

Chapter 5: Respiratory Disease



Nationwide, chronic respiratory diseases such as asthma and COPD are leading causes of restricted activity, hospitalizations, death, and across the state, respiratory illnesses are the number one reason for visiting a health practitioner. Historically, respiratory diseases have been a major cause of morbidity and mortality in rural Alaska, and respiratory problems remain a frequently cited health concern in NSB communities.^{1,2} Many respiratory diseases and symptoms are preventable through tobacco control, improved hygienic practices, vaccinations, reduction of air pollution, and other public and environmental health interventions.

5.1. Respiratory Disease Statistics

5.1.1. Prevalence of Chronic Respiratory Problems Such as Asthma, Emphysema, or Chronic Cough: Data from the 2010 NSB Census

Attempting to capture a spectrum of chronic respiratory conditions, the 2010 NSB Census asked household heads whether they or other household members had, in the last 12 months, had breathing problems such as asthma, emphysema, or a cough that does not go away.

Adults: Thirteen percent of household heads and 8% of all adults in the NSB reported or were reported to have experienced any of these problems. The estimated prevalence of these respiratory problems did not vary significantly by ethnic group, gender, or community of residence.

Children: Of children aged 0–17 years, 5% were reported by the household head to have had breathing problems such as asthma, emphysema, or a chronic cough in the past 12 months. The prevalence was not significantly different among ethnic groups except in the 10- to 17-year-old age group, in which children of other ethnic groups were more likely to be reported to have breathing problems than were Iñupiat or Caucasian children. The relationship between village of residence and the prevalence of breathing problems among children was not statistically significant.

5.1.2. Asthma

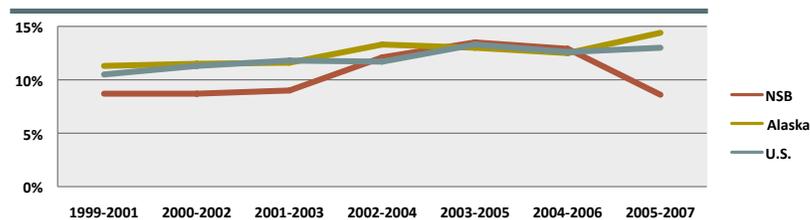
Asthma is a chronic condition that involves reversible tightening and inflammation of the airways, resulting in wheezing, coughing, chest tightness, and shortness of breath.

5.1.2.1. Asthma in Adults

NSB Asthma Data from BRFSS

Between 1999 and 2007, just over 10% of NSB adults surveyed in the Alaska BRFSS reported ever having been told by a health professional that they have asthma.⁴ This estimate is similar to the average state and national prevalence during this time period.^{4,5}

Figure 5.1: Adult Asthma Prevalence from BRFSS: Percent of adults who were ever told by a health professional that they have asthma, 1999–2007



U.S. and Alaska data source: Centers for Disease Control and Prevention (CDC) Behavioral Risk Factor Surveillance System (BRFSS).

NSB data source: Sub-regional analysis of Alaska BRFSS data provided by Alaska Department of Health and Social Services, Chronic Disease Prevention and Health Promotion, Division of Public Health.

NSB results are weighted according to the BRFSS rural region and not post-stratified to the NSB. Results are not age-adjusted.

Alaska and U.S. data are for single, midpoint year of time period shown.

NSB Asthma Data from SLiCA

In the SLiCA survey, 21% of NSB Iñupiat adults reported having asthma,⁶ roughly twice the lifetime prevalence estimated by BRFSS surveys and higher than the combined prevalence of asthma, emphysema, and chronic cough among Iñupiat adults in the 2010 NSB Census. Whereas results from the three surveys are not directly comparable, the reason for this wide discrepancy in prevalence estimates is not entirely clear. Often, asthma has not been clearly distinguished clinically from other chronic pulmonary diseases, such as emphysema or chronic bronchitis. This lack of diagnostic clarity may be contributing to the wide discrepancy in asthma prevalence estimates based on self-reported data.

