AiRMA

the Airborne and the Respiratory Microbiome and Allergic diseases

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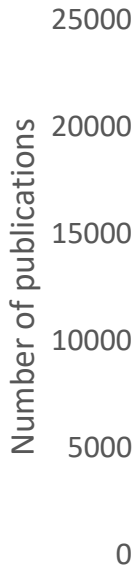
Publications available at PubMed within the last 5 years

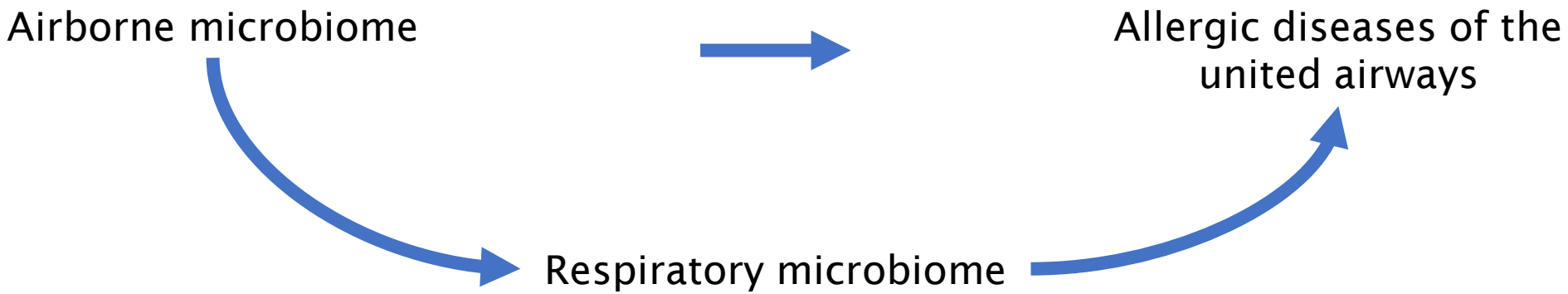


MeSH-terms used

Exposure
Airborne microbiome
- Abundance
- Diversity
- Composition

Outcome
Allergic diseases of the united airways
- Clinical examinations
- Registry data
- Questionnaires

Exposure
Respiratory microbiome
- Abundance
- Diversity
- Composition


Airborne microbiome
Allergic diseases of the united airways
Respiratory microbiome

The farm effect?

Dose dependent effect
Duration
Intensity
Etc.

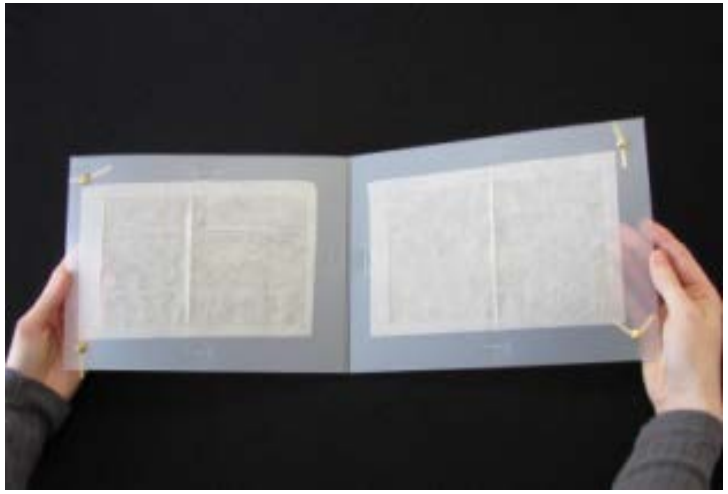
Pigeon breeders
Close relationship to animals
Abundant and rich airborne microbiome

From here …

DUST SAMPLING DEVICE
Electrostatic dust fall collector (EDC)

- Sampling surface: a polypropylene sampler with attached electrostatic cloths (0.0209 m^2)
- Airborne dust settling on the surface captured by the electrostatic properties of the cloths
- Extraction of dust components from the cloths
  - Bacteria
  - Fungi
  - Endotoxin
  - Allergens

