Welcome to the

2025 WOMENtum

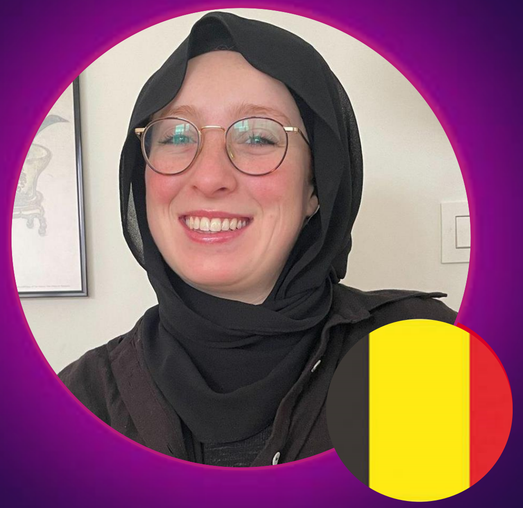
Together, let’s advance women’s intimate health, break barriers, and address taboos!

MICROBIOTALK

by Biocodex Microbiota Institute

03

Scientific insights on cultural practices and microbiota



Dr. Sarah AHANNACH, PhD

→ Postdoctoral researcher at the University of Antwerp
→ Microbiome Senior Researcher
→ Member of the Isala project
→ 2024 Belgian Grant winner

ISALA

University of Antwerp

MICROBIOTALK

Scientific insights on the vaginal microbiota and community-based science

Dr. Sarah Ahannach

Department of Bioscience Engineering

University of Antwerp

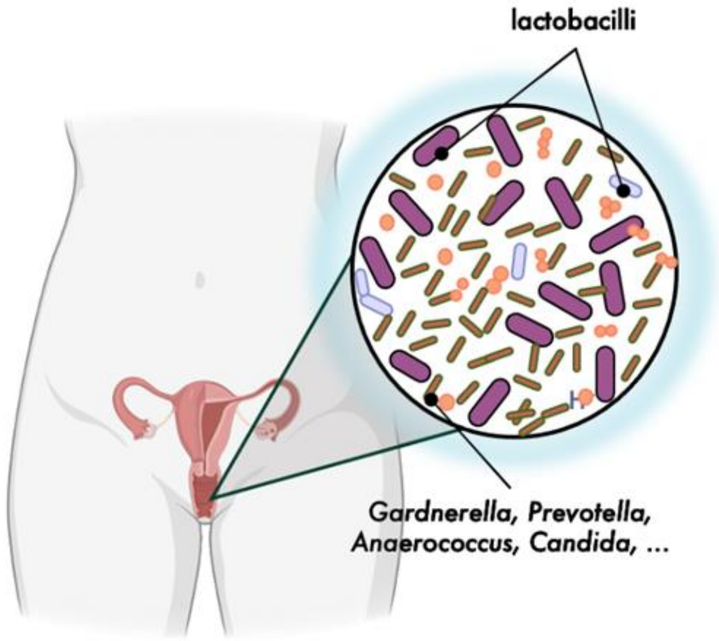
University of Antwerp
LAMB | Laboratory of Applied Microbiology and Biotechnology

ISALA

erc European Research Council

Crucial role for the vaginal microbiome in women's & human health

- As important as the gut microbiome (2nd genome), but much less explored



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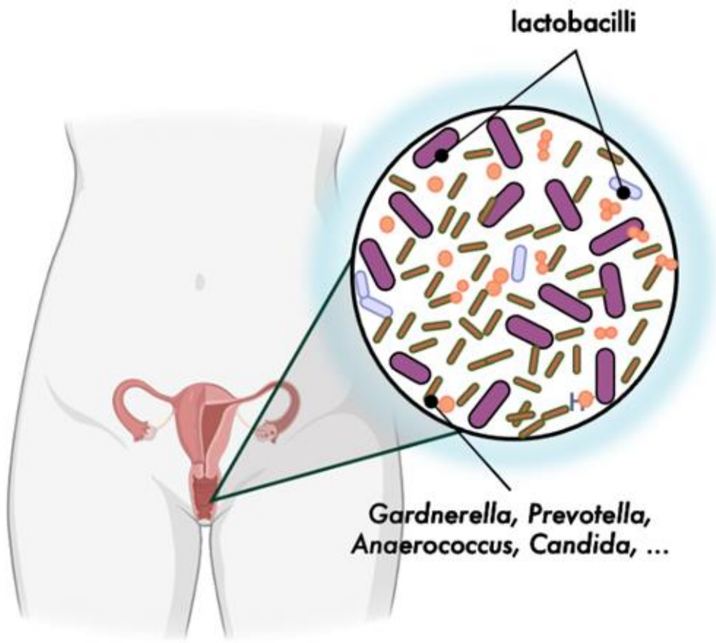

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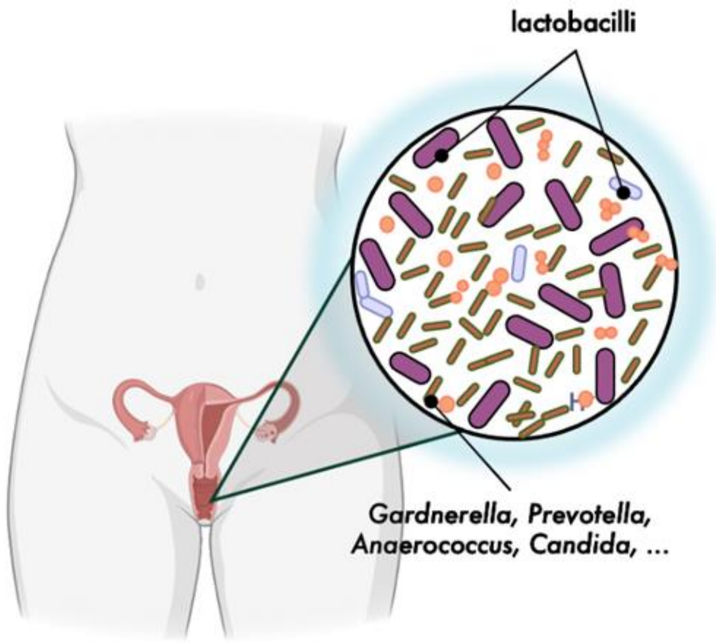

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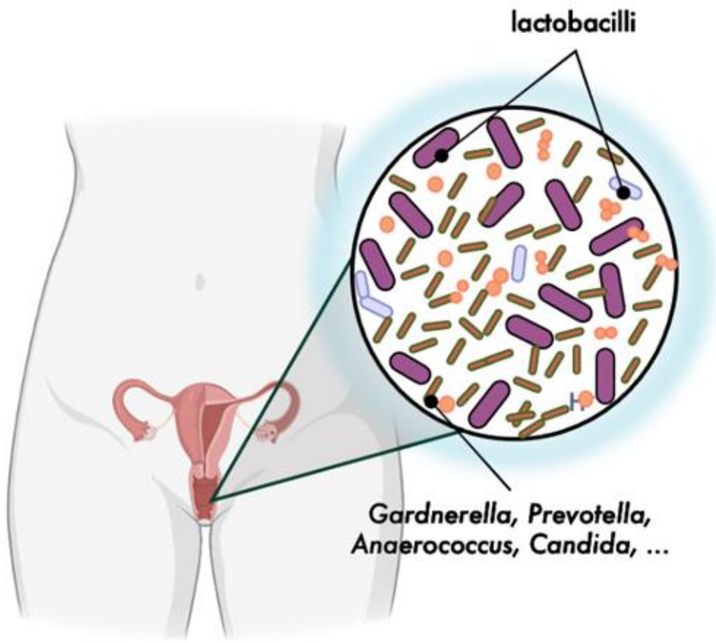

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"Our third genome"
Up to 10^9 CFU/ml of microbes with
genes with interesting functions

Many fundamental questions on the functions of the vaginal microbiota

How to study functionality
when no animal model and only few isolates/model bacteria available?
What are the functions of this third genome (in healthy women)?

Our approach: citizen science – human research

nature microbiology

Resource

https://doi.org/10.1038/s41564-023-01500-0

A citizen-science-enabled catalogue of the vaginal microbiome and associated factors

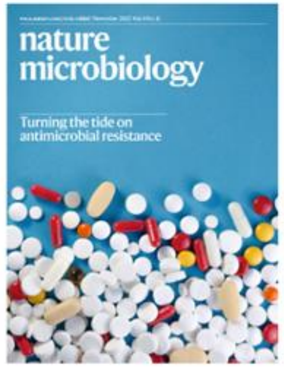
Received: 17 February 2022

Accepted: 13 September 2023

Published online: 26 October 2023

Check for updates

Sarah Lebeer[1,8,9], Sarah Ahannach[1,8], Thies Gehrmann[1,8], Stijn Wittouck[1,8], Tom Eilers[1], Eline Oerlemans[1], Sandra Condori[1], Jelle Dillen[1], Irina Spacova[1], Leonore Vander Donck[1], Caroline Masquillier[2], Camille Nina Allonsius[1], Peter A. Bron[1], Wannes Van Beeck[1], Charlotte De Backer[3], Gilbert Donders[4,5,6,9] & Veronique Verhoeven[7,9]



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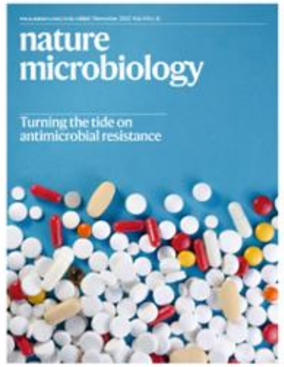

nature medicine

nature › nature medicine › research highlights › article

RESEARCH HIGHLIGHT | 16 November 2023

Linking the vaginal microbiome to women's health

A citizen science approach has helped craft a resource-rich vaginal microbiome map with associations to lifestyle and events across a woman's life course.

nature medicine

Perspective

https://doi.org/10.1038/s41591-024-03371-2

Citizen science as an instrument for women's health research

Received: 28 June 2024

Accepted: 22 October 2024

Published online: 22 November 2024

Sarah Ahannach[1,2], Ine Van Hoyweghen[3], Veronique Verhoeven[2,4] & Sarah Lebeer[1,2]

Isala as citizen-science project

Name?
Inspiring role model

Isala Van Diest
1842-1916
First female doctor in Belgium

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- **Scientific goals**
  - Map the vaginal microbiome in 'healthy' women outside the hospital as 'reference' → novel insights in biology & diagnostics
  - Map impact life-course, lifestyle & environment on the female microbiome → across the world
  - Set-up a large biobank with beneficial vaginal bacteria (lactobacilli) → fundamental research & innovative 'microbiome therapies'

