



Supporting Information

Supplementary methods and results

**This appendix was part of the submitted manuscript and has been peer reviewed.
It is posted as supplied by the authors.**

Appendix to: Huda MM, Ward J, Mamun AA. Measuring progress toward the Closing the Gap healthy birthweight target for Indigenous babies: an analysis of Queensland perinatal data, 2011–2020. *Med J Aust* 2024; doi: 10.5694/mja2.52408.

Supplementary methods

Selection and measurements of socio-demographic and health-related variables

The seven most frequent socio-demographic and health behaviour-related determinants of adverse birth outcomes, including low birthweight, were included in this study for the association analysis: maternal age, socio-economic status and geographic remoteness of the mother's residential postcode, maternal smoking during pregnancy, maternal body mass index (BMI), and maternal health conditions and maternal health care use, including antenatal care visits (Table 1).

The three socio-demographic factors were: maternal age, socioeconomic status of the mother's residential postcode, and geographic remoteness (Table 1). The Queensland Perinatal Data Collection (QPDC) records data on maternal age in completed years. In this study, we categorised maternal age into five groups: <20 years, 20-24 years, 25-34 years, 35-39 years, and ≥ 40 years. The socio-economic status of the residing areas of the mother was derived by applying the ABS 2016 Socio-Economic Indexes for Areas Index of Relative Socioeconomic Disadvantage¹ to the mother's usual residence and categorised by quintile (most disadvantaged to least disadvantaged). Finally, geographic remoteness was derived by applying the ABS 2016 Australian Statistical Geography Standard² to the area of the mother's usual residence, and further categorised as major cities, regional and remote areas (Table 1).

This study also considered four health and behaviour-related factors: maternal smoking during pregnancy, maternal BMI, maternal health conditions, and maternal health care use. Maternal smoking status was considered "smoked" if the mother smoked during pregnancy; otherwise, it was considered "did not smoke". Maternal BMI is the weight in kilograms divided by the square of the height in metres. Using maternal height and weight, maternal BMI was calculated and categorised as: underweight (BMI <18.5), normal weight (BMI ≥ 18.5 and <25), Overweight (BMI ≥ 25 and <30), and Obese (BMI ≥ 30). QPDC records data on pre-existing maternal diseases, conditions, and other diseases, illnesses, or conditions arising during the current pregnancy that are not directly attributable to pregnancy but may significantly affect care during the current pregnancy or pregnancy outcomes, including essential hypertension, psychiatric disorders, diabetes mellitus, epilepsy, cardiac disease, and chronic renal disease.³ Indicators of conditions that the clinician regards as affecting the management of the pregnancy were considered pre-existing medical conditions in this study. QPDC also collects data on the total number of antenatal care visits by a pregnant woman; we classified the number as fewer than 4 visits, 4-7 visits, or 8 or more visits in this study (Table 1).³

Statistical analysis

We first calculated the proportion of babies with healthy birthweight by year, expressed as a proportion of total singleton live births for each year (Table 2). We estimated the proportion of babies with healthy birthweight by year in four groups: (i) Indigenous babies born to non-Indigenous mothers, (ii) Indigenous babies born to Indigenous mothers, (iii) all Indigenous babies irrespective of mothers' Indigenous status, and (iv) non-Indigenous babies born to non-Indigenous mothers. In each group, the proportions over time were also fitted using fractional-polynomial regression to determine the mean proportion across the study period. We also examined the association between the mother's Indigenous status and healthy birthweight for Indigenous babies (binary outcome: healthy birthweight: 1=yes, 0=no) in a subsample of Indigenous babies for whom information for all covariates included in a logistic regression model was available (39 122 of 46 987). We assessed unadjusted associations between healthy birthweight and maternal Indigeneity among Indigenous babies in bivariate logistic regression models; the adjusted model included the seven most frequent socio-demographic and health behaviour-related determinants of adverse birth outcomes: low birthweight, maternal age (<20 years, 20-24 years, 25-34 years, 35-39 years, ≥ 40 years), living in socio-economically disadvantaged areas (quintile 1=most disadvantaged to quintile 5=least disadvantaged), remoteness (major cities, regional, remote), smoking during pregnancy (smoked, did not smoke), body mass index (underweight, normal weight, overweight, obese), pre-existing medical conditions (yes, no), and number of antenatal care visits (fewer than 4 visits, 4-7 visits, 8 or more visits). Both the unadjusted and adjusted models included babies' birth years as a covariate to take into account annual variation in the data. Adjusted and unadjusted odds ratios with 95% confidence intervals are reported.

