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Prevalence of chronic respiratory diseases in Aboriginal children: A whole population study

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Abstract

Background: The burden of bronchiectasis is disproportionately high in Aboriginal adults, with early mortality. Bronchiectasis precursors, that is, protracted bacterial bronchitis (PBB) and chronic suppurative lung disease (CSLD), often commence in early childhood. We previously reported a 10% prevalence of PBB in Aboriginal children aged 0 to 7 years, however there are no data on prevalence of chronic lung diseases in older children. Our study aimed to determine the prevalence of PBB, CSLD, bronchiectasis, and asthma in Aboriginal children living in four communities.

Methods: A whole-population cross-sectional community co-designed study of Aboriginal children aged <18-years in four remote communities in Western Australia

across two-time points, a month apart. Children were assessed by pediatric respiratory clinicians with spirometry undertaken (when possible) between March–September 2021. Children with respiratory symptoms were followed up via medical record audit from either the local medical clinic or via a respiratory specialist clinic through to March 2022 to establish a final diagnosis.

Findings: We recruited 392 (91.6%) of those in the selected communities; median age = 8.4 years (interquartile range [IQR] 5.1–11.5). Seventy children (17.9%) had a chronic respiratory pathology or abnormal spirometry results. PBB was confirmed in 30 (7.7%), CSLD = 13 (3.3%), bronchiectasis = 5 (1.3%) and asthma = 17 (4.3%). The prevalence of chronic wet cough significantly increased with increasing age.

Interpretation: The prevalence of PBB, CSLD and bronchiectasis is high in Aboriginal children and chronic wet cough increases with age. This study highlights the high disease burden in Aboriginal children and the urgent need for strategies to address these conditions.

KEYWORDS
Aboriginal children, prevalence, respiratory disease

1 | INTRODUCTION

Protracted bacterial bronchitis (PBB) is the most common cause of chronic wet cough in children in some settings including Australia[1,2] and if untreated, can progress to chronic suppurative lung disease (CSLD) or bronchiectasis, the latter being a chronic debilitating lung disease.[3] Life expectancy for First Nations Australians with bronchiectasis is over 20-years less than for non-First Nations Australians with bronchiectasis.[4] We have previously shown that the major barriers preventing timely diagnosis and management of PBB, particularly for First Nations people include low awareness of the disease by families[5] and clinicians,[6] and misdiagnosis of PBB as asthma. Such barriers may delay diagnosis and result in disease progression to bronchiectasis.[7] These factors also reduce the accuracy of using clinic-level data to determine disease prevalence. The European Respiratory Society Statement on PBB in children identified a need for data on disease burden at the community level.[8] The only study to-date to measure the prevalence of PBB at the community level focused on Aboriginal children aged 7 years and younger and reported that 10% had PBB.[8] The prevalence of PBB and related diseases in older children remains largely unknown. Indeed, to-date no studies have comprehensively investigated the prevalence of PBB, CSLD, and bronchiectasis in children (<18 years) at the community level.

First Nations populations have increased vulnerability to chronic respiratory diseases due to multiple complex factors, which include access to medical care, environmental factors, and remoteness.[9] Given these vulnerabilities and the known disproportionate burden of respiratory disease for First Nations populations, there is an urgent need to better understand community level disease prevalence.

We aimed to determine the chronic respiratory disease burden of Aboriginal children in four remote communities in the Kimberley region of Western Australia, specifically to (i) determine the prevalence of chronic wet cough (symptom), PBB, CSLD, bronchiectasis and asthma, and (ii) evaluate if these symptom and diseases are related to age, community, and participant characteristics.

