

Table S1. List of included studies in systematic review of birth weight standards and neonatal outcomes

Author, Year and Country	Population	Method of defining gestational age	Birth weight parameter	Outcome Measure	Total number of neonates	Number with specified outcome
Als et al 1976 ³⁵ USA	Unclear if singleton/ mixed Infants with IUGR and same number of control infants Year of birth No congenital anomalies included Ethnicity: all Caucasian	LMP and Dubowitz method	Ponderal Index <2.25	Brazelton motor score (10 days old), below average 3	20	4
Ananth and Vintzelios 2009 ³⁶ USA	Singleton General population in USA during study period Year of birth 1995- 2004 Congenital anomaly excluded Ethnicity 77.4% white, 17.5% black, 5.2% other	Clinical estimate (combination of USS, obstetrical and newborn examination)	Population chart <10 th centile (internal chart based on this population)	Neonatal death (28 days, from national dataset)[10,785]	18,169,349	10,785
Arora, Paul and Singh 1987 ³⁷ India	Unclear if singleton/ mixed Consecutive hospital born infants with IUGR and same number of control infants Year of birth 1984-	Unreported	Population chart <10 th centile (Singh chart)	1. Neonatal mortality (precise age unclear) 2. Neonatal hypoglycaemia ≤30mg/dL (2-20 hours of age)	200	1. 3 2. 12

Balcazar and Haas 1990 ³⁸ Mexico	1985 Congenital anomaly NOT excluded Ethnicity unreported Singleton Infants born to women of low social class at a mother and child centre Year of birth 1981-1983 Congenital anomaly NOT excluded Ethnicity unreported	LMP	1.Population chart < 10 th centile(Lubchenco chart) 2.Birth weight <2.9kg	Neonatal death (72 hours)	9201	43
Bhargava, Sachdev and Ghosh 1985 ³⁹ India	Singleton Hospital population, consecutive births Year of birth unreported No exclusions specified Ethnicity unreported	LMP, confirmed by neonatal physical and neurological examination	1 Birth weight > -1 Standard Deviation (from population mean) 2. Birth weight> -2 Standard deviations (from population mean)	Neonatal mortality (7 days)	15,596	212
De Almeida and de Mello Jorge 1998 ⁴⁰ Brazil	Hospital population (11 centres) Year of birth 1992 Singleton Excluded if gestational age unknown Ethnicity unreported	LMP	Population chart <10th percentile (Lubchenco chart)	Neonatal death (28 days)	2024	13
Doctor et al 2001 ⁴¹ USA	Hospital population Year of birth 1997 Mixed singleton and	Second trimester ultrasound scan	Population chart <10th percentile (Alexander et al reference chart)	1.Neonatal intubation required (at birth) 2.Neonatal intensive care	744	1. 14 2. 41 3. 22

	multiple pregnancy Infants with birth weight < 10 th percentile, and matched controls birth weight 10 th -90 th percentile Excluded if gestational age unreliable Ethnicity: 38% Caucasian, 60% African American, 2% other		Population chart <5 th percentile (Alexander et al reference chart)	unit admission required (neonatal) 3. Respiratory distress (transient tachypnoea requiring oxygen RR>60/min for more than 4 hours/pneumonia clinical and radiological/meconium aspiration with supportive radiology (neonatal) 4. Hypoglycaemia (blood glucose < 40mg/dL and symptoms- jittery/ tachypnoeic/hypothermic) (neonatal) 5. Seizures (threshold unreported) (neonatal)		4. 22 5. 3
Ferdynus et al 2009 ⁷ France	Births in the Burgundy region from 2000 to 2006 Singleton Chromosomal anomalies excluded Ethnicity not reported	LMP and early USS	1. Population chart <10 th percentile (based on whole study population) 2. 'Healthy population' chart <10 th percentile (excluding maternal diabetes, hypertension, pre-eclampsia/eclampsia, abruption placentae, placenta praevia, presumed chorioamnionitis)	1. Neonatal mortality (death during hospital stay) 2. HIE (definition not specified) (neonatal)	121,312	1. 61 2. 53
Figueras et al 2007 ²⁸	Hospital population Year of birth 2001-	Early second trimester	1. Population chart <10 th percentile	1. Neurological morbidity (Seizures, IVH> grade 2,	12,705	1. 56 2. 15