Table 1. Measurement of outcome, exposure, and other variables

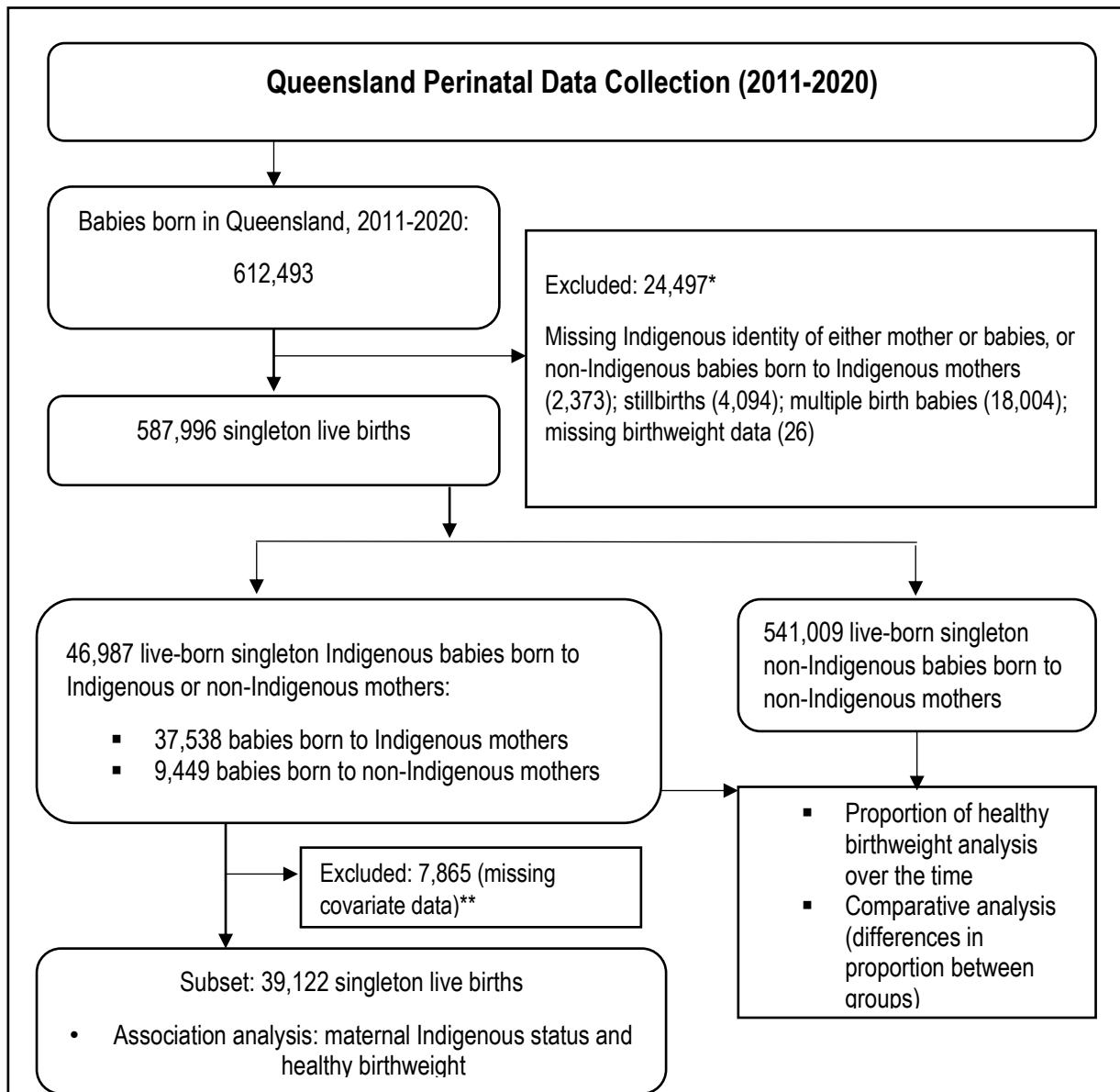
Variable	Description	Measurement
Outcome		
– Healthy birthweight	The newborn infant’s first weight is usually taken within the first hour of life. The weight of an infant at birth from 2500 grams to less than 4500 grams, irrespective of the infant’s gestational age were considered as healthy birthweight.	Nominal: 1= Yes, 0=No
Exposure of interest		
– Indigeneity	The QPDC determines the Indigenous identity of babies and mothers by asking this question to all mothers, following a standard guideline described in the ‘Are you of Aboriginal or Torres Strait Islander origin?’ pamphlet ³	Nominal: 1= Indigenous, 0=Non-Indigenous
Socio-demographic factors		
– Maternal age	Age in completed years. Age was further categorised into five age groups.	Ordinal: 1= <20 years, 2=20-24 years, 3=25-34 years, 4=35-39 years, 5= ≥40 years
– Area-level socio-economic status	Area-level socioeconomic status derived by applying ABS 2016 Socio-Economic Indexes for Areas Index of Relative Socio-economic Disadvantage ¹ to the place of mother’s usual residence	Ordinal: 1=Q1 (Quintile 1, most disadvantaged), 2=Q2, 3=Q3, 4=Q4, 5=Q5 (least disadvantaged)
– Remoteness area	Remoteness area derived by applying ABS 2016 Australian Statistical Geography Standard ² to the area of mother’s usual place of residence. Remoteness is categorised into three groups: major cities, regional (outer and inner cities), remote (remote and very remote)	Nominal: 1=Major cities, 2=Regional, 3= Remote
Health and behaviour-related factors		
– Maternal smoking	Mother’s tobacco smoking status during pregnancy is self-reported. Maternal smoking status during pregnancy was considered as ‘smoked’ if the mother smoked at all during pregnancy; otherwise, it was considered “did not smoke”.	Nominal: 1 = Smoked; 2 = Did not smoke