2 | METHODS

A whole population, cross-sectional study of Aboriginal children aged <18 years in four different communities across two-time points, 1-month apart (Supporting Information: Appendix, Figure S1). Ethical approval was granted by the WA Aboriginal Health Ethics Committee (HREC 834) and the WA Country Health Ethics Committee (RGS 1374). Informed consent was obtained and documented for all participants. As part of the informed consent process, parents were provided with culturally secure information about lung health, PBB, bronchiectasis and the importance of chronic wet cough, using flipcharts that have been shown to improve knowledge of lung health,[10] recognition and health seeking for chronic wet cough in children by Aboriginal families.[11]

2.1 | Setting

The study was undertaken in four remote Aboriginal communities (Table 1) in the Kimberley coastal region of WA, between March and November 2021. Each community is classified as "very remote" based on Australian classifications[12] and all are located within a 220-km radius of the region's largest town and closest regional hospital. The only pediatric hospital in the state is more than 2000 km away.

2.2 | Sampling strategy

The number of children residing in the community was ascertained through the local community's electronic medical record system, where all children are registered, with local Aboriginal health staff and navigators determining which children were present in the community during the study period. This method was considered to be the most accurate available, given the small community size and strong cultural networks, the known transient nature of remote community populations in the region, and the relative underestimation of Australian Bureau of Statistics population data.[13]

2.3 | Recruitment

Information posters were placed throughout the community, including the medical clinic and community store, 1 week before the initial week of recruitment, to inform families about the study. Recruitment occurred over a 1-week period in each community at local community barbeques hosted by the research team, at playgroups for preschool children, and through home-visits. Children present in the community but not recruited at the initial week-long visit were given the opportunity to participate at the time of the follow-up visit a month later.

2.4 | Data collection

Data were collected using a standardized format as each child was assessed by clinician-researchers with pediatric respiratory expertize (doctor and/or physiotherapist), and an Aboriginal researcher. Spirometry was undertaken by a lung function scientist if the child was old enough. The study team included a pediatric respiratory physician, who was consulted regarding any children identified with respiratory illness, and who, as duty of care, advised the local clinic on any pathology found or suspected. Before the study, the physician provided training to local clinicians on the management of chronic wet cough according to best practise guidelines.[6]

2.5 | Medical history and clinical assessment: (Supporting Information: Appendix)

After providing culturally secure health information, clinicians first asked parents whether their child had a current cough. If a current cough was present, parents were asked about cough quality and number of consecutive days that the cough had been present. Children were assessed to have chronic wet cough at the first study visit if parents reported that their child had daily wet cough for 4-weeks or more. Any existing respiratory disease in participants either reported by parent or known to the specialist respiratory service that served the region was documented, even if participants were asymptomatic at the time of the assessment.

The same team of clinicians assessed each child's cough quality across all communities. Initially, the child was asked to cough, and the cough characteristics recorded. Respiratory examination findings including chest wall shape and breath sounds on auscultation were documented. The clinicians assessed any children with chronic wet cough for specific alternative causes of respiratory diseases such as recurrent aspiration (infant with coughing or choking with feeds), foreign body aspiration (respiratory symptoms commenced after a choking episode) and asthma (recurrent wheeze with or without shortness of breath, typically responsive to inhaled bronchodilator treatment). Exposure to tobacco smoke was also obtained.

TABLE 1 Community details and demographics of participants across all four communities

Community	1	2	3	4
Total population size (*N*)[a]	750	285	240	330
Child population size (N)[a]	139	119	63	107
Season where child assessed	Wet	Dry	Dry	Dry
Road surface	unsealed	sealed	unsealed	sealed
Type of health service	Aboriginal controlled	Aboriginal controlled	State Government	State Government
Children recruited into study (*N*)	130	98	63	101
Male	69/130 (53%)	46/98 (47%)	29/63 (46%)	55/101 (54%)
Age at assessment (median [IQR] years)	8.7 (5.3, 12.0)	8.6 (4.6, 11.1)	7.1 (3.8, 10.4)	8.6 (5.3, 11.4)
Screened for tobacco smoking exposure	108/130 (83%)	93/98 (95%)	63/63 (100%)	99/101 (98%)
Child smoker	19/130 (15%)	7/98 (7.1%)	3/63 (4.8%)	9/101 (8.9%)
Secondary tobacco smoke exposure	97/130 (93%)	72/98 (80%)	45/63 (71%)	49/101 (49%)

Abbreviation: IQR, interquartile range.