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- **Societal/bidirectional goals – diverse & immediate impact**
  - Break taboos on vaginal health with input from citizens such as on menopause, menstrual hygiene, complaints, ramadan, …
  - Empower women & stimulate co-creation on which aspects to focus – engage with partners and children
  - Bring Women in Science & diversity more in the picture

Communication, design & tone of voice

Make participants feel honoured & properly acknowledge them when participating in our project

https://isala.be/en

ISALA_ UANTWERP

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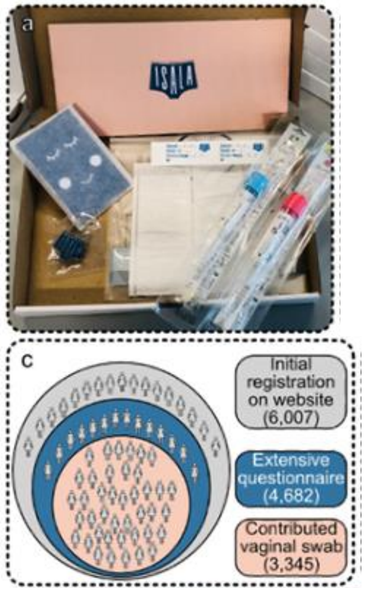
ISALA_ UANTWERP

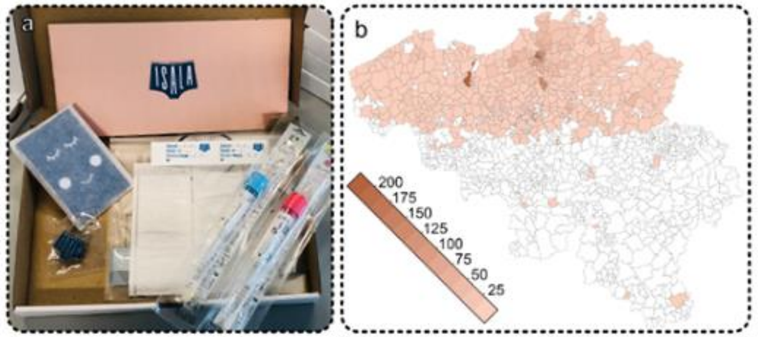
Goal: 200 participants in Belgium

Motivated & engaged participants



Belgium is small country in Europe!

Motivated & engaged participants



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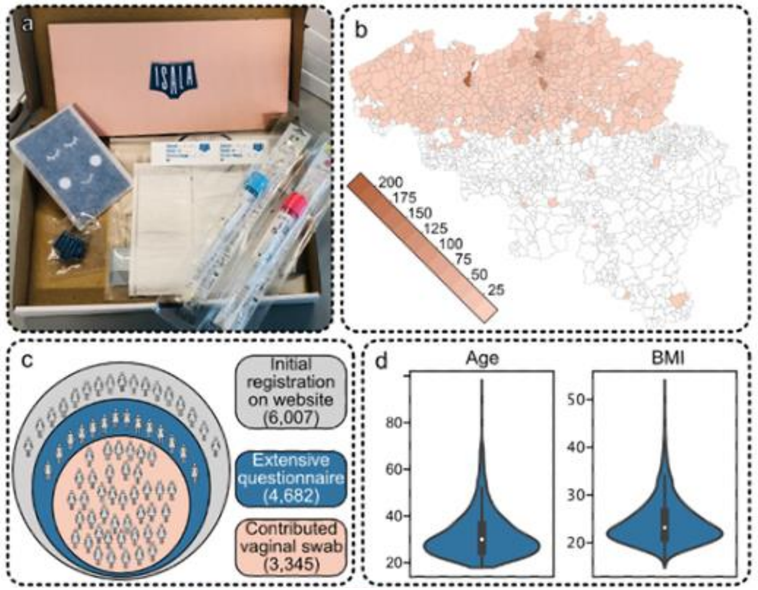

Minimal exclusion criteria (> 18y, not pregnant, understanding Dutch)
Oldest participant was 98!
Ethnicity or race not explicitely questioned

- 4.8 % not born in Belgium
- 10% identified themselves with a culture besides Belgium
- 5.4% below poverty level

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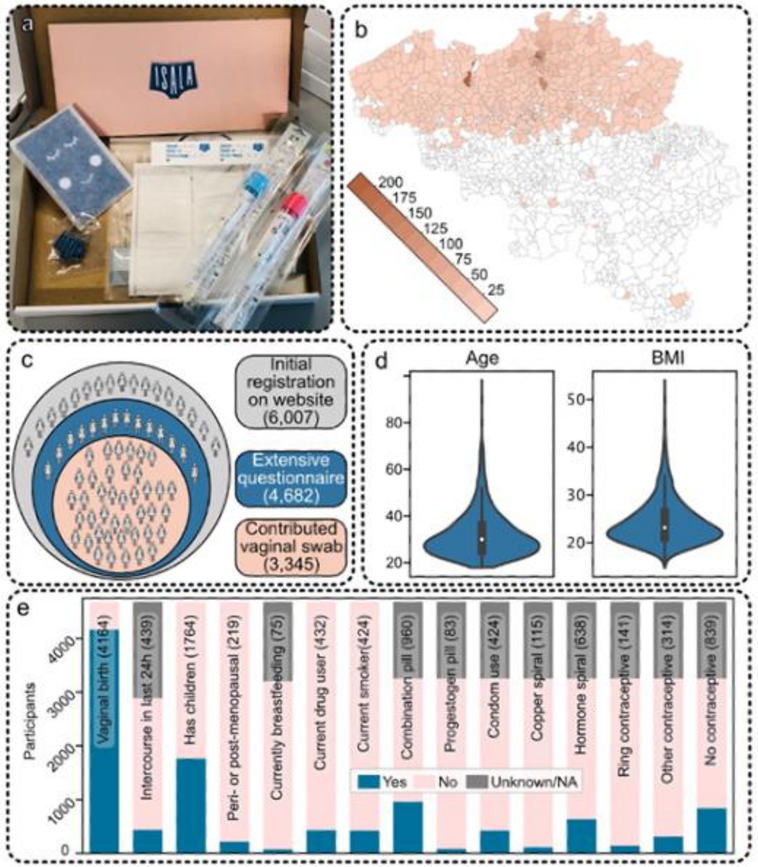

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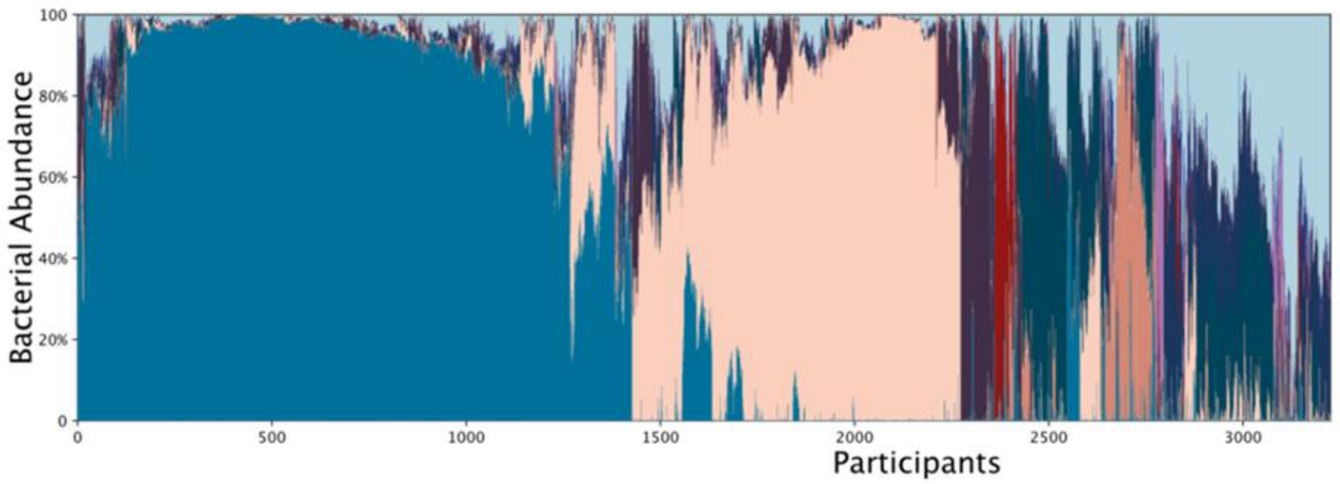