Spain	2005 Singleton Congenital and chromosomal anomalies excluded 58% multiparous mothers Ethnicity: 73.9% White, 4.6% South East Asian, 2.3% Central African, 18.2% South American, Other 0.9%	ultrasound	(Santamaria Spanish population chart) 2. Customised centile chart <10 th percentile (Gardosi et al)	PVL, HIE or abnormal EEG (neonatal) 2. Non-neurological morbidity (NICU stay > 10 days, NEC (Walsh criteria), renal failure (SCr > 132.6 µmol/l / 1.5mg/dl), cardiac failure (need for inotropes)		
Glinianaia et al 2010 ³¹ UK	All singleton births in Newcastle upon Tyne 1961-2000 Excluded individuals with missing data (congenital anomalies not excluded) Ethnicity unreported	Unreported	1. Birth weight <2.5kg 2. Birth weight <1.5kg	Neonatal death (28 days)	107,461	350
Gouyon et al 2003 ⁴² France	General population, all live full term births in Burgundy region Year of birth 2000- 2001 Ethnicity unreported Not specified if singleton/ multiple	Unreported	1. Population chart <10 th percentile (French growth curves) 2. Population chart <3 rd percentile (French growth curves)	1. Severe neurological disorders (threshold unreported) (neonatal) 2. Respiratory distress syndrome (threshold unreported) (neonatal) 3. Neonatal death	30,334	1. 49 2. 197 3. 25

Gray et al 1991 ⁴³ Brazil	births No exclusions reported Hospital and maternity unit population (5 centres) All low birth weight infants and control group (selection method unclear) Year of birth 1984-1986 Singleton Congenital anomalies not excluded Ethnicity unreported	Capurro method	Birth weight <2.5kg	1. Early neonatal death (7days)	2977	43
Haas, Balcazar and Caulfield 1987 ⁵⁴ Mexico	2 maternity hospitals, one serving lower socioeconomic class, one mixed population. Year of birth 1981-1984 Excluded outliers <500g or > 5500g, length <40 cm or > 56cm. Ethnicity Latin American	Classified by neonatal clinical examination as term or preterm, LMP addition if available	1.Population chart <10 th percentile (Brandt) 2.Rohrer's Index (wt (g) x100/length (cm) ³)	Early neonatal death (48 hours)	16,321	77
Kramer et al	Hospital born	USS BPD 16-18	1.Fetal growth ratio	1.Neonatal death (in	5305	1. 3

1990 ⁴⁴ Canada	infants at single centre. Year of birth 1980-1986 Singleton Excluded congenital anomalies, chromosomal anomalies and evidence of intrauterine infection Ethnicity unreported	weeks gestation + LMP	<0.75 (observed birth weight/ mean birth weight for gestational age for this hospital population) 2. Fetal growth ratio <0.80(observed birth weight/ mean birth weight for gestational age for this hospital population)	hospital, age range unspecified) 2. Hypoglycaemia (plasma glucose <40mg/dL) (neonatal)		2. 37
Lubchenco, Searls and Brazie 1972 ⁴⁵ USA	All live born infants at single university centre during the study period, with adequate information on gestational age Year of birth: 1958 to 1968 Mixed singleton/ multiple birth No exclusions reported Ethnicity 55% Anglo-American, 30% Mexican American, 15% African American	Unreported	1.Birth weight <2.5kg 2.Birth weight <2.0kg	Neonatal death (28days)	11,197	58
Mardones et al 2008 ⁴⁶	Live births and neonatal death	LMP, USS before 20	1. Birth weight <2.5kg 2. Birth weight <1.5kg	Neonatal death (28 days)	216,315	380

