S7 Table. Individual characteristics of included studies

Author	Year of publication	Recruitment	Design of prospective collection	Country	World Bank Region	Geographic income level	Period of LRTI	Period of observation	Evidence on Wide Spread	Case Ascertainment	Case Definition of Wheezing	Associated Lower LRTI	Associated Upper LRTI	Lower respiratory tract specimen	Other associated LRTI	Virus tested	Virus Detection Method	Sampling Time	Virus Detection Assay	Exclusion criteria	Time of LRTI	Wheezing ascertainment	Wheezing definition	Wheezing prevalence	Recurrent wheezing	Key Conclusions
Bedford	2016	Non probabilistic	Prospectively	Chile	South America	High-income economies	NR	NR	N	< 1 year	Unclear/Not reported	Hospitalized	Unclear/Not reported	Yes	Human Respiratory Syncytial Virus	Unclear/ Not reported	Immunofluorescent assay	Unclear Not reported	Immunofluorescent assay	Anywhere, previously healthy infants less than 12 months of age (0-9 months), six males and eight females, hospitalized at the Pontificia Universidad Catolica de Chile Hospital due to and bronchiolitis, were enrolled in this study.	Bronchiolitis	Unclear Not reported	Physician	Recurrent wheezing	Study, the same pulmonary secretion from normal infants less than 2 months of age (7-8 months); three males and two females, who were undergoing an inguinal procedure for a non-infectious disease (inguinal hernia. = 2 and Thromboscal fibrulin = 1).
Fjaerli	2005	Non probabilistic	Retrospectively	Norway	Northern Europe	High-income economies	1993–1996	NR	Y	< 1 year	5-10 years	Hospitalized	Unclear/Not reported	Unclear/Not reported	Human Respiratory Syncytial Virus	Nasopharyngeal	Immunofluorescent assay, enzyme immunoassay	Nasopharyngeal	Immunofluorescent assay, enzyme immunoassay	Children hospitalized during infancy with verified RSV bronchiolitis (RS-V) had to be positive for RSV in nasopharyngeal secretions and negative for other common non-RSV bronchiolitis (RN) had to be positive for RSV in the same two different microbiological tests	Bronchiolitis	Unclear Not reported	Parent	Recurrent wheezing	69 children had to be healthy term infants born at completed 37 with-out complications, without history of hospitalizations for respiratory problems during the first year of life.
Garcia-Garcia	2007	Non probabilistic	Prospectively	Spain	Southern Europe	High-income economies	Oct/2002 - Jun/2005	Oct/2005 - Dec/2005	N	< 1 year	2-5 years	Hospitalized	Hospitalized	Yes	Human Metapneumovirus	Unclear/ Not reported	Classical RT-PCR	Unclear Not reported	Classical RT-PCR	Exclusion criteria were children of more than 2 years of age with a previous history of hospitalization at the age 9–36 months due to AMPV bronchiolitis for the index group, RSV bronchiolitis for the RSV group, and gastroenteritis for rotavirus for the control group.	Bronchiolitis	The term recurrent wheezing was used to imply asthma or one or two episodes of wheezing verified by a physician.	Physician	Recurrent wheezing	A random sample of 90 infants with history of admission due to acute obstructive gastroenteritis in the first 2 years of life was selected from 400 admissions with this diagnosis during the same seasons. Sixty-eight could be contacted. Thirty-eight of them were excluded due to concurrent history of asthma or wheezing in their first 24 months of life.