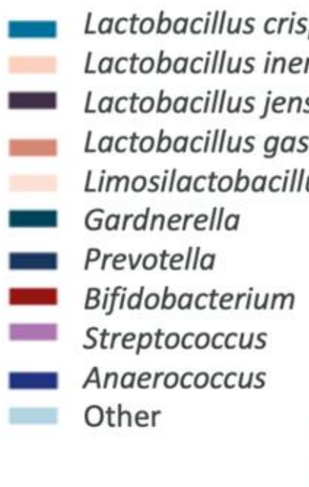

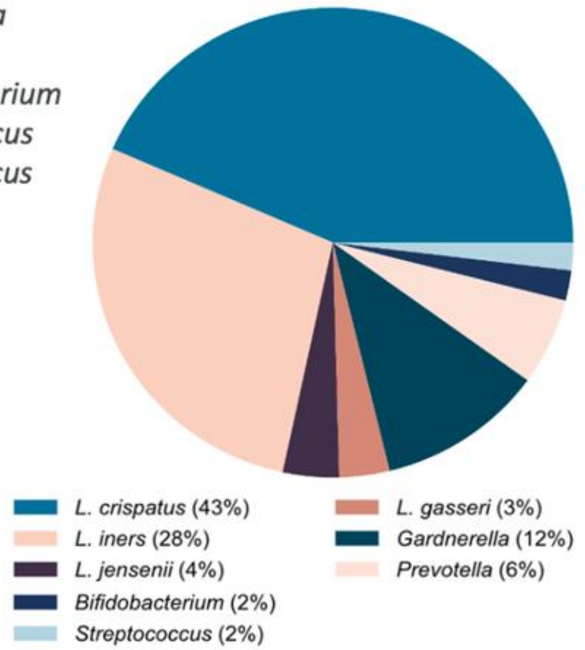

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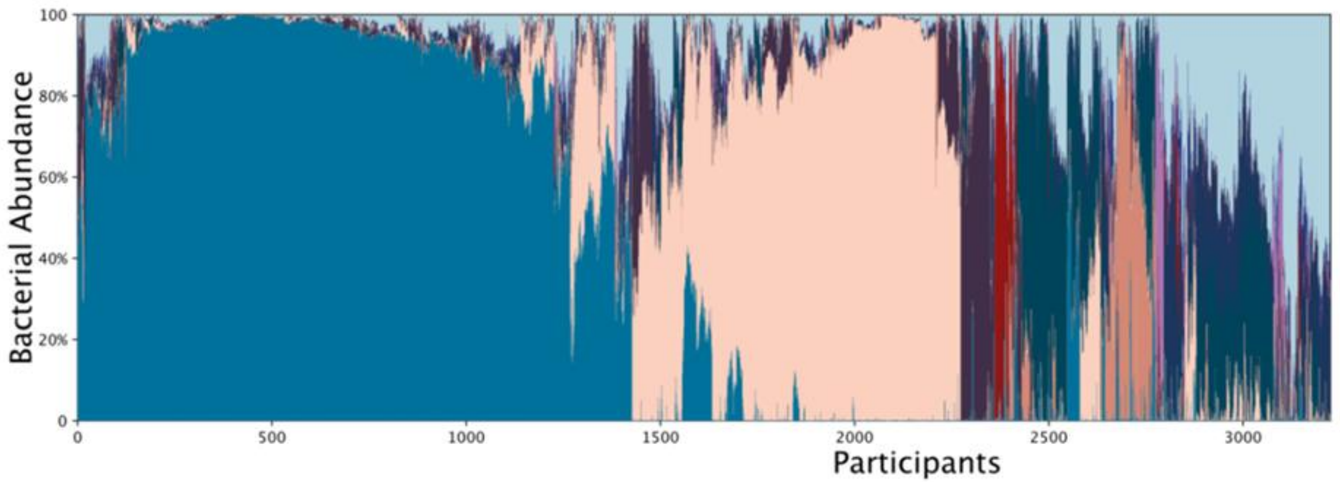

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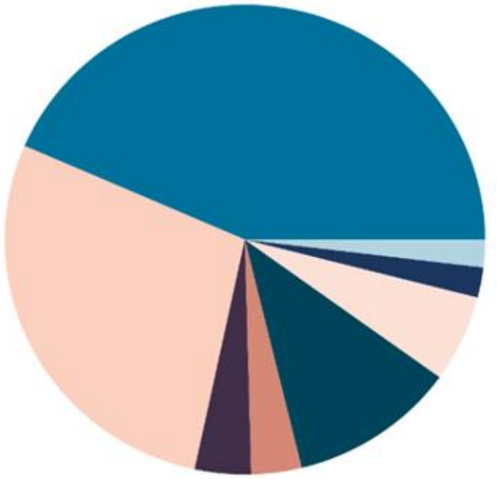
Other



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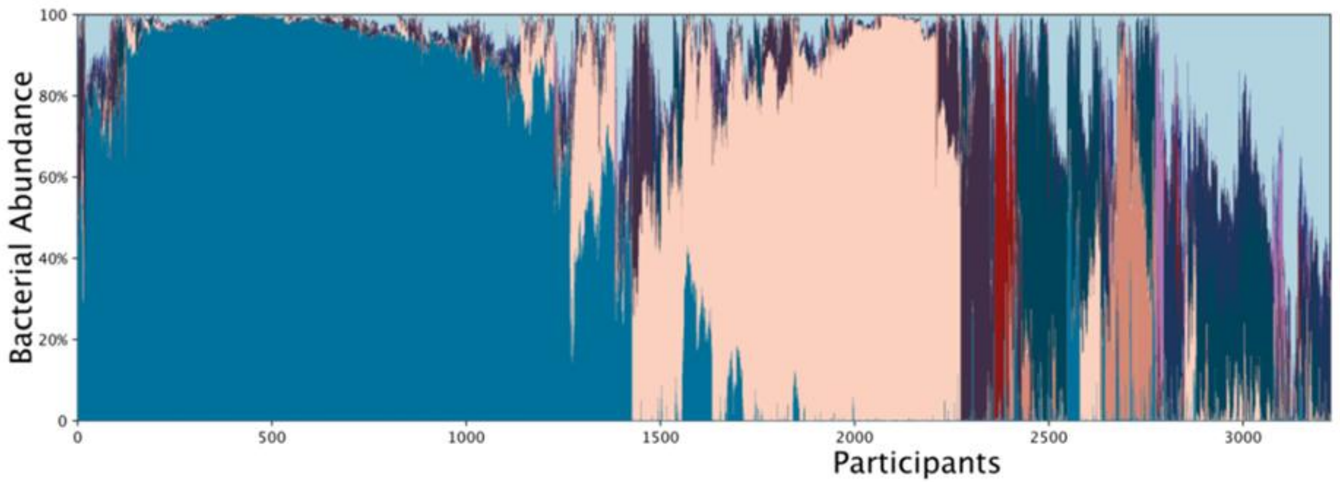

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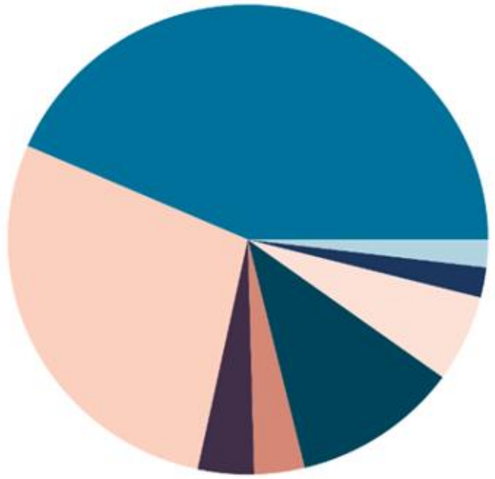
How healthy are our vaginas?

Healthier than we expected based on previous studies



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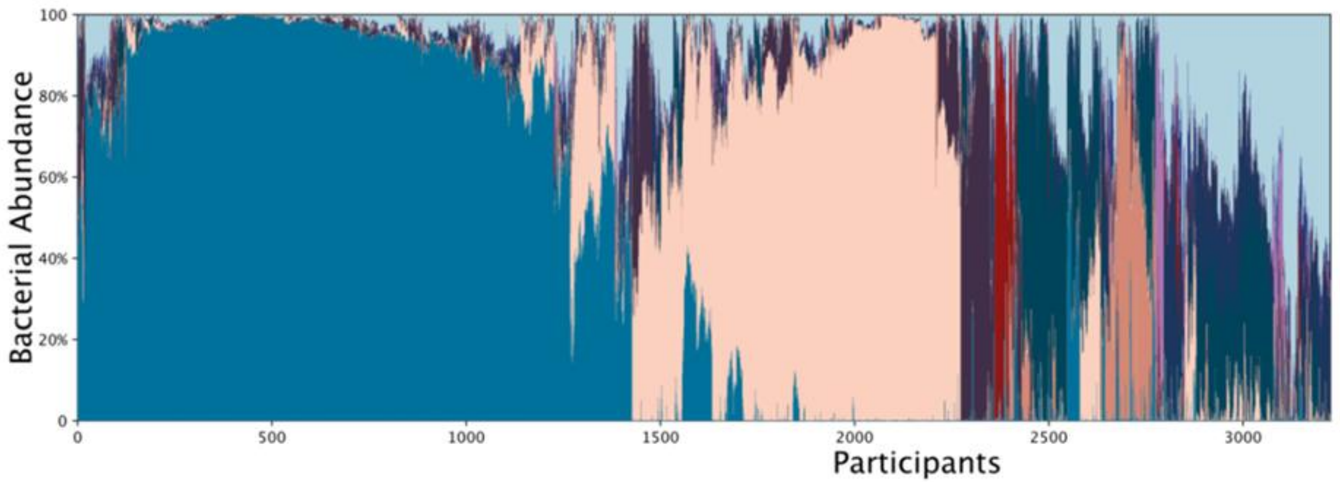

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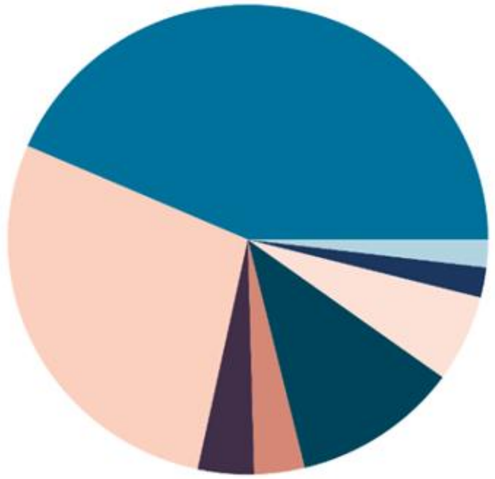

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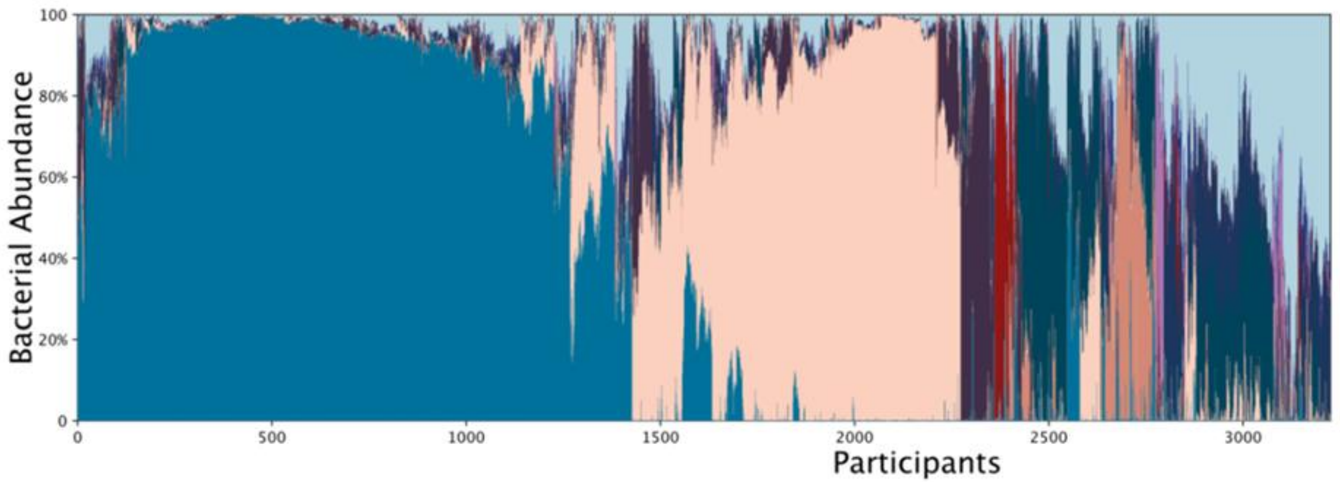

