattern of drinking); the higher the score, the greater the alcohol-attributable burden of disease (WHO, Global Status Report on Alcohol and Health 2014). In order to produce the most conservative predictions, we excluded the estimates of the prevalence of FAS available from those countries with a drinking pattern score of greater than or equal to four (South Africa), as it would have led to an unrealistically high ratio. These data were then linked to the prevalence of alcohol use during pregnancy for each respective country.

Based on these values, the best estimator for the number of women drinking during their pregnancy that lead to one FAS birth ($N_{\text{drinking_woman:FAS}}$) in n countries is:

$$N_{\text{drinking_woman:FAS}} = \frac{\sum_{i=1}^n P_{\text{drk}_i} \cdot N_{\text{births}_i}}{\sum_{i=1}^n P_{\text{FAS}_i} \cdot N_{\text{births}_i}}$$

Where P_{drk_i} is the prevalence of mothers consuming alcohol during their pregnancy for country i , N_{births_i} , the number of births in country i , and P_{FAS_i} the prevalence of FAS in country i . This model assumes that each mother gives birth to one single child. To estimate the 95% CI around the estimator, a Monte Carlo simulation study²⁰ was performed. We sampled 1,000,000 times per country from the distributions of P_{FAS} and P_{drk} for each of the seven countries and, following the equation for the best estimator of $N_{\text{drinking_woman:FAS}}$, the Monte Carlo samples of the estimator N_j were:

$$N_j = \frac{\sum_{i=1}^n P_{\text{drk}_{i,j}} \cdot N_{\text{births}_i}}{\sum_{i=1}^n P_{\text{FAS}_{i,j}} \cdot N_{\text{births}_i}}$$

For both P_{FAS} and P_{drk} only summary statistics (point estimate and CI) were available, and the underlying distributions had to be estimated. The prevalence of drinking during pregnancy, although theoretically following a binomial distribution, was modelled using a normal distribution as the mean was large enough and the standard deviation small enough to justify this approximation. The prevalence of FAS was modelled using a binomial distribution.²¹ The binomial distribution gives the probability of a certain amount of "positive outcomes" in a yes/no type experiment. In our case, a "yes" would be the occurrence of FAS. The binomial distribution then represents the probability of drawing x positive outcomes out of n samples given the probability (p) of a success for each individual draw. This can be written as follows:

$$P(x) = \frac{n!}{x!(n-x)!} p^x (1-p)^{n-x}$$

To obtain the equivalent number of draws n (the sample size of the summary statistic) for the prevalence of FAS, we used the Wilson score estimate of the upper confidence level of the binomial distribution. This yields the following estimate for the sample size (n) based on the upper limit and the point estimate:

$$n = \frac{(1 - \text{UpperLevel}) \cdot \text{UpperLevel} \cdot z^2}{(\text{UpperLevel} - p)^2}$$

Where z is the 97.5% quantile of the standard normal distribution (1.96), UpperLevel is the back-transformed upper confidence level from the meta-analysis, and P is the point estimate of the prevalence of FAS. The error around the

FAS prevalence estimates was then obtained by applying each of the sampled ratios to a sample of the prevalence of drinking in each country by using:

$$P_{FAS,k,j} = \frac{N_j}{P_{drk,i,j}}$$

Where N_j is the j^{th} sample of the number of women drinking during their pregnancy per one child with FAS. $P_{drk,i,j}$ the j^{th} sample of the prevalence of drinking during pregnancy in country i , and $P_{FAS,i,j}$ the j^{th} sample of the prevalence of FAS in country i .

Table A1. Study characteristics and the prevalence of alcohol use (any amount) during pregnancy among the general population reported in the identified studies, by country and region

Country (State/Province/Territory)	Reference	Study year(s)	Timing of data collection	Sample size	Setting	Instrument used to obtain alcohol use data	Prevalence of alcohol use (any amount) during pregnancy (n [%])
AFRICAN REGION							
Botswana (Gaborone)	²²	2007-10	Retrospective (at the time of delivery)	16,175	Hospital-based	Obstetric records	577 (3.6%)
Congo, Democratic Republic of the (Kinshasa)	²³	2010	During pregnancy; 24 weeks of gestation (ST)	240	Hospital-based	n/a	78 (32.5%)
Congo, Republic of the (Brazzaville)	²⁴	2011-12	During pregnancy; mean gestational age: 26 weeks (SD = 6.76, ST)	3,099	Hospital-based	Questionnaire	600 (19.4%)
Ethiopia (Butajira)	²⁵	2005-06	During pregnancy (TT)	1,046	Population-based	Self-report questionnaire (SRQ-20) ²⁶	52 (5.0%)
Ghana	²⁷	2008-09	During pregnancy	1,107	Hospital-based	Questionnaire	96 (8.7%)
Ghana (Bosomtwe District, Ashanti Region)	²⁸	2010	During pregnancy	397	Hospital-based	Questionnaire	81 (20.4%)
Kenya (Kisumu District, Nyanza Province)	²⁹	2010	During pregnancy	300	Hospital-based	Questionnaire	11 (3.7%)
Mozambique (Maputo City)	³⁰	1993-94	During pregnancy; ≤21 weeks of gestation (ST)	899	Hospital-based	Questionnaire	47 (5.2%)
Nigeria	³¹	2009-10	During pregnancy; Range: 7-37 weeks of gestation (FT-TT), Mean week: 26.2 (SD = 6.8, ST)	1,306	Hospital-based	n/a	385 (29.5%)
Nigeria (Abeokuta, Ogun State)	³²	2003	During pregnancy	534	Hospital-based	Questionnaire	14 (2.6%)
Nigeria (Benin City, Edo State)	³³	2003-04	During pregnancy	200	Hospital-based	Questionnaire	26 (13.0%)
Nigeria (Benin City, Edo State)	³⁴	2008-09	Retrospective; 6th week postpartum	502	Hospital-based	Questionnaire	21 (4.2%)
Nigeria (Jos, Plateau State)	³⁵	2001-02	During pregnancy	670	Hospital-based	Questionnaire	37 (5.5%)
Nigeria (Uyo, Niger Delta Region, Akwa Ibom State)	³⁶	n/a	During pregnancy	518	Hospital-based	Questionnaire (based on modified version of WHO guidelines for student's substance abuse survey) ³⁷	13 (2.5%)
Nigeria (Zawan, Plateau State)	³⁸	2005	During pregnancy	350	Hospital-based	Questionnaire	44 (12.6%)
South Africa (Cape Town, Western Cape)	³⁹	1995-96	During pregnancy	636	Hospital-based	Questionnaire	272 (42.8%)
South Africa (Cape Town, Western Cape)	⁴⁰	2009-10	During pregnancy; <34 weeks pregnant (TT)	1,214	Population-based	AUDIT-C ⁴¹	109 (9.0%)
South Africa (Cape Town, Western Cape)	⁴²	2008	During pregnancy (FT: 137 [42.4%], ST: 158 [48.9%], TT: 28 [8.7%]; Mean gestational age, weeks: 15.5 [SD = 6.9, ST])	323	Hospital-based	AUDIT ⁴³	66 (20.4%)

Country (State/Province/Territory)	Reference	Study year(s)	Timing of data collection	Sample size	Setting	Instrument used to obtain alcohol use data	Prevalence of alcohol use (any amount) during pregnancy (n [%])
South Africa (Gert Sibande District, Mpumalanga Province)	⁴⁴	2009	During pregnancy (FT: 53 [5·8%], ST: 353 [38·4%], TT: 513 [55·8%])	984	Hospital-based	AUDIT-C ⁴¹	133 (13·5%)
South Africa (Johannesburg, Gauteng);	⁴⁵	1999-2002	During pregnancy; 23 weeks of gestation (ST)	1,920	Hospital-based	n/a	62 (3·2%)
South Africa (Nkangala District, Mpumalanga Province)	⁴⁶	2010	During pregnancy (FT: 71 [4·7%], ST: 632 [42·1%], TT: 799 [53·2%]); Mean gestational month: 6·5 (SD = 1·6)	1,422	Hospital-based	AUDIT-C ⁴¹	93 (6·5%)
Tanzania, United Republic of (Morogoro municipality)	⁴⁷	2008-09	Retrospective (after delivery)	157	Hospital-based	Questionnaire	10 (6·4%)
Uganda (Kampala District)	⁴⁸	2006	During pregnancy; 28-34 weeks of gestation (TT)	610	Hospital-based	CAGE ⁴⁹	155 (25·4%)
Zambia (Lusaka)	⁵⁰	2000-01	Retrospective	1,123	Hospital-based	Questionnaire	317 (28·2%)
Zambia (Lusaka)	⁵¹	1989-2001	During pregnancy	3,160	Hospital-based	Questionnaire	392 (12·4%)
EASTERN-MEDITERRANEAN REGION							
Iran (Tehran)	⁵²	2004	During pregnancy (ST/TT)	2,189	Hospital-based	Questionnaire	4 (0·2%)
EUROPEAN REGION							
Belgium	⁵³	2010-11	During pregnancy	1,311	Hospital-based	Questionnaire	267 (20·4%)
Belgium (Flanders)	⁵⁴	2003	During pregnancy	148	Hospital-based	Questionnaire	107 (72·3%)
Croatia	⁵⁵	n/a	Retrospective (6-9 years)	917	School-based	Questionnaire	105 (11·5%)
Croatia (Zagreb)	⁵⁶	n/a	Retrospective (6-9 years)	575	School-based	Questionnaire	89 (15·5%)
Croatia (Split)	⁵⁷	1999-2003	Retrospective (post-partum period)	6,207	Hospital-based	Questionnaire	745 (12·0%)
Czech Republic (Teplice and Prachatice)	⁵⁸	1995-2004	Retrospective (at the time of delivery)	10,326	Hospital-based	Questionnaire	2,257 (21·9%)
Denmark	⁵⁹	1996-2003	During pregnancy (FT/ST, <16 weeks of gestation)	91,843	Hospital-based	Questionnaire	40,998 (44·6%)
Denmark	⁶⁰	1990-91	During pregnancy (ST & TT, 16 and 30 weeks of gestation)	2,404	Hospital-based	Questionnaire	1,002 (41·7%)
Denmark	⁶¹	2004-05	During pregnancy & Retrospective (TT & 2 weeks post-partum)	2,476	Hospital-based	Questionnaire	589 (23·8%)
Denmark (Aalborg and Odense)	⁶²	1984-87	During pregnancy (TT)	11,146	Hospital-based	Questionnaire	7,203 (64·6%)
Denmark (Aarhus)	⁶³	1989-96	During pregnancy	18,228	Hospital-based	Questionnaire/medical records	5,749 (31·5%)
Denmark (Aarhus)	⁶⁴	1998	During pregnancy (ST, 15-16 weeks of gestation)	432	Hospital-based	Questionnaire & diary	305 (70·6%)
Finland (Helsinki)	⁶⁵	1983-85	During pregnancy	530	Hospital-based	Questionnaire	445 (84·0%)
Finland (Helsinki)	⁶⁶	2000	During pregnancy (8-17 weeks of gestation)	623	Hospital-based	Questionnaire	350 (56·2%)
Finland (Kuopio)	⁶⁷	1989-2001	During pregnancy (ST; 20 weeks of gestation)	25,591	Hospital-based	Questionnaire	896 (3·5%)

Country (State/Province/Territory)	Reference	Study year(s)	Timing of data collection	Sample size	Setting	Instrument used to obtain alcohol use data	Prevalence of alcohol use (any amount) during pregnancy (n [%])
Finland (Oulu and Lapland Provinces)	⁶²	1986	During pregnancy	8,929	Hospital-based	Questionnaire	1,195 (13.4%)
France	⁶⁸	2003-04	Retrospective (day of delivery)	837	Hospital-based	AUDIT ⁴³	437 (52.2%)
France	⁶⁹	2002	During pregnancy/Retrospective (post-partum period)	150	Hospital-based	Questionnaire	65 (43.3%)
France	⁷⁰	2010	Retrospective (post-partum period)	13,776	Hospital-based	Questionnaire	611 (4.4%)
France (Auvergne)	⁷¹	2003-04	Retrospective (day of delivery/post-partum period)	1,027	Hospital-based	AUDIT ⁴³	487 (47.4%)
France (Brittany)	⁷²	2002-05	During pregnancy (FT)	2,255	Hospital-based	Questionnaire	39 (1.7%)
France (Haute-Normandie)	⁷³	2007	Retrospective (post-partum period)	923	Hospital-based	AUDIT ⁴³	102 (11.1%)
France (Nantes)	⁷⁴	2008	Retrospective (2 days post-partum)	300	Hospital-based	AUDIT ⁴³	189 (63.0%)
France (Paris)	⁷⁵	n/a	Retrospective (3 days post-partum)	247	Hospital-based	Questionnaire/medical records	30 (12.1%)
France (Paris)	⁷⁶	2006	During pregnancy (ST/TT)	245	Hospital-based	Questionnaire	62 (25.3%)
France (Roubaix)	⁷⁷	n/a	During pregnancy	115	Hospital-based	T-ACE ⁷⁸	20 (17.4%)
France (Seine Maritime)	⁷⁹	2010-11	Retrospective (post-partum period)	724	Hospital-based	Questionnaire	109 (15.1%)
France (Toulouse)	⁸⁰	1994-95	During pregnancy	250	Hospital-based	Questionnaire	186 (74.4%)
Germany	⁸¹	1993-2001	During pregnancy (FT/ST, <16 weeks of gestation)	7,365	Hospital-based	n/a	1,728 (23.5%)
Germany (Berlin)	⁸²	1999	Retrospective (at time of delivery)	182	Hospital-based	Questionnaire	40 (22.0%)
Germany (Berlin)	⁸³	2003-06	Retrospective (0-17 years)	17,641	Population-based	Questionnaire	2,470 (14.0%)
Germany (Erlangen, Nuremberg)	⁸⁴	n/a	Retrospective (post-partum period, 24 hours)	602	Hospital-based	Questionnaire	1 (0.2%)
Germany (West Germany)	⁸⁵	1987-88	During pregnancy (ST, 15-28 weeks of gestation)	1,859	Hospital-based	Questionnaire	1,656 (89.1%)
Greece (Athens)	⁸⁶	1987	During pregnancy (ST, 26 weeks of gestation)	141	Hospital-based	Questionnaire	51 (36.2%)
Ireland	⁸⁷	2003-04	During pregnancy (first antenatal visit)	1,011	Hospital-based	Questionnaire	545 (53.9%)
Ireland	⁸⁸	2003	Retrospective	151	Hospital-based	Questionnaire	134 (88.7%)
Ireland	⁸⁹	2010-11	During pregnancy	907	Hospital-based	Questionnaire	290 (32.0%)
Ireland	⁹⁰	n/a	During pregnancy (TT)	127	Hospital-based	Questionnaire	94 (74.0%)
Ireland (Dublin)	⁹¹	1990	During pregnancy	512	Hospital-based	Questionnaire	278 (54.3%)
Ireland (Dublin)	⁹²	n/a	Retrospective	100	Hospital-based	Questionnaire	78 (78.0%)
Ireland (Dublin)	⁹³	2004-06	During pregnancy (TT)	450	Hospital-based	Questionnaire	159 (35.3%)
Israel	⁹⁴	2009-10	Retrospective (post-partum period)	3,152	Hospital-based	T-ACE ⁷⁸	539 (17.1%)
Israel	⁹⁵	1999-2000	Retrospective (day of delivery)	2,477	Hospital-based	TWEAK ⁹⁶	28 (1.1%)