Nuiqsut Asthma Study

In response to community concerns about asthma and pollution from nearby oil development activities, a 2003 study of respiratory illness in Nuiqsut examined inpatient and outpatient visits for respiratory illness in this village and a control village.⁷ Asthma accounted for 75% of respiratory illness visits in Nuiqsut and 81% in the control village. Representing just over 10% of the population, 47 residents were seen for asthma during that time period. Again, this was similar to statewide asthma prevalence estimates, although not directly comparable. An additional 16 residents (3.6%) were identified with non-asthma respiratory diseases. The Nuiqsut residents visited the clinic more than twice as often as in the control village. The increased number of visits was due largely to a few individuals with numerous visits for asthma-related problems. Only one age group (10- to 19-year-olds) showed a statistically significant higher rate of asthma visits than the control village.

5.1.2.2. Asthma Patterns in Alaska and the U.S.

Approximately 9% of the adult population of Alaska⁴ and 9% of U.S. adults report a current diagnosis of asthma.⁵ Overall, asthma prevalence appears to be lower in rural Alaska than in urban areas, particularly Anchorage.⁸ This pattern is similar to that seen in other parts of the country and the world and may be attributable to factors such as urban air pollution. This observed disparity may also be caused, in part, by lower availability of specialists and a lower likelihood of an asthma diagnosis being made in rural parts of the state.

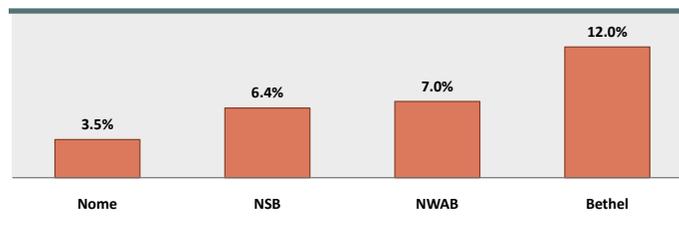
Asthma prevalence has been increasing for many years in the U.S. and other developed nations, although it appears that in the U.S., asthma prevalence is starting to plateau or even decline slightly.⁹ Although asthma mortality in the U.S. has decreased since 1994, asthma mortality in Alaska increased between 1979 and 2002,⁸ and lifetime prevalence has increased slightly in Alaska over the last decade.⁴

5.1.2.2. Pediatric Asthma

Pediatric Asthma Estimates from Medicaid Data

In a study looking at Medicaid recipients less than 20 years old for the years 1999–2002, non-Anchorage Alaska Natives consistently had the lowest estimated prevalence of asthma, compared with Alaska Natives living in Anchorage and non-Natives statewide. Estimates of child asthma prevalence vary widely among the rural areas, however. The NSB had the second lowest estimated prevalence of the four regions studied.¹⁰ The researchers thought that these differences may be caused, in part, by variation in provider practices in using asthma as a diagnosis and treating symptoms with asthma medications.

Figure 5.2: Asthma Diagnosis or Medication Use Among Medicaid Recipients Under Age 20 Years



NWAB=Northwest Arctic Borough

Data source: Gessner, B.D., and T. Neeno: Trends in asthma prevalence, hospitalization risk, and inhaled corticosteroid use among Alaska Native and nonnative Medicaid recipients younger than 20 years. *Annals of Allergy, Asthma, and Immunology* 94, no. 3 (2005): 372–379.

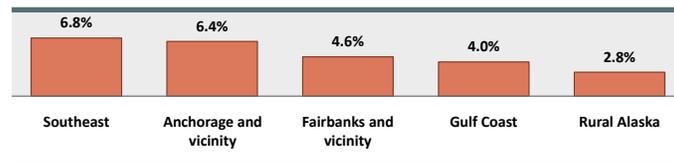
Teen Asthma Data from YRBS

In 2005, an estimated 13.8% (C.I. 10.0–18.7%) of NSB high school students had been diagnosed with asthma at some point in their lifetimes, compared with 18.2% of high school students in Alaska and 20.3% nationwide.¹¹

Pediatric Asthma Patterns in Alaska and the U.S.

Based on BRFSS survey data collected in 2004, an estimated 8.4% of Alaskan children were reported to ever have been diagnosed with asthma in their lifetime. Current asthma prevalence among children, approximately 6% overall,^{12,13} appears to be lowest in rural Alaska, compared with other regions.¹² Again, differences may reflect true differences in disease prevalence but also differences in diagnostic practices in different healthcare settings. Between 1999 and 2002, asthma prevalence among Medicaid recipients less than 20 years old appeared to increase, but this increase may have been caused, in part, by increased awareness and use of asthma as a billing diagnosis.¹⁰

Figure 5.3: Prevalence of Current Asthma Diagnosis in Children, by Region: 2004 Alaska BRFSS data



Asthma in Alaska 2007 Report: A Report on the Burden of Asthma in Alaska. Gordian, M.E., and B. Saylor: Institute for Circumpolar Health Studies, University of Anchorage.