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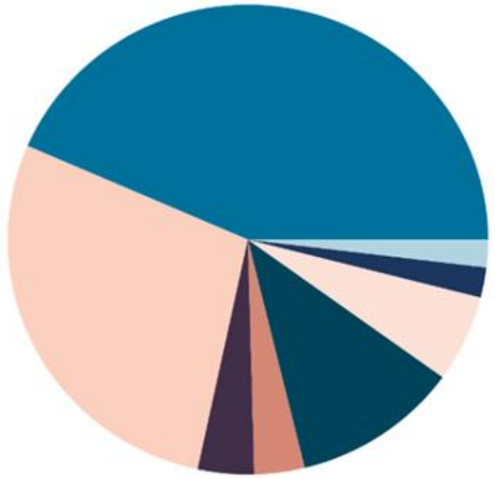
We discovered an

Isala crew

= beneficial bacteria working together



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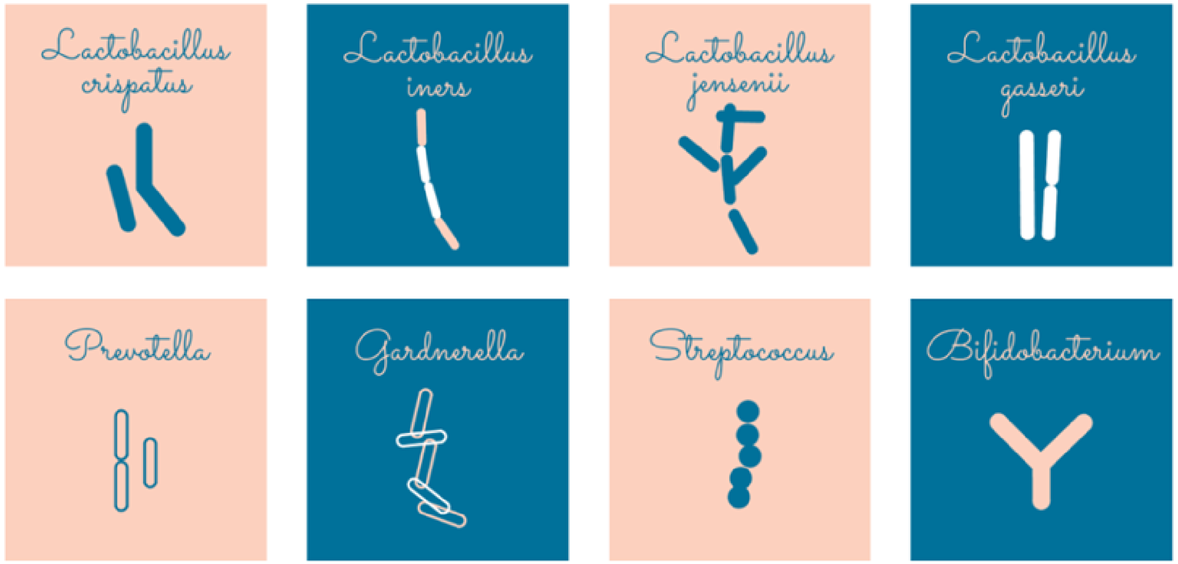
- General & personal results – highlight snapshot & dynamics
- Before peer-reviewed publication(s)
- More background per bacterium (nuance!)
- Webpage for medical professionals



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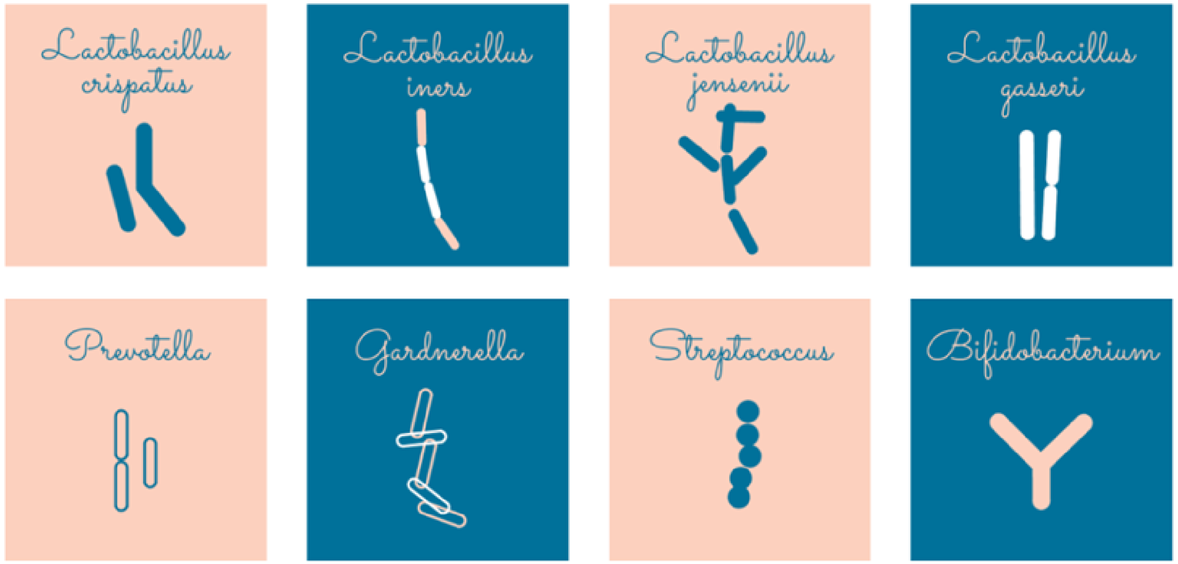


Isala sisterhood

#letswritehistorytogether

1. Isala, Belgium
2. Laura, Peru
3. Marie, Switzerland
4. Leke, Cameroon
5. Dora, Nigeria
6. Florence (twins), UK & Uganda
7. Fatima, Morocco
8. Manuela, Spain
9. Maggie Lim, Singapore
10. Bess, United States
11. Aiona, Hawaii – very cool Instagram
12. Cecilia, Argentina
13. Lya, Venezuela
14. Mary Malahlela, South Africa
15. Fatima, Morocco

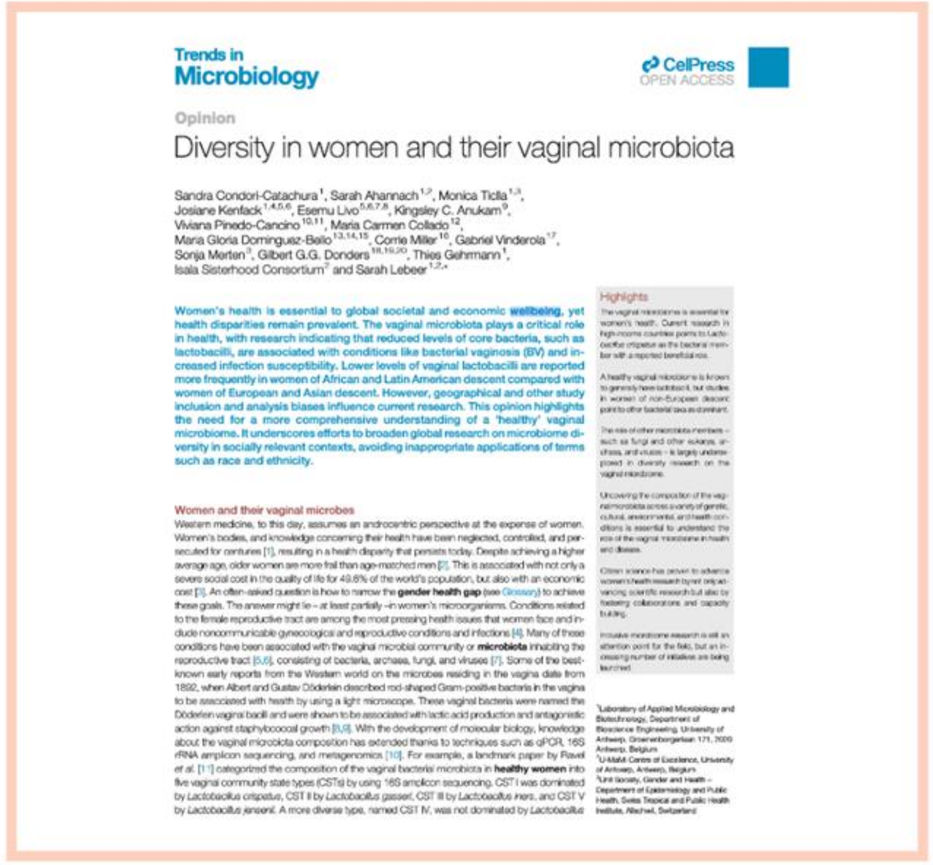
… (depending on funding, generally via MOU signed)

Capacity building: Bio-informactis, IP, ….

Bottom-up, local research leadership, local funding

One way to set a socially relevant research agenda is to actively involve citizens in scientific dialogues

Global sisterhood: raise awareness



Trends in Microbiology

CellPress OPEN ACCESS

Opinion

Diversity in women and their vaginal microbiota

Sandra Condori-Catachura[1], Sarah Ahannach[1,2], Monica Ticlla[1,3], Josiane Kenfack[1,4,5,6], Esemu Livo[5,6,7,8], Kingsley C. Anukam[9], Viviana Pinedo-Cancino[10,11], Maria Carmen Collado[12], Maria Gloria Dominguez-Bello[13,14,15], Corrie Miller[16], Gabriel Vinderola[17], Sonja Merten[3], Gilbert G.G. Donders[18,19,20], Thies Gehrmann[1], Isala Sisterhood Consortium[7] and Sarah Lebeer[1,2,*]

Women's health is essential to global societal and economic wellbeing, yet health disparities remain prevalent. The vaginal microbiota plays a critical role in health, with research indicating that reduced levels of core bacteria, such as lactobacilli, are associated with conditions like bacterial vaginosis (BV) and increased infection susceptibility. Lower levels of vaginal lactobacilli are reported more frequently in women of African and Latin American descent compared with women of European and Asian descent. However, geographical and other study inclusion and analysis biases influence current research. This opinion highlights the need for a more comprehensive understanding of a 'healthy' vaginal microbiome. It underscores efforts to broaden global research on microbiome diversity in socially relevant contexts, avoiding inappropriate applications of terms such as race and ethnicity.