Garcia-Garcia	2007	Non probabilistic	Prospectively	Spain	Southern Europe	High-income economies	Oct/2002 - Jun/2005	Oct/2005 - Dec/2005	Y	< 1 year	2-5 years	Hospitalized	Hospitalized	Yes	Human Respiratory Syncytial Virus	Unclear/ Not reported	Immunofluorescence, RT-PCR	Unclear Not reported	Immunofluorescence, RT-PCR	Exclusion criteria were children of more than 2 years of age with a previous history of hospitalization at the age 9–36 months due to AMPV bronchiolitis for the index group, RSV bronchiolitis for the RSV group, and gastroenteritis for rotavirus for the control group.	Bronchiolitis	The term recurrent wheezing was used to imply asthma or one or two episodes of wheezing verified by a physician.	Physician	Recurrent wheezing	A random sample of 90 infants with history of admission due to acute obstructive gastroenteritis in the first 2 years of life was selected from 400 admissions with this diagnosis during the same seasons. Sixty-eight could be contacted. Thirty-eight of them were excluded due to concurrent history of asthma or wheezing in their first 24 months of life.
Henderson	2005	Non probabilistic	Prospectively	UK	Northern Europe	High-income economies	NR	NR	Y, N.S.S.	< 1 year	2-5 years	Hospitalized	Ambulatory	Yes	Human Respiratory Syncytial Virus	Nasopharyngeal	Immunofluorescence, Culture	Nasopharyngeal	Immunofluorescence, Culture	To determine which children in the population had been admitted to hospital with RSV bronchiolitis, the discharge diagnostic codes of the two hospitals in Bristol with in-patient paediatric facilities were searched for all children with (a) a date of birth making them eligible for the ALSPAC study and (b) a history of admission. In hospital for bronchiolitis in the first 12 months after birth. The names and dates of birth of these subjects were linked anonymously to the study database containing other information on participating children. For each infant identified with a hospital admission for bronchiolitis, the public health laboratory records were hand-searched for corresponding virological data from nasopharyngeal aspirates (NPA) taken during the hospital admission. Only infants with RSV identified by immunofluorescence or culture in at least one NPA specimen were considered for the present study.	Bronchiolitis	Wheezing was reported in response to the question, 'In the last 12 months has he/she had any periods when there was wheezing with whistling on his/her chest when breathing?' Wheezing was defined as three or more episodes in the last 12 months. A supplementary question established the frequency of wheezing in positive responders as once, twice, 3–6 episodes or 6 or more episodes.	Parent	Current wheezing	Subjects with no history of admission for bronchiolitis within 12 months of birth were considered as the control population.
Henderson	2006	Non probabilistic	Prospectively	UK	Northern Europe	High-income economies	NR	NR	Y, Y-N.7	< 1 year	5-10 years	Hospitalized	Ambulatory	Yes	Human Respiratory Syncytial Virus	Nasopharyngeal	Immunofluorescence, Culture	Nasopharyngeal	Immunofluorescence, Culture	To determine which children in the population had been admitted to hospital with RSV bronchiolitis, the discharge diagnostic codes of the two hospitals in Bristol with in-patient paediatric facilities were searched for all children with (a) a date of birth making them eligible for the ALSPAC study and (b) a history of admission. In hospital for bronchiolitis in the first 12 months after birth. The names and dates of birth of these subjects were linked anonymously to the study database containing other information on participating children. For each infant identified with a hospital admission for bronchiolitis, the public health laboratory records were hand-searched for corresponding virological data from nasopharyngeal aspirates (NPA) taken during the hospital admission. Only infants with RSV identified by immunofluorescence or culture in at least one NPA specimen were considered for the present study.	Bronchiolitis	Wheezing was reported in response to the question, 'In the last 12 months has he/she had any periods when there was wheezing with whistling on his/her chest when breathing?' Wheezing was defined as three or more episodes in the last 12 months. A supplementary question established the frequency of wheezing in positive responders as once, twice, 3–6 episodes or 6 or more episodes.	Parent	Current wheezing	Subjects with no history of admission for bronchiolitis within 12 months of birth were considered as the control population.