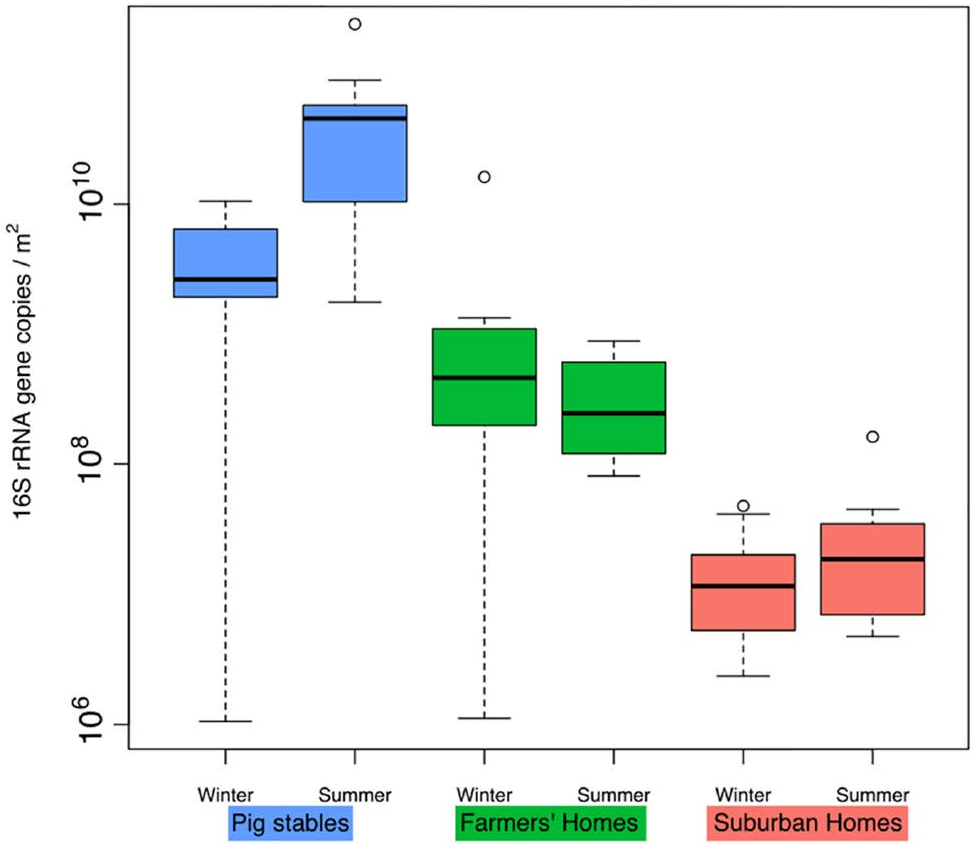
DUST SAMPLING DEVICE
Electrostatic dust fall collector (EDC)



BACTERIA
DNA sequencing

- Quantitative PCR was carried out to quantify bacterial abundance
- MiSeq sequencing targeting the V3–V4 region of bacterial 16S rRNA gene was used to detect bacteria using bacteria-specific primers

