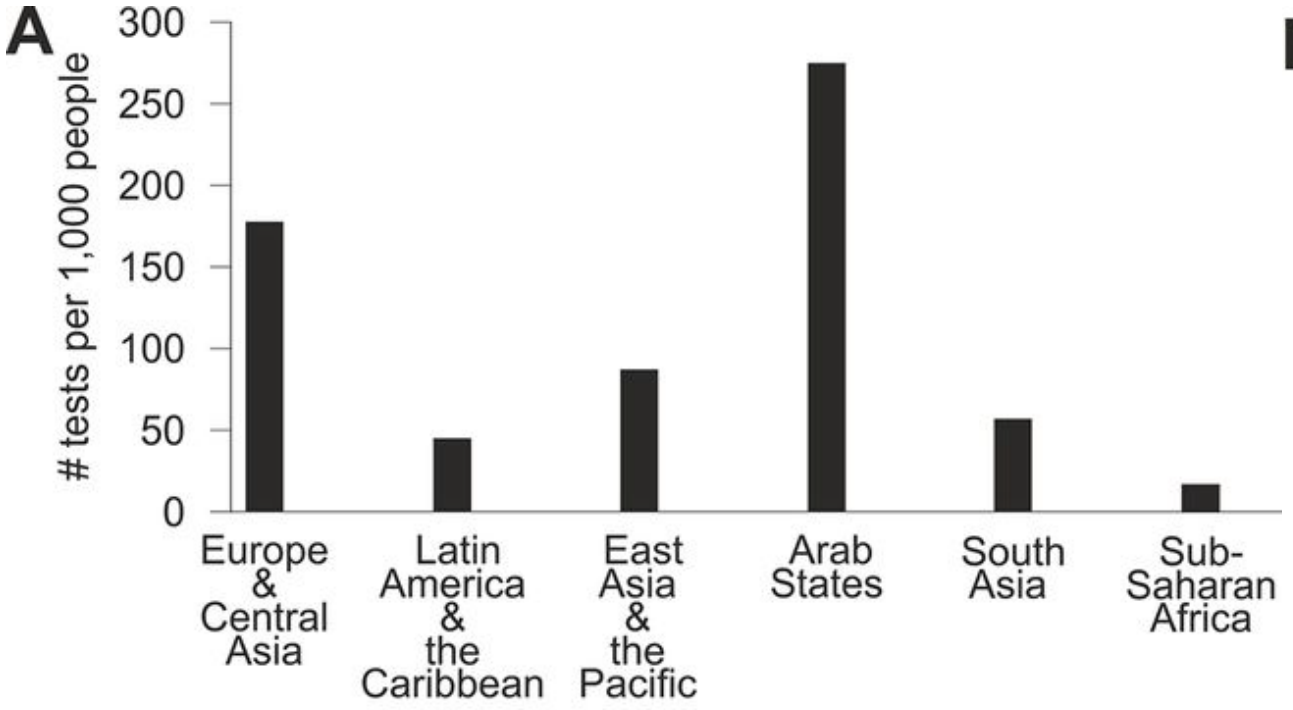
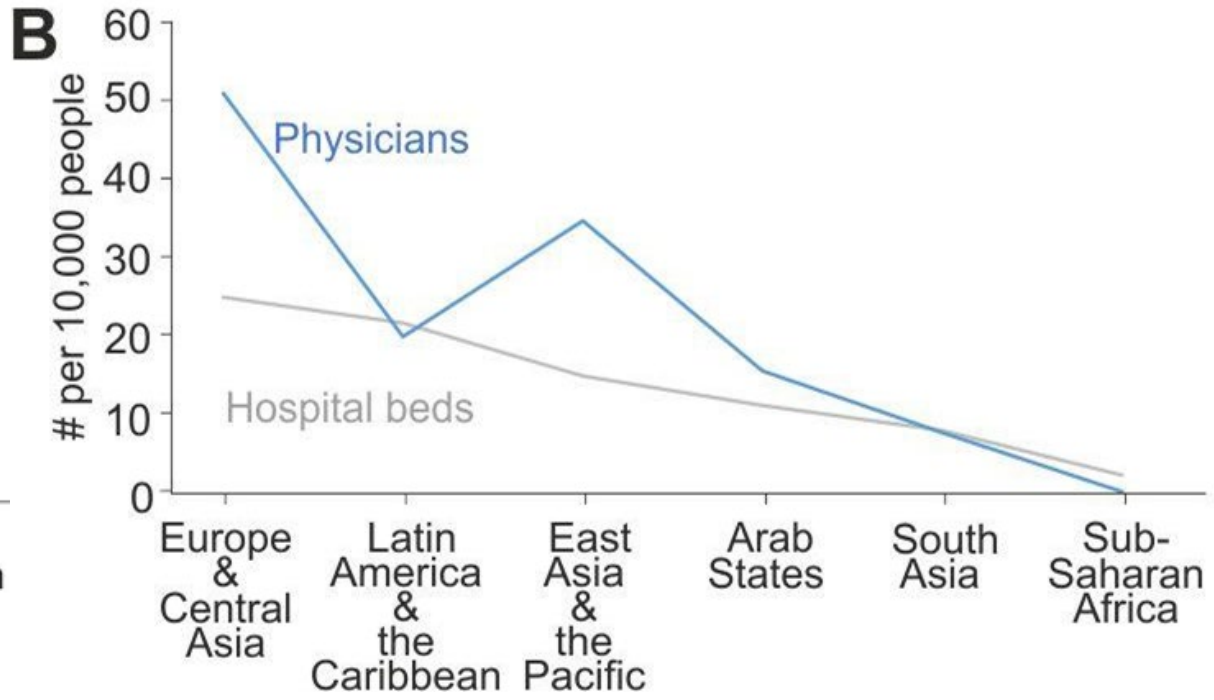
EQAs for enhanced COVID-19 laboratory surveillance in Africa and Europe