Juntti	2003	Non probabilistic	Prospectively	Finland	Northern Europe	High-income economies	1991–1994	2003–2007	N-W	< 1 year	6-10 years	Hospitalized	Unclear/Not reported	Unclear/Not reported	Human Respiratory Syncytial Virus	Nasopharyngeal	ELISA, latex agglutination test	Nasopharyngeal	ELISA, latex agglutination test	The study population was 117 children who had been admitted to the Oulu University Hospital during the years 1991–1994 because of an RSV infection during their first year of life.	LRTI not specified	Unclear Not reported	Physician and parent	Recurrent wheezing	A matched control was chosen from the National Population Registry for each subject by selecting a child of the same sex and date of birth as the index child. Their histories were checked from the history notes of the hospital and those meeting the same exclusion criteria as for the index children were excluded. Children who had had a respiratory infection at the hospital during the note RSV seasons were not accepted.
Kristjansson	2006	Probabilistic	Prospectively	Sweden	Northern Europe	High-income economies	NR	NR	Y, N	< 6 months	2-5 years	Hospitalized	Hospitalized	Unclear/Not reported	Human Respiratory Syncytial Virus	Nasopharyngeal	Immunofluorescent assay	Nasopharyngeal	Immunofluorescent assay	Seventeen children requiring hospitalization for RSV bronchiolitis at the Department of Pediatrics, Sundsvall Hallsvik University Hospital, Sweden, were included. RSV infection was diagnosed by direct (MAGIRIS, DakoCytomation) and indirect (Biotrin, respiratory viral panel) immunofluorescent staining of nasopharyngeal aspirates and culture performed at the Department of Virology, Umeå University Hospital, Sweden.	Bronchiolitis	Unclear Not reported	Parent	Recurrent wheezing	In addition, a reference group of 35 children without a history of RSV bronchiolitis, mean age 36.4 months, was randomly recruited from the Centre for Child Health Services (Table 1).
Khuzwat	1993	Non probabilistic	Retrospectively	Qatar	Western Asia	High-income economies	Jan/1989-Jun/1989	NR	Y	< 1 year	2-5 years	Hospitalized	Hospitalized	Yes	Human Respiratory Syncytial Virus	Unclear/ Not reported	Immunoassay, method	Unclear Not reported	Immunoassay method	Sixty-two children admitted between January 1988 and June 1989 with RSV positive bronchiolitis and 70 controls admitted to the same unit at the same time period, with non-respiratory illnesses at Hamad General Hospital in Qatar was carried out.	Bronchiolitis	Recurrent wheezing was defined as three or more episodes of attacks of cough, tiredness, of breath with respiratory rhonchi documented by a physician in the files.	Physician	Recurrent wheezing	A retrospective review of the records of 70 infants admitted between January 1988 and June 1989 with RSV positive bronchiolitis and 70 controls admitted to the same unit at the same time period, with non-respiratory illnesses at Hamad General Hospital in Qatar was carried out
Pyorenkuva	2010	Non probabilistic	Prospectively	Denmark	Northern Europe	High-income economies	Jan/1994 - May/2003	NR	Y-S	< 1 year	6-10 years	Hospitalized	Ambulatory	Yes	Human Respiratory Syncytial Virus	Unclear/ Not reported	Immunofluorescent assay, enzyme immunoassay	Unclear/ Not reported	Immunofluorescent assay, enzyme immunoassay	Hospital records were reviewed to verify respiratory symptoms compatible with RSV bronchiolitis (severe cough, abnormal radiograph of the thorax, use of O-2 regimen, crackles or wheezes by auscultation of lungs) 12 and were left with an enzyme-linked immunosorbent assay or immunofluorescence assay test results.	LRTI not specified	Unclear Not reported	Physician	Recurrent wheezing	The registry ensures that the control been had never been hospitalized with RSV infection.