Pediatric asthma is a common chronic illness and a major cause of healthcare expenditures nationwide. An estimated 14% of U.S. children less than 18 years of age have been diagnosed with asthma in their lifetime, while 9% are estimated to still have asthma.¹³ Children in poor families are significantly more likely to have ever been diagnosed with asthma or to still have asthma than are children from families who are not poor.¹⁴

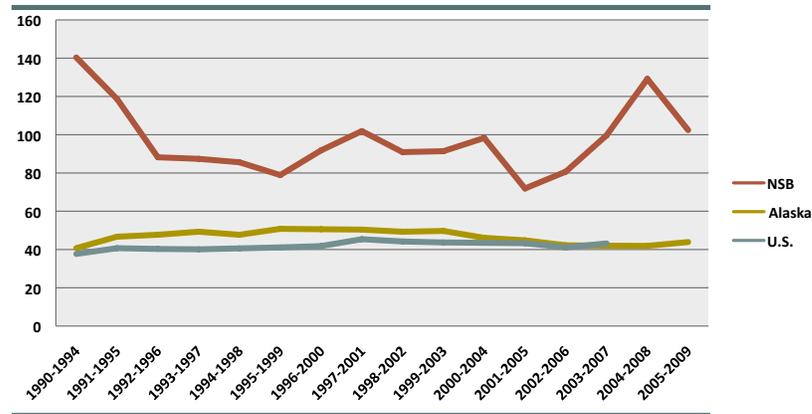
5.1.3. Chronic Lower Respiratory Disease

Chronic lower respiratory disease (CLRD) and chronic lung disease are general terms that describe a number of respiratory ailments that involve irreversible damage to the lungs and reduced lung function. The most common form in adults is chronic obstructive pulmonary disease (COPD), a disease that includes both emphysema and chronic bronchitis. In this country, COPD is primarily caused by cigarette smoking, although environmental and genetic factors also play a role. In Alaska, COPD death rates have been higher among Alaska Natives than among whites since the mid-1980s. Between 1980 and 2007, mortality rates from COPD doubled among Alaska Natives while remaining stable among whites in Alaska.¹⁵

5.1.3.1. Chronic Lower Respiratory Disease Mortality in the NSB

CLRD emerged as a leading cause of death in the NSB in the mid-1980s and has been the 5th leading cause of death in the Borough for most years since 1990. Mortality rates from CLRD in the NSB remain roughly twice statewide and national rates.^{16,17} Among Alaska Natives, only the Arctic Slope's death rate from COPD is significantly higher than the average rate for all other regions combined.¹⁵

Figure 5.4: Chronic Lower Respiratory Disease Mortality Rates:
Average annual number of deaths per 100,000 population, 1990–2009

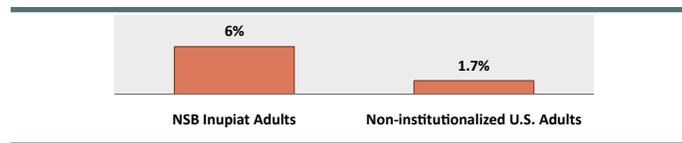


NSB rates are based on fewer than 20 events and must be interpreted with caution.
NSB and Alaska data source: Alaska Bureau of Vital Statistics.
U.S. data source: National Center for Health Statistics, *Health, United States 2008* and *Health, United States 2007, with Chartbook on Trends in Health of Americans*.
Age-adjusted to 2000 U.S. standard population.

5.1.3.2. Prevalence of Chronic Lower Respiratory Disease in the NSB

Limited data suggest that Iñupiat in the NSB report emphysema at higher rates than do non-institutionalized U.S. adults.^{6,15} The data from the two surveys illustrated below are not adjusted for age differences in the population, and the survey methodologies were different. Comparisons must therefore be made with caution. These data do, however, suggest a higher prevalence of emphysema in NSB Iñupiat, compared with national prevalence estimates.