Country (State/Province/Territory)	Reference	Study year(s)	Timing of data collection	Sample size	Setting	Instrument used to obtain alcohol use data	Prevalence of alcohol use (any amount) during pregnancy (n [%])
Italy	⁹⁷	1989-90	Retrospective (post-partum period)	4,966	Hospital-based	Questionnaire	1,457 (29.3%)
Italy	⁹⁸	1989-90	Retrospective (post-partum period)	1,886	Hospital-based	Questionnaire	699 (37.1%)
Italy (Milan)	⁹⁹	1986-87	Retrospective (post-partum period)	1,516	Hospital-based	Questionnaire	1,182 (78.0%)
Italy (Reggio Emilia)	¹⁰⁰	n/a	Retrospective	96	Hospital-based	Questionnaire	3 (3.1%)
Italy (Rome, Florence, Belluno)	¹⁰¹	2011-12	Retrospective	69	Hospital-based	Medical records	33 (47.8%)
Italy (Rome)	¹⁰²	2011-12	During pregnancy	991	Hospital-based	Questionnaire (with tolerance question from T-ACE) ⁷⁸	336 (33.9%)
Italy (Turin)	¹⁰³	2005-08	Retrospective	36,092	Hospital-based	Questionnaire/medical records	7,760 (21.5%)
Italy (Verona, San Daniele del Friuli, Reggio Emilia, Florence, Rome, Naples, Crotona)	¹⁰⁴	n/a	Retrospective	607	Hospital-based	Questionnaire	175 (28.8%)
Lithuania (Kaunas)	¹⁰⁵	1999-2005	Retrospective (post-partum period)	642	Hospital-based	Questionnaire	73 (11.4%)
Lithuania (Kaunas)	¹⁰⁶	2009	Retrospective (2-3 days post-partum)	181	Hospital-based	Questionnaire	76 (42.0%)
Malta (Gozo)	¹⁰⁷	1998	Retrospective (2 days post-partum)	388	Hospital-based	Questionnaire	11 (2.8%)
Netherlands	¹⁰⁸	2011	During pregnancy (ST)	1,340	Hospital-based	Questionnaire	110 (8.2%)
Netherlands	¹⁰⁹	2007	Retrospective (0-6 months post-partum)	1,839	Hospital-based	Questionnaire	526 (28.6%)
Netherlands	¹¹⁰	n/a	Retrospective (3-6 years)	652	School-based	Questionnaire	105 (16.1%)
Netherlands (Amsterdam)	¹¹¹	2003	During pregnancy	8,050	Hospital-based	Questionnaire	1,689 (21.0%)
Netherlands (Drenthe)	¹¹²	2006	During pregnancy (TT)/Retrospective (6 months post-partum)	2,209	Population-based	Questionnaire	89 (4.0%)
Netherlands (Eindhoven)	¹¹³	n/a	During pregnancy (FT, ST, & TT)	1,058	Clinic-based (midwifery practices)	n/a	137 (12.9%)
Netherlands (Heerlen, Maastricht)	¹¹⁴	1985-87	During pregnancy (first antenatal visit)	691	Hospital-based	n/a	150 (21.7%)
Netherlands (Maastricht)	¹¹⁵	1985	During pregnancy (TT)	796	Hospital-based	Questionnaire	175 (22.0%)
Netherlands (Rotterdam)	¹¹⁶	2001	During pregnancy	7,333	Hospital-based	Questionnaire	2,708 (36.9%)
Netherlands (Veendam, Groningen)	¹¹⁷	2004	Retrospective (post-partum period)	529	Hospital-based	Questionnaire	107 (20.2%)
Norway	¹¹⁸	1996-2001	Retrospective	758	Population-based	Questionnaire	231 (30.5%)
Norway	¹¹⁹	1999-2008	During pregnancy (ST)	60,068	Population-based	Questionnaire	7,890 (13.1%)
Norway	¹²⁰	2008	During pregnancy	835	Population-based	Questionnaire	62 (7.4%)
Norway (Oslo)	¹²¹	2000-01	During pregnancy (FT & ST)	1,550	Hospital-based	T-ACE ⁷⁸	347 (22.4%)
Norway (Oslo)	¹²²	n/a	During pregnancy (ST)	416	Hospital-based	Questionnaire	217 (52.2%)
Poland	¹²³	2009-12	Retrospective (post-partum)	3,662	Hospital-based	Questionnaire	561 (15.3%)

Country (State/Province/Territory)	Reference	Study year(s)	Timing of data collection	Sample size	Setting	Instrument used to obtain alcohol use data	Prevalence of alcohol use (any amount) during pregnancy (n [%])
Portugal (Sao Joao, Porto)	¹²⁴	1999-2000	Retrospective (post-partum period, within 96 hours)	2,658	Hospital-based	Questionnaire	224 (8.4%)
Portugal (Vila Nova de Gaia)	¹²⁵	1991	Retrospective (post-partum period, within 48 hours)	740	Hospital-based	Questionnaire	368 (49.7%)
Russia (Astrakhan)	¹²⁶	n/a	Retrospective (post-partum period)	100	Hospital-based	Questionnaire	83 (83.0%)
Russia (Moscow)	¹²⁷	n/a	During pregnancy	139	n/a	Questionnaire	46 (33.1%)
Russia (Nizhny Novgorod, St. Petersburg)	¹²⁸	2004-05	During pregnancy	301	Hospital-based	T-ACE ⁷⁸ & TWEAK ⁹⁶	60 (19.9%)
Russia (Severodinsk)	¹²⁹	1999	During pregnancy	999	Hospital-based	Questionnaire	255 (25.5%)
Russia (St. Petersburg)	¹³⁰	2007	During pregnancy	270	Hospital-based	Questionnaire	37 (13.7%)
Russia (St. Petersburg)	¹³¹	1999-2000	During pregnancy	200	Hospital-based	Questionnaire	117 (58.5%)
Russia (Yekaterinburg)	¹³²	n/a	During pregnancy	550	Populations-based	Questionnaire	171 (31.1%)
Spain	¹³³	n/a	Retrospective	62	Hospital-based	Questionnaire	0 (0%)
Spain	¹³⁴	1995	Retrospective (3 days post-partum)	8,978	Hospital-based	Questionnaire	869 (9.7%)
Spain	¹³⁵	n/a	During pregnancy	296	Population-based	Questionnaire	0 (0%)
Spain (Barcelona)	¹⁰¹	2011-12	Retrospective	82	Hospital-based	Medical records	27 (32.9%)
Spain (Barcelona)	¹⁰⁰	2009	Retrospective	81	Hospital-based	Questionnaire	4 (4.9%)
Spain (Cádiz)	¹³⁶	1994	Retrospective (1-6 months post-partum)	590	Hospital-based	Questionnaire	156 (26.4%)
Spain (Cantabria)	¹³⁷	1998	Retrospective (3 days post-partum)	1,510	Hospital-based	Questionnaire	342 (22.6%)
Spain (Ibiza)	¹³⁸	2010	During pregnancy (TT)	107	Hospital-based	Questionnaire	38 (35.5%)
Spain (Valencia)	¹³⁹	1989	During pregnancy (FT/ST)	1,004	Hospital-based	Questionnaire	458 (45.6%)
Spain (Vigo)	¹⁴⁰	2011	Retrospective (after delivery)	51	Hospital-based	Questionnaire	7 (13.7%)
Sweden	¹⁴¹	2003-04	Retrospective (6 months post-partum)	5,600	Population-based	Questionnaire	11 (0.2%)
Sweden	¹⁴²	2007-09	During pregnancy (TT)	1,868	Hospital-based	AUDIT ⁴³	229 (12.3%)
Sweden	¹⁴³	2002	Retrospective (24 hours after delivery)	865	Hospital-based	Questionnaire	96 (11.1%)
Sweden	¹⁴⁴	2009-10	During pregnancy	1,594	Hospital-based	AUDIT-C ⁴¹ (modified for pregnancy)	89 (5.6%)
Sweden (Göteborg)	¹⁴⁵	1996-97	During pregnancy	207	Hospital-based	Questionnaire	24 (11.6%)
Sweden (Linköping)	¹⁴⁶	2005-07	Retrospective (1 year post-partum)	924	Hospital-based	Questionnaire	55 (6.0%)
Sweden (Stockholm)	¹⁴⁷	2000	During pregnancy (TT)	1,101	Hospital-based	AUDIT ⁴³	330 (30.0%)
Sweden (Stockholm)	¹⁴⁸	2001-02	During pregnancy	147	Hospital-based	Timeline follow-back ¹⁴⁹	22 (15.0%)
Switzerland (Cantons)	¹⁵⁰	2007	Retrospective (6 weeks post-partum)	368	Population-based	AUDIT ⁴³ & T-ACE ⁷⁸	110 (29.9%)
Switzerland (Geneva)	¹⁵¹	2008	Retrospective (after delivery)	201	Hospital-based	Questionnaire	73 (36.3%)
Turkey (Konak)	¹⁵²	2004-05	During pregnancy	214	Hospital-based	Questionnaire	6 (2.8%)
Ukraine	¹⁵³	2004-06	During pregnancy (ST, 18-19 weeks gestation)	166	Hospital-based	AUDIT, ⁴³ CAGE, ⁴⁹ T-ACE, ⁷⁸ Timeline follow-back ¹⁴⁹ & TWEAK ⁹⁶	43 (25.9%)

Country (State/Province/Territory)	Reference	Study year(s)	Timing of data collection	Sample size	Setting	Instrument used to obtain alcohol use data	Prevalence of alcohol use (any amount) during pregnancy (n [%])
Ukraine (Rivne Oblast & Khmelnytsky Oblast)	¹⁵⁴	2007-12	During pregnancy	11,909	Population-based	CAGE, ⁴⁹ T-ACE ⁷⁸ & TWEAK ⁹⁶	5,083 (42.7%)
United Kingdom	¹⁵⁵	2001-02	Retrospective (post-partum period)	18,525	Population-based	Questionnaire	6,175 (33.3%)
United Kingdom	¹⁵⁶	n/a	During pregnancy	1,203	Hospital-based	Questionnaire	397 (33.0%)
United Kingdom	¹⁵⁷	n/a	During pregnancy (ST, 20 weeks gestation)	392	Hospital-based	AUDIT ⁴³	83 (21.2%)
United Kingdom	¹⁵⁸	2001	Retrospective	6,073	Population-based	Questionnaire	2,602 (42.8%)
United Kingdom (England, Southampton)	¹⁵⁹	1998-2003	During pregnancy (FT & TT, 11 & 34 weeks gestation)	1,490	Population-based	Questionnaire	1,015 (68.1%)
United Kingdom (East Midlands: Nottingham, Derby City)	¹⁶⁰	1988-91	During pregnancy	9,342	Hospital-based	Medical records (direct questions)	2,203 (23.6%)
United Kingdom (England, Birmingham)	¹⁶¹	n/a	During pregnancy	232	Hospital-based	Questionnaire	31 (13.4%)
United Kingdom (England, Bradford)	¹⁶²	2007-10	During pregnancy (ST/TT, 26-28 weeks gestation)	10,823	Hospital-based	Questionnaire	1,640 (15.2%)
United Kingdom (England, Bristol)	¹⁶³	1995	During pregnancy (TT)	377	Hospital-based	Questionnaire (dietary diary)	206 (54.6%)
United Kingdom (England, Hull)	¹⁶⁴	n/a	Retrospective (24-48 hours after delivery)	82	Hospital-based	Questionnaire	43 (52.4%)
United Kingdom (England, Leeds)	¹⁶⁵	2003-06	During pregnancy	1,135	Hospital-based	Questionnaire	892 (78.6%)
United Kingdom (England, London)	¹⁶⁶	1988	During pregnancy (throughout)	1,427	Hospital-based	Questionnaire	716 (50.2%)
United Kingdom (England, London)	¹⁶⁷	1982-84	During pregnancy (TT)	1,510	Hospital-based	Questionnaire	751 (49.7%)
United Kingdom (England, Southampton)	⁹⁹	1989-90	Retrospective (post-partum period)	996	Hospital-based	Questionnaire	538 (54.0%)
United Kingdom (England, Southampton)	¹⁶⁸	n/a	During pregnancy	576	Hospital-based	Questionnaire	326 (56.6%)
United Kingdom (England)	¹⁶⁹	1991-92	During pregnancy (FT & TT)	13,033	Population-based	Questionnaire	7,114 (54.6%)
United Kingdom (Liverpool)	¹⁷⁰	1998-2003	Retrospective	9,506	Hospital-based	Medical records	3,146 (33.1%)
United Kingdom (Scotland, Glasgow)	¹⁷¹	1982-84	During pregnancy	2,765	Hospital-based	Questionnaire	979 (35.4%)
United Kingdom (South West of England)	¹⁷²	2010	During pregnancy	409	Hospital-based	AUDIT ⁴³ & T-ACE ⁷⁸	106 (25.9%)
REGION OF THE AMERICAS							
Brazil (Bahia, Feira de Santana)	¹⁷³	2009	Retrospective (4-5 years)	438	School-based	T-ACE ⁷⁸	107 (24.4%)
Brazil (Bahia, Santo Amaro)	¹⁷⁴	2002	Retrospective (upon being admitted for delivery)	55	Hospital-based	Questionnaire	1 (1.8%)
Brazil (Bahia)	¹⁷⁵	2008-10	During pregnancy	2,761	Hospital-based	Questionnaire	483 (17.5%)
Brazil (Fortaleza, Manaus, Porto Alegre, Rio de Janeiro, and Salvador)	¹⁷⁶	1991-95	During pregnancy (21-28 weeks of gestation)	5,539	Hospital-based	Questionnaire	1,905 (34.4%)