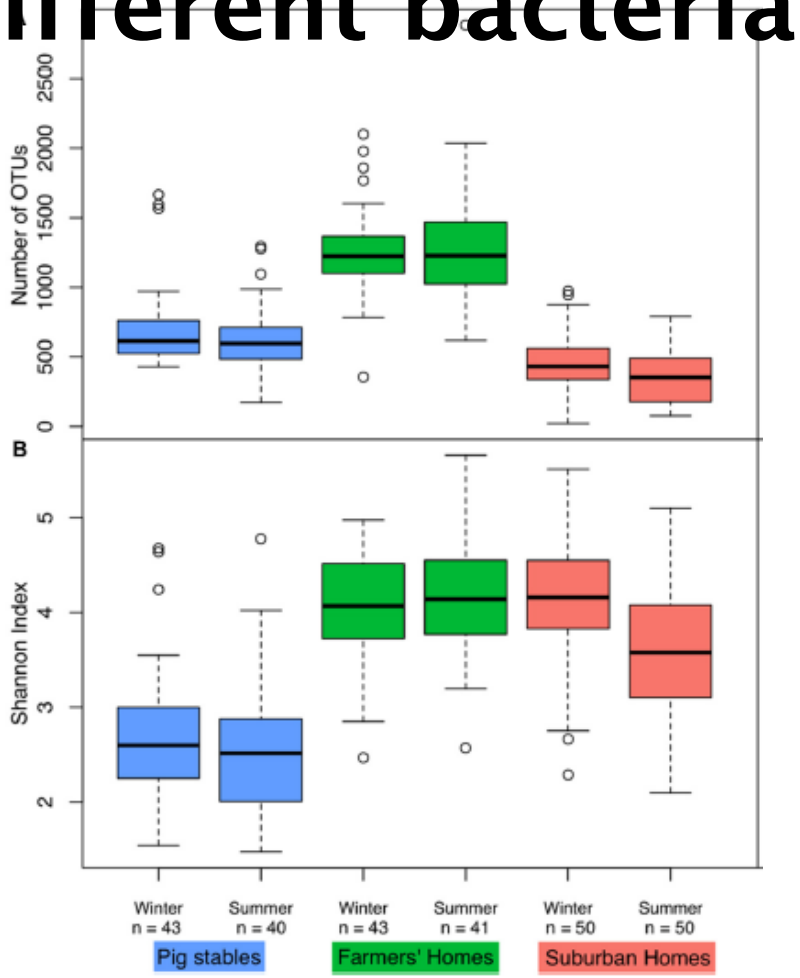
How many bacteria are present?



Vestergaard et al 2018



How many different bacteria are present?



Vestergaard et al 2018

Name

Date of birth

Address

Date of enrolment

Number of pigeons*

DANMARKS STATISTIK

Unique personal identification numbers (CPR)

Redeemed medical prescriptions

Diagnoses of diseases

Work history

Etc.