Figure 5.5: Self-Reported Diagnosis of Emphysema Among Adults



Data source: Poppel, 2007, SLICA results (includes Iñupiat residents aged 16 years and older)
U.S. data source: Summary Health Statistics for U.S. Adults: National Health Interview Survey, 2008 (noninstitutionalized adults)

In 2008, exacerbation of COPD was the most common admitting diagnosis among adults at Samuel Simmonds Memorial Hospital (SSMH), excluding childbirth.¹⁸ In the statewide analysis of Community Health Aide practice, chronic lung disease accounted for 25% of all lung problems assessed in NSB village clinics. Overall, the pattern of lung problems seen in NSB villages was similar to statewide data within the Alaska Native rural health system.¹⁹

5.1.3.3. Pediatric Chronic Lower Respiratory Disease

Rural Alaska Native children have been found to be at particularly high risk of chronic lung disease,²⁰ although most of the research in this area has occurred in the Yukon-Kuskokwim Delta (YK Delta). In the 2004 study, an estimated 21.5% of Alaska Native children in the YK Delta region experienced chronic productive cough without asthma diagnosis or symptoms.²¹ Similar studies have not been conducted in the NSB. In the 2010 NSB Census questionnaire, however, chronic cough was combined with asthma in a single survey question, yielding an estimated combined prevalence among children of only 5%, suggesting that the prevalence of respiratory disease among children in the NSB may be considerably lower than in the YK Delta region.³

5.1.4. Respiratory Infections

5.1.4.1. Lower Respiratory Infection (LRI)

LRIs refer to infections affecting the lung tissue and air sacs, commonly referred to as pneumonia. In 2008, pneumonia was the leading reason for pediatric hospital admission at SSMH (excluding newborn admission).¹⁸ In 1998–2003, the incidence of outpatient-diagnosed LRI among Medicaid-enrolled children in the NSB was comparable with the statewide rates for Medicaid-enrolled children (38.4 and 42 per 100 child-years, respectively).^{22,23} Alaska, however, has one of the highest rates of LRI ever reported among Medicaid-enrolled children aged less than two years old.²³ Among children, pneumonia is also an area of racial health disparity in Alaska. Among non-Natives, 3.3% of mothers reported that their two-year-olds had been diagnosed with pneumonia and treated with antibiotics in 2006. Among Alaska Natives, 24.5% of mothers, more than seven times as many, reported receiving a diagnosis of pneumonia in their two-year-olds.²⁴

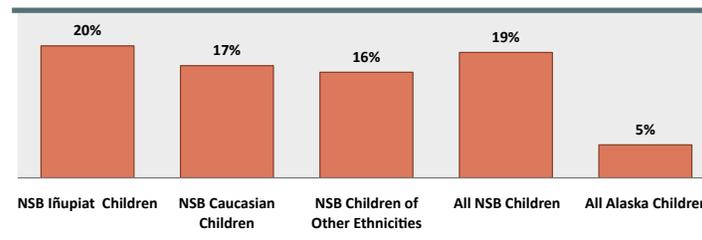
5.1.4.2. Upper Respiratory Infection (URI)

URI is a nonspecific term used to describe the common cold, flu, and other infections involving the ears, nose, sinuses, throat, and airways. Although generally mild and self-limited, these infections lead to lost days of school and work, increases in healthcare costs, and can occasionally lead to more serious illness in vulnerable persons. URIs are the most common assessment made by NSB community health aides as well as community health aides statewide, accounting for about one-third of all visits.¹⁹ Acute URI is also the most commonly coded reason for an outpatient medical visit at SSMH.¹⁸

Ear Infections

Ear infections are among the most common ailments suffered by infants and young children in the U.S. The 2010 NSB Census survey asked household heads whether they or other household members had, in the past 12 months, experienced frequent (three or more) or chronic ear infections. The estimated prevalence among NSB children aged 0–17 years was almost four times the estimated statewide prevalence,^{3,13} and the prevalence was similarly high in all ethnic groups. The prevalence also varied widely among North Slope communities, ranging from 10% in Kaktovik to 23% in Barrow.³

Figure 5.6: Frequent* or Chronic Ear Infections Among Children (Aged 0–17 Years), by Ethnic Group



*Three or more ear infections in the past 12 months

NSB data source: 2010 NSB Census.

Alaska data source: National Survey of Children's Health 2007.