[a]Australian Bureau of Statistics, 2016.

2.6 | Spirometry

Children aged ≥6 years were invited to perform spirometry at one of the two study visits. Spirometry was performed using a hand-held Easy On-PC® spirometer (NDD Medizintechnik) in accordance with American Thoracic Society and European Respiratory Society guidelines.[14] Forced Expiratory Volume in one-second (FEV_1), Forced Vital Capacity (FVC) and FEV1/FVC ratio were converted to *z*-scores using the 2012 Global Lung Function Initiative (GLI) spirometry equations.[15] Abnormal spirometry was defined as an FEV_1/FVC, FEV_1, or FVC below the lower limit of normal, derived using GLI equations for ethnicity "Other" (corresponding to groups other than Caucasian, African American, North Asian, and South Asian ethnicity).

Second (follow-up) visit: A month following the first study visit, a second clinical assessment was performed on children, if any one of the following were found during the first visit:

1. Parent reported wet cough but of less than 4-weeks or uncertain duration.
2. Parent initially reported a dry cough, but the clinician assessed child's cough as wet. In these children, the researchers verified that families understood how a wet cough sounded.
3. Physical assessment could not be performed and only a parental history was taken.

In all the above scenarios parents had been advised at the first study visit to monitor for the presence or absence of daily wet cough over the following month. This second assessment 1-month after the initial study visit was conducted to allow parents to carefully observe their child's cough because before receiving knowledge about lung health and chronic wet cough, chronic wet cough is often unnoticed or normalized (considered normal).[5]

The second study visit also allowed children not previously recruited at the first study visit to be recruited. However, if the newly recruited child had a wet cough for less than 4-weeks, no further study follow-up was provided.

Medical record audit: Outcomes of any medical management or subsequent respiratory diagnosis was recorded following medical records assessed within 12-months. The 12-months was allocated to allow time for the diagnostic process. Further diagnoses, made either by the local general practitioners or by specialist respiratory physicians where referrals had been made to them, were documented. Supporting Information: Appendix, Figure S1 describes the flow of recruitment and data collection process.

Definitions used in our study:

1. Chronic wet cough: daily wet cough present for ≥4-weeks,[16] as reported by parent and confirmed by clinician, if the cough could be elicited.
2. PBB: chronic wet cough, without pointers to an alternative cause that responded to 2 to 4 weeks of an appropriate antibiotic therapy.[16]
3. Bronchiectasis: chronic wet cough with the presence of characteristic radiographic features on chest high-resolution computed tomography (c-HRCT) scan.[17]
4. CSLD: child with chronic wet cough, who has shown response to antibiotics, but has ongoing wet cough or ≥3 episodes of PBB in a year[17] or chronic wet cough not responding to oral antibiotic treatment in the absence of clinical symptoms or signs indicating alternative diagnoses (e.g., recurrent wheeze and shortness of breath suggesting asthma).
5. Abnormal respiratory findings were considered present if any one of the following: spirometry test result below −1.64 *z*-score, reported history of asthma, current chronic wet cough, current PBB, bronchiectasis, CSLD, abnormal clinician respiratory assessment (e.g., abnormal auscultation findings, chest wall abnormality).
6. Asthma: history of recurrent wheeze ± diagnosis of asthma by a doctor (which included history recurrent wheeze/shortness of breath and positive response to an inhaled bronchodilator) ± spirometry suggestive of small airway obstruction.
7. Child smoker: child smokes tobacco cigarettes.
8. Tobacco smoke exposure: child is exposed to tobacco smoke.

2.7 | Statistical analysis

Data were recorded in REDCap[18] and analyzed using R version 4.02 (RStudio Team). Demographic differences across the four communities were assessed by Fisher's and Kruskal–Wallis tests. Prevalence estimates and 95% confidence intervals (CI) were determined for chronic wet cough, PBB, CSLD, bronchiectasis and asthma; overall and specific to each community. Cohen's κ was used to determine the agreement between parent report and clinician assessment of wet cough. Trends in proportions with disease or symptoms across age groups were assessed by the Cochran–Armitage test. Secondary analyses were performed to investigate possible reasons for variation in prevalence between communities by consideration of season of measurement, road surface, and tobacco smoke exposure using logistic regression, summarized by prevalence odds ratios and 95% profile CI.