Pigeon project

Research Year Project

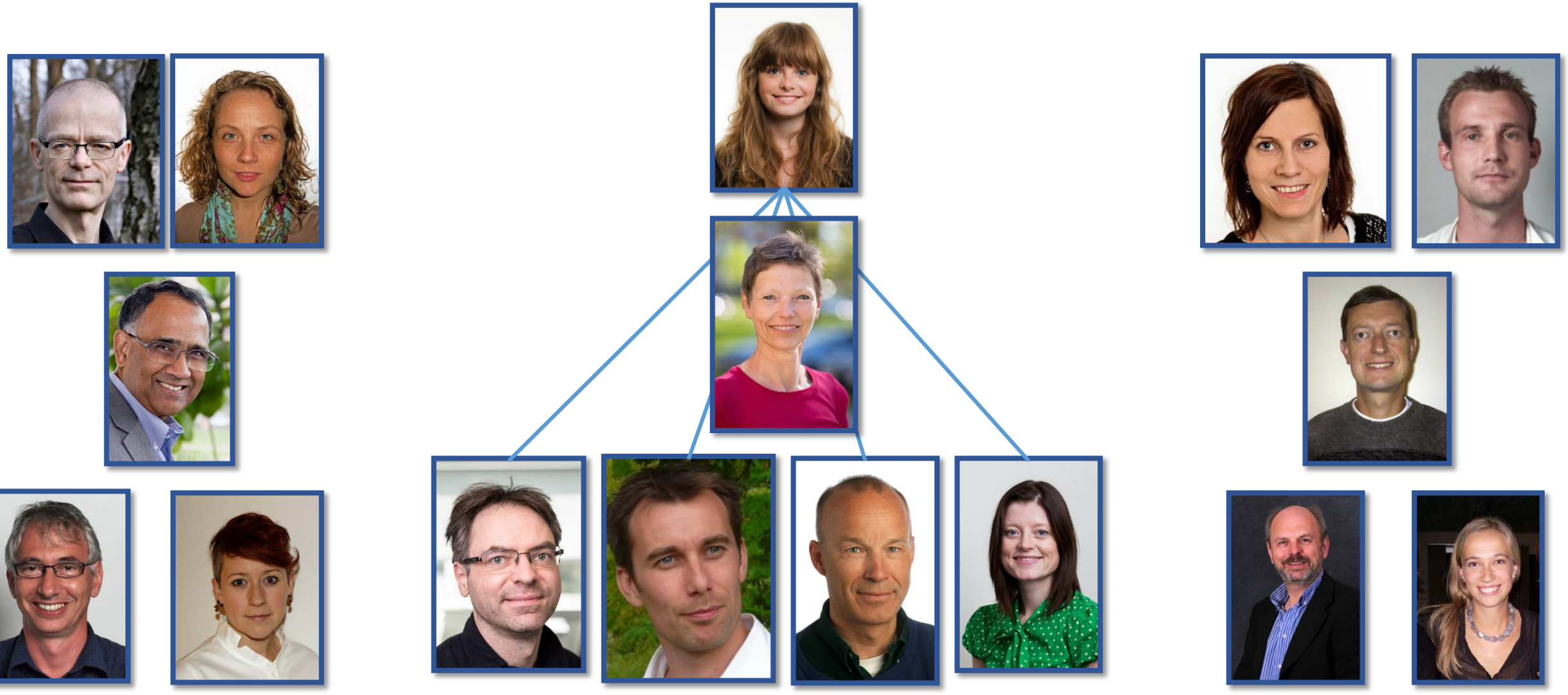
Retrospective follow-up study

Largest pigeon breeder population published

Cramer et al, 2016, ERJ

* Number of rings purchased for the newly bred pigeons used as proxy for number of pigeon

…to the PhD



Study 1

Case control

Population
167 individuals from SUS12
100 individuals from Health2012

Exposure
EDCs collected in 2009 and 2012
Analysed for abundance and diversity

Case definition
Affirmative answer on questions regarding allergic respiratory diseases + medication

Study 1 – part 2
Non-cases followed through registers up until 2018

The microbiome at baseline for new cases compared to that of the controls

Up-qualifying by registers
LPR
Danish National Health Service Prescription Database

