



Scientific publications PIENTER 3-study

Design of PIENTER 3

[Third national biobank for population-based seroprevalence studies in the Netherlands, including the Caribbean Netherlands.](#)

Verberk JDM, Vos RA, Mollema L, van Vliet J, van Weert JWM, de Melker HE, van der Klis FRM.

BMC Infectious Diseases 2019; 19(470).

Haemophilus influenzae type b (Hib)

Factsheet: [Haemophilus influenzae type b. PIENTER 3 study results](#)

Publication: pending

Pertussis

[More than 10 years after introduction of an acellular pertussis vaccine in infancy: a cross-sectional serosurvey of pertussis in the Netherlands.](#)

Versteegen P, Berbers GAM, Smits G, Sanders EAM, van der Klis FRM, de Melker HE, van der Maas NAT.

The Lancet Regional Health - Europe 2021; 10:100196.

Diphtheria

[Circulation of pertussis and poor protection against diphtheria among middle-aged adults in 18 European countries.](#)

Berbers G, van Gageldonk P, Kassteele JV, Wiedermann U, Desombere I, Dalby T, Toubiana J, Tsiodras S, Ferencz IP, Mullan K, Griskevicius A, Kolupajeva T, Vestrheim DF, Palminha P, Popovici O, Wehlin L, Kastrin T, Maďarová L, Campbell H, Ködmön C, Bacci S, Barkoff AM, He Q & the Serosurveillance Study Team.

Nature Communications 2021; 12(1):2871.

Meningococcal disease

Factsheet: [Meningococcal ACWY disease. PIENTER 3 study results](#)

Publication:

- [Seroprevalence of meningococcal ACWY antibodies across the population in the Netherlands: Two consecutive surveys in 2016/17 and 2020.](#)

Ohm M, Knol MJ, Vos ERA, Bogaard MJM, van Rooijen DM, Sanders EAM, de Melker HE, van der Klis FRM, Berbers GAM.
Vaccine 2022; 40(1):59-66.

HPV

[Changes in HPV Seroprevalence from an Unvaccinated toward a Girls-Only Vaccinated Population in the Netherlands.](#)

Pasmans H, Hoes J, Tymchenko L, de Melker HE, van der Klis FRM. Cancer Epidemiology, Biomarkers & Prevention 2020; 29(11):2243-2254.

RS-virus

Factsheets:

- [Respiratory Syncytial Virus. PIENTER 3 study results](#)
- [RS-virus during COVID-19 pandemic. PIENTER 3 study results](#)

Publications:

- [Antibody Responses to Respiratory Syncytial Virus: A Cross-Sectional Serosurveillance Study in the Dutch Population Focusing on Infants Younger Than 2 Years.](#)
Berbers G, Mollema L, van der Klis F, den Hartog G, Schepp R.
The Journal of Infectious Diseases 2021; 224(2):269-278.
- [Population-based serology reveals risk factors for RSV infection in children younger than 5 years.](#)
Andeweg SP, Schepp RM, van de Kasstele J, Mollema L, Berbers GAM, van Boven M.
Scientific Reports 2021; 11(1):8953.
- [Decline of RSV-specific antibodies during the COVID-19 pandemic.](#)
Den Hartog, van Kasteren PB, Schepp RM, Teirlinck AC, van der Klis FRM, van Binnendijk RS.
The Lancet Infectious Diseases 2023; 31(1):23-25.

Chlamydia

Factsheet: [Chlamydia Trachomatis. PIENTER 3 study results](#)

Publication:

- [Trends in Chlamydia trachomatis IgG seroprevalence in the general population of the Netherlands over 20 years.](#)
Alexiou ZW, van Aar F, Hoenderboom BM, Morre SA, Heijne JCM.
Sexually Transmitted Infections 2024; 100(1):31-38.

Hepatitis B, hepatitis C en HIV

Publication:

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- [Trends in Hepatitis B, Hepatitis C, and HIV Seroprevalence in the Netherlands: Insights From Two Decades of Nationwide PIENTER Serosurveys](#)
Van Straten CGJI, Van Benthem BHB, Van der Klis FRM, Smits G, Vos ERA, Woudenberg T, Van der Valk M, Op de Coul ELM.
Journal of Viral Hepatitis 2026; 33(8):e70213.

Antimicrobial resistance against colistine

Factsheet: [Colistin resistance PIENTER 3 study results](#)

Publication:

- [Colistin-resistant Enterobacterales among veterinary healthcare workers and in the Dutch population.](#)
Dierikx CM, Meijs AP, Hengeveld PD, van der Klis FRM, van Vliet J, Gijsbers EF, Rozwandowicz M, van Hoek AHAM, Hendrickx APA, Hordijk J, Van Duijkeren E.
JAC Antimicrobial Resistance 2022; 4(2):dlac041.

Antimicrobial resistance: ESBL- and CPE bacteria

[Gastric acid suppression, lifestyle factors and intestinal carriage of ESBL and carbapenemase-producing Enterobacterales: a nationwide population-based study.](#)

Willems RPJ, van Dijk K, Dierikx CM, Twisk JWR, van der Klis FRM, de Greeff SC, Vandenbroucke-Grauls CMJE.

Journal of Antimicrobial Chemotherapy 2021; 77(1):237-245.

Cytomegalovirus (CMV) and Epstein-Barr virus (EBV)

[Cytomegalovirus and Epstein-Barr virus co-infected young and middle-aged adults can have an aging-related T-cell phenotype.](#)

Hofstee MI, Cevirgel A, de Zeeuw-Brouwer ML, de Rond L, van der Klis F, Buisman AM.
Scientific Reports 2023; 13(1):10912.