Jan Felix Drexler

Charité - Universitätsmedizin Berlin
German Centre for Infection Research

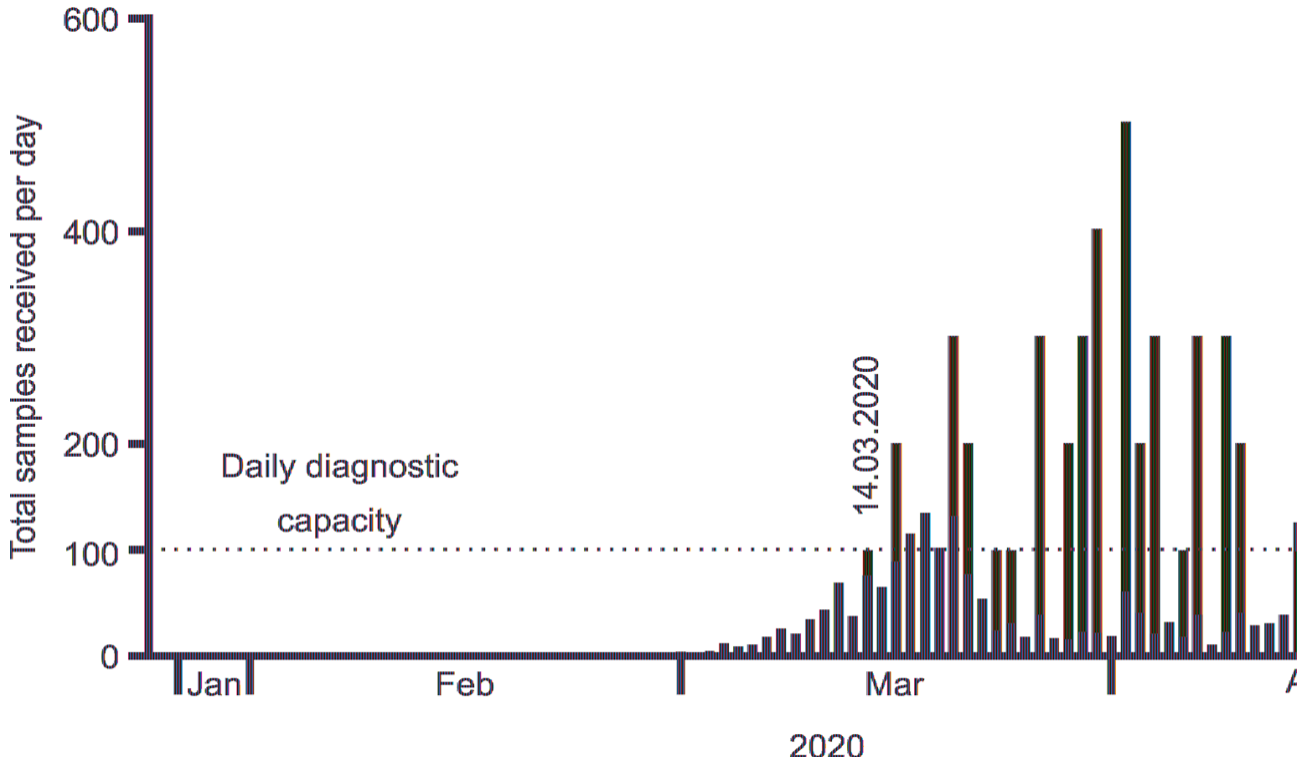
COVID-19:
Limited infrastructure in Sub-Saharan Africa





