Effect of different definitions of numerators and denominators to estimate the incidence rates of diarrhea and upper respiratory tract infections in day care centers (DCC)

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Background

- Increasing number of children in DCC
- Association between DCC and infectious diseases
- DCC children vs home children at increased risk of:
  - Diarrhea
  - Upper respiratory tract infections (URTI)
  - Otitis media (middle ear infection)
- DCC risk factors:
  - Exposure through air
  - Indirect and direct contact by children and personnel
  - DCC environment

Background

- Risk greatest in children < 36 months of age
- Public Health Concern

  re: increased incidence rates (IR) of diarrhea and URTI in DCC
- Numerators and denominators of IR vary considerably

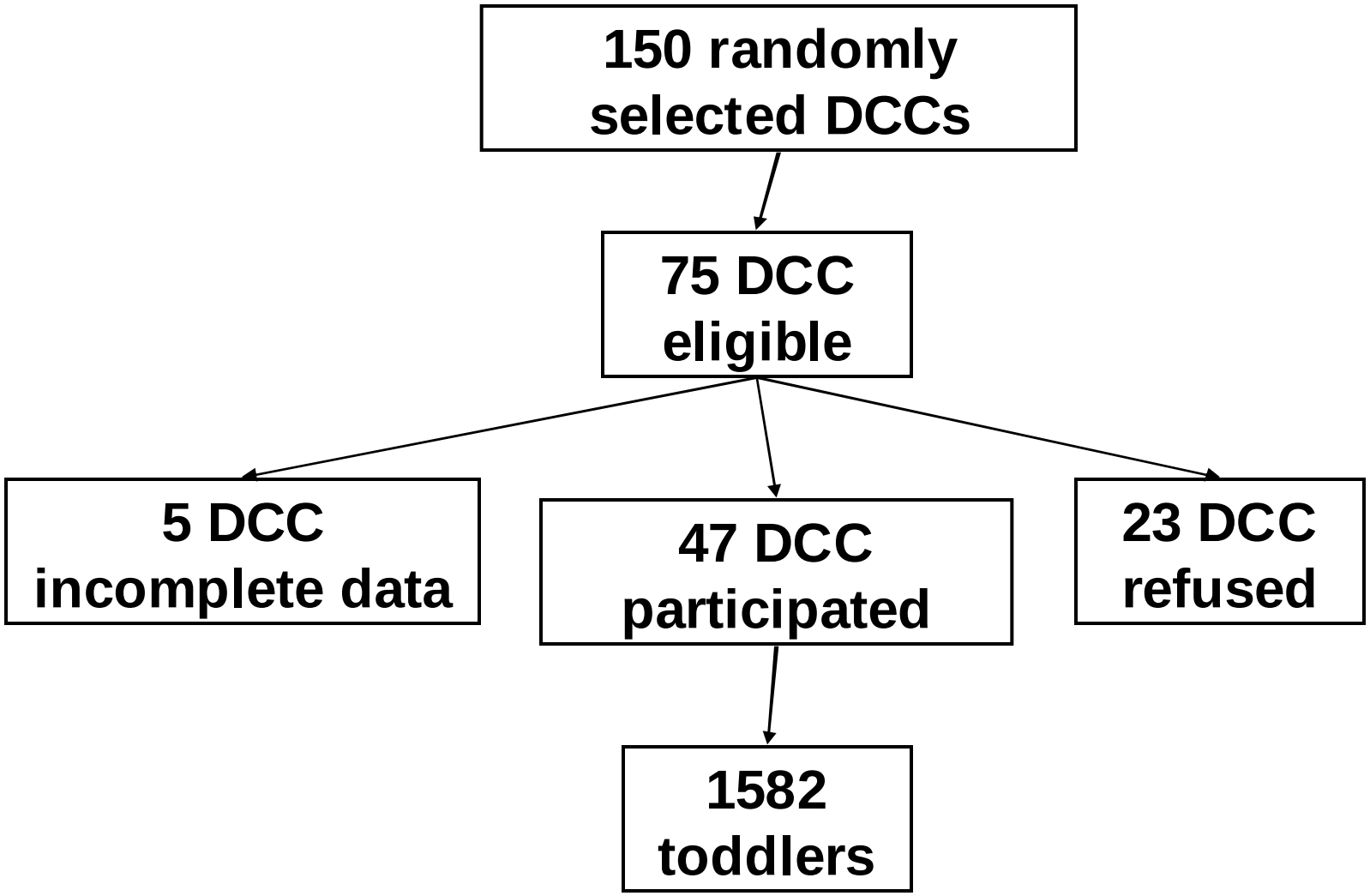
Objective

- To assess the impact of using different definitions for episodes of illness (numerator) and at-risk time units to define child-at-risk (denominator) on the estimation of IR of diarrhea and URTI in children attending DCCs

Methods

- Study design: Longitudinal
- Study length: Sept-Nov,96 and Sept-Nov,97
- Study region: 4 regions in SE Québec, Canada
- Study population:
  - 47 eligible DCCs
  - 1582 children
  - Between 18 and 36 months of age

Methods



Methods

- Data collection:
  - DCC educators recorded
    - daily occurrence of illness
    - days each child was expected to attend DCC
    - absences and their causes (when known)
- Definitions:
  - Diarrhea – presence of 2x the normal # of stools or a change in the consistency of stool to watery.
  - URTI / Cold – presence of nasal discharge (runny nose) accompanied by ≥ 1: fever, sneezing, cough, sore throat, earache, malaise, irritability.

Different population-time definitions & lag times

Method #1	Method #2	Method #3	Method #4
child-day	child-week	child-fortnight	child-month