Chile	information from Chilean Civil Registry service Year of birth: 2000 Mixed singleton and multiple births Excluded if data incomplete Ethnicity unreported	weeks, postnatal clinical examination. Majority have USS dating but exact no not reported				
Matijasevich et al 2008 ³³	Three separate birth cohorts in city of Pelotas. Maternity wards visited on daily basis and mothers interviewed. Perinatal mortality surveillance: visiting maternity wards, intermediate care centres, registry offices and cemeteries Year of birth : 1982, 1993, 2004 Mixed singleton and multiple births Excluded if gestational age incompatible with birth weight. Congenital anomalies not	LMP, in 1993 and 2004 Dubowitz score also used, in 2004 large number also had early pregnancy USS	Population chart < 10 th percentile (Williams curve)	Early neonatal death (7 days)	1. 4130 2. 4171 3. 3392	1. 35 2. 13 3. 10
Brazil						

	excluded. Ethnicity unreported					
McIntire et al 1999 ⁴⁷ USA	Live births at single hospital during study period. Outcomes abstracted from medical records, birth information prospective database. Year of birth 1988-1996 Singleton Congenital anomalies excluded, and birth weight >75 th centile Ethnicity: 54% Hispanic, 28% black, 15% white, 3% other	LMP, if fundal height discrepancy (18-30 weeks gestation) > 2cm confirmed by USS	1. Population chart ≤ 10 th percentile (this population) 2. Population chart ≤ 5 th percentile (this population) 3. Population chart ≤ 3 rd percentile (this population)	1. Neonatal death (28 days) 2. Seizures (definition unreported)(1 st 24 hours)	82,361	1. 37 2. 125
Melve and Skjaerven 2003 ³² Norway	Births in the Norwegian Medical Birth Registry, mothers with at least 2 singletons Year of Birth 1967 to 1998 Singleton No exclusions specified Ethnicity unreported	LMP	1. Birth weight <2.5kg 2. Birth weight <2.0kg 3. Birth weight <1.5kg	Neonatal death (28 days)	527,157	452
Minikami, Izumi	Japanese Ministry of	Exact numbers	Birth weight > -1SD	Early neonatal death	54,802	132

and Sato 1999 ²⁹ Japan	Health and Welfare data regarding births and deaths Year of birth: 1989-1993 All multiple births No exclusions specified Ethnicity unreported	unreported: "early USS widely practiced in Japan/ many multiple pregnancies conceived after IVF"	below mean (calculated from study population)	(7days)		
Minior and Divon 1998 ³⁰ USA	Cohort of SGA infants born following uncomplicated pregnancies (excluded maternal medical conditions e.g. pre-eclampsia, diabetes, renal or autoimmune disease), matched to three AGA controls Year of birth 1988-1995 Singleton Congenital or chromosomal anomalies excluded Ethnicity 35% white, 31% Black, 27% Hispanic, 7% Other	Early USS	1.Population chart <10 th percentile (Brenner) 2.Population chart <5 th percentile (Brenner)	Neonatal morbidity (one of more of: hypoglycaemia, respiratory distress, thrombocytopenia, hyperbilirubinaemia, intubation, sepsis, IVH, apnoea) (thresholds unreported)	268	18
Moser et al 2007 ⁴⁸ UK	Routine birth and death registration records, and NHS	Unreported	1.Birth weight <2.5kg 2.Birth weight <1.5kg	Neonatal death (up to 28 days)	590,430	546