Study 2

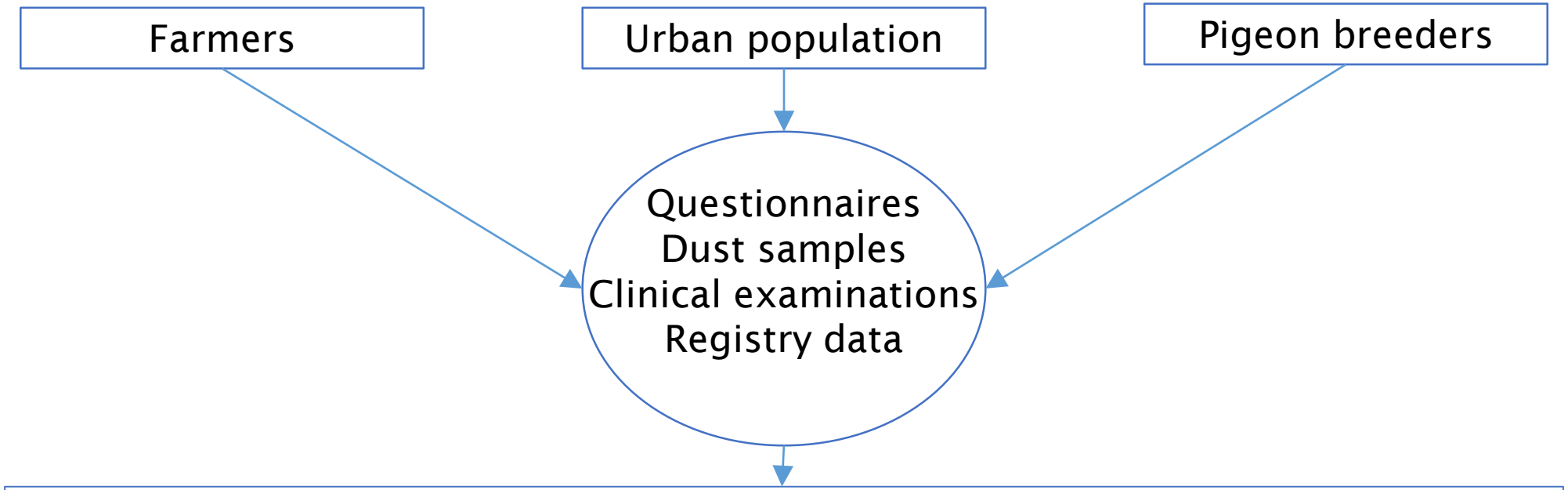
Exposure model

Exposure predictors
Pets
Number of residents
Location
Cleaning practise
Etc.

Exposure model
Apply exposure data to a larger population
Cost efficient
Larger populations yields it possible to investigate rare diseases

Study 3 + 4

Study design



Cross sectional study: a diverse and abundant airborne microbiome has a protective effect on allergic diseases, mediated by the respiratory microbiome, independent of the farm effect

Study 3

Airborne & respiratory microbiome

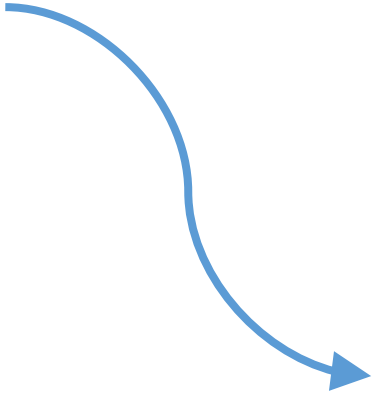
Exposure: airborne microbiome

Abundance

Composition

Diversity

- Richness
- Shannon Index



Re-sample

- Subgroup
- EDCs and swabs

Outcome: respiratory microbiome

Abundance

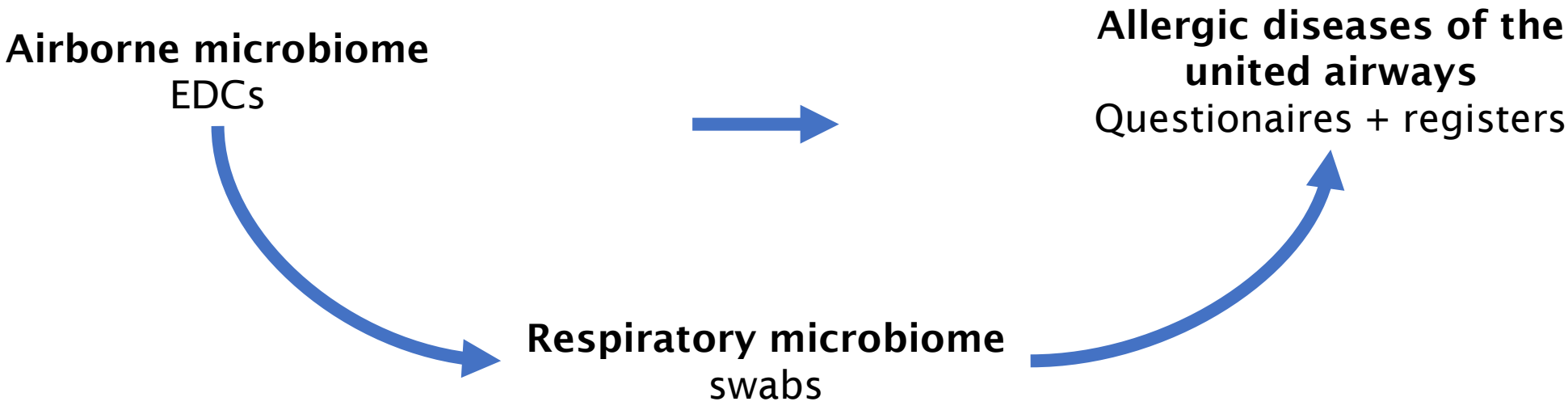
Composition

Diversity

- Richness
- Shannon Index

Study 4

Mediation



Questions?

Thank you!