Country (State/Province/Territory)	Reference	Study year(s)	Timing of data collection	Sample size	Setting	Instrument used to obtain alcohol use data	Prevalence of alcohol use (any amount) during pregnancy (n [%])
Brazil (Juiz de Fora, Minas Gerais)	¹⁷⁷	2006-08	During pregnancy (20-42 weeks of gestation, mean gestational week: 33 [SD=4.4])	260	Hospital-based	AUDIT ⁴³	64 (24.6%)
Brazil (Minas Gerais)	¹⁷⁸	2009	Retrospective (post-partum, 12-24 hours after delivery)	493	Hospital-based	AUDIT ⁴³	114 (23.1%)
Brazil (Pernambuco, Recife, and São Paulo, Campinas)	¹⁷⁹	n/a	Retrospective (post-partum)	555	Hospital-based	Questionnaire	44 (7.9%)
Brazil (Rio de Janeiro)	¹⁸⁰	1999-2006	During pregnancy	433	Hospital-based	Questionnaire	32 (7.4%)
Brazil (Rio de Janeiro)	¹⁸¹	2000	Retrospective (post-partum, 48 hours after delivery)	537	Hospital-based	CAGE, ⁴⁹ T-ACE ⁷⁸ & TWEAK ⁹⁶	218 (40.6%)
Brazil (Rio de Janeiro)	¹⁸²	2000-01	Retrospective (post-partum)	8,961	Hospital-based	Questionnaire/ medical record	1,656 (18.5%)
Brazil (Rio Grande do Sul, Pelotas)	¹⁸³	2006-08	During pregnancy (>14 weeks of gestation, mean gestational week: 27.7 [SD=9.4])	1,204	Hospital-based	CAGE ⁴⁹	99 (8.2%)
Brazil (Rio Grande do Sul, Pelotas)	¹⁸⁴	1993	Retrospective (post-partum, 24 hours after delivery)	5,189	Hospital-based	Questionnaire	259 (5.0%)
Brazil (Rio Grande do Sul, Porto Alegre)	¹⁸⁵	2006-07	During pregnancy (16-36 weeks of gestation)	578	Hospital-based	Questionnaire	97 (16.8%)
Brazil (Rio Grande do Sul)	¹⁸⁶	2007	During pregnancy	2,523	Hospital-based	Questionnaire	96 (3.8%)
Brazil (São Paulo, Ribeirão Preto)	¹⁸⁷	2001	During pregnancy (TT)	450	Hospital-based	Questionnaire	99 (22.0%)
Brazil (São Paulo)	¹⁸⁸	2004-06	During pregnancy (≤16-32 weeks)	334	Hospital-based	Questionnaire	23 (6.9%)
Brazil (Sergipe, Aracaju)	¹⁸⁹	2005	Retrospective (post-partum)	4,712	Hospital-based	Questionnaire	977 (20.7%)
Canada	¹⁹⁰	2006	Retrospective (post-partum period)	6,421	Population-based	Questionnaire	674 (10.5%)
Canada	¹⁹¹	2003-10	Retrospective (≤5 years postpartum)	18,612	Population-based	Questionnaire	1,791 (9.6%)
Canada	¹⁹²	1994-97	Retrospective (4-5 years postpartum)	6,337	Population-based	Questionnaire	1,065 (16.8%)
Canada (Alberta)	¹⁹³	2001-05	Retrospective	191,686	Hospital-based	Medical charts/records	3,768 (2.0%)
Canada (Alberta)	¹⁹⁴	2001-04	During pregnancy	1,929	Hospital-based	T-ACE ⁷⁸	430 (22.3%)
Canada (Alberta)	¹⁹⁵	1994-96	Retrospective	106,306	Population-based	Medical charts/records	7,970 (7.5%)
Canada (Alberta)	¹⁹⁶	1994-95	During pregnancy (FT/ST)	1,991	Hospital-based	Questionnaire	348 (17.5%)
Canada (Alberta)	¹⁹⁷	1995-98	Retrospective (time of delivery)	55,542	Population-based	Medical charts/records	1,104 (2.0%)
Canada (British Columbia)	¹⁹⁸	2012	During pregnancy	98	Population-based	AUDIT ⁴³	11 (11.2%)
Canada (British Columbia)	¹⁹⁹	2003-08	Retrospective	5,031	Hospital-based	Medical charts/records	28 (0.6%)
Canada (Ontario)	²⁰⁰	2004-05	Retrospective (post-partum period)	1,019	Hospital-based	Questionnaire	5 (0.5%)
Canada (Ontario)	²⁰¹	1992-93	During pregnancy (ST & TT)	466	Hospital-based	Questionnaire	68 (14.6%)
Canada (Quebec)	²⁰²	1982-84	Retrospective	47,146	Hospital-based	Questionnaire	13,982 (29.7%)
Canada & United States	²⁰³	1997-2010	During pregnancy (TT)	406	Population-based	Questionnaire	122 (30.0%)

Country (State/Province/Territory)	Reference	Study year(s)	Timing of data collection	Sample size	Setting	Instrument used to obtain alcohol use data	Prevalence of alcohol use (any amount) during pregnancy (n [%])
Chile (Santiago)	²⁰⁴	1995-2000	During pregnancy (mean gestational week: 16.7 [SD=8.1])	9,628	Hospital-based	Questionnaire	5,524 (57.4%)
Chile (Valdivia)	²⁰⁵	2005-06	Retrospective (post-partum, 48 hours after delivery)	315	Hospital-based	Questionnaire	50 (15.9%)
Guatemala (Guatemala City)	²⁰⁶	2006	During pregnancy	1,897	Hospital-based	Questionnaire	93 (4.9%)
Mexico (Guadalajara)	²⁰⁷	1991-98	Retrospective (post-partum period)	78,871	Hospital-based	Medical records	1,909 (2.4%)
Mexico (Mexico City)	²⁰⁸	2003-04	During pregnancy	386	Hospital-based	Questionnaire	5 (1.3%)
Mexico (Tijuana)	²⁰⁹	2006-07	Retrospective (post-partum period)	730	Hospital-based	Questionnaire	3 (0.4%)
United States	²¹⁰	1987-90	Retrospective	1,768	Hospital-based	Medical charts/records	175 (9.9%)
United States	²¹¹	1993-95	Retrospective (24 hours after delivery)	9,444	Hospital-based	Questionnaire	3,659 (38.7%)
United States	²¹²	1982-95	Retrospective	6,676	Population-based	Questionnaire	2,130 (31.9%)
United States	²¹³	1993-94	During pregnancy (TT) and retrospective (3 months postpartum)	1,548	Population-based	Questionnaire	95 (6.1%)
United States	²¹⁴	2001	Retrospective (6-22 months postpartum)	10,700	Population-based	Questionnaire	300 (2.8%)
United States	²¹⁵	2001-02	During pregnancy and retrospective (\leq 1 year postpartum)	1,515	Population-based	Alcohol Use Disorder and Associated Disabilities Interview Schedule-IV ²¹⁶	139 (9.2%)
United States	²¹⁷	1991	During pregnancy	1,067	Population-based	Questionnaire	147 (13.8%)
United States	²¹⁸	1988	During pregnancy	8,396	Population-based	Questionnaire	1,738 (20.7%)
United States	²¹⁹	1995	During pregnancy	1,313	Population-based	Questionnaire	214 (16.3%)
United States	²²⁰	1997	During pregnancy	1,429	Population-based	Questionnaire	163 (11.4%)
United States	²²⁰	1999	During pregnancy	1,888	Population-based	Questionnaire	242 (12.8%)
United States	²²¹	2001-05	During pregnancy	13,820	Population-based	Questionnaire	1,548 (11.2%)
United States	²²²	2006-10	During pregnancy	13,880	Population-based	Questionnaire	1,055 (7.6%)
United States	²²³	1989	During pregnancy (TT)	153	Hospital-based	Questionnaire	60 (39.2%)
United States	²²⁴	2008	Retrospective (2-6 months postpartum)	35,446	Population-based	T-ACE, ⁷⁸ CAGE ⁴⁹ & MAST ²²⁵	2,320 (6.5%)
United States	²²⁶	1989-92	Retrospective	82,210	Population-based	Medical charts/records	2,302 (2.8%)
United States	²²⁷	1979-86	Retrospective	4,409	Population-based	Questionnaire	1,506 (34.2%)
United States	²²⁸	1988-95	During pregnancy	21,069	Hospital-based	Medical charts/records	6,655 (31.6%)
United States	²²⁹	2002-03	During pregnancy	1,800	Population-based	Questionnaire	180 (10.0%)
United States	²³⁰	1989-90	During pregnancy	3,850,653	Hospital-based	Medical charts/records	131,716 (3.4%)
United States	²³¹	1998-2002	Retrospective (post-partum period)	4,854	Hospital-based	Questionnaire	534 (11.0%)
United States	²³²	1996	Retrospective	2,958,309	Hospital-based	Medical charts/records	38,899 (1.3%)
United States	²³³	1995-2001	During pregnancy (ST & TT)	2,534	Hospital-based	Questionnaire	1,017 (40.1%)
United States	²³⁴	1996-99	Retrospective (2-6 months postpartum)	87,087	Population-based	Questionnaire	5,229 (6.0%)
United States	²³⁵	1999-2001	During pregnancy	72	Population-based	Questionnaire	4 (5.6%)

Country (State/Province/Territory)	Reference	Study year(s)	Timing of data collection	Sample size	Setting	Instrument used to obtain alcohol use data	Prevalence of alcohol use (any amount) during pregnancy (n [%])
United States	²³⁶	1985	Retrospective	67	Population-based	Questionnaire	16 (23.9%)
United States	²³⁷	2004-08	During pregnancy	6,499	Population-based	Questionnaire	694 (10.7%)
United States (Alabama)	²³⁸	1997-2001	During pregnancy (ST)	3,046	Hospital-based	Questionnaire	156 (5.1%)
United States (Alabama)	²³⁹	1991	During pregnancy	3,554	Hospital-based	Medical charts/records	175 (4.9%)
United States (Alaska)	²⁴⁰	1991-94	Retrospective (2-8 months postpartum)	6,973	Population-based	Questionnaire	616 (8.8%)
United States (Arizona, California, Florida, Georgia, Idaho, Illinois, Indiana, Kentucky, Minnesota, Montana, New York, North Carolina, North Dakota, Ohio, Rhode Island, South Carolina, Tennessee, Utah, District of Columbia, West Virginia, Wisconsin)	²⁴¹	1985-88	During pregnancy	1,712	Population-based	Questionnaire	429 (25.1%)
United States (Arkansas, California, Georgia, Iowa, Massachusetts, New Jersey, New York, Texas)	²⁴²	1997-2002	Retrospective (≤ 2 years postpartum)	4,088	Population-based	Questionnaire	1,239 (30.3%)
United States (Arkansas)	²⁴³	1998-2006	Retrospective	363	Population-based	Questionnaire	114 (31.4%)
United States (California, Illinois, New Jersey)	²⁴⁴	2005	During pregnancy	4,865	Hospital-based	4P's Plus Screen ²⁴⁴	512 (10.5%)
United States (California, Iowa, Oklahoma, Hawaii)	²⁴⁵	2006	Retrospective (post-partum period)	1,632	Hospital-based	Questionnaire	372 (22.8%)
United States (California)	²⁴⁶	1959-66	During pregnancy	1,341	Hospital-based	Questionnaire	518 (38.6%)
United States (California)	²⁴⁷	1990-91	During pregnancy (FT)	5,144	Hospital-based	Questionnaire	397 (7.7%)
United States (California)	²⁴⁸	1999-2003	Retrospective	700	Hospital-based	Questionnaire	39 (5.6%)
United States (California)	²⁴⁹	2001	During pregnancy	186	Hospital-based	CAGE ⁴⁹	31 (16.7%)
United States (California)	²⁵⁰	1997	During pregnancy	401	Population-based	CAGE ⁴⁹	193 (48.1%)
United States (California)	²⁵¹	1974-77	During pregnancy (first prenatal visit)	30,583	Hospital-based	Questionnaire	14,546 (47.6%)
United States (California)	²⁵²	1986-87	Retrospective (8-9 months postpartum)	1,233	Hospital-based	Questionnaire	662 (53.7%)
United States (California)	²⁵³	1990-91	During pregnancy (FT)	5,142	Hospital-based	Questionnaire	387 (7.5%)
United States (Colorado)	²⁵⁴	1998-99	Retrospective	118,904	Hospital-based	Medical charts/records	1,486 (1.3%)
United States (Colorado)	²⁵⁵	2000-02	Retrospective	4,528	Population-based	Questionnaire	485 (10.7%)
United States (Colorado)	²⁵⁶	1996-97	During pregnancy	71	Hospital-based	Questionnaire	3 (4.2%)
United States (Connecticut)	²⁵⁷	1988-92	During pregnancy (FT & ST)	2,839	Hospital-based	Questionnaire	1,429 (50.3%)
United States (Connecticut)	²⁵⁸	1988-92	During pregnancy	2,714	Hospital-based	Questionnaire	1,354 (49.9%)
United States (Hawaii)	²⁵⁹	1999	Retrospective	436	Hospital-based	Medical charts/records	23 (5.3%)
United States (Hawaii)	²⁶⁰	2007	n/a	84	Hospital-based	TWEAK ⁹⁶	11 (13.1%)
United States (Idaho, Oregon, Washington)	²⁶¹	2012	Retrospective (5-18 years postpartum)	357	Population-based	Questionnaire	65 (18.2%)
United States (Illinois, Massachusetts, New York,	²⁶²	1980-85	During pregnancy (throughout)	423	Hospital-based	Questionnaire	367 (86.8%)

