

Supplementary Table 1.

1. Gestational

- a. Intrauterine growth restriction ^{1 2 3}
- b. Fetal exposure to maternal smoking ⁴
- c. Genetic conditions and mutations ^{5,6}

2. Infancy

- a. Prematurity ^{7,8}
- b. Bronchopulmonary dysplasia ^{9 10 11 12}
- c. Infant wheezing ¹³
- d. Pneumonia ^{14,15}
- e. Secondhand smoke ^{16 17}
- f. Genetic conditions and mutations ^{18,19 20}
- g. Nutrition ²¹

3. Childhood

- a. Asthma ^{22 23 24}
- b. Secondhand smoke/air pollution ^{25 26}
- c. Allergic diseases ^{27 28}
- d. COPD susceptibility genes ²⁹

4. Adolescence

- a. Primary smoking ²²
- b. COPD susceptibility genes ^{30 31}
- c. Secondhand smoke/air pollution ³²

1. Harkin P, Marttila R, Pokka T, Saarela T, Hallman M. Survival analysis of a cohort of extremely preterm infants born in Finland during 2005-2013. *The journal of maternal-fetal & neonatal medicine : the official journal of the European Association of Perinatal Medicine, the Federation of Asia and Oceania Perinatal Societies, the International Society of Perinatal Obstet.* 2019;1-7.
2. Rocha G, de Lima FF, Machado AP, et al. Small for gestational age very preterm infants present a higher risk of developing bronchopulmonary dysplasia. *Journal of neonatal-perinatal medicine.* 2019.
3. den Dekker HT, Jaddoe VWV, Reiss IK, de Jongste JC, Duijts L. Fetal and Infant Growth Patterns and Risk of Lower Lung Function and Asthma. The Generation R Study. *American journal of respiratory and critical care medicine.* 2018;197(2):183-192.
4. Morrow LA, Wagner BD, Ingram DA, et al. Antenatal Determinants of Bronchopulmonary Dysplasia and Late Respiratory Disease in Preterm Infants. *Am J Respir Crit Care Med.* 2017;196(3):364-374.
5. Watkins WS, Hernandez EJ, Wesolowski S, et al. De novo and recessive forms of congenital heart disease have distinct genetic and phenotypic landscapes. *Nature communications.* 2019;10(1):4722.
6. Alapati D, Zacharias WJ, Hartman HA, et al. In utero gene editing for monogenic lung disease. *Science translational medicine.* 2019;11(488).
7. Stoll BJ, Hansen NI, Bell EF, et al. Neonatal outcomes of extremely preterm infants from the NICHD Neonatal Research Network. *Pediatrics.* 2010;126(3):443-456.