Highlights

The vaginal microbiome is essential for women's health. Current research in high-income countries points to *Lactobacillus* crispatus as the bacterial member with a reported beneficial role.

A healthy vaginal microbiome is known to generally have lactobacilli, but studies in women of non-European descent point to other bacterial taxa as dominant.

The role of other microbiota members – such as fungi and other eukaryotes, archaea, and viruses – is largely underexplored in diversity research on the vaginal microbiome.

Uncovering the composition of the vaginal microbiota across a variety of genetic, cultural, environmental, and health conditions is essential to understand the role of the vaginal microbiome in health and disease.

Citizen science has proven to advance women's health research by not only advancing scientific research but also by fostering collaborations and capacity building.

Inclusive microbiome research is still an attention point for the field, but an increasing number of initiatives are being launched.

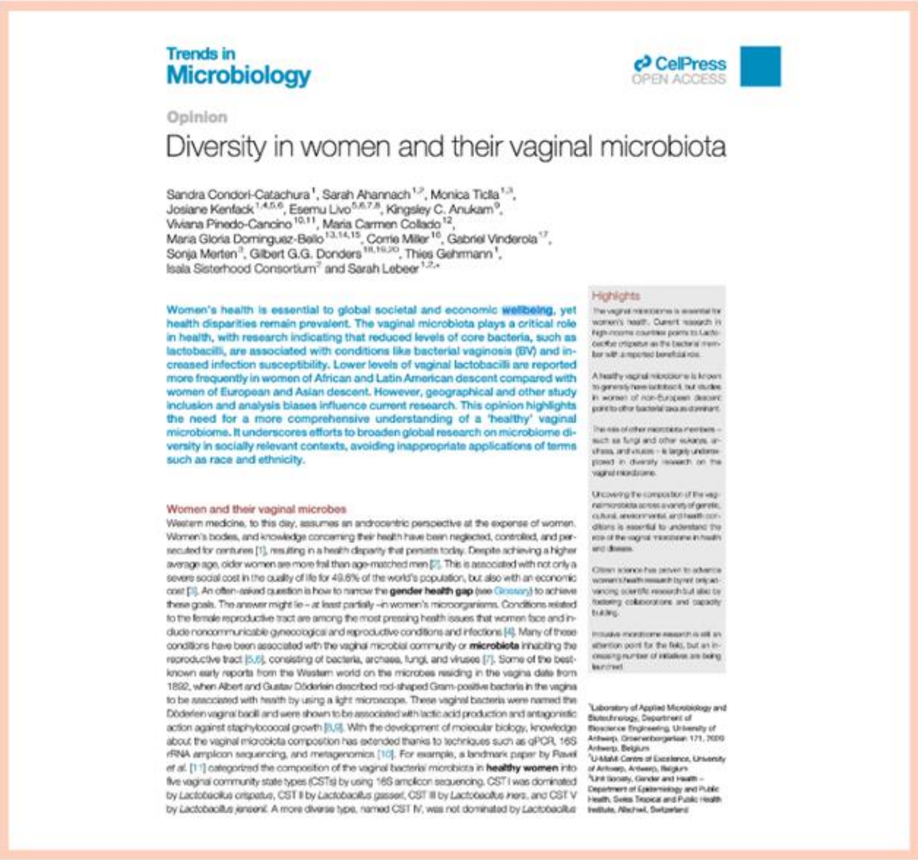
[1]Laboratory of Applied Microbiology and Biotechnology, Department of Bioscience Engineering, University of Antwerp, Groenenborgerlaan 171, 2020 Antwerp, Belgium
[2]U-Mahl-Centre of Excellence, University of Antwerp, Antwerp, Belgium
[3]Unit Society, Gender and Health – Department of Epidemiology and Public Health, Swiss Tropical and Public Health Institute, Allschwil, Switzerland

Women and their vaginal microbes

Western medicine, to this day, assumes an androcentric perspective at the expense of women. Women's bodies, and knowledge concerning their health have been neglected, controlled, and persecuted for centuries [1], resulting in a health disparity that persists today. Despite achieving a higher average age, older women are more frail than age-matched men [2]. This is associated with not only a severe social cost in the quality of life for 49.6% of the world's population, but also with an economic cost [3]. An often-asked question is how to narrow the **gender health gap** (see Glossary) to achieve these goals. The answer might lie – at least partially –in women's microorganisms. Conditions related to the female reproductive tract are among the most pressing health issues that women face and include noncommunicable gynecological and reproductive conditions and infections [4]. Many of these conditions have been associated with the vaginal microbial community or **microbiota** inhabiting the reproductive tract [5,6], consisting of bacteria, archaea, fungi, and viruses [7]. Some of the best-known early reports from the Western world on the microbes residing in the vagina date from 1892, when Albert and Gustav Döderlein described rod-shaped Gram-positive bacteria in the vagina to be associated with health by using a light microscope. These vaginal bacteria were named the Döderlein vaginal bacilli and were shown to be associated with lactic acid production and antagonistic action against staphylococcal growth [8,9]. With the development of molecular biology, knowledge about the vaginal microbiota composition has extended thanks to techniques such as qPCR, 16S rRNA amplicon sequencing, and metagenomics [10]. For example, a landmark paper by Ravel *et al.* [11] categorized the composition of the vaginal bacteria/microbiota in **healthy women** into five vaginal community state types (CSTs) by using 16S amplicon sequencing. CST I was dominated by *Lactobacillus crispatus*, CST II by *Lactobacillus gasseri*, CST III by *Lactobacillus iners*, and CST V by *Lactobacillus jensenii*. A more diverse type, named CST IV, was not dominated by *Lactobacillus*

MICROBIOTALK

Global sisterhood: raise awareness



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Inclusive microbiome research is still an attention point for the field, but an increasing number of initiatives are being launched.

Women and their vaginal microbes

Western medicine, to this day, assumes an androcentric perspective at the expense of women. Women's bodies, and knowledge concerning their health have been neglected, controlled, and persecuted for centuries [1], resulting in a health disparity that persists today. Despite achieving a higher average age, older women are more frail than age-matched men [2]. This is associated with not only a severe social cost in the quality of life for 49.6% of the world's population, but also with an economic cost [3]. An often-asked question is how to narrow the **gender health gap** (see Glossary) to achieve these goals. The answer might lie – at least partially –in women's microorganisms. Conditions related to the female reproductive tract are among the most pressing health issues that women face and include noncommunicable gynecological and reproductive conditions and infections [4]. Many of these conditions have been associated with the vaginal microbial community or **microbiota** inhabiting the reproductive tract [5,6], consisting of bacteria, archaea, fungi, and viruses [7]. Some of the best-known early reports from the Western world on the microbes residing in the vagina date from 1892, when Albert and Gustav Döderlein described rod-shaped Gram-positive bacteria in the vagina to be associated with health by using a light microscope. These vaginal bacteria were named the Döderlein vaginal bacilli and were shown to be associated with lactic acid production and antagonistic action against staphylococcal growth [8,9]. With the development of molecular biology, knowledge about the vaginal microbiota composition has extended thanks to techniques such as qPCR, 16S rRNA amplicon sequencing, and metagenomics [10]. For example, a landmark paper by Ravel *et al.* [11] categorized the composition of the vaginal bacteria/microbiota in **healthy women** into five vaginal community state types (CSTs) by using 16S amplicon sequencing. CST I was dominated by *Lactobacillus crispatus*, CST II by *Lactobacillus gasseri*, CST III by *Lactobacillus iners*, and CST V by *Lactobacillus jensenii*. A more diverse type, named CST IV, was not dominated by *Lactobacillus*

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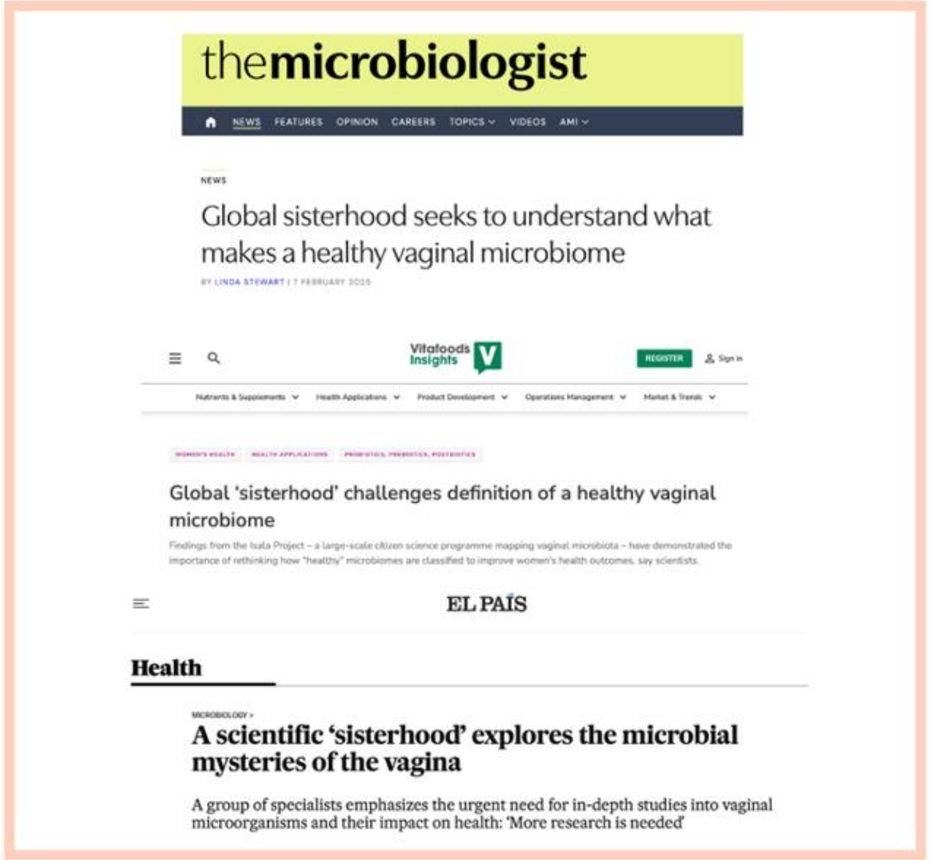
[2]U-Mahl: Centre of Excellence, University of Antwerp, Antwerp, Belgium
[3]Unit Gender and Health – Department of Epidemiology and Public Health, Swiss Tropical and Public Health Institute, Allschwil, Switzerland



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NEWS

Global sisterhood seeks to understand what makes a healthy vaginal microbiome

BY LINDA STEWART | 7 FEBRUARY 2025

Vitafoods Insights

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Global 'sisterhood' challenges definition of a healthy vaginal microbiome

Findings from the Isala Project – a large-scale citizen science programme mapping vaginal microbiota – have demonstrated the importance of rethinking how "healthy" microbiomes are classified to improve women's health outcomes, say scientists.