Country (State/Province/Territory)	Reference	Study year(s)	Timing of data collection	Sample size	Setting	Instrument used to obtain alcohol use data	Prevalence of alcohol use (any amount) during pregnancy (n [%])
Pennsylvania, Washington United States (Illinois)	263	1990	Retrospective (post-partum period)	378	Hospital-based	Questionnaire	89 (23.5%)
United States (Illinois)	264	1990	During pregnancy	32	Population-based	Questionnaire	6 (18.8%)
United States (Illinois)	265	1990	Retrospective	48,416	Hospital-based	Medical charts/records	1,355 (2.8%)
United States (Kentucky, West Virginia, Tennessee, Virginia)	266	2004	During pregnancy (ST)	120	Hospital-based	Questionnaire	2 (1.7%)
United States (Las Vegas)	267	1995	During pregnancy (ST)	134	Hospital-based	CAGE ⁴⁹	29 (21.6%)
United States (Louisiana, New York, Oklahoma, Texas, Washington)	268	1984-89	During pregnancy (ST)	7,470	Hospital-based	Questionnaire	2,549 (34.1%)
United States (Maryland)	269	2004	Retrospective (≤1 year postpartum)	993	Population-based	Questionnaire	242 (24.4%)
United States (Maryland)	270	2005-08	During pregnancy	2,104	Hospital-based	Medical charts/records	66 (3.1%)
United States (Massachusetts)	271	2011	During pregnancy (ST)	30	Hospital-based	T-ACE, ⁷⁸ CRAFFT ²⁷² & medical charts/record	8 (26.7%)
United States (Massachusetts)	273	2000-04	During pregnancy (FT & TT)	1,130	Hospital-based	Questionnaire	16 (1.4%)
United States (Massachusetts)	274	2006-09	During pregnancy (FT & ST)	916	Hospital-based	Questionnaire	130 (14.2%)
United States (Massachusetts)	275	2004	Retrospective (post-partum period)	1,940	Hospital-based	Questionnaire & medical charts/records	258 (13.3%)
United States (Massachusetts)	276	1994-95	During pregnancy (end of ST)	270	Hospital-based	Questionnaire	214 (79.3%)
United States (Massachusetts)	277	2005-07	Retrospective (within 72 hours after delivery)	252	Hospital-based	Questionnaire	17 (6.7%)
United States (Massachusetts)	278	2006-11	During pregnancy	953	Hospital-based	Questionnaire	24 (2.5%)
United States (Michigan)	279	1989-2006	Retrospective	2,377,661	Population-based	Questionnaire	38,710 (1.6%)
United States (Michigan)	280	1998-99	During pregnancy	1,116	Hospital-based	TWEAK ⁹⁶	169 (15.1%)
United States (Minnesota, Montana, North and South Dakota)	281	2001-03	During pregnancy (first prenatal visit)	9,004	Hospital-based	Questionnaire	1,983 (22.0%)
United States (Minnesota, Washington)	282	1993-95	During pregnancy (FT)	7,489	Hospital-based	Questionnaire	389 (5.2%)
United States (Minnesota)	283	1980-82	Retrospective	923	Hospital-based	Medical charts/records	125 (13.5%)
United States (Minnesota)	284	1993	Retrospective (post-partum period)	683	Population-based	Questionnaire	171 (25.0%)
United States (Minnesota)	285	2000-03	During pregnancy (first prenatal visit)	1,704	Hospital-based	Questionnaire	334 (19.6%)
United States (Minnesota)	286	2001-03	During pregnancy (first prenatal visit)	4,272	Hospital-based	Questionnaire	1,137 (26.6%)
United States (Missouri)	287	1989-2005	Retrospective	1,221,677	Hospital-based	Medical charts/records	15,914 (1.3%)
United States (Missouri)	288	1990-2002	Retrospective	82,856	Hospital-based	Medical charts/records	2,140 (2.6%)
United States (Missouri)	289	1989-97	Retrospective	156,475	Hospital-based	Medical charts/records	3,599 (2.3%)

Country (State/Province/Territory)	Reference	Study year(s)	Timing of data collection	Sample size	Setting	Instrument used to obtain alcohol use data	Prevalence of alcohol use (any amount) during pregnancy (n [%])
United States (Missouri)	²⁹⁰	1995-98	Retrospective (postpartum period)	1,936	Population-based	Modified SSAGA ²⁹¹	533 (27.5%)
United States (Montana, North and South Dakota)	²⁹²	2003	During pregnancy	232	Hospital-based	n/a	24 (10.3%)
United States (New Jersey)	²⁹³	1990-91	Retrospective	209,560	Population-based	Medical charts/records	6,220 (3.0%)
United States (New York, Pennsylvania)	²⁹⁴	1987-89	During pregnancy	662	Population-based	Questionnaire & medical charts/records	41 (6.2%)
United States (New York, Pennsylvania)	²⁹⁵	1987-89	During pregnancy	504	Hospital-based	Questionnaire	170 (33.7%)
United States (North Carolina)	²⁹⁶	2007	During pregnancy (TT)	104	Hospital-based	Questionnaire	2 (1.9%)
United States (North Carolina)	²⁹⁷	1987-91	Retrospective	4,708	Population-based	Medical charts/records	212 (4.5%)
United States (North Carolina)	²⁹⁸	2000-05	During pregnancy (FT & ST)	1,457	Hospital-based	Questionnaire	7 (0.5%)
United States (North Dakota)	²⁹⁹	2003	During pregnancy	1,081	Hospital-based	TWEAK ⁹⁶	43 (4.0%)
United States (Ohio)	³⁰⁰	2003-05	Retrospective	1,548	Hospital-based	Medical charts/records	6 (0.4%)
United States (Ohio)	³⁰¹	2002	During pregnancy	10	Hospital-based	Timeline follow-back ¹⁴⁹	5 (50.0%)
United States (Pennsylvania)	³⁰²	2000-02	Retrospective (3 months postpartum)	1,476	Hospital-based	Questionnaire	99 (6.7%)
United States (Washington)	³⁰³	1993-95	Retrospective (2-6 months postpartum)	5,740	Population-based	Questionnaire	544 (9.5%)
United States (Washington)	³⁰⁴	1996-99	Retrospective	24	Population-based	Timeline follow-back ¹⁴⁹	8 (33.3%)
United States (Washington)	³⁰⁵	2001-03	During pregnancy (ST)	1,070	Hospital-based	Questionnaire	229 (21.4%)
United States (Washington)	³⁰⁶	2011	n/a	136	Population-based	Questionnaire	24 (17.6%)
United States (Washington)	³⁰⁷	1989-91	Retrospective	7,178	Hospital-based	Questionnaire	2,125 (29.6%)
United States (Washington)	³⁰⁷	1991-92	Retrospective	2,230	Hospital-based	Questionnaire	524 (23.5%)
United States (Washington)	³⁰⁷	2002-04	Retrospective	3,124	Hospital-based	Questionnaire	372 (11.9%)
United States (Washington)	³⁰⁸	1994	During pregnancy	234	Hospital-based	Questionnaire	8 (3.4%)
United States (Washington)	³⁰⁹	1982-84	During pregnancy (ST) & retrospective (1 month postpartum)	463	Hospital-based	Questionnaire	186 (40.2%)
United States (Washington)	³¹⁰	2004-08	During pregnancy (ST & TT)	1,440	Hospital-based	T-ACE ⁷⁵	212 (14.7%)
United States (West Virginia)	³¹¹	2009	Retrospective	1,074	Hospital-based	Medical charts/records	13 (1.2%)
United States (Wisconsin)	³¹²	2002-05	Retrospective (post-partum period)	8,283	Hospital-based	CAGE ⁴⁹	447 (5.4%)
Uruguay	³¹³	2009	Retrospective (post-partum, 48 hours after delivery)	245		Questionnaire	132 (53.9%)
SOUTH-EAST ASIA REGION							
Sri Lanka	³¹⁴	2001-02	During pregnancy (FT, ST, & TT)	550	Clinic-based (health units)	Questionnaire	11 (2.0%)
WESTERN PACIFIC REGION							
Australia	³¹⁵	1985	Retrospective (at the time of delivery)	8,884	Hospital-based	Questionnaire	3,215 (36.2%)
Australia	³¹⁶	2001-10	Retrospective	3,281	Population-based	Questionnaire	1,023 (31.2%)
Australia	³¹⁷	n/a	During pregnancy	112	Hospital-based	Questionnaire	40 (35.7%)

Country (State/Province/Territory)	Reference	Study year(s)	Timing of data collection	Sample size	Setting	Instrument used to obtain alcohol use data	Prevalence of alcohol use (any amount) during pregnancy (n [%])
Australia	³¹⁸	1995	Retrospective (up to 4 years post-partum)	84	Population-based	Questionnaire	38 (45.2%)
Australia	³¹⁸	2001	Retrospective (up to 4 years post-partum)	137	Population-based	Questionnaire	39 (29.5%)
Australia	³¹⁹	2004	Retrospective (from 0 to 5 years)	10,090	Population-based	Questionnaire	3,270 (32.4%)
Australia	³²⁰	1996	n/a	433	Population-based	Questionnaire	327 (75.5%)
Australia	³²¹	2006	Retrospective	700	Population-based	Questionnaire	239 (34.1%)
Australia	³²²	n/a	During pregnancy	248	Population-based	Timeline follow-back ¹⁴⁹	190 (76.6%)
Australia (Adelaide, South Australia)	³²³	1999	During pregnancy (TT)	47	Hospital-based	Questionnaire/medical charts	22 (46.8%)
Australia (Brisbane)	³²⁴	1981-88	During pregnancy (first prenatal visit) & retrospective (post-partum period)	8,556	Hospital-based	Questionnaire/medical charts	4,244 (49.6%)
Australia (Brisbane)	³²⁵	2000-06	During pregnancy (first prenatal visit)	14,564	Hospital-based	n/a	1,094 (7.5%)
Australia (Cairns)	³²⁶	n/a	During pregnancy (>20 weeks of gestation)	96	Hospital-based	Questionnaire	15 (15.6%)
Australia (Cherbourg & Kingaroy)	³²⁷	1991	During pregnancy (antenatal visit) & Retrospective (time of delivery and post-partum period)	117	Hospital-based	Medical charts	38 (32.5%)
Australia (Far North Queensland)	³²⁸	2005	During pregnancy (first antenatal visit)	532	Hospital-based	Medical charts	131 (24.6%)
Australia (Perth)	³²⁹	2002-03	Retrospective (multiple time points)	585	Hospital-based	Questionnaire	208 (35.6%)
Australia (South Australia)	³³⁰	2005-06	During pregnancy	748	Hospital-based	Questionnaire	89 (11.9%)
Australia (Sydney)	³³¹	2008-09	During pregnancy	576	Hospital-based	Questionnaire	119 (20.7%)
Australia (Tasmania)	³³²	1988-95	During pregnancy	7,945	Hospital-based	Questionnaire	2,662 (33.5%)
Australia (Western Australia)	³³³	1995-97	Retrospective (12 weeks post-partum)	4,839	Population-based	Questionnaire	2,840 (58.7%)
Australia (Western Australia)	³³⁴	1989-91	During pregnancy (TT)	2,370	Hospital-based	Questionnaire	791 (33.4%)
China	³³⁵	1998	During pregnancy	631	Hospital-based	Questionnaire	18 (2.9%)
China	³³⁶	2007-09	During pregnancy (TT)	9,967	Hospital-based	Questionnaire	974 (9.8%)
China (Hainan Island)	³³⁷	2007-08	During pregnancy	265	Hospital-based	Questionnaire	28 (10.6%)
China (Pingding County, Shanxi Province)	³³⁸	2002-04	During pregnancy	483	Hospital-based	Questionnaire	24 (5.0%)
Japan	³³⁹	2006	Retrospective (post-partum period)	19,136	Hospital-based	Questionnaire	863 (4.5%)
Japan	³⁴⁰	1995-99	During pregnancy	254	Population-based	Questionnaire	1 (0.4%)
Japan	³⁴¹	2006	During pregnancy	18,965	Hospital-based	Questionnaire	878 (4.6%)
Japan	³⁴²	2002	During pregnancy	14,239	Hospital-based	Questionnaire	1,580 (11.1%)
Japan (Aichi Prefecture)	³⁴³	1987	During pregnancy & Retrospective (post-partum period)	6,831	Population-based	Questionnaire	1,024 (15.0%)