– Maternal BMI	Body mass index (BMI): A measure of an adult’s weight (body mass) relative to height, used to assess the extent of weight deficit or excess where height and weight have been measured. Body mass index is the weight in kilograms divided by the square of the height in metres. BMI is categorised into 4 groups: underweight (BMI <18.5), normal weight (BMI >=18.5 and <25), overweight (BMI >=25 and <30), and Obese (BMI >=30)	Ordinal: 1=Underweight, 2=Normal weight, 3=Overweight, 4=Obese
– Pre-existing medical condition reported	Indicators of pre-existing medical conditions of pregnant women that are regarded by the clinician to affect the management of the pregnancy are considered as pre-existing medical conditions of the mother in this study	Nominal: 1 = Yes; 2 = No
– Antenatal care visit	Number of antenatal care visits were attended by a pregnant woman. The number of antenatal care visits is further classified into three groups: i) less than 4 visits, ii) 4-7 visits, and iii) 8 plus visits in this study	Ordinal: 1=Fewer than 4 visits, 2=4-7 visits, 3=8 or more visits

Indigenous ethics approval statement

Professor Ward, co-author of this research letter, is an Aboriginal leader in health research. The manuscript was reviewed by the Institute for Urban Indigenous Health (Brisbane, Queensland) with no comments received. The study was approved by the Metro North Health Human Research Ethics Committee, Queensland Health (HREC/2021/QRBW/70547) and Research Ethics and Integrity, The University of Queensland (2021/HE000721). Both the University of Queensland Human Research Ethics Committee and Metro North Health Human Research Ethics Committee have members who are Aboriginal and or Torres Strait Islander. The state of Queensland does not have an Aboriginal and Torres Strait Island Human Research Ethics Committee.