EL PAÍS

Health

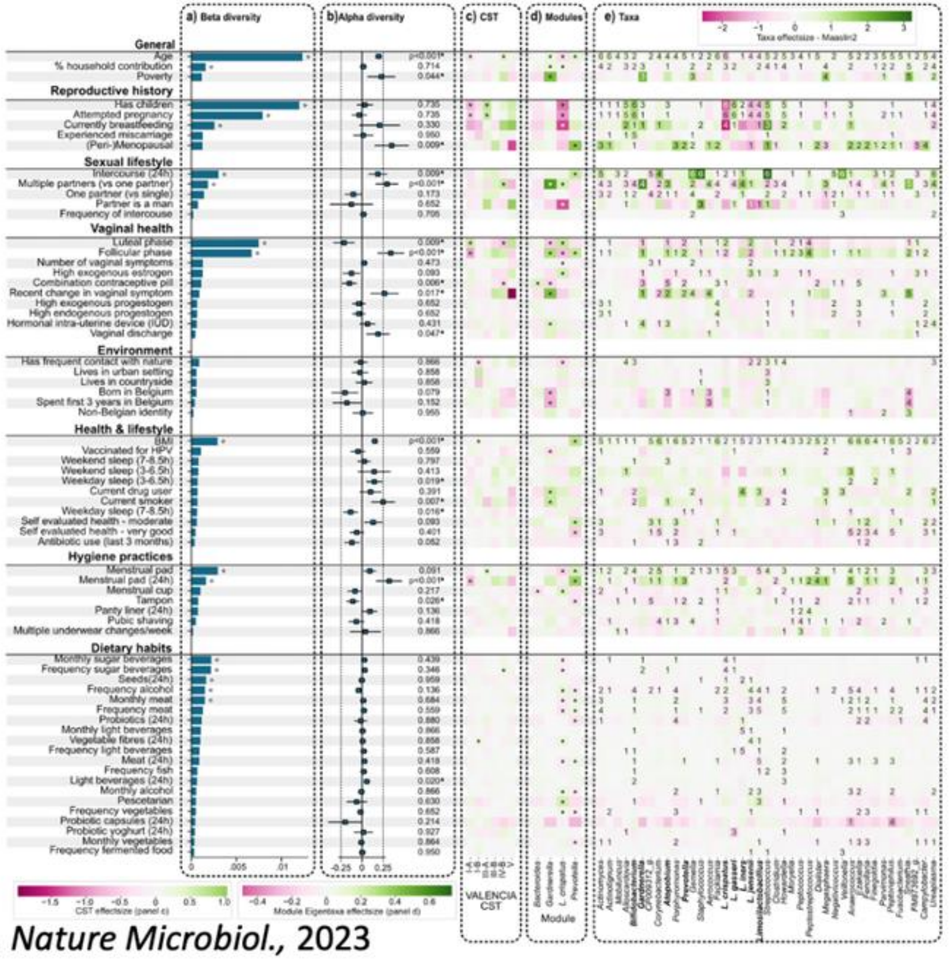
MICROBIOLOGY

A scientific 'sisterhood' explores the microbial mysteries of the vagina

A group of specialists emphasizes the urgent need for in-depth studies into vaginal microorganisms and their impact on health: 'More research is needed'

Diversity due to different lifestyle, lifecourse and environment?

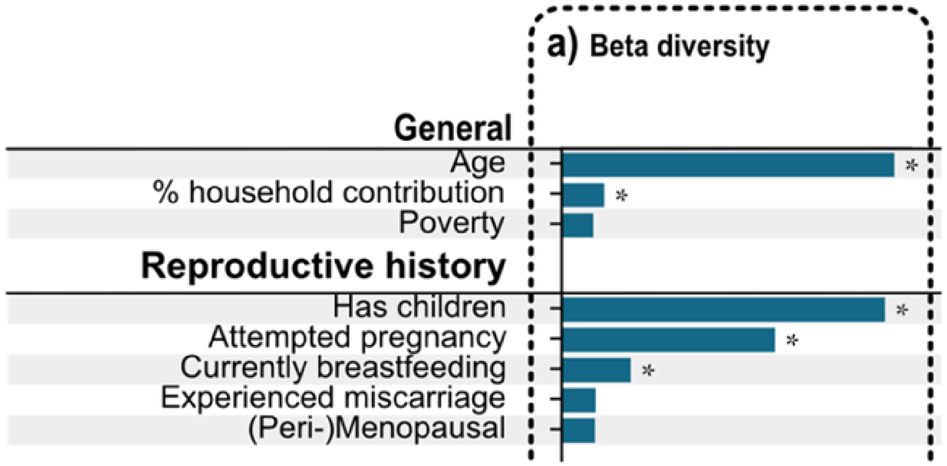
Isala survey in Belgium



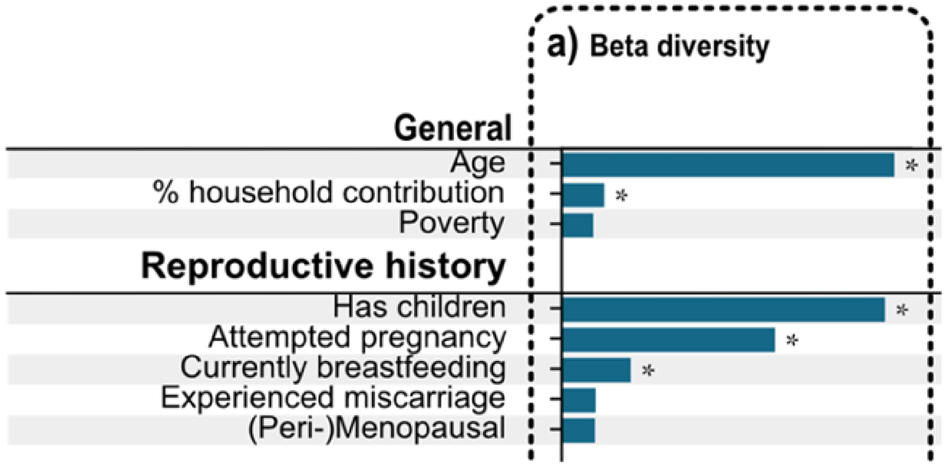
Lebeer *et al., Nature Microbiol.*, 2023

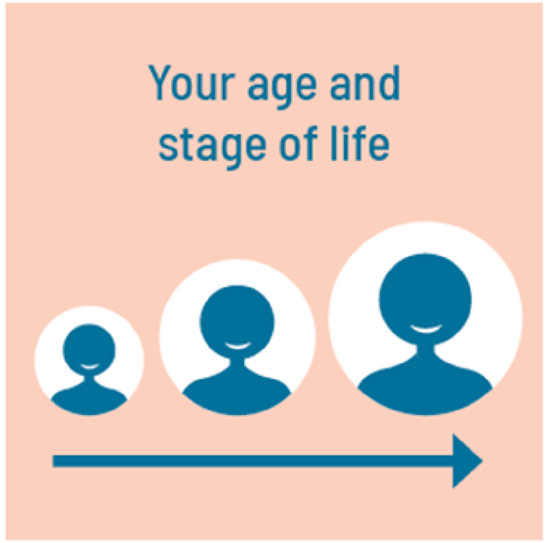
- Sequencing data are available at the European Nucleotide Archive under bioproject PRJEB50407.
- Sample meta-data are available with access control via the European Genome–Phenome Archive (EGA) under dataset ID EGAD00001009890
- Data can be accessed as described upon agreeing to the harmonised Data Access Agreement.

Childbirth & pregnancy: big impact

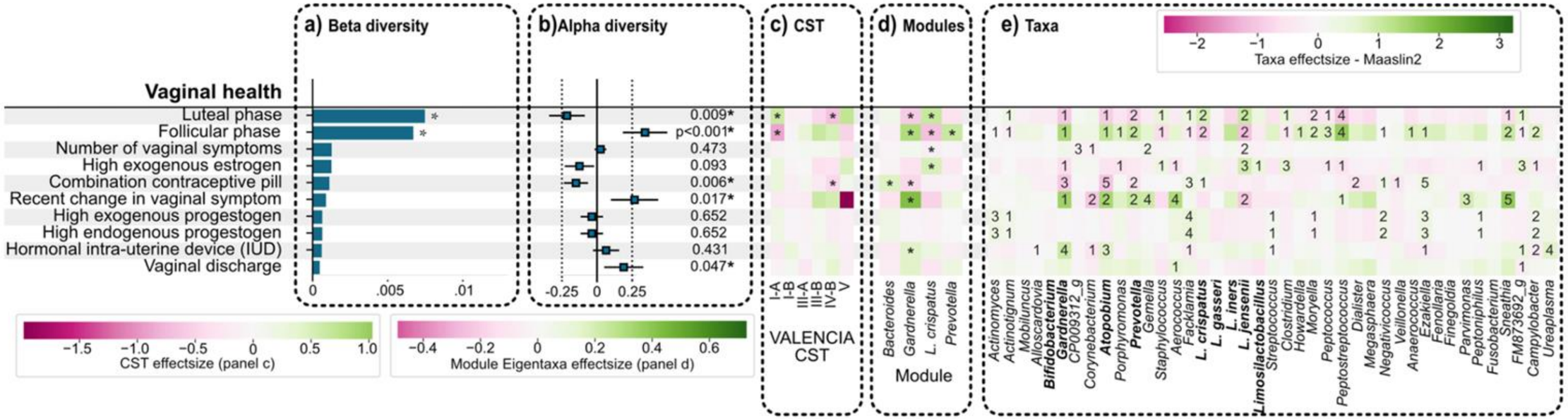


Childbirth & pregnancy: big impact



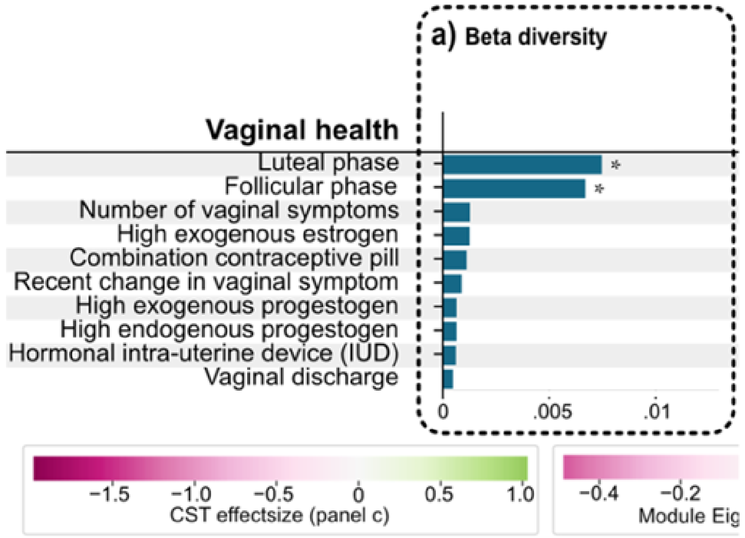


Key role for hormones & contraceptives



“ bit of positive news about traditional combination birth control pill”
Validation needed!