North 1966 ⁴⁹ USA	<p>Numbers for Babies data for babies born in England and Wales</p> <p>Year of Birth: 2005</p> <p>Mixed singleton/multiple birth</p> <p>Excluded if incomplete data</p> <p>Ethnicity unreported</p> <p>Deliveries at single maternity unit, infants weighing 1.0-2.5kg matched with infants 3.0-3.5kg.</p> <p>Year of birth 1957-1964</p> <p>Mixed singleton/multiple birth</p> <p>No exclusions specified</p> <p>Ethnicity: 75% White, 25% Non-white</p>	Unreported	Birth weight ≤ 2.5 kg	Neonatal death	2,676	26
Ott 1995 ⁵⁰ USA	<p>Infants of a series of high risk obstetric patients referred to single perinatal centre.</p> <p>Year of birth: 1990-1991</p>	Unreported	Population chart $<10^{\text{th}}$ percentile (Ott and Hadlock)	Neonatal mortality	957	2

Pulver et al 2009 ⁵¹ USA	Unclear if singleton/ multiple birth Congenital anomalies excluded Ethnicity unreported Population study of infants born in Utah, linked birth and death databases Year of birth: 1999- 2005 Unclear if singleton/ mixed Congenital anomalies not excluded Ethnicity unreported	LMP, prenatal USS and/or newborn examination	Population <10 th percentile (curves for the study population)	Neonatal death (up to 28 days)	316,077	239
Ullah et al 2009 ⁵² Bangladesh	Term newborns at a single hospital, stratified sampling from three birth weight strata (≤ 2 , >2 to <2.5 and ≥ 2.5 kg) Year of birth: unreported Singleton Included infants defined as normal, therefore anomalies excluded Ethnicity: Bangladeshi	LMP	1. Birth weight <2.5 kg 2. Birth weight ≤ 2 kg	1. Neonatal death (1 st 7 days) 2. Birth asphyxia (definition not described)(1 st 7 days) 3. Acute respiratory infection (definition not described) (1 st 7 days)	770	1. 7 2. 18 3. 17
Walther and	500 consecutive live	Dubowitz	1. Population chart	1. Hypothermia (admission	500	1. 38

Ramaekers 1982 ⁹ The Netherlands	born infants admitted to the neonatal ward directly after birth at a single hospital. Year of birth: Unreported Singleton Congenital anomalies, chromosomal anomalies, fetal infections or haemolytic disease excluded. Ethnicity: all Caucasian	method	<10th percentile (Kloosterman grid) 2. Ponderal Index (kg/m ³) <10 th percentile (Miller and Hassanein chart)	rectal temp < 35.5 C)(neonatal) 2. Hypoglycaemia (≤ 1.6mmol/L blood glucose)(neonatal)		2. 18
Wennergren 1986 ⁵³ Sweden	Unselected population, all infants born in Goteburg Year of birth:1978 Mixed singleton/ multiple births Exclusions: missing data Ethnicity: unreported	Unreported	Birth weight ≥-2SD below mean (standard unreported)	Respiratory disorders (Respiratory rate ≥ 60/ min or <30/ min during first 3 hours; grunting/ chest wall recessions at 2hrs age or later; central cyanosis or apnoeic spells) (neonatal)	4415	234

Zhang et al 2007 ³⁴ Sweden	Population based, data from Swedish birth registry Year of birth 1992- 2001 Singleton Exclusions: missing data Ethnicity: 87% Nordic	USS 18 weeks gestation	Population chart <10 th percentile (centiles based on the study population)	Early neonatal death (first 7 days)	751,281	600
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Kg=kilograms, USS= Ultrasound scan, LMP= Last menstrual period, mg/dL= milligrams per decilitre, SGA= small for gestational age, AGA= appropriate for gestational age, IUGR= intrauterine growth restricted, HIE= Hypoxic Ischaemic Encephalopathy, IVH- Intraventricular Haemorrhage, g/dL= grams per decilitre, SD=Standard deviation, PVL= Periventricular leukomalacia, EEG= electroencephalogram, NICU=Neonatal Intensive Care Unit, NEC= Necrotising enterocolitis, SCr= serum creatinine, µmol/L= micromoles per litre, CRL= crown rump length, BPD= biparietal diameter,