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Novel tools for test evaluation and disease prevalence estimation

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Diagnostic Accuracy and its impact on Biosecurity Implementation Strategies

Polychronis Kostoulas

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Novel tools for test evaluation and disease prevalence estimation

COST ACTION CA15208

Novel tools for test evaluation and disease prevalence estimation

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DESCRIPTION OF THE ACTION

Epidemiological studies assessing disease prevalence are critically important to both the identification and control of pathogens in humans and animals (including zoonosis and food borne outbreaks).

Novel tools for test evaluation and disease prevalence estimation

- Evaluation of diagnostics
- Prevalence estimation
- Proof of disease freedom
- Confidence in Disease Absence
- Syndromic surveillance - Early warning systems

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JOURNAL ARTICLE

Diagnostic Accuracy Estimates for COVID-19 Real-Time Polymerase Chain Reaction and Lateral Flow Immunoassay Tests With Bayesian Latent-Class Models

Polychronis Kostoulas ✉, Paolo Eusebi, Sonja Hartnack

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Bayesian latent class analysis when the reference test is imperfect

A. Cheung [1, 2], S. Dufour [3], G. Jones [4], P. Kostoulas [5], M.A. Stevenson [1, 2], N.B. Singanallur [2, 6] & S.M. Firestone [1, 2]*

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ARTICLES | VOLUME 11, ISSUE 5, E740-E748, MAY 2023

Accuracy, acceptability, and feasibility of diagnostic tests for the screening of *Strongyloides stercoralis* in the field (ESTRELLA): a cross-sectional study in Ecuador

Francesca Tamarozzi, PhD • Prof Ángel G Guevara, PhD • Mariella Anselmi, MD • Yosselin Vicuña, MSc • Rosanna Prandi, MSc • Monica Marquez, BSc • et al. Show all authors

Open Access • Published: March 24, 2023 • DOI: https://doi.org/10.1016/S2214-109X(23)00108-0 •

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Summary

Summary

Pateras and Kostoulas *BMC Medical Research Methodology* (2022) 22:91
https://doi.org/10.1186/s12874-022-01557-1

BMC Medical Research Methodology

SOFTWARE Open Access

|tPRiors|: a tool for prior elicitation and obtaining posterior distributions of true disease prevalence

Konstantinos Pateras* and Polychronis Kostoulas

Abstract

Background: Tests have false positive or false negative results, which, if not properly accounted for, may provide misleading apparent prevalence estimates based on the observed rate of positive tests and not the true disease prevalence estimates. Methods to estimate the true prevalence of disease, adjusting for the sensitivity and the

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Original research

Prevalence estimates of major depressive disorder in 27 European countries from the European Health Interview Survey: accounting for imperfect diagnostic accuracy of the PHQ-8

Felix Fischer [1], Dario Zocholl [2], Geraldine Rauch [2], Brooke Levis [3, 4], Andrea Benedetti [4, 5, 6], Brett Thombs [3, 4, 6, 7, 8, 9], Matthias Rose [1, 10], Polychronis Kostoulas [11]

Correspondence to Dr Felix Fischer, Department of Psychosomatic Medicine, Charité Universitätsmedizin Berlin, Berlin, Germany; felix.fischer@charite.de

Abstract

Background Cut-offs on self-report depression screening tools are designed to identify many more people than those who meet criteria for major depressive disorder. In a recent analysis of the European Health Interview Survey (EHIS), the percentage of participants with Patient Health Questionnaire-8 (PHQ-8) scores ≥10 was reported as major depression prevalence.