Key role for hormones & contraceptives



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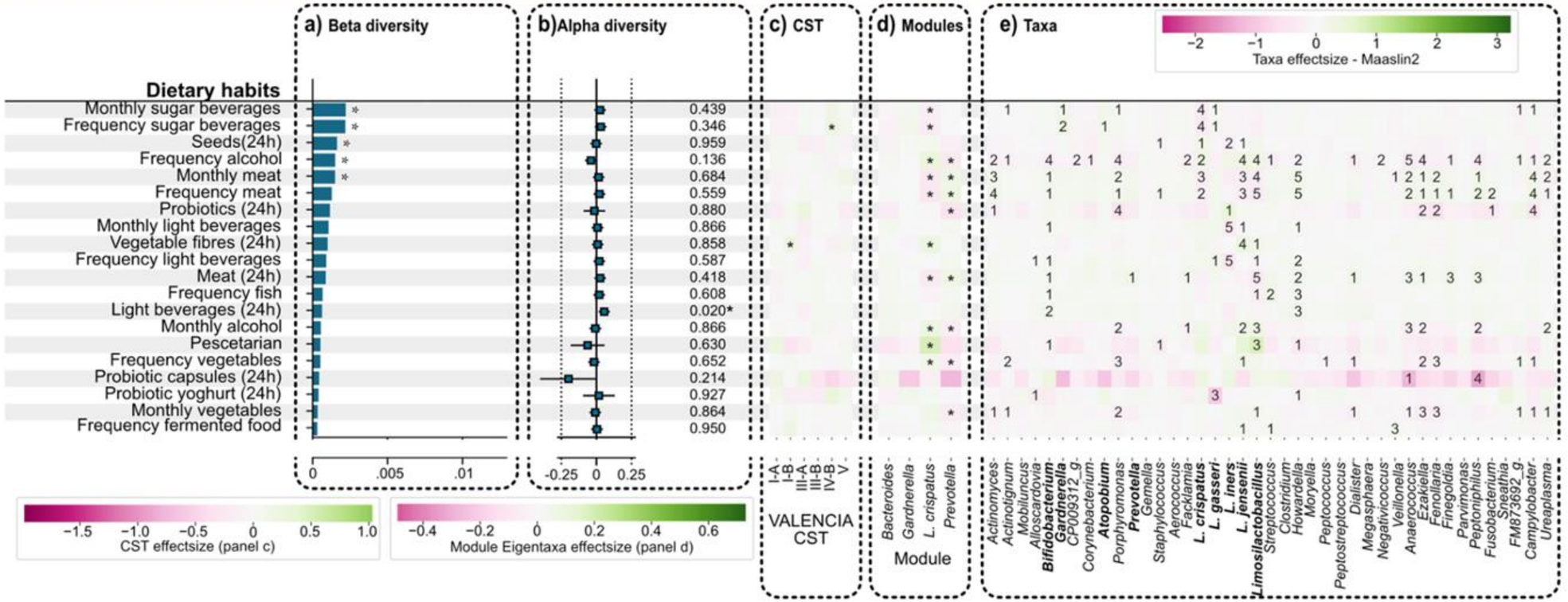
Associations with diet – idea of citizens



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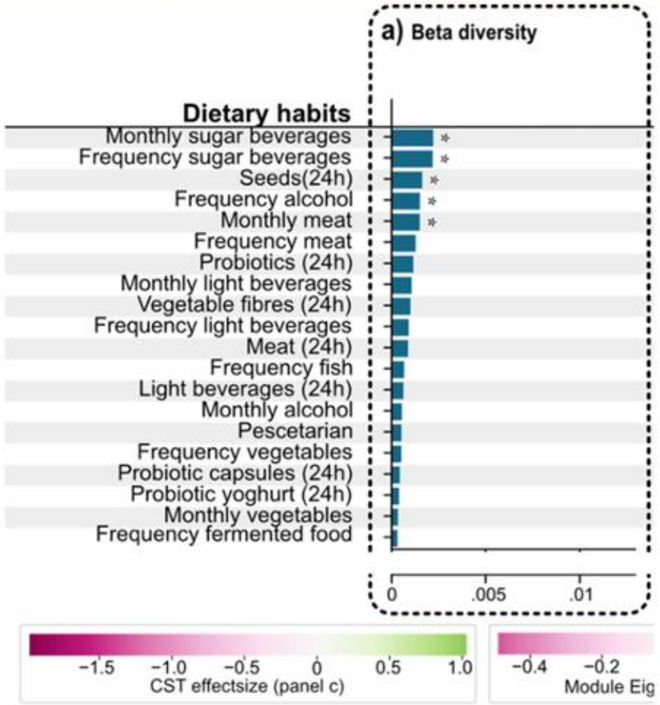
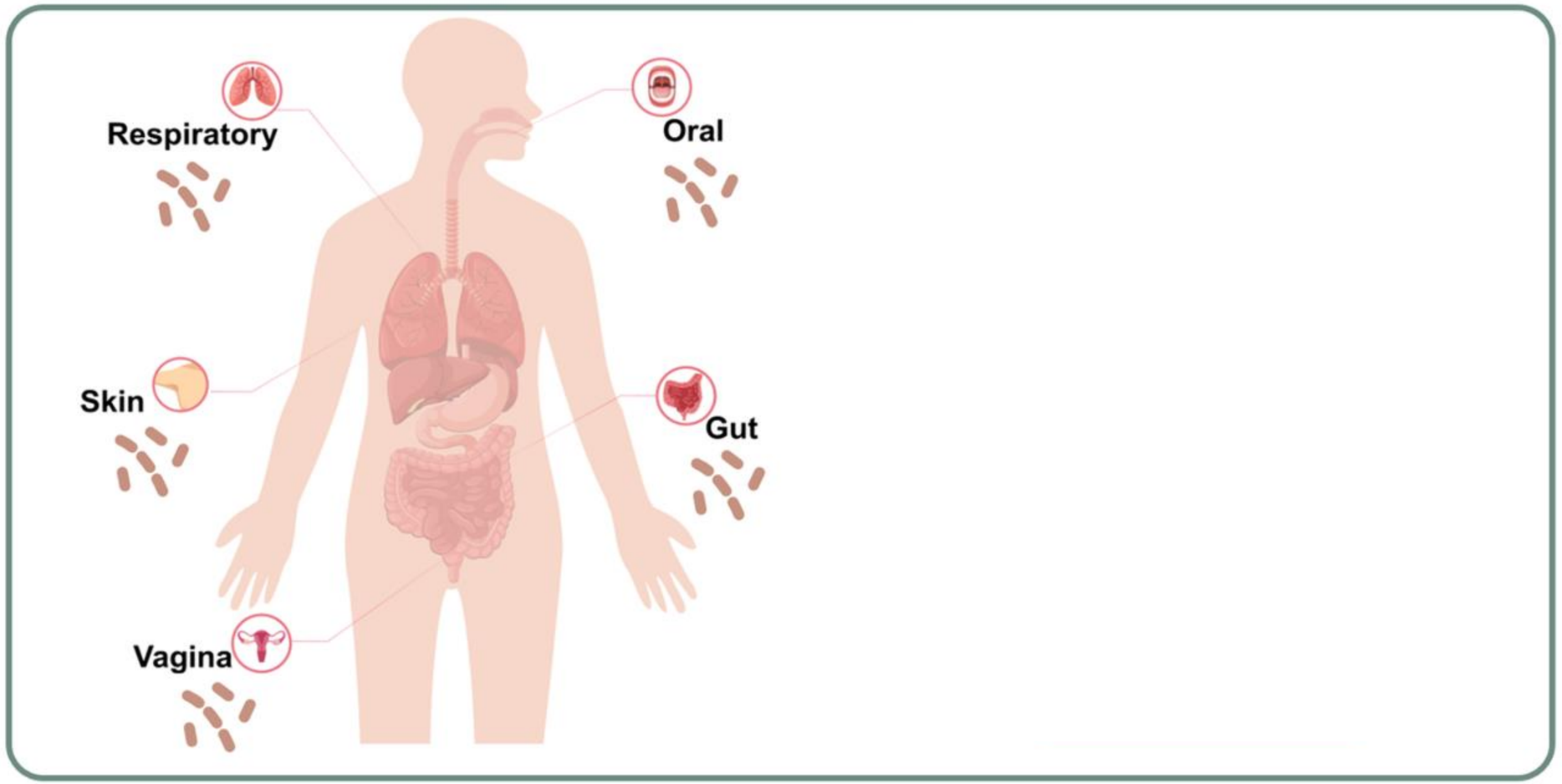