Pullan	1982	Non probabilistic	Prospectively	United Kingdom	Northern Europe	High-income economies	NR	NR	N	< 6 months	Unclear/Not reported	Hospitalized	Ambulatory	Yes	Human Respiratory Syncytial Virus	Unclear/ Not reported	Unclear/Not reported	Unclear/ Not reported	Unclear/Not reported	The remaining 136 children (136) were seen and examined, and 107 of these completed a full pulmonary assessment. Ten of the 16 children diagnosed as having bronchitis, 108 of the 116 diagnosed as having bronchiolitis, and 13 of the 20 diagnosed as pneumonia were admitted to hospital for investigation and/or as suggested by Court 2 were seen for assessment. There was nothing to suggest that the health of the children who were not fully assessed differed significantly from that of those who were. Of the children admitted with clinical features of bronchiolitis, 26 had shown subsegmental collapse or consolidation in the chest radiograph (of whom 21 were seen for follow-up) and 23 had had segmental shadows (of whom 19 were seen for follow-up).	LRTI not specified	Unclear Not reported	Physician	Recurrent wheezing	Control children of comparable age, sex, and social class were contacted with the consent of the family doctor. Care was taken to exclude from the control group children who had been admitted to hospital with a history of respiratory problems (a possible defect in the doctor survey, where control children had been selected by school staff) Either of the controls had been in hospital with bronchitis (no virus was isolated), and a second had been admitted with "wheezy bronchitis" in the first year of life.
Rigaux	2000	Non probabilistic	Prospectively	Sweden	Northern Europe	High-income economies	Dec/1989-Apr/1990	NR	Y	< 1 year	6-10 years	Hospitalized	Ambulatory	Yes	Human Respiratory Syncytial Virus	Nasopharyngeal	Enzyme immunoassay	Nasopharyngeal	Enzyme immunoassay	Children with RSV bronchiolitis. From December 1989 to April 1990, 53 infants (29 boys) without other concomitant chronic disease were hospitalized with RSV bronchiolitis at the Pediatric Department, Biolis Central Hospital, with laboratory-verified RSV bronchiolitis. The diagnosis was verified using the Abbott Tempus IQ RSV (Abbott Laboratories, Abbott Park, IL) rapid enzyme-immunoassay for direct detection of viral antigen in nasopharyngeal secretion. [11]	Bronchiolitis	Bronchial obstruction occurring at least three times but not verified by a physician was classified as "recurrent wheezing." The term "any wheezing" was used to imply asthma, recurrent wheezing, or one or two episodes of wheezing.	Parent	Recurrent wheezing	For each child with RSV bronchiolitis, we contacted the parents of the two infants with birth dates closest to this index infant and of the same sex and from the same local Child Health Centre.
Rigaux	2010	Non probabilistic	Prospectively	Sweden	Northern Europe	High-income economies	Dec/1989-Apr/1990	NR	18	< 1 year	05-20 years	Hospitalized	Ambulatory	No	Human Respiratory Syncytial Virus	Unclear/ Not reported	Unclear/Not reported	Unclear/ Not reported	Unclear/Not reported	Fourteen children aged < 1 year hospitalized with RSV (-VRS) between December 1989 and April 1990 constituted the index group.	Bronchiolitis	Unclear Not reported	Parent	Recurrent wheezing	An age- and gender-matched control group (n=56) was recruited from children attending the same child healthcare centres as the index cases.
Rigaux	2005	Non probabilistic	Prospectively	Sweden	Northern Europe	High-income economies	NR	NR	N	< 6 months	10-20 years	Hospitalized	Ambulatory	Yes	Human Respiratory Syncytial Virus	Unclear/ Not reported	Unclear/Not reported	Unclear/ Not reported	Unclear/Not reported	Forty-seven children (21 boys) hospitalized with RSV bronchiolitis in infancy (mean age 168 days, 43 - 6 months) and a control group of 93 infants were followed prospectively (9, 6). At the present follow-up (mean age 10.4 years, range 7.9–14.5), 44 (21 boys) of the RSV bronchiolitis group and 88 control subjects (42 boys) were asked for assessment. Data on lung function were obtained using structured questionnaires. In 38 of 47 subjects with RSV (20 boys) and 50 of 88 control subjects (25 boys), A clinical examination was performed in 35 children with RSV and in 69 control subjects. Initial bronchitis was defined according to Court [11], and Rauskolb and Ogle [3].	Bronchiolitis	Unclear Not reported	Parent	Recurrent wheezing	Forty-seven children (21 boys) hospitalized with RSV bronchiolitis in infancy (mean age 168 days, 43 - 6 months) and a control group of 93 infants were followed prospectively (9, 6). At the present follow-up (mean age 10.4 years, range 7.9–14.5), 44 (21 boys) of the RSV bronchiolitis group and 88 control subjects (42 boys), A clinical examination was performed in 35 children with RSV and in 69 control subjects. Initial bronchitis was defined according to Court [11], and Rauskolb and Ogle [3].