Country (State/Province/Territory)	Reference	Study year(s)	Timing of data collection	Sample size	Setting	Instrument used to obtain alcohol use data	Prevalence of alcohol use (any amount) during pregnancy (n [%])
Japan (Fukuoka City)	³⁴⁴	1987-95	Retrospective (1 month post-partum)	23,132	Hospital- and School-based	Questionnaire	2,877 (12.4%)
Japan (Gifu)	³⁴⁵	2000-01	During pregnancy (TT)	189	Hospital-based	Questionnaire	9 (4.8%)
Japan (Kyoto)	³⁴⁶	2007	Retrospective (4 months after delivery)	689	Population-based	Questionnaire	63 (9.1%)
Japan (Kyushu Island, Okinawa Prefecture)	³⁴⁷	2007-08	During pregnancy	1,565	Population-based	Questionnaire	209 (13.4%)
Japan (Tokyo)	³⁴⁸	2004	During pregnancy	537	Hospital-based	Questionnaire	51 (9.5%)
Japan (Yamanashi Prefecture)	³⁴⁹	1991-99	During pregnancy (≤ 16 weeks of gestation)	1,395	Hospital-based	Questionnaire	139 (10.0%)
Korea, Republic of	³⁵⁰	2009	During pregnancy (TT)	665	Hospital-based	Questionnaire	163 (24.5%)
Korea, Republic of	³⁵¹	2010	During pregnancy	645	Hospital-based	AUDIT-C ⁴¹	105 (16.3%)
Korea, Republic of (Seoul)	³⁵²	2009-10	During pregnancy (TT)	614	Hospital-based	TWEAK ⁹⁶	215 (35.0%)
Korea, Republic of (Seoul)	³⁵³	2009	Retrospective (post-partum period)	221	Hospital-based	Questionnaire	28 (12.7%)
New Zealand	³⁵⁴	1990-91	Retrospective	4,286	Hospital-based	Questionnaire	1,783 (41.6%)
New Zealand	³⁵⁵	2011	Retrospective (post-partum period)	571	Hospital-based	Questionnaire	173 (24.0%)
New Zealand	³⁵⁶	n/a	During pregnancy (ST)	660	Hospital-based	Questionnaire	173 (26.2%)
New Zealand	³⁵⁷	2005	During pregnancy/Retrospective	552	Population-based	AUDIT-C ⁴¹	72 (13.0%)
New Zealand (Auckland and Waikato)	³⁵⁸	n/a	Retrospective	2,391	n/a	Questionnaire	581 (24.3%)
New Zealand (Taranaki)	³⁵⁹	2006	Retrospective	100	Hospital-based	Questionnaire	28 (28.0%)

FT=first trimester. n/a=not available. ST=second trimester. TT=third trimester. SD=standard deviation.

^a Included in the analysis for both Canada and the USA.²⁰³

Table A2. Prevalence of alcohol use (any amount) during pregnancy among the general population, by country and region

Country	Prevalence Estimate	95% Confidence Interval	
		Lower	Upper
AFRICAN REGION			
Algeria	4.3%	3.2%	5.3%
Angola	11.7%	9.1%	14.2%
Benin	7.9%	6.0%	9.8%
Botswana	5.7%	4.4%	7.1%
Burkina Faso	11.3%	8.8%	13.9%
Burundi	16.6%	13.1%	20.0%
Cameroon	12.6%	9.9%	15.4%
Cape Verde	8.1%	6.2%	9.9%
Central African Republic	9.3%	7.1%	11.4%
Chad	7.2%	5.5%	9.0%
Comoros	7.2%	5.4%	9.0%
Congo, Democratic Republic of the	9.9%	7.7%	12.2%
Congo, Republic of the	7.1%	5.4%	8.8%
Equatorial Guinea	2.2%	1.6%	2.8%
Eritrea	7.4%	5.6%	9.2%
Ethiopia	7.9%	6.0%	9.7%
Gabon	8.9%	6.8%	11.0%
Gambia	9.2%	7.1%	11.4%
Ghana*	13.0%	0.0%	26.7%
Guinea	7.2%	5.4%	9.0%
Guinea Bissau	8.9%	6.9%	11.0%
Ivory Coast	9.0%	6.9%	11.0%
Kenya	7.7%	5.9%	9.6%
Lesotho	9.2%	7.1%	11.3%
Liberia	10.1%	7.8%	12.4%
Madagascar	7.8%	5.9%	9.7%
Malawi	7.9%	6.0%	9.8%
Mali	7.1%	5.3%	8.8%
Mauritania	6.6%	5.0%	8.3%
Mauritius	4.6%	3.5%	5.7%
Mozambique	8.4%	6.4%	10.4%
Namibia	14.2%	11.1%	17.3%
Niger	7.3%	5.5%	9.1%
Nigeria*	8.1%	2.8%	15.4%
Rwanda	18.1%	14.4%	21.8%
Sao Tome & Principe	10.0%	7.8%	12.3%
Senegal	6.9%	5.2%	8.6%
Seychelles	3.4%	2.6%	4.3%
Sierra Leone	14.8%	11.6%	17.9%
South Africa*	13.2%	4.3%	25.4%
South Sudan	7.0%	5.3%	8.7%
Swaziland	7.3%	5.6%	8.9%
Tanzania, United Republic of	15.1%	11.9%	18.3%
Togo	8.2%	6.2%	10.1%
Uganda	20.5%	16.4%	24.7%
Zambia*	18.5%	0.0%	36.7%
Zimbabwe	8.2%	6.3%	10.1%
EASTERN-MEDITERRANEAN REGION			
Afghanistan	0.3%	0.0%	2.1%
Bahrain	0.0%	0.0%	0.4%
Djibouti	0.3%	0.0%	2.1%
Egypt	0.2%	0.0%	1.3%
Iran	0.1%	0.0%	1.1%
Iraq	0.1%	0.0%	1.1%
Jordan	0.2%	0.0%	1.4%
Kuwait	0.0%	0.0%	0.0%
Lebanon	0.2%	0.0%	1.2%
Libya	0.1%	0.0%	0.7%
Morocco	0.2%	0.0%	1.7%
Oman	0.0%	0.0%	0.2%
Pakistan	0.2%	0.0%	1.8%
Qatar	0.0%	0.0%	0.0%
Saudi Arabia	0.0%	0.0%	0.2%
Somalia	0.3%	0.0%	2.2%

Country	Prevalence Estimate	95% Confidence Interval	
		Lower	Upper
Sudan	0.3%	0.0%	2.3%
Tunisia	0.2%	0.0%	1.4%
United Arab Emirates	0.0%	0.0%	0.1%
Yemen	0.2%	0.0%	1.9%
EUROPEAN REGION			
Albania	19.4%	16.6%	22.3%
Armenia	18.6%	15.6%	21.6%
Austria	13.1%	12.1%	14.0%
Azerbaijan	9.5%	7.6%	11.3%
Belarus	46.6%	42.4%	50.7%
Belgium	14.9%	14.0%	15.9%
Bosnia and Herzegovina	17.5%	14.1%	20.8%
Bulgaria	32.7%	30.6%	34.8%
Croatia*	12.7%	10.7%	14.8%
Cyprus	20.7%	19.6%	21.7%
Czech Republic	36.3%	34.8%	37.8%
Denmark*	45.8%	30.9%	61.2%
Estonia	35.9%	34.8%	37.1%
Finland	15.7%	14.8%	16.6%
France*	27.0%	13.5%	43.0%
Georgia	23.3%	20.1%	26.5%
Germany*	25.8%	0.0%	64.3%
Greece	21.1%	19.7%	22.5%
Hungary	30.5%	29.3%	31.7%
Iceland	8.9%	8.0%	9.7%
Ireland*	60.4%	42.8%	76.8%
Israel*	7.0%	0.0%	28.1%
Italy*	33.1%	17.5%	50.6%
Kazakhstan	15.5%	13.4%	17.5%
Kyrgyzstan	19.0%	15.5%	22.4%
Latvia	32.3%	30.9%	33.6%
Lithuania*	25.0%	0.0%	60.2%
Luxembourg	2.1%	1.5%	2.6%
Macedonia, Republic of	16.5%	13.9%	19.1%
Malta	20.0%	18.9%	21.2%
Moldova, Republic of	29.6%	26.1%	33.2%
Montenegro	20.5%	17.8%	23.1%
Netherlands*	18.0%	12.2%	24.7%
Norway*	22.6%	9.1%	39.7%
Poland	24.5%	23.0%	25.9%
Portugal	29.7%	28.6%	30.7%
Romania	28.3%	26.3%	30.3%
Russian Federation*	36.5%	18.7%	56.4%
Serbia, Republic of	27.5%	24.6%	30.5%
Slovakia	24.4%	23.2%	25.6%
Slovenia	26.9%	25.9%	27.9%
Spain	15.0%	5.5%	27.6%
Sweden	9.4%	3.9%	16.7%
Switzerland*	32.7%	26.6%	39.1%
Tajikistan	15.4%	12.1%	18.7%
Turkey	7.5%	5.9%	9.1%
Turkmenistan	11.1%	8.9%	13.3%
Ukraine*	34.0%	18.4%	51.6%
United Kingdom*	41.3%	32.9%	49.9%
Uzbekistan	16.8%	13.6%	20.0%
REGION OF THE AMERICAS			
Antigua and Barbuda	9.7%	8.3%	11.0%
Argentina	12.9%	11.1%	14.7%
Bahamas	12.0%	10.1%	14.0%
Barbados	14.7%	12.7%	16.7%
Belize	9.6%	8.4%	10.7%
Bolivia	10.5%	9.3%	11.7%
Brazil*	15.2%	10.4%	20.8%
Canada*	10.0%	5.2%	16.2%
Chile	10.6%	9.1%	12.2%
Colombia	9.1%	8.0%	10.1%
Costa Rica	8.3%	7.3%	9.3%
Cuba	4.8%	4.2%	5.4%

Country	Prevalence Estimate	95% Confidence Interval	
		Lower	Upper
Dominica	14·6%	12·9%	16·3%
Dominican Republic	12·1%	10·7%	13·5%
Ecuador	8·9%	7·8%	9·9%
El Salvador	8·3%	7·3%	9·3%
Grenada	23·3%	20·1%	26·5%
Guatemala	6·5%	5·6%	7·4%
Guyana	18·2%	16·1%	20·2%
Haiti	14·9%	13·3%	16·6%
Honduras	10·6%	9·4%	11·9%
Jamaica	9·4%	8·3%	10·5%
Mexico*	1·2%	0·0%	2·7%
Nicaragua	8·9%	7·8%	10·0%
Panama	11·7%	10·1%	13·2%
Paraguay	17·9%	15·9%	20·0%
Peru	12·5%	11·0%	13·9%
Puerto Rico	3·4%	2·9%	3·9%
St Kitts and Nevis	9·5%	8·2%	10·8%
St Lucia	21·8%	19·0%	24·7%
St Vincent and Grenadines	14·9%	13·2%	16·7%
Suriname	10·2%	8·9%	11·4%
Trinidad and Tobago	5·6%	4·8%	6·5%
United States of America*	14·8%	12·0%	18·0%
Uruguay	8·8%	7·6%	9·9%
Venezuela	10·0%	8·7%	11·2%
SOUTH-EAST ASIA REGION			
Bangladesh	2·1%	0·0%	10·7%
Bhutan	1·7%	0·0%	8·7%
India	2·0%	0·0%	10·3%
Indonesia	1·5%	0·0%	7·9%
Maldives	1·4%	0·0%	7·4%
Myanmar	1·9%	0·0%	10·2%
Nepal	2·1%	0·0%	11·1%
Sri Lanka	1·5%	0·0%	8·0%
Thailand	1·4%	0·0%	7·3%
Timor-Leste	2·1%	0·0%	11·1%
WESTERN PACIFIC REGION			
Australia*	35·6%	27·7%	43·9%
Brunei Darussalam	0·4%	0·3%	0·5%
Cambodia	15·4%	12·6%	18·2%
China*	6·5%	3·2%	10·7%
Fiji	11·3%	9·1%	13·5%
Japan*	8·0%	5·3%	11·2%
Kiribati	13·9%	11·1%	16·8%
Korea, Republic of*	21·4%	12·6%	31·8%
Laos	20·0%	17·2%	22·8%
Malaysia	5·3%	4·3%	6·3%
Marshall Islands	12·4%	9·8%	14·9%
Micronesia	13·6%	10·9%	16·2%
Mongolia	17·5%	15·1%	19·8%
New Zealand*	26·7%	19·2%	34·9%
Palau	15·2%	13·5%	17·0%
Papua New Guinea	14·8%	12·0%	17·6%
Philippines	16·6%	14·1%	19·1%
Samoa	11·3%	9·0%	13·6%
Singapore	0·6%	0·4%	0·7%
Solomon Islands	14·0%	11·2%	16·8%
Tonga	12·1%	9·7%	14·5%
Tuvalu	13·5%	10·8%	16·1%
Vanuatu	13·2%	10·5%	15·8%
Viet Nam	12·0%	9·5%	14·4%

*Estimate based on a meta-analysis of the current literature.

Note. Prediction of the prevalence of alcohol use during pregnancy for Andorra, Cook Islands, Monaco, Nauru, Niue, North Korea, San Marino, and Syrian Arab Republic was not possible due to missing data.