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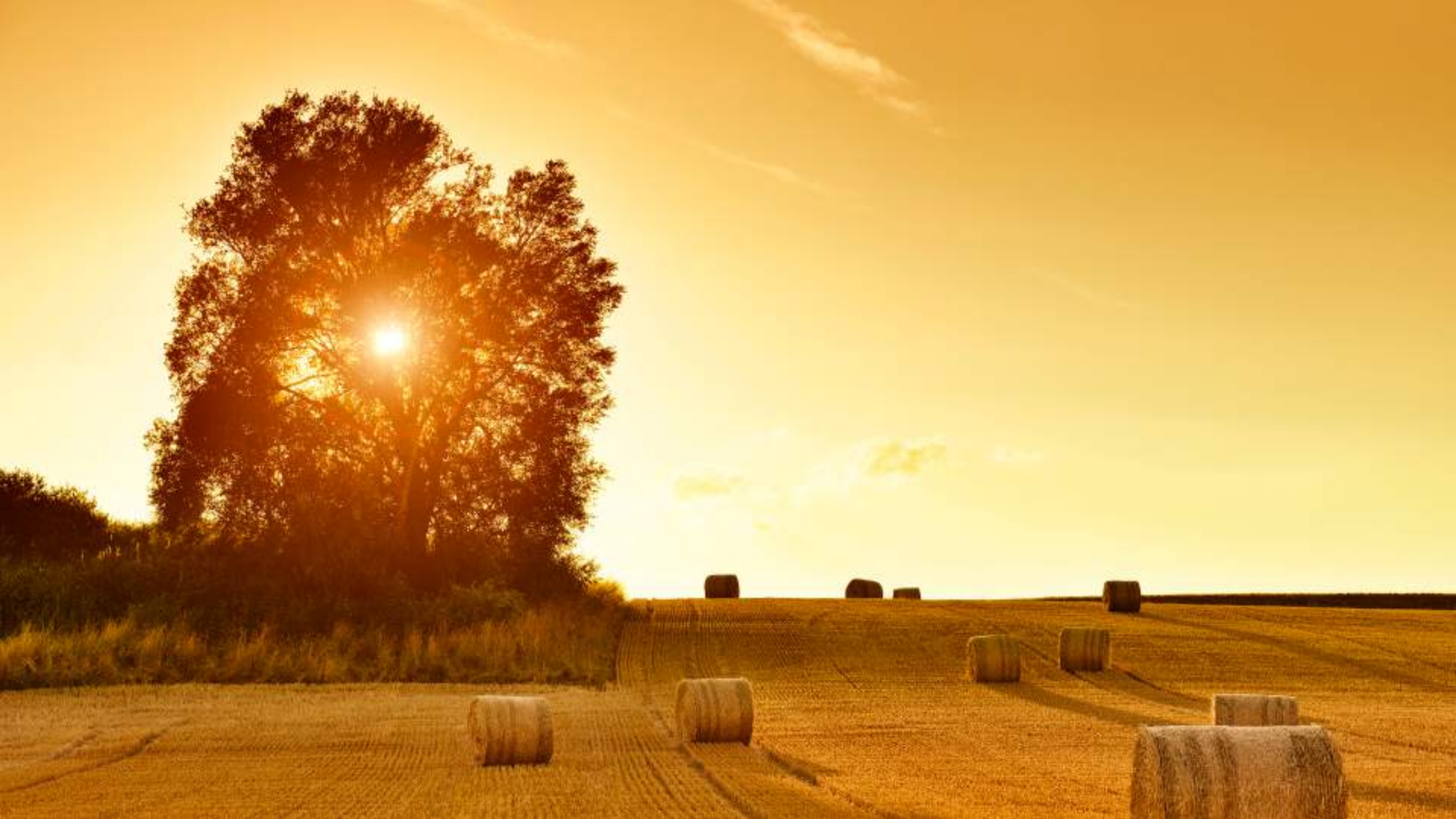
The epidemic volatility index, a novel early warning tool for identifying new waves in an epidemic

Polychronis Kostoulas[1]✉, Eletherios Meletis[1], Konstantinos Pateras[1], Paolo Eusebi[2], Theodoros Kostoulas[3], Luis Furuya-Kanamori[4], Niko Speybroeck[5], Matthew Denwood[6], Suhail A. R. Doi[7], Christian L. Althaus[8], Carsten Kirkeby[6], Pejman Rohani[9],

Confidence in disease absence models



Bayesian analysis is grounded in the concept of evidential learning and knowledge updating. Beliefs can be updated based on new evidence.

Bayes' Theorem

- Let us consider two possible outcomes A and B. The Bayes' theorem provides an expression for the conditional probability of A given B, which is equal to:

$$P(A|B)=\frac{P(B|A)P(A)}{P(B)}$$

$$P(A|B)=\frac{P(B|A)*P(A)}{P(B)}$$

$$P(D+|T+)=\frac{P(T+|D+)*P(D+)}{P(T+)}$$

https://youtu.be/hLiL24vL3rg

PV+, Prevalence = 0.1

- PPV = (0.90 * 0.1) / [(0.90 * 0.1) + ((1 - 0.99) * (1 - 0.1))]
- PPV = 0.09 / [0.09 + (0.01 * 0.9)]
- PPV = 0.09 / 0.099
- PPV = 0.9091

PV+, Prevalence = 0.01

- PPV = (0.90 * 0.01) / [(0.90 * 0.01) + ((1 - 0.99) * (1 - 0.01))]
- PPV = 0.009 / [0.009 + (0.01 * 0.99)]
- PPV = 0.009 / 0.0199
- PPV = 0.4523

PV+, Prevalence = 0.001

- PPV = (0.90 * 0.001) / [(0.90 * 0.001) + ((1 - 0.99) * (1 - 0.001))]
- PPV = 0.0009 / [0.0009 + (0.01 * 0.999)]
- PPV = 0.0009 / 0.010899
- PPV = 0.0826

Prevalence, PV+ &…

Prevalence	PV+
0.1	0.91
0.01	0.45
0.001	0.08

Prevalence, PV+ &… Risk

Prevalence	PV+	Risk ratio
0.1	0.9	9
0.01	0.45	**45**
0.001	0.083	**83**