Rigaux	1995	Non probabilistic	Prospectively	Sweden	Northern Europe	High-income economies	Dec/1989-Apr/1990	NR	Y	< 1 year	2-5 years	Hospitalized	Hospitalized/ambulatory	Yes	Human Respiratory Syncytial Virus	Nasopharyngeal	Enzyme immunoassay	Nasopharyngeal	Enzyme immunoassay	From December 1989 to April 1990, 52 children under 1-year of age and without concomitant chronic disease, asthma, or other disease were hospitalized at the Pediatric Department, Biolis Central Hospital, with laboratory-verified RSV bronchiolitis.	Bronchiolitis	Bronchial obstruction occurring at least three times but not verified by a physician was classified as "recurrent wheezing." The term "any wheezing" was used to imply asthma, recurrent wheezing, or one or two episodes of wheezing.	Parent	Any wheezing	For each child with RSV bronchiolitis, we contacted the parents of the two children with birth dates closest to the index children, and of the same sex and from the same local Child Health Centre.
Rigaux	1995	Non probabilistic	Prospectively	Sweden	Northern Europe	High-income economies	Dec/1989-Apr/1990	NR	Y	< 1 year	2-5 years	Hospitalized	Hospitalized/ambulatory	Yes	Human Respiratory Syncytial Virus	Nasopharyngeal	Enzyme immunoassay	Nasopharyngeal	Enzyme immunoassay	From December 1989 to April 1990, 52 children under 1-year of age and without concomitant chronic disease, asthma, or other disease were hospitalized at the Pediatric Department, Biolis Central Hospital, with laboratory-verified RSV bronchiolitis.	Bronchiolitis	Bronchial obstruction occurring at least three times but not verified by a physician was classified as "recurrent wheezing." The term "any wheezing" was used to imply asthma, recurrent wheezing, or one or two episodes of wheezing.	Parent	Any wheezing	For each child with RSV bronchiolitis, we contacted the parents of the two children with birth dates closest to the index children, and of the same sex and from the same local Child Health Centre.
Ross	1978	Non probabilistic	Prospectively	England	Northern Europe	High-income economies	1967-1968	NR	Y	Unclear/Not reported	6-10 years	Hospitalized	Unclear/Not reported	Unclear/Not reported	Human Respiratory Syncytial Virus	Unclear/ Not reported	Unclear/Not reported	Unclear/ Not reported	Unclear/Not reported	The records of all infants from whom RR virus was isolated in the winter epidemic of 1967-8 were examined. Fifty-six infants (29 girls and 27 boys) had one or more signs of bronchiolitis recorded and were selected.	Bronchiolitis	Unclear Not reported	Parent	Current wheezing	Control children were identified by giving lists containing the sex, age and social class of the index children to the headteachers of two primary schools. The headteachers selected children of the same sex and age to within two months and to attempt to match the social class using fathers' occupation as a guide.