Table A3. Results of the tests of heterogeneity and publication bias for meta-analyses on the prevalence of alcohol use (any amount) during pregnancy among the general population, by country and region

Country (WHO Region)	# of studies	Heterogeneity tests				Publication bias tests	
		I ² test	Q statistic	df (Q statistic)	p-value (Q statistic)	p-value (rank test)	p-value (regression test)
AFRICAN REGION							
Ghana	2 ^{27,28}	97.0%	33.8	1	<0.001	-	-
Nigeria	7 ^{31-36,38}	98.0%	481.4	6	<0.001	1	0.753
South Africa	6 ^{39,40,42,44-46}	99.3%	604.7	5	<0.001	0.017	0.083
Zambia	2 ^{50,51}	99.2%	132.9	1	<0.001	-	-
EUROPEAN REGION							
Croatia	3 ⁵⁵⁻⁵⁷	73.7%	6.0	2	0.049	0.333	0.426
Denmark	6 ⁵⁹⁻⁶⁴	99.9%	3,759.8	5	0	0.719	0.297
France	12 ⁶⁸⁻⁸⁰	99.7%	3,613.9	11	0	0.638	0.192
Germany	5 ⁸¹⁻⁸⁵	100.0%	5,328.7	4	0	0.817	0.764
Ireland	7 ⁸⁷⁻⁹³	98.9%	353.5	6	<0.001	0.239	0.001
Israel	2 ^{94,95}	99.8%	564.7	1	<0.001	-	-
Italy	8 ⁹⁷⁻¹⁰⁴	99.8%	2,417.6	7	0	0.720	0.583
Lithuania	2 ^{105,106}	98.6%	73.6	1	<0.001	-	-
Netherlands	10 ¹⁰⁸⁻¹¹⁷	99.3%	1,846.4	9	0	1	0.623
Norway	5 ¹¹⁸⁻¹²²	99.6%	565.2	4	<0.001	0.083	0.152
Russian Federation	7 ¹²⁶⁻¹³²	98.9%	264.1	6	<0.001	0.239	0.036
Spain	10 ^{100,101,133-140}	99.4%	1,037.6	9	<0.001	0.381	0.501
Sweden	8 ¹⁴¹⁻¹⁴⁸	99.2%	1,480.1	7	<0.001	0.720	0.304
Switzerland	2 ¹⁵⁰⁻¹⁵¹	59.1%	2.4	1	0.118	-	-
Ukraine	2 ¹⁵³⁻¹⁵⁴	95.1%	20.4	1	<0.001	-	-
United Kingdom	19 ^{99,155-172}	99.8%	7,517.1	18	0	0.945	0.864
REGION OF THE AMERICAS							
Brazil	17 ¹⁷³⁻¹⁸⁹	99.4%	2,717.3	16	0	0.839	0.326
Canada	14 ¹⁹⁰⁻²⁰³	100.0%	34,725.2	13	0	0.667	0.442
Mexico	3 ²⁰⁷⁻²⁰⁹	89.1%	24.0	2	<0.001	1	0.370
United States of America	103 ^{210-215,217-224,226-271,273-290,292-312}	100.0%	198,478.0	102	0	<0.001	0.022
WESTERN PACIFIC REGION							
Australia	21 ³¹⁵⁻³³⁴	99.8%	9,458.8	20	0	0.420	0.630
China	4 ³³⁵⁻³³⁸	94.8%	64.0	3	<0.001	1	0.888
Japan	11 ³³⁹⁻³⁴⁹	99.6%	1,859.0	10	0	0.283	0.098
Korea, Republic of	4 ³⁵⁰⁻³⁵³	96.6%	78.9	3	<0.001	1	0.249
New Zealand	6 ³⁵⁴⁻³⁵⁹	98.1%	369.9	5	<0.001	1	0.696

df=degrees of freedom. WHO=World Health Organization.

Table A4. Critical appraisal of studies reporting on the prevalence of alcohol use (any amount) during pregnancy among the general population

Reference	Representativeness of the sample		Adequate sample size (n≥300)	Method used to ascertain alcohol use during pregnancy		Response/ participation rate		
	Probability sampling	Non-probability sampling		Validated tool	Structured/ unstructured questionnaire (including a single question)	≥70%	35-69%	≤34%
36	X		X		X			
314		X	X			X		
210		X	X		X	X		
28	X		X		X	X		
35		X	X		X			
246		X	X		X	X		
287		X	X		X			
141		X	X		X	X		
189		X	X		X			
263		X	X		X	X		
121		X	X	X		X		
59		X	X		X			
269		X	X		X			
202		X	X		X	X		
204		X	X		X	X		
245		X	X		X			X
303	X		X		X	X		
296		X		X		X		
304		X	X		X	X		
84		X	X	X				
153		X		X		X		
116		X	X		X		X	
128		X	X		X	X		
50		X	X		X	X		
264	X		X		X		X	
205		X	X		X	X		
23		X						
91		X	X		X			
211	X		X		X	X		
108		X	X		X		X	
315		X	X		X		X	
82		X			X		X	
82	X		X		X		X	
30		X	X					
60		X	X		X			
58		X	X		X	X		
212	X		X		X			
139		X	X		X	X		
97		X	X		X			
213	X		X		X		X	
214	X		X		X			
299	X		X	X				
193		X	X		X			
185		X	X		X	X		
215	X		X		X	X		
198		X		X		X		
316	X		X		X		X	
75		X			X			
209		X	X		X			
217	X		X		X			
218	X		X		X	X		
219	X		X		X	X		
220	X		X		X			
221	X		X		X		X	
222	X		X		X		X	
186		X	X		X	X		
190	X		X		X	X		
154		X		X				
271		X		X			X	
244		X	X		X			
74		X		X		X		
302		X	X		X	X		

Reference	Representativeness of the sample		Adequate sample size (n≥300)	Method used to ascertain alcohol use during pregnancy		Response/ participation rate		
	Probability sampling	Non-probability sampling		Validated tool	Structured/ unstructured questionnaire (including a single question)	≥70%	35-69%	≤34%
223		X		X		X		
333					X			
142		X	X	X		X		
317	X		X		X	X		
162		X	X		X	X		
354	X		X		X	X		
39		X	X		X			
159		X	X		X	X		
224	X		X		X	X		
183		X	X	X		X		
92	X				X			
80	X				X			
68	X		X	X		X		
178		X	X	X		X		
226		X	X		X			
170		X	X		X			
259		X	X		X			
118	X		X		X	X		
273		X	X		X			
288		X	X		X			
155	X		X		X	X		
257		X	X		X	X		
87		X	X		X	X		
208		X	X		X	X		
76		X			X	X		
151		X			X	X		
33		X			X			
305		X	X			X		
279		X	X		X			
45		X	X			X		
152		X			X			
283		X	X		X			
242		X	X		X		X	
38		X	X		X			
31		X	X					
227	X		X		X			
358	X		X		X	X		
32	X		X		X			
247		X	X		X	X		
102		X	X	X				
280		X	X	X		X		
274		X	X		X			
180		X	X		X			
138		X			X	X		
130		X			X			
228		X	X		X			
200		X	X		X	X		
306		X			X			
289		X	X		X			
329		X	X		X		X	
318	X		X		X	X		
260		X		X		X		
111		X	X		X		X	
147		X	X	X		X		
307		X	X		X		X	
307		X	X		X		X	
307		X	X		X		X	
248	X		X		X	X		
129		X	X		X	X		
72		X	X		X	X		
65		X	X		X			
25		X	X	X		X		
339		X	X		X	X		
156		X	X		X	X		
229	X		X		X	X		

Reference	Representativeness of the sample		Adequate sample size (n≥300)	Method used to ascertain alcohol use during pregnancy		Response/ participation rate		
	Probability sampling	Non-probability sampling		Validated tool	Structured/ unstructured questionnaire (including a single question)	≥70%	35-69%	≤34%
292		X						
169		X	X		X	X		
145		X			X	X		
166		X	X		X	X		
323		X			X	X		
194		X	X	X		X		
359		X			X	X		
243	X		X		X			
294		X	X		X	X		
203		X	X		X			
352		X	X	X				
330		X	X		X			X
69		X		X				
230		X	X					
231	X		X		X			
232		X	X					
326		X						
319	X		X		X			
122	X		X		X			
312		X	X	X		X		
163		X	X		X	X		
117		X	X		X			
266		X			X	X		
136	X		X		X			
308		X			X			
206		X	X		X	X		
320	X		X		X		X	
284	X		X		X			X
275		X	X		X	X		
324		X	X		X	X		
249		X		X				
63		X	X		X			
360		X	X		X	X		
353		X			X			
325		X	X					
61		X	X		X	X		
250	X		X	X		X		
290		X	X		X			
115		X	X		X	X		
131		X	X		X	X		
176		X	X		X			
105	X		X		X			
113		X	X		X	X		
126		X			X			
66		X	X		X			
276		X			X	X		
331		X	X		X	X		
79		X	X	X		X		
191	X		X		X	X		
109	X		X		X		X	
98		X	X		X			X
351		X	X	X		X		
150		X	X	X				
140		X			X	X		
335		X	X					
238		X	X		X			
161		X			X			
309		X	X		X	X		
173	X		X		X			
81		X	X		X			
258		X	X		X	X		
158	X		X		X	X		
148	X		X	X		X		
29	X		X	X				
71	X		X	X		X		

Reference	Representativeness of the sample		Adequate sample size (n≥300)	Method used to ascertain alcohol use during pregnancy		Response/ participation rate		
	Probability sampling	Non-probability sampling		Validated tool	Structured/ unstructured questionnaire (including a single question)	≥70%	35-69%	≤34%
355		X	X		X	X		
133		X			X			
297		X	X					
134		X	X		X			
344		X	X		X			
46	X		X		X			
346		X	X		X	X		
348		X	X			X		
356		X	X		X		X	
88		X			X			
233		X	X		X			
157		X	X	X		X		
119		X	X		X		X	
175		X	X		X			
179		X	X		X	X		
277		X			X		X	
285	X		X	X				
286		X	X	X				
281	X		X	X		X		
167		X	X		X	X		
313		X			X			
262		X	X		X			
347		X	X		X			
349			X		X	X		
143		X	X		X	X		
234	X		X		X	X		
135		X			X			
181	X		X	X				
101		X		X				
47	X				X			
89		X	X		X	X		
112		X	X		X		X	
345		X			X		X	
48	X		X	X		X		
235	X				X		X	
146		X	X		X		X	
300		X	X					
90		X			X			
165		X	X		X			X
34		X	X		X			
343		X	X		X			
137	X		X		X	X		
357	X		X	X			X	
22		X	X			X		
321		X	X		X		X	
239		X	X		X			
207		X	X		X			
240	X		X		X	X		
56		X			X		X	
55		X			X	X		
86	X				X	X		
44		X	X	X				
100		X			X			
104		X	X	X				
187		X	X		X			
261		X	X		X			
282		X	X		X	X		
103		X	X		X			
236		X			X			
327		X						
99		X	X		X	X		
67		X	X		X			
251		X	X		X	X		
164		X			X			
254		X	X					

Reference	Representativeness of the sample		Adequate sample size (n≥300)	Method used to ascertain alcohol use during pregnancy		Response/ participation rate		
	Probability sampling	Non-probability sampling		Validated tool	Structured/ unstructured questionnaire (including a single question)	≥70%	35-69%	≤34%
328		X	X					
168		X	X					
334		X	X		X	X		
124		X	X		X			
62		X	X		X	X		
40		X	X	X				
171		X	X		X	X		
184		X	X		X	X		
127		X			X			
265		X	X					
70	X		X		X			
301		X		X		X		
107		X	X		X			X
85	X		X		X			X
94		X	X	X		X		
241	X		X		X	X		
132		X	X		X			
268		X	X					
295		X	X		X	X		
177		X	X		X	X		
278		X	X					
278		X	X		X			
106		X			X			
144		X	X	X		X		
110	X		X		X			
172		X	X	X		X		
51		X	X		X	X		
201		X	X		X	X		
311		X	X	X				
199		X	X		X			
57		X			X	X		
237	X		X		X	X		
340	X		X		X			
341		X	X		X	X		
93		X	X		X	X		
52		X	X		X	X		
125		X	X		X			
195		X	X		X			
53	X		X		X			
77	X			X				
293		X	X					
267		X		X				
54		X			X		X	
182	X		X		X	X		
73		X	X	X		X		
298		X	X		X			
188		X	X		X	X		
114		X	X		X	X		
42		X	X	X		X		
332		X	X		X			
192		X	X		X			
95		X	X		X			
255	X		X		X	X		
196		X	X		X	X		
160		X	X		X			
24		X	X	X				
252	X		X		X	X		
253		X	X		X	X		
123	X		X		X			
310		X	X	X		X		
197		X	X		X			
342	X		X		X			
27		X	X		X			
120		X	X		X			
322				X		X		

Reference	Representativeness of the sample		Adequate sample size (n≥300)	Method used to ascertain alcohol use during pregnancy		Response/ participation rate		
	Probability sampling	Non-probability sampling		Validated tool	Structured/ unstructured questionnaire (including a single question)	≥70%	35-69%	≤34%
256		X			X	X		
174		X			X			
336		X	X					
337	X							
336		X	X		X			

Source: Adapted from Wong and colleagues.²

Note. The absence of an “X” can mean either "no" or "not reported".

Table A5. Results of the fractional response model for the prediction of the prevalence of alcohol use during pregnancy

Variable	Beta	Standard Error	p-value
Intercept	-1.332	0.020	<0.001
Gross domestic product (adjusted for purchase power parity) per capita	-0.506	0.003	<0.001
Per capita consumption of alcohol among women	0.572	0.005	<0.001
WHO European Region (EU-member states; reference category)	1	-	-
WHO European Region (non-EU-member states)	-0.297	0.011	<0.001
WHO African Region	-1.168	0.022	<0.001
WHO Eastern-Mediterranean Region	-4.522	0.501	<0.001
WHO South-East Asia Region	-2.390	0.305	<0.001
WHO Western Pacific Region	-0.437	0.008	<0.001
WHO Region of the Americas (non-high income)	-1.055	0.016	<0.001
WHO Region of the Americas (high income)	-2.122	0.006	<0.001

EU=European Union. WHO=World Health Organization.