Influenza

Influenza, or “the flu,” refers to a common systemic illness involving the upper respiratory tract, caused by the influenza virus. People with the flu typically experience cough, fever, fatigue, and muscle aches along with other symptoms, and they may or may not seek medical care. The severity of the illness depends on many factors, including the strains of viruses circulating in a given season and the underlying health condition of the person infected. Statewide, Alaska Natives experience higher rates of serious influenza infections than non-Native Alaskans.²⁵ Every year, thousands of people in the U.S. die from complications of influenza.²⁶ In 2009–2010, a new and very different flu virus called H1N1 spread worldwide and affected all regions of Alaska, including the NSB. This H1N1 flu was unusual in that nearly 90% of the deaths nationwide occurred among people younger than 65 years of age.²⁶

Bronchiolitis and RSV

Bronchiolitis is a common infection of the small airways, occurring most often in the winter months. It affects infants most severely and can result in prolonged illness, hospitalization, and sometimes respiratory failure. The most common cause of bronchiolitis is a virus called Respiratory Syncytial Virus (RSV). RSV infection is a major cause of illness and hospitalization in Alaska and, in particular, among Alaska Native infants, where rates far exceed U.S. rates.²⁰

In the winter of 2006–2007, an outbreak of RSV occurred on the North Slope, resulting in the hospitalization of 53 infants and young children in Barrow. Twenty-eight children required transport to Anchorage for intensive care.²⁷ RSV and bronchiolitis continue to be common health problems in children in the NSB, accounting for 25% of lung problems seen in NSB village clinics.¹⁹

5.2. Determinants of Respiratory Disease

The drivers, or determinants, of respiratory disease overlap with the various factors driving other aspects of health. Some of the specific factors known to affect respiratory health in communities are discussed in this section.

5.2.1. Determinants of Asthma

The causes of asthma are multiple and not completely understood. The development of asthma involves changes in the immune system's response to certain exposures, resulting in inflammation of the airways. In children especially, asthma is linked with environmental allergies such as those to pollen, dust, and smoke. Children who have had a severe viral pneumonia as infants, particularly from RSV, are also more likely to experience asthma.²⁸

A number of environmental factors are known to trigger asthma or exacerbate asthma symptoms. NSB-specific data in these areas are discussed in Chapter 1: Overall Health, in the Physical Environment section.

- **Indoor air quality:** Exposures to tobacco smoke and exhaust from heating sources and nearby vehicles are potential triggers for asthma and exacerbations of asthma symptoms. Arctic residents are particularly vulnerable to indoor air pollution because of tightly sealed houses and poor ventilation, as well as prolonged time spent indoors.^{29,30} Inadequate indoor ventilation and air circulation can also increase the prevalence of allergenic indoor molds and animal dander.
- **Outdoor air quality:** Children living in proximity to roadways have more asthma symptoms, decreased lung function, more hospitalizations, and increased incidence of asthma exacerbations.¹² This association with traffic density is thought to be caused by increased exposure to a number of components of vehicle exhaust, as well as increased aerosolization of dust and silt. Evidence suggests that coarse particulate matter such as dust is associated with increased outpatient visits and quick-relief asthma medication use among children.^{31,32}
- **Water and wastewater service:** Respiratory infections are frequent triggers of asthma exacerbations. Adequate water supply in villages, which facilitates handwashing, has been associated with a decreased incidence of respiratory infections.^{33,34}

5.2.2. Determinants of Chronic Lung Disease

By far the most important risk factor for CLRD in the U.S. is smoking. In the U.S., COPD is associated with a history of cigarette smoking in 80–90% of cases.³⁵ Thus, although other factors may be contributory, the high rates of COPD and mortality from chronic lung disease are not surprising given the high rates of tobacco smoking in the NSB, discussed in Chapter 1: Overall Health.

Recurrent and severe LRIs during infancy and childhood also increase the risk of developing some types of chronic lung disease and reduced lung function. Current rates of LRI among NSB children do not appear to be higher than statewide rates, although at least one serious outbreak of RSV has occurred recently in the NSB, as described previously. The older generation of rural Alaska Natives suffered from a very high prevalence of respiratory infections such as tuberculosis during the last century,³⁶ and the complications of these infections may still be contributing to the disparity in chronic lower respiratory morbidity and mortality seen in the NSB.