2.8 | Role of funding source

The study funders had no role in study design, collection, analysis, and interpretation of data, writing of the report or decision to submit paper for publication.

3 | RESULTS

A total of 428 children aged <18 years were present in the four communities during the recruitment period. Of these, 392 (91.6%) were recruited. The median (interquartile range [IQR]) age of the participants recruited was 8.4 years (5.1, 11.5) and 191 (48.7%) were

female (Table 1). Twenty-nine children (median age = 7.3, IQR 5.2–13.6 years) could not be located during the recruitment period, despite the best efforts of the research team. The remaining seven who were not recruited declined participation. Several of the parents of children who declined, reported that their children felt "shame" (i.e., cultural concept to convey strong feelings of shame/embarrassment that may be due to attention, circumstances or actions of self or others[19]) due to tobacco smoking or experiencing "smokers cough." Tobacco smoke exposure was common across all communities, and 28/61(45.9%) of recruited adolescents (≥13 years) reported to be smokers. Challenges related to screening for tobacco smoke exposure resulted in missing data; values have conservatively been reported as "no smoke exposure" in such cases.

3.1 | Chronic respiratory disease

Overall, 74 (18.9%) children had at least one abnormal respiratory finding. Four were subsequently deemed healthy by respiratory specialist review (e.g., borderline low FVC in otherwise healthy child) (Figure 1), 61 (15.6%) had a final diagnosis of respiratory disease (Figure 2) and 10 (2.6%) had abnormal respiratory finding with no specific diagnosis within the time-period of the study. Detailed findings for each child are outlined in Supporting Information: Appendix, Table S1, and prevalence summaries and spirometry findings, for the four communities, are provided in Supporting Information: Appendix, Tables S2 and S3–S6 respectively.