Supplementary results

Figure 1. Selection of sample for analysis



* Inclusion criteria: i) non-missing maternal and babies' Indigenous identity, ii) Indigenous babies born to Indigenous or non-Indigenous mothers, and non-Indigenous babies born to non-Indigenous mothers, iii) singleton birth, iv) not a stillbirth, and v) non-missing birthweight.

** Missing data area-level socio-economic status (four), maternal body mass index (1468), maternal smoking (269), antenatal care visits (6759), and pre-existing medical conditions (three).

Table 2. Characteristics of the mothers of the 587,996 singleton babies born alive in Queensland during 2011–2020

	Indigenous mothers	Non-Indigenous mothers	Total
Babies, by Indigenous status			
– Indigenous	37538	550458	587996
– Non-Indigenous	—	9449	46987
– Total	37538	541009	541009
Subsample of babies for association analysis			
Indigenous babies	31,179	7,943	39,122
Maternal age			
– <20 years	4583 (14.7%)	882 (11.1%)	5465 (14.0%)
– 20-24 years	10361 (33.2%)	2336 (29.4%)	12697 (32.4%)
– 25-34 years	13275 (42.6%)	3850 (48.5%)	17125 (43.8%)
– 35-39 years	2358 (7.6%)	700 (8.8%)	3058 (7.8%)
– ≥40 years	602 (1.9%)	175 (2.2%)	777 (2.0%)
Area-level socio-economic status			
– Q1 (most disadvantaged)	15497 (49.7%)	2888 (36.4%)	18385 (47.0%)
– Q2	7787 (25.0%)	2158 (27.2%)	9945 (25.4%)
– Q3	4166 (13.4%)	1319 (16.6%)	5485 (14.0%)
– Q4	2650 (8.5%)	1065 (13.4%)	3715 (9.5%)
– Q5 (least disadvantaged)	1079 (3.5%)	513 (6.5%)	1592 (4.1%)
Remoteness area			
– Major cities	8649 (27.7%)	3301 (41.6%)	11950 (30.6%)
– Regional	16992 (54.5%)	4364 (54.9%)	21356 (54.6%)
– Remote	5538 (17.8%)	278 (3.5%)	5816 (14.9%)
Maternal smoking during pregnancy			
– Did not smoke	17309 (55.5%)	5525 (69.6%)	22834 (58.4%)
– Smoked	13870 (44.5%)	2418 (30.4%)	16288 (41.6%)
Maternal body mass index			
– Underweight	2662 (8.5%)	588 (7.4%)	3250 (8.3%)
– Normal weight	12148 (39.0%)	3385 (42.6%)	15533 (39.7%)
– Overweight	7401 (23.7%)	1881 (23.7%)	9282 (23.7%)
– Obese	8968 (28.8%)	2089 (26.3%)	11057 (28.3%)
Pre-existing medical condition			
– no	17860 (57.3%)	4840 (60.9%)	22700 (58.0%)
– yes	13319 (42.7%)	3103 (39.1%)	16422 (42.0%)
Antenatal care visit			
– Fewer than 4 visits	1883 (6.0%)	281 (3.5%)	2164 (5.5%)
– 4-7 visits	8698 (27.9%)	1558 (19.6%)	10256 (26.2%)
– 8 or more visits	20598 (66.1%)	6104 (76.8%)	26702 (68.2%)

Table 3. Healthy birthweight for Indigenous and non-Indigenous babies, Queensland, 2011–2020