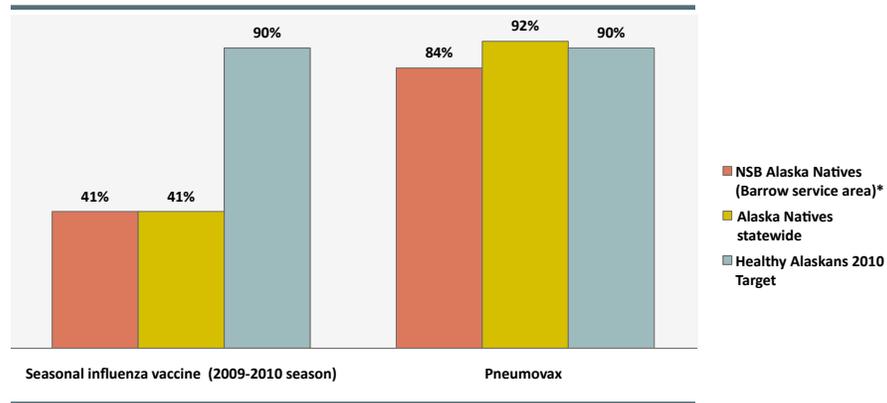
Indoor and outdoor air pollution, dust and chemicals in the workplace, and second-hand tobacco smoke also play a role in the development of chronic lung disease. In more developed countries, these environmental factors are estimated to contribute between 10 and 30% of the disease burden of COPD.³⁷ As discussed in the Overall Health section, air quality data in the NSB are very limited, and the contribution of oil development-related air pollution to chronic lung disease and asthma in the NSB has not been fully determined. A recent study examining air quality in Nuiqsut, the village closest to oil development activities, has not found evidence of pollution at levels expected to have significant health effects, according to one of the investigators.³⁸

5.2.3. Determinants of Respiratory Infections

5.2.3.1. Influenza and Pneumococcal Immunization

Immunization of adults and children can reduce the incidence of influenza and pneumococcal respiratory illness in a community. As of June, 2010, pneumococcal vaccinations rates among elderly Alaska Natives in the NSB are close to the Healthy Alaskans 2010 target, but influenza vaccination rates in this high-risk group were less than 50%.²⁵

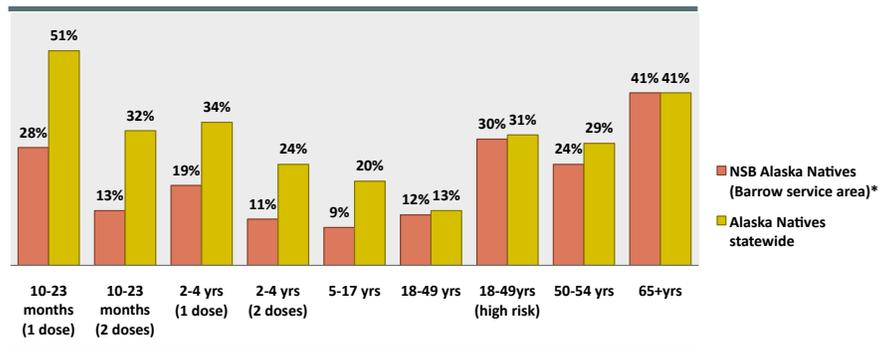
Figure 5.7: Influenza and Pneumococcal Immunization Rates for Adults Ages 65+ (as of June 2010)



*Includes all NSB villages except Point Hope.
Data source: Alaska Native Tribal Health Consortium Immunization Program.

During the 2009–2010 flu season, seasonal influenza immunization rates among Alaska Native adults in the NSB were similar to those among Alaska Native adults statewide. Pediatric influenza vaccination rates were considerably lower than statewide rates, however.²⁵ The 2009–2010 flu season was unusual in that public health efforts were largely focused immunizing against the epidemic H1N1 strain, which required a vaccine separate from the seasonal flu vaccine.

Figure 5.8: Seasonal Influenza Immunization Rates, by Age: Percent vaccinated during 2009–2010 Season



*Includes all NSB villages except Point Hope.
Data source: Alaska Native Tribal Health Consortium Immunization Program.

5.2.3.2. Behavioral and Environmental Factors

The transmission of respiratory infections depends on many of the same factors as other infectious diseases. In particular, crowding,³⁹ poor nutrition and underlying health problems, tobacco smoking and secondhand smoke,^{40,41} inadequate water supplies,^{33,34} and poor ventilation and indoor air quality,^{39,41} increase the risk of respiratory infections. Breastfeeding and handwashing can reduce the incidence of many infectious respiratory illnesses. Community education levels have also been shown to predict pediatric LRI rates and are an even better predictor than the educational level of mothers.²³

Chapter 5 Endnotes

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