Table A6. Study characteristics and prevalence of FAS among the general population reported in the identified studies, by country and region

Country (State/Province/Territory)	Reference	Study year(s)	Sample size	Number of cases of FAS	Prevalence of FAS (per 10,000)	Diagnostic guidelines/Case definition	Sex (% male)	Age range (years)	Method
AFRICAN REGION									
South Africa (Gauteng)	³⁶¹	2001	830	16	192.8	IOM criteria ³⁶²	n/a	5-10	ACA
South Africa (Northern Cape, De Aar & Upington)	³⁶³	2003-10	809	32	395.6	Clarification of the IOM criteria ³⁶⁴	49.5	9.5-11.0	ACA
South Africa (Western Cape)	³⁶⁵	1997-98	992	46	463.7	IOM criteria ³⁶²	52.8	5-9	ACA
South Africa (Western Cape)	³⁶⁶	2002-03	818	55	672.4	Clarification of the IOM criteria ³⁶⁴	51.5	6-7	ACA
South Africa (Western Cape)	³⁶⁷	2008-09	747	68	910.3	Clarification of the IOM criteria ³⁶⁴	49.0	6-7	ACA
South Africa (Western Cape, rural)	³⁶⁸	2008	160	16	1000.0	Clarification of the IOM criteria ³⁶⁴	50.0	4.8-16.4	ACA
South Africa (Northern Cape, De Aar & Upington)	³⁶⁹	2001-04	1,830	123	672.1	IOM criteria ³⁶²	49.7	6-7	ACA
South Africa (Northern Cape)	³⁷⁰	2012-13	1,503	83	552.2	Clarification of the IOM criteria ³⁶⁴	52.6	6-7	ACA
South Africa (Western Cape)	³⁷¹	1999-2000	863	64	741.6	Clarification of the IOM criteria ³⁶⁴	50.8	6-7	ACA
EUROPEAN REGION									
Croatia (rural)	⁵⁵	n/a	824	14	169.9	Clarification of the IOM criteria ³⁶⁴	n/a	7.0-11.9	ACA
Croatia (urban)	⁵⁶	n/a	466	3	64.4	Clarification of the IOM criteria ³⁶⁴	46.1	6.6-11.1	ACA
Denmark (Odense)	³⁷²	n/a	278	0	0.0	n/a	51.4	0-1 (newborns)	PS
France	⁶⁸	2003-04	1,050	2	19.0	Criteria suggested by Jones et al. ³⁷³	n/a	0-1 (newborns)	CB
France (Roubaix)	³⁷⁴	1975-76	6,927	20	28.8	n/a	n/a	0-1 (newborns)	CB
France (Roubaix)	³⁷⁵	1977-79	8,284	12	14.5	Case definition provided	n/a	0-1 (newborns)	CB
France (Roubaix)	³⁷⁶	1986-90	13,118	16	12.2	n/a	n/a	0-1 (newborns)	CB
France (Roubaix)	³⁷²	n/a	626	0	0.0	n/a	49.9	0-1 (newborns)	PS
France (Saint-Pierre, Reunion Island)	³⁷⁷	1996	1,320	22	484.8	IOM criteria ³⁶²	n/a	n/a	ACA
France	³⁷⁸	1995-2003	5,000	21	42.0	Guidelines established by the Fetal Alcohol Study Group of the RSA ³⁷⁹	n/a	0-1 (newborns)	CB
Germany (Berlin)	³⁷²	n/a	998	0	0.0	n/a	51.6	0-1 (newborns)	PS
Ireland (Dublin)	³⁸⁰	2000-07	61,241	3	0.5	n/a	50.2	0-1 (newborns)	PS
Italy (Lazio)	³⁸¹	2004	543	4	73.7	Clarification of the IOM	51.0	6-7	ACA

Country (State/Province/ Territory)	Reference	Study year(s)	Sample size	Number of cases of FAS	Prevalence of FAS (per 10,000)	Diagnostic guidelines/Case definition	Sex (% male)	Age range (years)	Method
Italy (Lazio)	382	2005-07	976	8	82.0	criteria ³⁶⁴ Clarification of the IOM	50.6	6-7	ACA
Italy	99	1986-87	1,516	0	0.0	criteria ³⁶⁴ n/a	n/a	0-1 (newborns)	CB
Netherlands	372	n/a	2,803	0	0.0	n/a	50.6	0-1 (newborns)	PS
Portugal (Proto)	372	n/a	427	0	0.0	n/a	54.4	0-1 (newborns)	PS
Spain (Valencia, Vizcaya, Guipuzcoa)	372	n/a	2,479	0	0.0	n/a	50.8	0-1 (newborns)	PS
Sweden (Stockholm)	383	1979	669	1	14.9	n/a	n/a	0-1 (newborns)	CB
Sweden (Göteborg)	384	1977-78	7,600	12	15.8	n/a	n/a	0-1 (newborns)	Mixed methods (ACA & PS)
Switzerland (Aarau)	385	n/a	996	0	0.0	n/a	n/a	0-1 (newborns)	CB
United Kingdom	386	2002	11,903	0	0.0	n/a	n/a	4-6	CB
United Kingdom (Dundee)	372	n/a	842	0	0.0	n/a	50.2	0-1 (newborns)	PS
United Kingdom (Southampton)	99	1989-90	996	0	0.0	n/a	n/a	0-1 (newborns)	CB
REGION OF THE AMERICAS									
Canada (Northwest British Columbia & Yukon)	387	1983-84	33,485	82	24.5	Guidelines established by the Fetal Alcohol Study Group of the RSA ³⁷⁹	63.0	0-16	ACA
Canada (Saskatchewan)	388	1992-94	331,475	194	5.9	Guidelines established by the Fetal Alcohol Study Group of the RSA ³⁷⁹ and the criteria by Sokol & Clarren ³⁸⁹		0.5-28.3	Mixed methods (ACA & PS)
United States (North Dakota)	390	n/a	1,013	6	59.2	Criteria by Sokol & Clarren ³⁸⁹	n/a	3-14	ACA
United States	391	1979-93	9,434,560	2,032	2.2	n/a	n/a	n/a	PS
United States (Georgia)	392	1981-89	285,538	29	1.0	IOM criteria ³⁶²	n/a	3-10	PS
United States (Alaska, Arizona, Colorado)	393	1995-97	348,463	145	4.2	IOM criteria ³⁶²	n/a	n/a	PS
United States (Washington)	394	n/a	3,740	7	18.7	4-digit diagnostic code ³⁹⁵	n/a	6-7	ACA
United States (New York)	396	1995-99	106,336	63	5.9	IOM criteria ³⁶²	n/a	0-4	PS
United States (Alaska)	397	1977-92	176,765	137	7.8	Case definition provided	n/a	0-16	PS
United States (New York)	398	1995-98	111,197	36	3.2	IOM criteria ³⁶²	n/a	0-2	PS
United States (Arizona, Colorado, New York)	399	2010	472,457	161	3.4	Case definition based on IOM criteria ³⁶²	51.0	7-9	PS
United States (Georgia)	400	2006-12	143,393	276	19.2	Case definition based on	n/a	0-12	PS

Country (State/Province/Territory)	Reference	Study year(s)	Sample size	Number of cases of FAS	Prevalence of FAS (per 10,000)	Diagnostic guidelines/Case definition	Sex (% male)	Age range (years)	Method
United States (Boston)	⁴⁰¹	1977-79	1,690	1	5.9	IOM criteria ³⁶² Guidelines established by the Fetal Alcohol Study Group of the RSA ³⁷⁹	n/a	0 (live births)	CB
United States (Texas)	³⁰⁹	1977-80	5,602	6	10.7	n/a	n/a	n/a	PS
United States (Washington)	⁴⁰²	n/a	801	0	0.0	n/a	n/a	0-1 (newborns)	CB
United States (Midwestern)	⁴⁰³	2010-11	1,433	12	83.7	Clarification of the IOM criteria ³⁶⁴	51.8	6-7	ACA
United States (Northern Plains)	⁴⁰⁴	2007-09	2,334	7	30.0	Clarification of the IOM criteria ³⁶⁴	54.5	6-7	ACA
United States (Colorado, Michigan, Minnesota, Missouri, North Dakota, Oregon, South Dakota, and Wisconsin)	⁴⁰⁵	2001-06	1,322,831	422	3.2	Case definition provided	n/a	n/a	Mixed method (ACA & PS)
United States (Arizona, Arkansas, Hawaii, Iowa, Massachusetts, Missouri, Oklahoma)	⁴⁰⁶	1985-95	1,090,440	182	1.7	n/a	n/a	0-1 (newborns)	PS
United States (21 States)	⁴⁰⁷	1989-95	10,683,535	2,455	2.3	n/a	n/a	0-1 (newborns)	PS
United States (24 States)	⁴⁰⁸	1996-2000	7,711,455	1,150	1.5	n/a	n/a	0-1 (newborns)	PS
United States (Boston)	⁴⁰⁹	1974	322	1	31.1	n/a	n/a	0-1 (newborns)	CB
United States	⁴¹⁰	1992-2000	1,384	6	43.4	Criteria by Sokol & Clarren ³⁸⁹	n/a	5-6	ACA
United States (Ohio)	⁴¹¹	1973-79	12,127	5	4.1	Criteria by Clarren & Smith ⁴¹²	n/a	0 (live births)	PS
United States (Ohio)	⁴¹³	1979-81	8,331	25	30.0	Guidelines established by the Fetal Alcohol Study Group of the RSA ³⁷⁹	n/a	0 (live birth)	CB
United States (Wisconsin)	⁴¹⁴	1998-99	56,257	13	2.3	IOM criteria ³⁶²	n/a	21m-41m	Mixed method (ACA & PS)
Uruguay (Montevideo)	⁴¹⁵	2005	900	1	11.1	n/a	n/a	0-1 (newborns)	Mixed methods (CB & PS)
WESTERN PACIFIC REGION									
Australia (Victoria)	⁴¹⁶	1995-2002	600,000	18	0.3	CDC diagnostic guidelines ⁴¹⁷	n/a	0 (live births)	PS
Australia (Victoria)	³¹⁵	1985	8,884	0	0.0	n/a	n/a	0 (live births)	CB
Australia (Western)	⁴¹⁸	1980-2011	825,104	216	2.6	n/a	n/a	0-6	PS
Australia	⁴¹⁹	2001-04	1,533,333	27	0.2	IOM criteria ³⁶²	n/a	0-15	ACA
Australia (South)	⁴²⁰	1986-2011	498,524	14	0.3	n/a	n/a	0 (live births)	PS
Australia (Northern)	⁴²¹	1990-2000	25,209	18	7.1	Adapted 4-digit diagnostic	n/a	0-10	Mixed

Country (State/Province/Territory)	Reference	Study year(s)	Sample size	Number of cases of FAS	Prevalence of FAS (per 10,000)	Diagnostic guidelines/Case definition	Sex (% male)	Age range (years)	Method
Territory)						code ³⁹⁵ and the criteria by the American Academy of Pediatrics ⁴²²			methods (PS & CB)
Australia (Victoria)	⁴²³	1983-1998	1,014,863	3	0.03	n/a	n/a	n/a	PS
Korea, Republic of	⁴²⁴	n/a	7,785	14	18.0	Canadian diagnostic guidelines ⁴²⁵	n/a	n/a	ACA
New Zealand	⁴²⁶	1993	60,000	63	10.5	n/a	n/a	<10	PS

ACA=active case ascertainment. CDC=Centre for Disease Control and Prevention. CB=clinic-based. FAS=fetal alcohol syndrome. IOM=Institute of Medicine. PS=passive surveillance. RSA=Research Society on Alcoholism.

Table A7. Prevalence of FAS (per 10,000) among the general population, by country and region

Country	Prevalence Estimate	95% Confidence Interval	
		Lower	Upper
AFRICAN REGION			
Algeria	6.4	3.6	10.0
Angola	17.3	10.0	27.0
Benin	11.8	6.8	18.5
Botswana	8.5	4.9	13.4
Burkina Faso	16.8	9.8	26.2
Burundi	24.6	14.4	38.2
Cameroon	18.8	10.9	29.2
Cape Verde	12.0	6.9	18.7
Central African Republic	13.7	7.9	21.5
Chad	10.7	6.2	16.9
Comoros	10.7	6.1	16.8
Congo, Democratic Republic of the	14.7	8.5	23.1
Congo, Republic of the	10.5	6.1	16.5
Equatorial Guinea	3.3	1.8	5.2
Eritrea	11.0	6.3	17.3
Ethiopia	11.7	6.7	18.3
Gabon	13.2	7.6	20.7
Gambia	13.7	7.9	21.4
Ghana	19.3	0.0	44.5
Guinea	10.7	6.1	16.8
Guinea Bissau	13.3	7.6	20.8
Ivory Coast	13.3	7.7	20.8
Kenya	11.5	6.6	18.0
Lesotho	13.6	7.9	21.3
Liberia	15.0	8.7	23.4
Madagascar	11.6	6.7	18.2
Malawi	11.7	6.7	18.4
Mali	10.5	6.0	16.5
Mauritania	9.8	5.6	15.5
Mauritius	6.9	3.9	10.8
Mozambique	12.5	7.2	19.6
Namibia	21.1	12.2	32.8
Niger	10.9	6.2	17.2
Nigeria	12.0	1.1	25.9
Rwanda	26.9	15.7	41.6
Sao Tome & Principe	14.9	8.6	23.2
Senegal	10.3	5.9	16.2
Seychelles	5.1	2.9	8.0
Sierra Leone	21.9	12.8	34.0
South Africa*	585.3	430.7	761.7
South Sudan	10.3	5.9	16.3
Swaziland	10.8	6.2	16.9
Tanzania, United Republic of	22.4	13.1	34.9
Togo	12.1	7.0	19.0
Uganda	30.5	17.9	47.2
Zambia	27.5	0.5	61.5
Zimbabwe	12.2	7.0	19.1
EASTERN-MEDITERRANEAN REGION			
Afghanistan	0.4	0.0	3.3
Bahrain	0.1	0.0	0.6
Djibouti	0.4	0.0	3.4
Egypt	0.3	0.0	2.1
Iran	0.2	0.0	1.7
Iraq	0.2	0.0	1.8
Jordan	0.3	0.0	2.1
Kuwait	0.0	0.0	0.0
Lebanon	0.2	0.0	1.9
Libya	0.1	0.0	1.1
Morocco	0.3	0.0	2.6
Oman	0.0	0.0	0.4
Pakistan	0.3	0.0	2.9
Qatar	0.0	0.0	0.0
Saudi Arabia	0.0	0.0	0.3
Somalia	0.4	0.0	3.5
Sudan	0.4	0.0	3.7