Year	Proportion of healthy birthweight				Estimated differences in proportions: percentage points (95% CI)		
	Non-Indigenous babies born to non-Indigenous mothers [a]	Indigenous babies born to Indigenous mothers [b]	Indigenous babies born to non-Indigenous mothers [c]	Indigenous babies irrespective of maternal indigeneity [d]	[a – b]	[c – b]	[d – b]
2011	51031 (93.68%)	2786 (88.14%)	844 (92.85%)	3630 (89.19%)	5.54 (4.40, 6.69)	4.71 (2.69, 6.73)	1.05 (-0.42, 2.53)
2012	52473 (93.22%)	3125 (88.65%)	613 (93.30%)	3738 (89.38%)	4.57 (3.50, 5.63)	4.65 (2.47, 6.83)	0.71 (-0.67, 2.13)
2013	52507 (93.75%)	3180 (88.46%)	568 (92.36%)	3748 (89.03%)	5.29 (4.23, 6.36)	3.90 (1.56, 6.25)	0.57 (-0.84, 1.98)
2014	52799 (93.73%)	3345 (88.89%)	615 (93.32%)	3960 (89.55%)	4.84 (3.81, 5.86)	4.43 (2.28, 6.59)	0.66 (-0.69, 2.01)
2015	50789 (93.69%)	3267 (89.31%)	703 (92.38%)	3970 (89.84%)	4.38 (3.36, 5.40)	3.07 (0.93, 5.20)	0.53 (-0.81, 1.87)
2016	51513 (93.76%)	3457 (89.42%)	872 (90.08%)	4329 (89.55%)	4.34 (3.35, 5.33)	0.66 (-1.46, 2.78)	0.13 (-1.16, 1.43)
2017	49178 (93.77%)	3405 (88.56%)	987 (90.88%)	4392 (89.07%)	5.21 (4.19, 6.24)	2.32 (0.34, 4.31)	0.51 (-0.82, 1.84)
2018	49564 (94.00%)	3418 (88.96%)	1059 (91.14%)	4477 (89.47%)	5.04 (4.03, 6.05)	2.18 (0.26, 4.08)	0.51 (-0.80, 1.81)
2019	48996 (93.72%)	3703 (88.91%)	1114 (92.29%)	4817 (89.67%)	4.81 (3.84, 5.79)	3.38 (1.61, 5.17)	0.76 (-0.49, 2.01)
2020	48145 (93.84%)	3635 (88.27%)	1316 (92.35%)	4951 (89.32%)	5.57 (4.56, 6.57)	4.08 (2.39, 5.77)	1.05 (-0.23, 2.32)
Total	506995 (93.71%)	33321 (88.77%)	8691 (91.98%)	42012 (89.41%)	4.97 (4.62, 5.97)	4.92 (4.59, 5.24)	0.65 (0.22, 1.07)

CI = confidence interval.

References

1. Australian Bureau of Statistics. Index of Relative Socio-economic Disadvantage (IRSD). In: Socio-Economic Indexes for Areas (SEIFA), Australia, 2021. 27 Apr 2021. <https://www.abs.gov.au/statistics/people/people-and-communities/socio-economic-indexes-areas-seifa-australia/latest-release#index-of-relative-socio-economic-disadvantage-irsd-> (viewed Nov 2023).
2. Australian Bureau of Statistics. Australian Statistical Geography Standard (ASGS), volume 5. Remoteness structure (1270.0.55.005). 16 Mar 2018. <https://www.abs.gov.au/ausstats/abs@.nsf/mf/1270.0.55.005> (viewed Nov 2023).
3. State of Queensland (Queensland Health). Queensland Perinatal Data Collection (QPDC) Manual 2019-2020 Collection Year. 2019. https://www.health.qld.gov.au/__data/assets/pdf_file/0029/858431/qpdc-manual-1920-v1.0.pdf . (viewed July 2024).