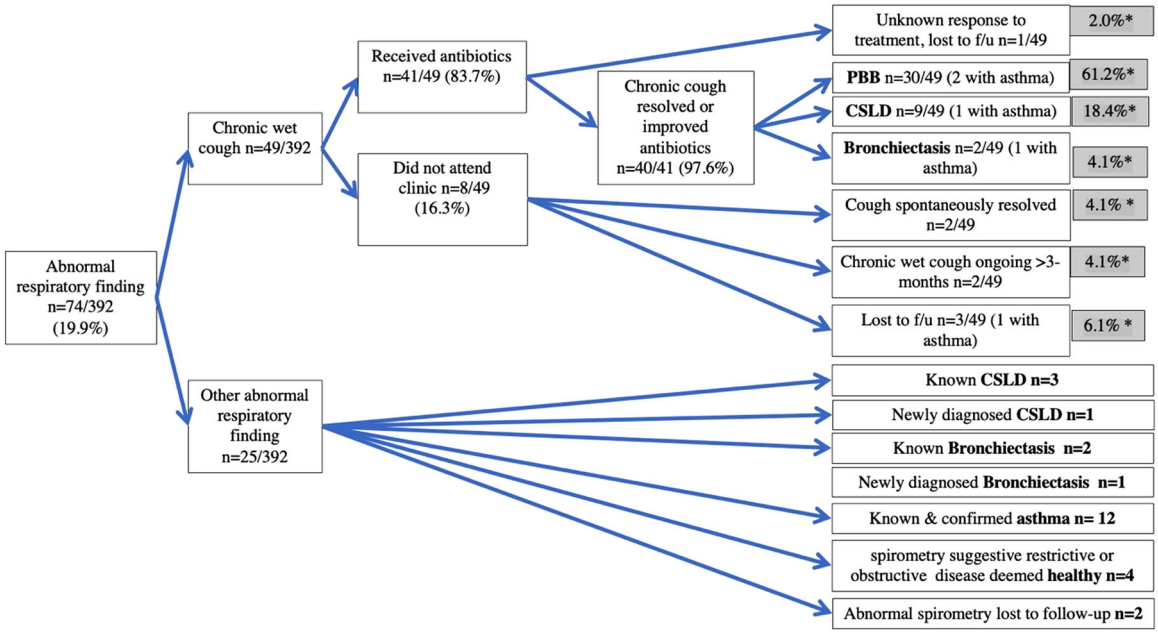

FIGURE 1 Outcomes for children with chronic wet cough or other respiratory findings. CSLD, chronic suppurative lung disease; n, number; PBB, protracted bacterial bronchitis; *%, children with chronic wet cough.

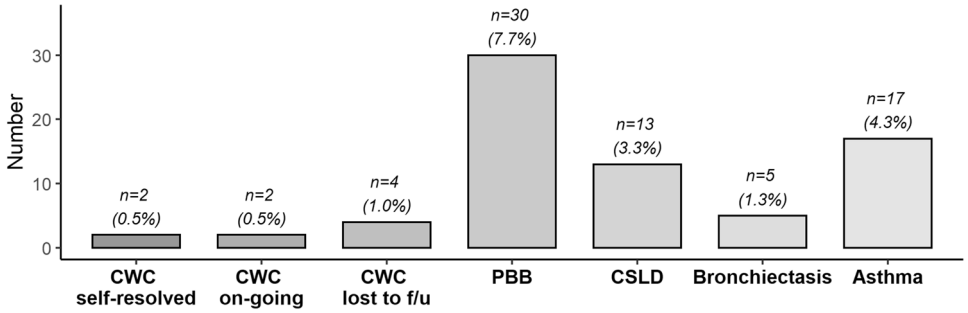

FIGURE 2 Outcomes of children with chronic wet cough or at least one abnormal respiratory finding. CSLD, chronic suppurative lung disease; CWC, chronic wet cough, f/u, follow-up; PBB, protracted bacterial bronchitis.

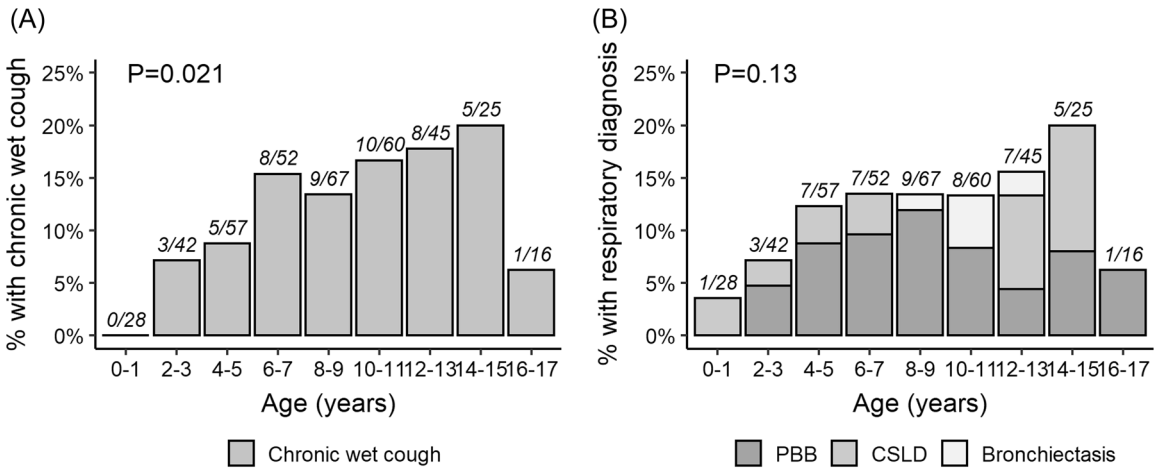

FIGURE 3 Proportion of children with chronic wet cough (A) and confirmed PBB/CSLD/bronchiectasis (b) by age. P, *p* value from the Cochran–Armitage test for a trend in proportions; data reported as number with diagnosis/total number in age group.