Day of illness @ DCC	Week of illness @ DCC	Day of illness @ DCC	Day of illness @ DCC
preceded by 7 days w/o SX	preceded by 1 week w/o SX	preceded by 7 days w/o SX	preceded by 7 days w/o SX
Child at DCC w/o SX in the past 7 days	Child at DCC at least 1 day/week w/o SX in the previous week and the present week	Child at DCC at least 20 hours/ week w/o SX in the present fortnight	Average number of children present per month

Results: IRs (Diarrhea)

Method	Episodes (Numerator)	Child-year at-risk (Denominator)	Incidence Rates (95% CI)
#1	309	179.66 (365 child-days)	1.72 (1.53 – 1.92)
#2	315	316.71 (52 child-weeks)	0.99 (0.89 – 1.11)
#3	309	286.12 (26 child-fortnights)	1.08 (0.96 – 1.21)
#4	309	294.61 (12 child-months)	1.05 (0.94 – 1.17)

Results: IRs (URTI)

Method	Episodes (Numerator)	Child-year at-risk (Denominator)	Incidence Rates (95% CI)
#1	1747	148.98 (365 child-days)	11.73 (11.18 – 12.29)
#2	2065	247.46 (52 child-weeks)	8.35 (7.99 – 8.71)
#3	1747	222.50 (26 child-fortnights)	7.85 (7.49 – 8.23)
#4	1747	293.54 (12 child-months)	5.95 (5.68 – 6.24)

Conclusions

- Different episodes and population-time definitions affect the estimation of IR of diarrhea and URTI
  - These variations make comparisons difficult
- Uptake of research results into public health practice may suffer
  - Estimates of IRDs are affected
    - Important impact on PH policy and decision making
    - How many episodes averted based on IRD estimates?
    - Cost per case averted…

Conclusions

- Significant differences were observed in IRD for health education intervention
  - May change with a hierarchical multivariate Poisson model
- Estimates of measure of association (IRR) less affected
  - Similar results with hierarchical multivariate Poisson model
- Recommendations
  - Promote development of a more standard approach to the measurement and reporting of IRs in epidemiological, occupational, and environmental health studies

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