STROBE Statement—checklist of items that should be included in reports of observational studies (page numbers refer to the submitted manuscript, not to the published article or its supplementary information file)

	Item No.	Recommendation	Page No.	Relevant text from manuscript
Title and abstract	1	(a) Indicate the study's design with a commonly used term in the title or the abstract	1 (in abstract)	Using population-based cross-sectional data
		(b) Provide in the abstract an informative and balanced summary of what was done and what was found	1	
Introduction				
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported	1	
Objectives	3	State specific objectives, including any prespecified hypotheses	1	Therefore, this study aims to examine differences in healthy birth weight between Indigenous babies born to Indigenous and non-Indigenous mothers and their impact on the existing CTG-2 goal measurement.
Methods				
Study design	4	Present key elements of study design early in the paper	1	As a case study, we analysed the Queensland Perinatal Data Collection (QPDC) which is a population-based cross-sectional data collection
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	1	2 nd paragraph
Participants	6	(a) <i>Cohort study</i> —Give the eligibility criteria, and the sources and methods of selection of participants. Describe methods of follow-up <i>Case-control study</i> —Give the eligibility criteria, and the sources and methods of case ascertainment and control selection. Give the rationale for the choice of cases and controls <i>Cross-sectional study</i> —Give the eligibility criteria, and the sources and methods of selection of participants	1 and Figure 1 in appendix	Population-based cross-sectional
		(b) <i>Cohort study</i> —For matched studies, give matching criteria and number of exposed and unexposed	N/A	

		<i>Case-control study</i> —For matched studies, give matching criteria and the number of controls per case		
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	In appendix	Supplementary text
Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group	In appendix	Supplementary text
Bias	9	Describe any efforts to address potential sources of bias	In appendix	Supplementary text
Study size	10	Explain how the study size was arrived at	Figure 1 in appendix	
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	In appendix	
Statistical methods	12	(a) Describe all statistical methods, including those used to control for confounding	In appendix	
		(b) Describe any methods used to examine subgroups and interactions	In appendix	
		(c) Explain how missing data were addressed	N/A (only complete cases were analysis)	
		(d) <i>Cohort study</i> —If applicable, explain how loss to follow-up was addressed <i>Case-control study</i> —If applicable, explain how matching of cases and controls was addressed <i>Cross-sectional study</i> —If applicable, describe analytical methods taking account of sampling strategy	N/A	
		(e) Describe any sensitivity analyses	N/A	
Results				
Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed	1 and in appendix	
		(b) Give reasons for non-participation at each stage	In appendix	
		(c) Consider use of a flow diagram	Figure 1 in appendix	
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders	Table 1 in appendix	
		(b) Indicate number of participants with missing data for each variable of interest	Figure 1 in appendix	

		(c) <i>Cohort study</i> —Summarise follow-up time (eg, average and total amount)	N/A	
Outcome data	15*	<i>Cohort study</i> —Report numbers of outcome events or summary measures over time	N/A	
		<i>Case-control study</i> —Report numbers in each exposure category, or summary measures of exposure	N/A	
		<i>Cross-sectional study</i> —Report numbers of outcome events or summary measures	2	Figure 1, Table 1, and Table 2 in appendix
Main results	16	(a) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included	1&2	In appendix
		(b) Report category boundaries when continuous variables were categorized	In appendix	
		(c) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	N/A	
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses	2	
Discussion				
Key results	18	Summarise key results with reference to study objectives	2	
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias	2	
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	2	
Generalisability	21	Discuss the generalisability (external validity) of the study results	2	
Other information				
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	In the submission system	

*Give information separately for cases and controls in case-control studies and, if applicable, for exposed and unexposed groups in cohort and cross-sectional studies.

Note: An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at <http://www.plosmedicine.org/>, Annals of Internal Medicine at <http://www.annals.org/>, and Epidemiology at <http://www.epidem.com/>). Information on the STROBE Initiative is available at www.strobe-statement.org.