TABLE 2 Associations of disease and symptoms with demographic variables, tobacco smoke exposure and community characteristics

	CWC			PBB/CSLD/bronchiectasis			Asthma		
	POR[a]	95% CI	*p* Value	POR[a]	95% CI	*p* Value	POR[a]	95% CI	*p* Value
Male (vs. female)[b]	1.19	0.64–2.22	0.59	1.04	0.56–1.93	0.90	1.15	0.42–3.18	0.79
Secondary tobacco smoke exposure[b]	0.88	0.46–1.73	0.70	0.80	0.42–1.56	0.50	2.37	0.72–10.7	0.19
Child smoker[b]	2.76	1.04–7.18	0.04	2.47	0.91–6.45	0.07	0.44	0.02–2.89	0.47
Dry season (vs. wet)[c]	2.21	1.10–4.84	0.04	1.27	0.67–2.54	0.48	4.02	1.11–25.8	0.07
Sealed road (vs. unsealed)[c]	1.01	0.55–1.84	0.98	0.79	0.43–1.46	0.46	4.79	1.53–21.0	0.02
Govt health clinic[c]	2.88	1.56–5.49	0.0009	1.82	0.99–3.37	0.06	0.58	0.18–1.60	0.31

Abbreviations: CI, confidence interval; CSLD, chronic suppurative lung disease; CWC, chronic wet cough; PBB, protracted bacterial bronchitis; POR, prevalence odds ratio.

[a]Prevalence odds ratio (95% CI) from logistic regression.

[b]adjusted for age and community.

[c]adjusted for age.

3.2 | Children with chronic wet cough

Forty-nine children had chronic wet cough; median age was 9.2 years (IQR 7.1–12.6) and median cough duration was 37 days (IQR 31–60). The cough resolved or improved on receipt of antibiotics in 40 of the 41 (97.6%) children who attended clinic. Outcomes were unknown in four children. The prevalence of chronic wet cough significantly increased with increasing age ($p = 0.02$, Figure 3), and there was a positive association with child smoking status (Prevalence odds ratio [POR], [95% CI]: 2.88 [1.25–6.23], $p = 0.01$, unadjusted, Supporting Information: Appendix, Table S6; 2.76 [1.04–4.84], $p = 0.04$ adjusted for age and community, Table 2).

There was high agreement across the 318 concurrent parental/clinician assessments of children's coughs: Cohen's κ (95% CI) = 0.84 (0.77–0.9).

3.3 | PBB, CSLD, and bronchiectasis

PBB was the most common diagnosis overall, observed in 61.2% (30/49) of children with chronic wet cough. Those diagnosed with PBB ranged in age from 2 to 16 years (median (IQR) 8.3 (6.5–10.8) years). Thirteen children were identified with CSLD, of which nine had chronic wet cough at the time of assessment, three with previously diagnosed CSLD (c-HRCT confirmed bronchial wall thickening but no bronchiectasis) and one subsequently diagnosed CSLD (child had chronic wet cough just outside of the 1-month study period).

Of the five children with bronchiectasis, ranging in age from 8 to 12-years, four had abnormal spirometry findings (restrictive $n = 1$, obstructive $n = 3$). Three of the five children with bronchiectasis were previously diagnosed (one etiology, bronchiolitis obliterans, one etiology unknown, but hospitalized with pneumonia as infant, one

etiology unknown but recurrent PBB). The remaining two children were subsequently reviewed by a pediatric respiratory physician and underwent c-HRCT. Bronchiectasis was confirmed in both children, with unknown etiology in one child and Mounier-Kuhn syndrome in the other child.

Overall, there was a small positive trend in prevalence of PBB/CSLD/bronchiectasis with increasing age (Figure 3).