Sander, Yadouleton, Moreira-Soto et al., mSphere 2020

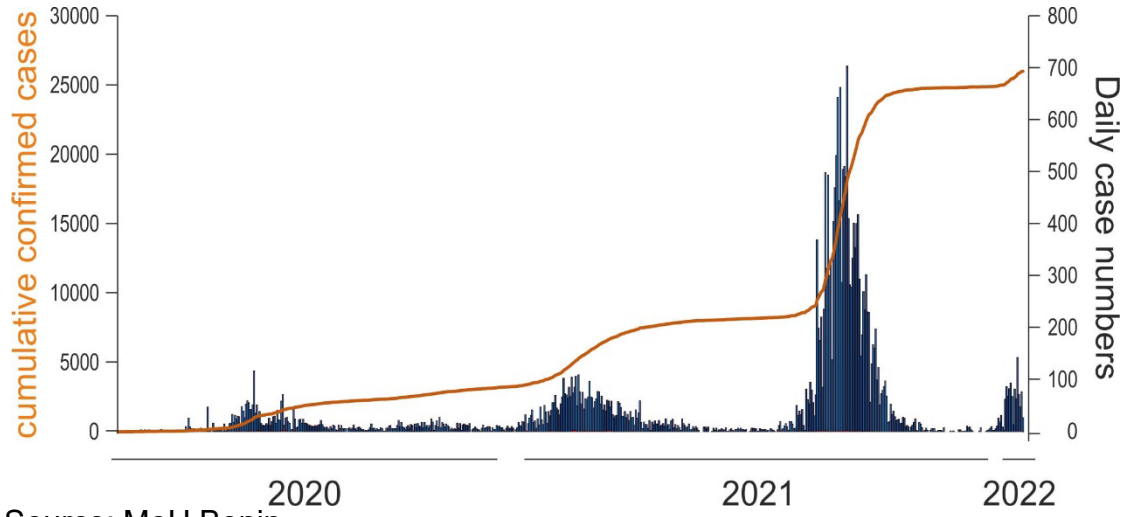
Overload of laboratories at cost of routine work