Respiratory mucosal immune marker profiles

Factsheet: [Respiratory mucosal immune marker profiles PIENTER 3 study results](#)

Publication:

- [Effect of age and season on respiratory mucosal immune marker profiles.](#)
Van Woudenberg E, van Rooijen DM, Veldman-Wolf JJ, Nicolaie MA, Huynen MA, van der Klis FRM, de Jonge MI, den Hartog G.
Journal of Allergy and Clinical Immunology 2024; 153(6):1681-1691.e12.

Lyme Borreliosis

- [Twenty Years of Lyme Borreliosis in the Netherlands: Temporal Trends in Seroprevalence and Risk Factors.](#)
Hoeve-Bakker BJA, van den Berg OE, Doppenberg HS, van der Klis FRM, van den Wijngaard CC, Kluytmans JAJW, Thijsen SFT, Kerkhof K.
Microorganisms 2024; 12(11):2185.
- [Seroprevalence and Risk Factors of Lyme Borreliosis in The Netherlands: A Population-Based Cross-Sectional Study.](#)
Hoeve-Bakker BJA, van den Berg OE, Doppenberg HS, van der Klis FRM, van den Wijngaard CC, Kluytmans JAJW, Thijsen SFT, Kerkhof K.
Microorganisms 2023; 11(4):1081.

Borrelia miyamotoi

[Exposure, infection and disease with the tick-borne pathogen *Borrelia miyamotoi* in the Netherlands and Sweden, 2007-2019.](#)

Hoornstra D, Stukolova OA, van Eck JA, Sokolova MI, Platonov AE, Hofhuis A, Vos ERA, Reimerink JH, van den Berg OE, van den Wijngaard CC, Lager M, Wilhelmsson P, Lindgren PE, Forsberg P, Henningsson AJ, Hovius JW.
Journal of Infection 2024; 89(6):106326.

Toxoplasmosis

[Seroprevalence of *Toxoplasma gondii* and associated risk factors for infection in the Netherlands: third cross-sectional national study.](#)

Van den Berg OE, Stanoeva KR, Zonneveld R, Hoek-van Deursen D, van der Klis FR, van de Kasstele J, Franz E, Opsteegh M, Friesema IHM, Kortbeek LM.
Epidemiology & Infection 2023; 151:e136.

Emerging diseases: West Nile Virus en Usutu virus

[Assessing West Nile virus \(WNV\) and Usutu virus \(USUV\) exposure in bird ringers in the Netherlands: a high-risk group for WNV and USUV infection?](#)

De Bellegarde de Saint Lary C, Kasbergen LMR, Bruijning-Verhagen PCJL, van der Jeugd H, Chandler F, Hogema BM, Zaaijer HL, van der Klis FRM, Barzon L, de Bruin E, Ten Bosch Q, Koopmans MPG, Sikkema RS, Visser LG.
One Health 2023; 16:100533.

Microbiome

Factsheet: [Microbiome. PIENTER 3 study results](#)

Publications:

- [Profiling the fecal microbiome and its modulators across the lifespan in the Netherlands.](#)
Boverhoff D, Kool J, Pijnacker R, Ducarmon QR, Zeller G, Shetty S, Sie S, Mulder AC, van der Klis F, Franz E, Mughini-Gras L, van Baarle D, Fuentes S. Cell Reports 2024; 43(9):114729.

- [Host and environmental factors shape upper airway microbiota and respiratory health across the human lifespan.](#)
Odendaal ML, de Steenhuijsen Piters WAA, Franz E, Chu MLJN, Groot JA, van Logchem EM, Hasrat R, Kuiling S, Pijnacker R, Mariman R, Trzciński K, van der Klis FRM, Sanders EAM, Smit LAM, Bogaert D, Bosch T.
Cell 2024; 187(17):4571-4585.e15.
- [Gut colonisation by extended-spectrum \$\beta\$ -lactamase-producing *Escherichia coli* and its association with the gut microbiome and metabolome in Dutch adults: a matched case-control study.](#)
Ducarmon QR, Zwittink RD, Willems RPJ, Verhoeven A, Nooij S, van der Klis FRM, Franz E, Kool J, Giera M, Vandenbroucke-Grauls CMJE, Fuentes S, Kuijper EJ.
The Lancet Microbe 2022; 3(6):e443-e451
- [Reducing bias in microbiome research: Comparing methods from sample collection to sequencing.](#)
Kool J, Tymchenko L, Shetty SA, Fuentes S.
Frontiers in Microbiology 2023; 14:1094800.
- [Benchmarking laboratory processes to characterise low-biomass respiratory microbiota.](#)
Hasrat R, Kool J, de Steenhuijsen Piters WAA, Chu MLJN, Kuiling S, Groot JA, van Logchem EM, Fuentes S, Franz E, Bogaert D, Bosch T.
Scientific Reports 2021; 11(1):17148.
- [Higher off-target amplicon detection rate in MiSeq v3 compared to v2 reagent kits in the context of 16S-rRNA-sequencing.](#)
Odendaal ML, Groot JA, Hasrat R, Chu MLJN, Franz E, Bogaert D, Bosch T, de Steenhuijsen Piters WAA.
Scientific Reports 2022; 12(1):16489.

PFAS

[PFAS in bloed van de Nederlandse bevolking](#). Rijksinstituut voor Volksgezondheid en Milieu (RIVM). 2025. [In Dutch]