8. Laughon MM, Langer JC, Bose CL, et al. Prediction of bronchopulmonary dysplasia by postnatal age in extremely premature infants. *Am J Respir Crit Care Med*. 2011;183(12):1715-1722.
9. Yoder LM, Higano NS, Schapiro AH, et al. Elevated lung volumes in neonates with bronchopulmonary dysplasia measured via MRI. *Pediatr Pulmonol*. 2019;54(8):1311-1318.
10. Gibson AM, Reddington C, McBride L, Callanan C, Robertson C, Doyle LW. Lung function in adult survivors of very low birth weight, with and without bronchopulmonary dysplasia. *Pediatr Pulmonol*. 2015;50(10):987-994.
11. Hirata K, Nishihara M, Kimura T, et al. Longitudinal impairment of lung function in school-age children with extremely low birth weights. *Pediatr Pulmonol*. 2017;52(6):779-786.
12. Caskey S, Gough A, Rowan S, et al. Structural and Functional Lung Impairment in Adult Survivors of Bronchopulmonary Dysplasia. *Annals of the American Thoracic Society*. 2016;13(8):1262-1270.
13. Han M, Rajput C, Hershenson MB. Rhinovirus Attributes that Contribute to Asthma Development. *Immunology and allergy clinics of North America*. 2019;39(3):345-359.
14. Martinez FD. Early-Life Origins of Chronic Obstructive Pulmonary Disease. *N Engl J Med*. 2016;375(9):871-878.
15. Chan JY, Stern DA, Guerra S, Wright AL, Morgan WJ, Martinez FD. Pneumonia in childhood and impaired lung function in adults: a longitudinal study. *Pediatrics*. 2015;135(4):607-616.
16. Postma DS, Bush A, van den Berge M. Risk factors and early origins of chronic obstructive pulmonary disease. *Lancet*. 2015;385(9971):899-909.
17. Flexeder C, Zock JP, Jarvis D, et al. Second-hand smoke exposure in adulthood and lower respiratory health during 20 year follow up in the European Community Respiratory Health Survey. *Respiratory research*. 2019;20(1):33.
18. Hall R, Hall IP, Sayers I. Genetic risk factors for the development of pulmonary disease identified by genome-wide association. *Respirology*. 2019;24(3):204-214.
19. Karaaslan C, Hirakawa H, Yasumatsu R, et al. Elastase inhibitory activity of airway alpha1-antitrypsin is protected by treatment with a catalytic antioxidant in a baboon model of severe bronchopulmonary dysplasia. *Pediatr Res*. 2011;70(4):363-367.
20. Halbeisen FS, Jose A, de Jong C, et al. Spirometric indices in primary ciliary dyskinesia: systematic review and meta-analysis. *ERJ open research*. 2019;5(2).
21. Victora CG, Adair L, Fall C, et al. Maternal and child undernutrition: consequences for adult health and human capital. *Lancet*. 2008;371(9609):340-357.
22. Bui DS, Walters HE, Burgess JA, et al. Childhood Respiratory Risk Factor Profiles and Middle-Age Lung Function: A Prospective Cohort Study from the First to Sixth Decade. *Annals of the American Thoracic Society*. 2018;15(9):1057-1066.
23. Tagiyeva N, Devereux G, Fielding S, Turner S, Douglas G. Outcomes of Childhood Asthma and Wheezy Bronchitis. A 50-Year Cohort Study. *American journal of respiratory and critical care medicine*. 2016;193(1):23-30.
24. Tai A, Tran H, Roberts M, Clarke N, Wilson J, Robertson CF. The association between childhood asthma and adult chronic obstructive pulmonary disease. *Thorax*. 2014;69(9):805-810.
25. Diver WR, Jacobs EJ, Gapstur SM. Secondhand Smoke Exposure in Childhood and Adulthood in Relation to Adult Mortality Among Never Smokers. *American journal of preventive medicine*. 2018;55(3):345-352.
26. Brunekreef B, Beelen R, Hoek G, et al. Effects of long-term exposure to traffic-related air pollution on respiratory and cardiovascular mortality in the Netherlands: the NLCS-AIR study. *Research report (Health Effects Institute)*. 2009(139):5-71; discussion 73-89.

27. Bui DS, Burgess JA, Lowe AJ, et al. Childhood Lung Function Predicts Adult Chronic Obstructive Pulmonary Disease and Asthma-Chronic Obstructive Pulmonary Disease Overlap Syndrome. *American journal of respiratory and critical care medicine*. 2017;196(1):39-46.
28. Belgrave DCM, Granel R, Turner SW, et al. Lung function trajectories from pre-school age to adulthood and their associations with early life factors: a retrospective analysis of three population-based birth cohort studies. *The Lancet Respiratory medicine*. 2018;6(7):526-534.
29. den Dekker HT, Burrows K, Felix JF, et al. Newborn DNA-methylation, childhood lung function, and the risks of asthma and COPD across the life course. *The European respiratory journal*. 2019;53(4).
30. Green CE, Vayalapa S, Hampson JA, Mukherjee D, Stockley RA, Turner AM. PiSZ alpha-1 antitrypsin deficiency (AATD): pulmonary phenotype and prognosis relative to PiZZ AATD and PiMM COPD. *Thorax*. 2015;70(10):939-945.
31. Piitulainen E, Mostafavi B, Tanash HA. Health status and lung function in the Swedish alpha 1-antitrypsin deficient cohort, identified by neonatal screening, at the age of 37-40 years. *International journal of chronic obstructive pulmonary disease*. 2017;12:495-500.
32. Carney C, Benzeval M. The moderating effect of childhood disadvantage on the associations between smoking and occupational exposure and lung function; a cross sectional analysis of the UK Household Longitudinal Study (UKHLS). *BMC public health*. 2019;19(1):690.