3.4 | Asthma

Seventeen (4.3%) children had parent reported current/recent asthma and four (0.8%) had previous asthma, that is, no symptoms or treatment in >2 years. All 17 children with current reported asthma, had a final asthma diagnosis and 6 (35%) of these had spirometry suggestive of small airway obstruction. One child with a diagnosis of asthma had spirometry suggestive of restrictive disease, but also recurrent wheeze and shortness of breath triggered by smoke exposure and exercise, wheeze relieved by salbutamol and severe episodes successfully managed with prednisolone. Reports of asthma were relatively more frequent in communities serviced by a sealed road ($p = 0.02$; Table 2). Four of the 17 children with asthma also had either PBB ($n = 2$), CSLD ($n = 1$), or bronchiectasis ($n = 1$).

3.5 | Abnormal spirometry

In total, 182 children attempted spirometry, with 133 (73.1%) children meeting the criteria for acceptable spirometry, 62 (46.6%) females. (Supporting Information: Appendix, Table S4) The median age of children who performed acceptable spirometry was 10.5years (IQR 8.8–11.9). Twenty-three (17.3%) children had abnormal results, 16 (69.6%) of whom had a respiratory diagnosis, four (17.4%) (two obstructive and two restrictive) subsequently deemed healthy after respiratory physician review, and three (13.0%) (one with ongoing chronic wet cough) did not follow-up with any medical review (Supporting Information: Appendix, Table S7).

3.6 | Community differences

The prevalence of chronic wet cough ranged from 7.7%–22.2% across communities (Supporting Information: Appendix, Table S2). Communities measured in the dry season had higher reported prevalence of chronic wet cough ($p = 0.04$, adjusted for age). There was no significant difference in rates of chronic wet cough between communities with different road surfaces $p > 0.9$ for chronic wet cough, prevalence observed in communities served by health clinics run by the State government was increased compared to Aboriginal-Controlled Health Services (Table 2) (chronic wet cough: $p = 0.001$). The effect remained evident when adjusting for both age and season (chronic wet cough: POR = 2.7, $p = 0.02$).

4 | DISCUSSION

Given the paucity of community-based data on the prevalence of lung conditions, we undertook this whole population study of respiratory health of Aboriginal children aged <18 years in four remote Australian communities. We recruited 91.6% of the communities' children and found that 17.9% of children had a chronic respiratory pathology or abnormal spirometry result. PBB was confirmed in 30 (7.7%), CSLD in 13 (3.3%), bronchiectasis in 5 (1.3%) and asthma in 17 (4.3%). The prevalence of chronic wet cough significantly increased with increasing age.

The prevalence of PBB/CSLD/bronchiectasis was high (12.2% of children), a figure substantially higher than reported for non-First Nations children.[7] The prevalence of bronchiectasis in our study was 1.3%, which is similar to two previous studies in other regions of Australia that both reported a prevalence of 1.5%.[20] Thus, our study confirms very high rates of bronchiectasis in First Nations Australian children, which needs to be addressed, as bronchiectasis remains one of the most neglected respiratory diseases,[21] with inequitable service compared to other chronic lung diseases such as cystic fibrosis.[22]

The prevalence of PBB in our study's cohort was 7.7%, a figure slightly lower than the reported 10% reported from our 2019 study of children aged ≤7 years in the same communities.[8] Our study confirms that older children can also have PBB, and PBB/CSLD and bronchiectasis do not decrease with increasing child age. The progression of untreated PBB to bronchiectasis is now widely accepted,[3] and our findings highlight the importance of early detection and management of PBB to prevent disease progression to bronchiectasis, given the high prevalence of all three conditions.

We found asthma in 4.3% of children, a figure well below national self-report rates of 15% in First Nations children.[23] The lower rates in our study may be explained by the known challenges in accurately diagnosing asthma, or it may contextualize the magnitude of the potential inflation of rates when determined via self-report, with asthma diagnosis often being unsubstantiated[24] or PBB being misdiagnosed as asthma.[2,16] Importantly, 29% of the children in our study with a diagnosis of asthma had concurrent diagnosis of PBB, CSLD or bronchiectasis, which highlight that asthma can coexist with PBB, CSLD, or bronchiectasis.[25]

We found higher rates of chronic wet cough in communities where data were collected during the dry season. Environmental dust exposure may partly contribute to the difference as airborne geogenic dust is high in iron ore, and is highly prevalent in the region, particularly during dry season.[26]

More than 10% of children were smokers, with a significant relationship between child smoking and prevalence of disease. The increased disease prevalence in child smokers and high rates of smoking within the communities highlights the importance of continued efforts to reduce smoking.