Validation in intervention studies such as the Rufaida study

RUFAIDA

Empowered by isala.be

The gut-vagina-axis



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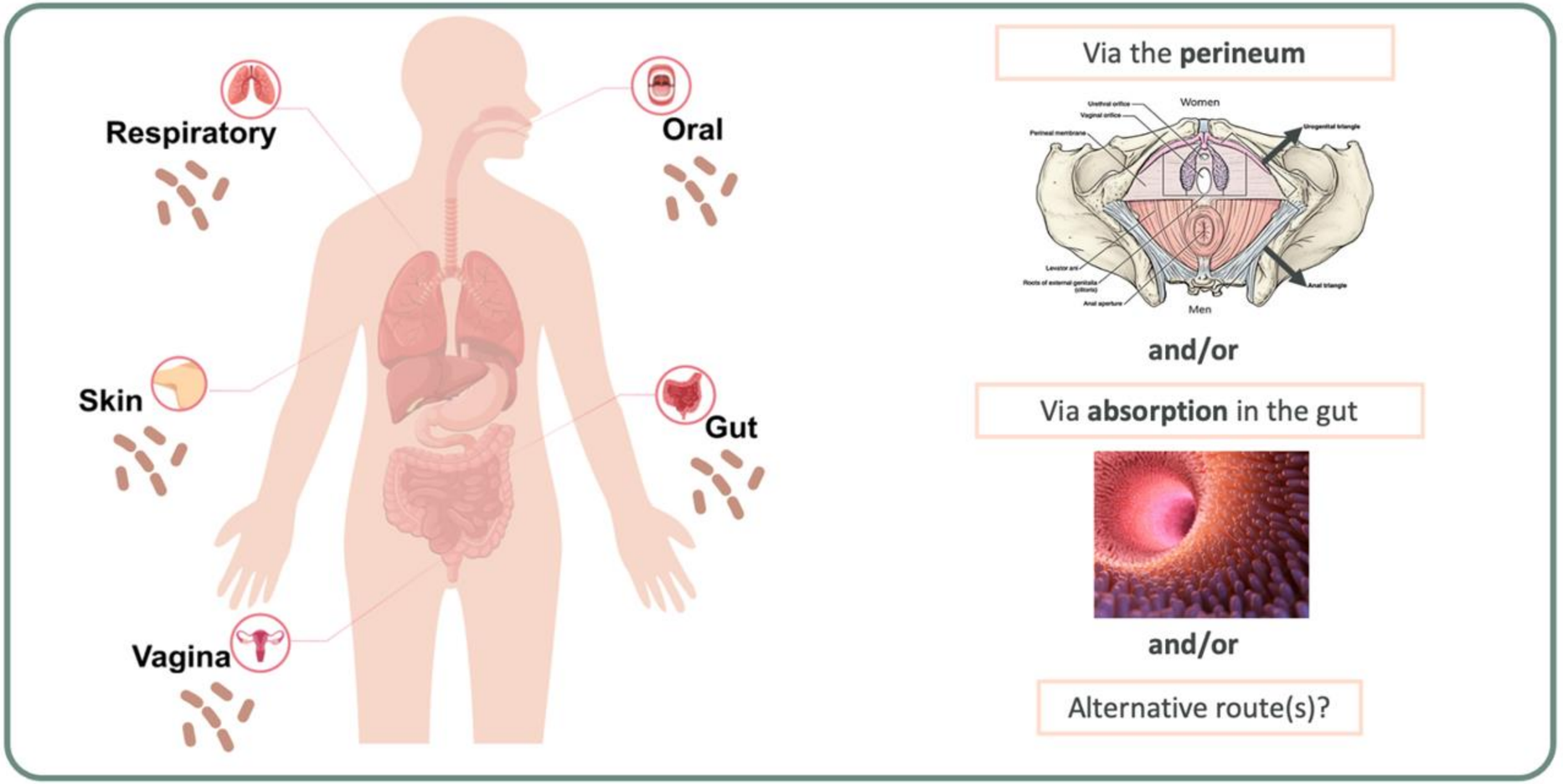

Via the **perineum**

and/or

Via **absorption** in the gut

and/or

Alternative route(s)?

Summary in infographic for laymen

We could only explain 10.4 % of the variation

(Jeroes Raes & colleagues for the gut microbiome: 7.63 %)

How can we be more inclusive?

So we interviewed women with a Moroccan and Turkish migration background

Awareness

Be aware of our diverse community, do not only communicate from your background

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Many groups do not trust the science world.

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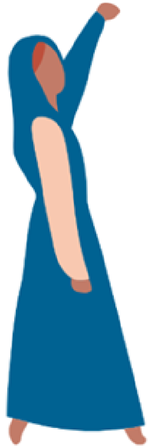


Subtlety

Keep communication tools sober and do not provoke anyone

Isala entered its 3rd phase with 6 new projects!!

VIA B_2L

Empowered by isala.be

Vitamines voor je vaginale gezondheid?

LUNA

Empowered by isala.be

Welk menstruatieproduct voor je vaginale gezondheid?

EMMA

Empowered by isala.be

Een nieuw kompas voor je menstruatiecyclus?

MAGGIE

Empowered by isala.be

Deel jij vaginale bacteriën met je naasten?

DeEnIR

Empowered by isala.be

Samen strijden tegen vaginale schimmelinfecties!

Isala enter … new projects!!

Empowered by isala.be

Empowered by isala.be

Vitamines voor je vaginale gezondheid?

Empo…

Welk men… voor je va…

GIE

…y isala.be

…acteriën

Empowered by isala.be

Samen strijden tegen vaginale schimmelinfecties!

Wat betekent vasten tijdens Ramadan voor je vaginale en darm microbioom?

Rufaida – impact of Ramadan fasting on microbiome

World population of muslim women in approcimately 1 billion

Fasting 1 month per year

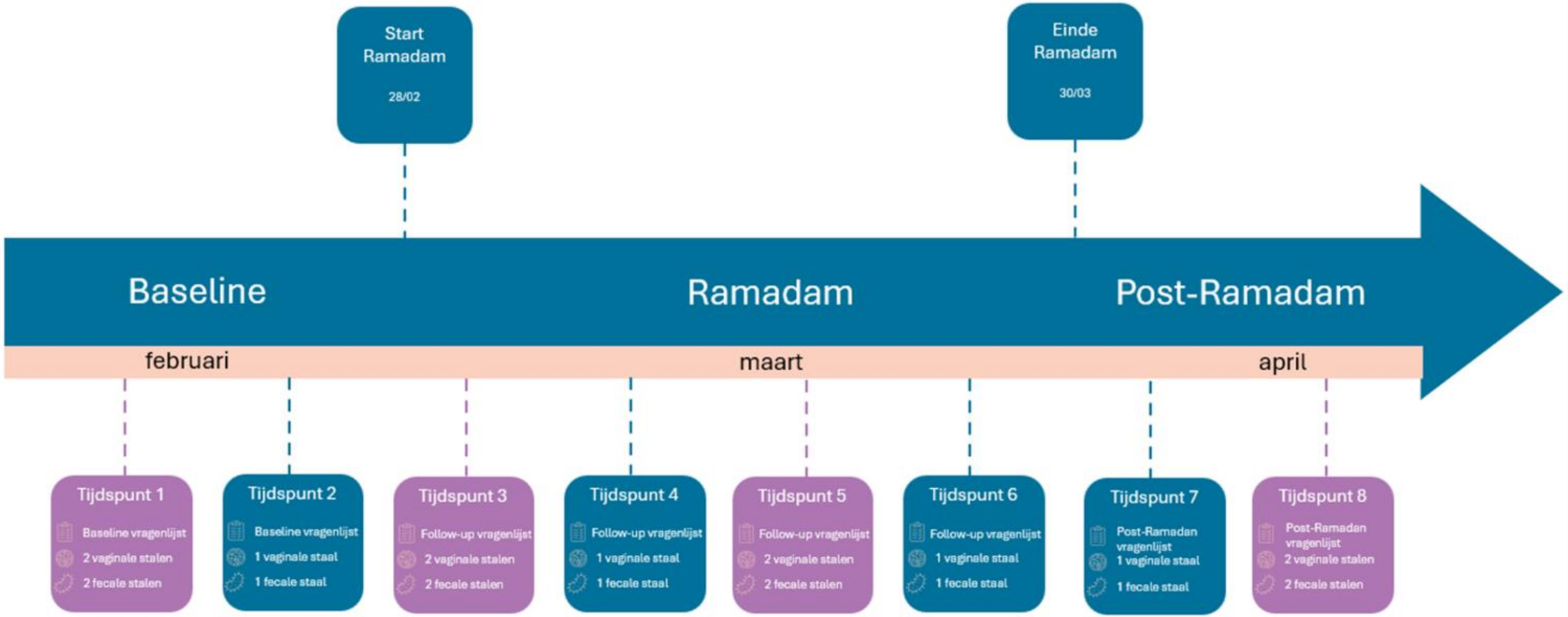
Group rarely included in scientific research

Bacterial fermentaion in gut depend on dietary habits

Various different diets such as keto diet, intermittent fasting, etc.

Not just what we eat? But when we eat? And frequency of meals?

Rufaida


Start Ramadam
28/02
Einde Ramadam
30/03
Baseline
Ramadam
Post-Ramadam
februari
maart
april
Tijdspunt 1
Baseline vragenlijst
2 vaginale stalen
2 fecale stalen
Tijdspunt 2
Baseline vragenlijst
1 vaginale staal
1 fecale staal
Tijdspunt 3
Follow-up vragenlijst
2 vaginale stalen
2 fecale stalen
Tijdspunt 4
Follow-up vragenlijst
1 vaginale staal
1 fecale staal
Tijdspunt 5
Follow-up vragenlijst
2 vaginale stalen
2 fecale stalen
Tijdspunt 6
Follow-up vragenlijst
1 vaginale staal
1 fecale staal
Tijdspunt 7
Post-Ramadan vragenlijst
1 vaginale staal
1 fecale staal
Tijdspunt 8
Post-Ramadan vragenlijst
2 vaginale stalen
2 fecale stalen

Most beautiful iftar or Eid table

- 29 submissies
- 3 winnaars!!
- Isala Goodie bag

Acknowledgements

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Reine Audenaert
Camille Gepts
Eline Cauwenberghs

Universiteit Antwerpen
ENdEMIC Environmental Ecology and Applied Microbiology University of Antwerp
ELIZA Eerstelijns- en Interdisciplinaire Zorg Antwerpen Universiteit Antwerpen
MIOS Media & ICT in Organisaties & Samenleving University of Antwerp
erc
Vlaams expertisecentrum voor seksueel gezondheid SENSOA
UZA
fwo
rz tienen regionaal ziekenhuis heilig hart tienen vlw
Provincie Antwerpen
vliruos SHARING MINDS, CHANGING LIVES
femicare
Stuivenberg MARIA
VIABL Probiotics & Vitamins
DeVEnIR
snis
Copan Innovating together
EMBL
Nicola Segata & team
Jacques Ravel & team

Isala sisterhood

Advancing Health Equity through Microbiome-Centric & Multidisciplinary Research