Singleton	2003	Non probabilistic	Retrospectively	Russia	Eastern Europe	Upper-middle-income economies	Oct/1983- Sep/1986	1989-2001	Y-N	< 2 years	6-10 years	Hospitalized	Unclear/Not reported	Yes	Human Respiratory Syncytial Virus	Unclear/ Not reported	Culture, Rapid antigen	Unclear/ Not reported	Culture, Rapid antigen	The original case subjects were recruited from participants in a prospective hospitalbased laboratory surveillance study of children who were from the YK Delta and were hospitalized with acute respiratory infections during the first 3 years of life [1,14] The original study was conducted over 3 RSV seasons (1983–1986) during which time there were 856 acute respiratory hospitalizations, 437 of which were RSV positive by culture or rapid EIA. The study was conducted in Bethel, Alaska, and in the Yukon-Kuskokwim as illness leading to the first hospitalization with laboratory confirmation of RSV infection among children younger than 3 years.	LRTI not specified	Current wheezing was defined as wheezing in the past year determined by interview with parent, review of outpatient visits in the medical record, or wheezing on study examination.	Physician and parent	Current wheezing	Age- and village-matched control subjects were recruited during the same season, using upper matching on the basis of the caregiver's date of birth and village/subregion of residence.
Sly	1991	Non probabilistic	Retrospectively	Australia	Oceania	High-income economies	1980 - 1979	NR	Y	< 6 months	Unclear/Not reported	Hospitalized	Hospitalized	Yes	Adenovirus type 7	Unclear/ Not reported	Culture	Unclear/ Not reported	Culture	Twenty patients admitted between 1980 and 1979 with adenovirus type 7 pneumonia could be traced.	Pneumonia	Unclear Not reported	Physician	Recurrent wheezing	A control group of 20 patients admitted to the same hospital with adenovirus type 7 upper respiratory tract infection was selected for comparison. All controls had normal chest radiographs.
Stensballe	2017	Non probabilistic	Prospectively	Greenlandic	Northern Europe	High-income economies	2001-2002	NR	Y, N	< 3 years	2-5 years	Hospitalized	Hospitalized	No	Human Respiratory Syncytial Virus	Unclear/ Not reported	Classical RT-PCR, ELISA	Unclear/ Not reported	Classical RT-PCR, ELISA	Cases: comprised children hospitalized with signs of airway infection and with nasopharyngeal aspirates positive for RSV in immunofluorescence or PCR assays.	LRTI not specified	Unclear Not reported	Parent	Current wheezing	The control group consisted of 23 children selected among children aged 0 to 36months hospitalized as inpatients with conditions other than airway infection, specifically, congenital heart disease, failure to thrive, gastroenteritis, dehydration, malnutrition, and skin rashes
Stensballe	2017	Non probabilistic	Prospectively	Danemark	Northern Europe	High-income economies	2001-2002	NR	Y, N	< 3 years	2-5 years	Hospitalized	Hospitalized	No	Human Respiratory Syncytial Virus	Unclear/ Not reported	Classical RT-PCR, ELISA	Unclear/ Not reported	Classical RT-PCR, ELISA	Cases: comprised children hospitalized with signs of airway infection and with nasopharyngeal aspirates positive for RSV in immunofluorescence or PCR assays.	LRTI not specified	Unclear Not reported	Parent	Current wheezing	The control group consisted of 23 children selected among children aged 0 to 36months hospitalized as inpatients with conditions other than airway infection, specifically, congenital heart disease, failure to thrive, gastroenteritis, dehydration, malnutrition, and skin rashes
Zomer-Kooijker	2014	Non probabilistic	Prospectively	Netherland	Western Europe	High-income economies	2010-2011	NR	Y	< 6 months	6-10 years	Hospitalized	Ambulatory	Yes	Human Respiratory Syncytial Virus	Nasopharyngeal	Immunofluorescence, RT-PCR	Nasopharyngeal	Immunofluorescence, RT-PCR	Children that were hospitalized during infancy for a proven RSV bronchiolitis (positive immunofluorescence test or PCR) were identified.	Bronchiolitis	Current wheeze, in both the hospitalized patients and non-hospitalized children, was defined as a positive response to the question "Has your child had wheezing or whistling in the chest in the last 12 months?"	Parent	Wheezing in the last 12 months	Respiratory outcomes of hospitalized RSV bronchiolitis patients within the complete cohort (n =158, hereafter called hospitalized patients), were compared to non-hospitalized children (n = 58).