A study limitation was reliance on parental reporting of cough and other respiratory symptoms such as wheeze and ongoing cough in the 4-week period between clinical assessments. It is possible that symptoms were under-reported, if parents normalized cough,[5] or in

cases where the parent was not always with the child (within Aboriginal cultures different family members may be responsible for care of a child). However, we previously showed Aboriginal parents report an accurate cough history when parents understand the importance of chronic wet cough and clinicians use culturally informed methods.[11]

Another study limitation was that serious pathology may have been missed in some children due to the loss of children with ongoing respiratory symptoms to specialist follow-up and older children with chronic respiratory symptoms not consenting, anecdotally reported, due to shame and smoking. Hence, the actual prevalence of bronchiectasis may be higher than reported, as c-HRCT was not obtained on several children whose clinical findings were suggestive of bronchiectasis. Finally, children with a diagnosis of asthma were not tested for bronchodilator response using spirometry. However, all were reviewed by a respiratory physician to confirm that the diagnosis met study criteria.

A further consideration of our cross-sectional study was that we conducted a similar study in children aged ≤7 years in the same communities 3-years earlier. Hence, a proportion of children aged between 3 and 10 years in the current study would have been diagnosed and treated for PBB during the previous study, thereby potentially reducing numbers of younger children with chronic disease in this study. Thus, we consider the estimates provided in this paper to be indicative of a likely minimum estimate of the true prevalence rate for these conditions.

Finally, borderline low spirometry findings may well have been normal if adjusted for the lower Cormic Index observed in Aboriginal children.[27] However, the presence of a respiratory physician on the study team facilitated interpretation of results, for example, where a borderline restrictive spirometry curve was found in the absence of abnormal symptoms or physical findings children were classified as healthy.

5 | CONCLUSION

This first community-based study found that the prevalence of PBB, CSLD and bronchiectasis is high in Aboriginal children and chronic wet cough increases with age. These findings demand efforts to reduce the disease burden.

AUTHOR CONTRIBUTIONS

Pamela Laird: Conceptualization; investigation; funding acquisition; writing – original draft; methodology; validation; visualization; writing – review & editing; software; formal analysis; data curation; supervision; resources. **Nicola Ball**: Writing – review & editing; data curation. **Shekira Brahim**: Methodology; writing – review & editing. **Henry Brown**: Investigation; writing – review & editing; validation. **Anne B Chang**: Conceptualization; methodology; writing – review & editing; supervision; resources. **Matthew Cooper**: Validation; formal analysis; software. **Deanne Cox**: Methodology; writing – review & editing. **Denetta Cox**: Methodology; writing – review & editing. **Samantha Crute**: Investigation; writing – review & editing. **Rachel E Foong**: Investigation; writing – review & editing; validation; formal analysis. **Janella Isaacs**: Writing – review & editing; methodology. **John Jacky**: Methodology; writing – review & editing. **Gloria Lau**: Investigation; writing – review & editing. **Elizabeth McKinnon**: Writing – review & editing; visualization; validation; formal analysis; software. **Annie Scanlon**: Investigation; writing – review & editing. **Elizabeth F Smith**: Investigation; writing – review & editing; validation. **Sarah Thomason**: Investigation; writing – review & editing. **Roz Walker**: Conceptualization; resources; writing – review & editing; methodology. **André Schultz**: Conceptualization; investigation; funding acquisition; methodology; writing – review & editing; visualization; validation; formal analysis; project administration; supervision; resources.

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CONFLICTS OF INTEREST

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DATA AVAILABILITY STATEMENT

Data collected from the study has been included in the manuscript (Table 2 and Tables S1–7). The study protocol and informed consent forms are available if requested in writing.

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SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

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