Country	Prevalence Estimate	95% Confidence Interval	
		Lower	Upper
Tunisia	0·3	0·0	2·1
United Arab Emirates	0·0	0·0	0·2
Yemen	0·4	0·0	3·0
EUROPEAN REGION			
Albania	28·9	17·3	43·8
Armenia	27·6	16·4	42·1
Austria	19·4	11·9	28·9
Azerbaijan	14·0	8·2	21·7
Belarus	69·1	42·1	103·5
Belgium	22·2	13·6	33·1
Bosnia and Herzegovina	25·9	15·3	39·9
Bulgaria	48·5	29·7	72·3
Croatia*	115·2	34·8	236·0
Cyprus	30·7	18·8	45·7
Czech Republic	53·9	33·1	80·1
Denmark	68·0	36·2	111·4
Estonia	53·4	32·8	79·3
Finland	23·3	14·3	34·8
France*	41·4	0·0	112·6
Georgia	34·6	20·8	52·4
Germany	38·3	0·0	105·4
Greece	31·3	19·1	46·7
Hungary	45·3	27·8	67·4
Iceland	13·1	8·0	19·7
Ireland	89·7	50·4	142·8
Israel	10·3	0·0	44·9
Italy*	82·1	42·1	134·6
Kazakhstan	23·0	13·9	34·8
Kyrgyzstan	28·2	16·7	43·3
Latvia	47·9	29·4	71·2
Lithuania	37·1	0·0	99·0
Luxembourg	3·0	1·7	4·8
Macedonia, Republic of	24·5	14·7	37·4
Malta	29·8	18·2	44·3
Moldova, Republic of	44·0	26·6	66·3
Montenegro	30·4	18·3	45·9
Netherlands	26·7	13·7	44·6
Norway	33·6	7·7	67·6
Poland	36·3	22·3	54·2
Portugal	44·0	27·1	65·4
Romania	42·0	25·7	62·7
Russian Federation	54·2	21·7	98·4
Serbia, Republic of	40·9	24·9	61·5
Slovakia	36·2	22·2	53·9
Slovenia	40·0	24·5	59·4
Spain	22·2	3·2	46·7
Sweden	13·9	2·8	28·4
Switzerland	48·5	28·5	75·0
Tajikistan	22·8	13·3	35·5
Turkey	11·2	6·5	17·4
Turkmenistan	16·4	9·7	25·4
Ukraine	50·5	21·3	90·5
United Kingdom	61·3	35·8	95·1
Uzbekistan	24·9	14·7	38·4
REGION OF THE AMERICAS			
Antigua and Barbuda	14·3	8·6	21·7
Argentina	19·2	11·5	29·0
Bahamas	17·9	10·7	27·2
Barbados	21·8	13·1	33·0
Belize	14·2	8·6	21·4
Bolivia	15·6	9·4	23·5
Brazil	22·6	11·7	37·6
Canada*	10·5	0·0	34·9
Chile	15·8	9·5	24·0
Colombia	13·4	8·1	20·2
Costa Rica	12·3	7·5	18·6
Cuba	7·1	4·3	10·8
Dominica	21·7	13·1	32·7

Country	Prevalence Estimate	95% Confidence Interval	
		Lower	Upper
Dominican Republic	18.0	10.9	27.0
Ecuador	13.2	8.0	19.9
El Salvador	12.3	7.4	18.6
Grenada	34.7	20.9	52.5
Guatemala	9.7	5.8	14.7
Guyana	27.0	16.4	40.6
Haiti	22.2	13.5	33.3
Honduras	15.8	9.6	23.8
Jamaica	13.9	8.4	20.9
Mexico	1.8	0.0	4.5
Nicaragua	13.2	8.0	20.0
Panama	17.3	10.4	26.2
Paraguay	26.6	16.1	40.0
Peru	18.5	11.2	27.9
Puerto Rico	5.0	3.0	7.7
St Kitts and Nevis	14.1	8.5	21.4
St Lucia	32.4	19.5	49.0
St Vincent and Grenadines	22.2	13.4	33.4
Suriname	15.1	9.1	22.7
Trinidad and Tobago	8.4	5.0	12.7
United States of America*	22.5	8.3	42.9
Uruguay	13.0	7.9	19.7
Venezuela	14.8	8.9	22.3
SOUTH-EAST ASIA REGION			
Bangladesh	3.1	0.0	17.1
Bhutan	2.5	0.0	13.8
India	2.9	0.0	16.3
Indonesia	2.2	0.0	12.6
Maldives	2.1	0.0	11.8
Myanmar	2.9	0.0	16.1
Nepal	3.2	0.0	17.7
Sri Lanka	2.3	0.0	12.8
Thailand	2.1	0.0	11.7
Timor-Leste	3.2	0.0	17.7
WESTERN PACIFIC REGION			
Australia*	2.4	0.0	11.8
Brunei Darussalam	0.7	0.4	1.0
Cambodia	22.8	13.5	35.1
China	9.6	3.0	18.4
Fiji	16.8	9.9	25.9
Japan	11.8	5.9	20.1
Kiribati	20.7	12.1	32.0
Korea, Republic of	31.8	14.1	56.0
Laos	29.7	17.9	44.9
Malaysia	7.9	4.7	12.2
Marshall Islands	18.3	10.7	28.5
Micronesia	20.1	11.8	31.1
Mongolia	25.9	15.6	39.2
New Zealand	39.6	21.7	64.1
Palau	22.6	13.7	34.1
Papua New Guinea	22.0	13.0	33.9
Philippines	24.6	14.8	37.5
Samoa	16.8	9.8	26.0
Singapore	0.8	0.5	1.3
Solomon Islands	20.8	12.2	32.3
Tonga	17.9	10.5	27.7
Tuvalu	20.0	11.8	30.9
Vanuatu	19.6	11.5	30.3
Viet Nam	17.7	10.4	27.4

*Estimate based on a meta-analysis of the current literature.

Note. Prediction of the prevalence of alcohol use during pregnancy for Andorra, Cook Islands, Monaco, Nauru, Niue, North Korea, San Marino, and Syrian Arab Republic was not possible due to missing data.

Table A8. Results of the tests of heterogeneity and publication bias for the primary meta-analyses on the prevalence of FAS among the general population, by country and region

Country (WHO region)	# of studies	Heterogeneity tests				Publication bias tests	
		I ² test	Q statistic	df (Q statistic)	p-value (Q statistic)	p-value (rank test)	p-value (regression test)
AFRICAN REGION							
South Africa	9 ^{361,363,365-371}	90.3%	67.4	8	<0.001	0.761	0.237
EUROPEAN REGION							
Croatia	2 ^{55,56}	61.2%	2.6	1	0.109	-	-
France	4 ^{68,375,377,378}	95.1%	41.4	3	<0.001	0.750	0.465
Italy	2 ^{381,382}	0%	0.001	1	0.928	-	-
REGION OF THE AMERICAS							
Canada	2 ^{387,388}	98.7%	78.7	1	<0.001	-	-
United States of America	9 ^{390,394,401,403- 405,410,413,414}	97.9%	135.4	8	<0.001	0.119	<0.001
WESTERN PACIFIC REGION							
Australia	2 ^{419,421}	98.1%	51.8	1	<0.001	-	-

df=degrees of freedom. WHO=World Health Organization.

Table A9. Results of the tests of heterogeneity and publication bias for the secondary meta-analyses on the prevalence of FAS among the general population, by country and region

Country (WHO region)	# of studies	Prevalence (per 10,000)	95% Confidence Interval		I ² test	Heterogeneity tests			Publication bias tests	
			Lower	Upper		Q statistic	df (Q statistic)	p-value (Q statistic)	p-value (rank test)	p-value (regression test)
AFRICAN REGION										
South Africa	9 ^{361,363,365-371}	585.3	430.7	761.7	90.3%	67.4	8	<0.001	0.761	0.237
EUROPEAN REGION										
Croatia	2 ^{35,56}	115.2	34.8	236.0	61.2%	2.6	1	0.109	-	-
France	7 ^{68,372,374-378}	28.5	0.0	62.9	95.0%	56.6	6	<0.001	0.381	0.823
Italy	3 ^{99,381,382}	41.2	0.0	123.6	87.9%	19.3	2	<0.001	1.0	0.231
Sweden	2 ^{383,384}	16.2	8.6	26.2	0%	0.1	1	0.762	-	-
United Kingdom	3 ^{99,372,386}	0.4	0.0	1.9	0%	0.9	2	0.650	0.333	0.353
REGION OF THE AMERICAS										
Canada	2 ^{387,388}	10.5	0.0	34.9	98.7%	78.7	1	<0.001	-	-
United States of America	24 ^{309,390-394,396-411,413,414}	9.2	4.8	14.9	99.9%	1191.1	23	<0.001	0.902	<0.001
WESTERN PACIFIC REGION										
Australia	7 ^{315,416,418-421}	0.9	0.0	2.3	99.4%	476.5	6	<0.001	0.381	0.444

df=degrees of freedom. WHO=World Health Organization.

Table A10. Critical appraisal of studies reporting on the prevalence of FAS among the general population

Reference	1. Was the sample representative of the target population?		2. Were study participants recruited in an appropriate way?		3. Was the sample size adequate?		4. Were the study subjects and the setting described in detail?		5. Was the data analysis conducted with sufficient coverage of the identified sample?		6. Were objective, standard criteria used for the measurement of the condition?		7. Was the condition measured reliably?		8. Was there appropriate statistical analysis?		9. Are all important confounding factors/subgroups/differences identified and accounted for?		10. Were subpopulations identified using objective criteria?		
	Y	N/ Unclear	Y	N/ Unclear	Y	N/ Unclear	Y	N/ Unclear	Y	N/ Unclear	Y	N/ Unclear	Y	N/ Unclear	Y	N/ Unclear	Y	N/ Unclear	Y	N/ Unclear	
416	X				X		X		X		X		X								
387	X		X		X		X		X		X		X				X			X	
315	X		X		X		X		X		X		X				X				
418	X				X		X				X		X					X			
390		X	X		X		X		X		X		X								
391	X				X		X		X		X		X								
219	X				X		X		X		X		X				X			X	
220	X				X		X		X		X		X								
361	X		X		X		X		X		X		X								
386	X		X		X		X		X		X		X		X						
363	X		X		X		X		X		X		X		X						
394	X		X		X		X		X		X		X								
68	X		X		X		X		X		X		X				X			X	
374	X			X	X		X		X		X		X		X						
375	X				X		X		X		X		X		X						
376	X			X	X		X		X		X		X		X						
396	X				X		X		X		X		X								
397	X				X		X		X		X		X				X			X	
419	X		X		X		X		X		X		X					X			
398	X				X		X		X		X		X								
399	X				X		X		X		X		X				X			X	
385	X		X		X		X		X		X		X		X						
420	X				X		X		X		X		X				X		X		
388	X		X		X		X		X		X		X		X						
400	X				X		X		X		X		X								
421	X		X		X		X		X		X		X				X			X	
401	X		X		X		X		X		X		X								
383	X		X		X		X		X		X		X		X						
424	X		X		X		X		X		X		X		X						
426	X		X		X		X		X		X		X		X						
402	X		X		X		X		X		X		X		X						
309	X				X		X		X		X		X		X						
415	X		X		X		X		X		X		X		X						
365	X		X		X		X		X		X		X		X						
381	X		X		X		X		X		X		X		X						
366	X		X		X		X		X		X		X		X						
382	X		X		X		X		X		X		X		X						
367	X		X		X		X		X		X		X		X						
403	X		X		X		X		X		X		X		X						

Reference	1. Was the sample representative of the target population?		2. Were study participants recruited in an appropriate way?		3. Was the sample size adequate?		4. Were the study subjects and the setting described in detail?		5. Was the data analysis conducted with sufficient coverage of the identified sample?		6. Were objective, standard criteria used for the measurement of the condition?		7. Was the condition measured reliably?		8. Was there appropriate statistical analysis?		9. Are all important confounding factors/subgroups/differences identified and accounted for?		10. Were subpopulations identified using objective criteria?		
	Y	N/ Unclear	Y	N/ Unclear	Y	N/ Unclear	Y	N/ Unclear	Y	N/ Unclear	Y	N/ Unclear	Y	N/ Unclear	Y	N/ Unclear	Y	N/ Unclear	Y	N/ Unclear	
404	X		X		X		X		X		X		X		X						
405	X		X		X		X		X		X		X		X						
380	X				X		X					X		X		X					
406	X				X			X				X		X				X			
407	X				X			X				X		X				X			
408	X				X			X				X		X			X			X	
372	X		X		X			X				X		X							
384	X		X		X		X		X		X		X		X						
368	X		X			X		X		X		X		X							
409	X		X		X		X		X		X		X		X						
56	X		X		X			X		X		X		X							
55	X		X		X			X		X		X		X							
410	X		X		X			X		X		X		X							
99	X		X		X			X				X		X							
423	X		X		X		X					X		X						X	
377	X		X		X			X		X		X		X							
411	X		X		X			X		X		X		X							
413	X		X		X			X		X		X		X							
378	X		X		X			X		X		X		X							
369	X		X		X			X		X		X		X							
370	X		X		X			X		X		X		X							
371	X		X		X			X		X		X		X							
414	X		X		X			X		X		X		X							

Y=yes. N=no.

Note. The absence of an "X" means that the respective criterion was "not applicable".

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