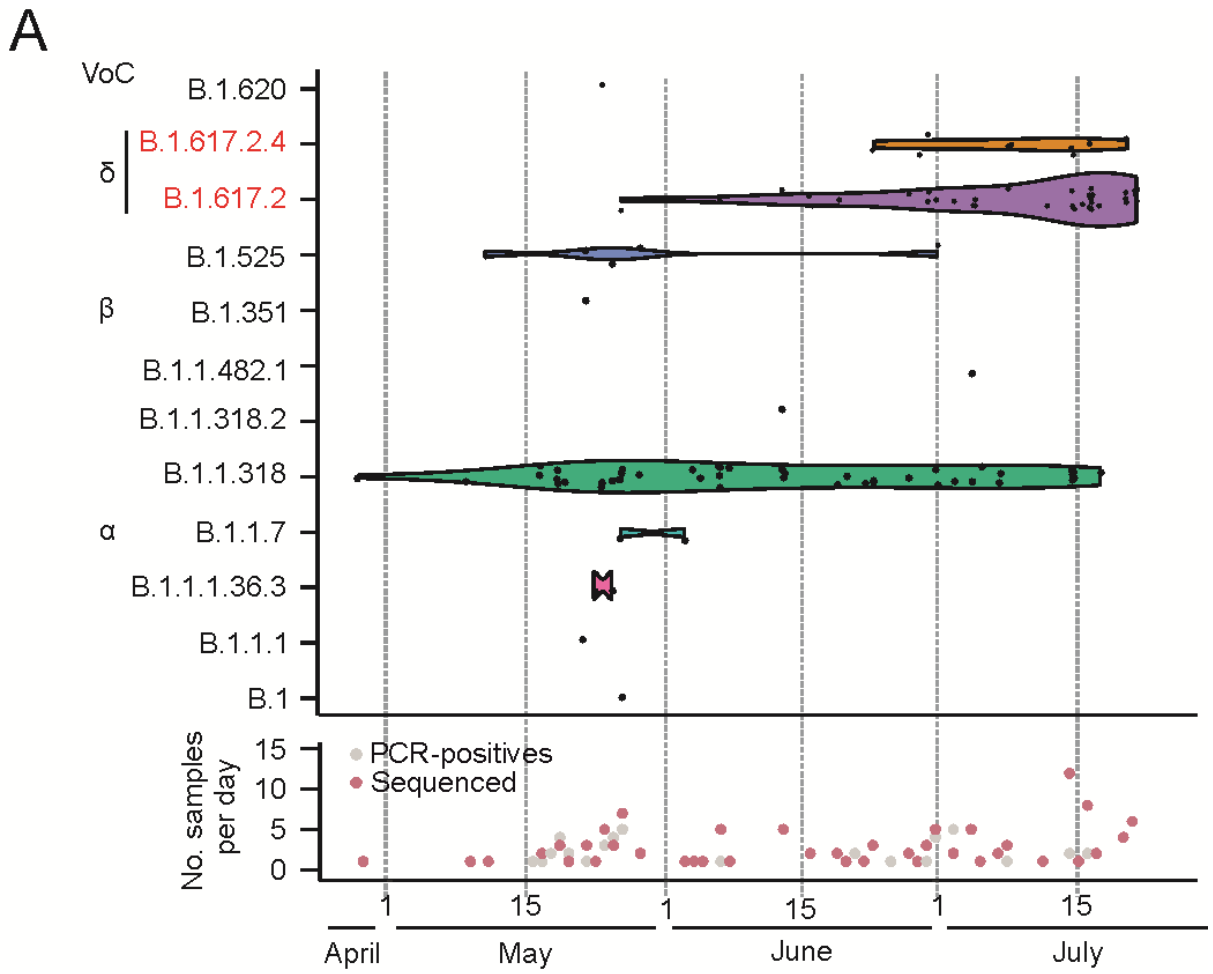
Example Benin

Sander, Yadouleton, Moreira-Soto et al., mSphere 2020

SARS-CoV-2 in Africa: High genetic diversity!



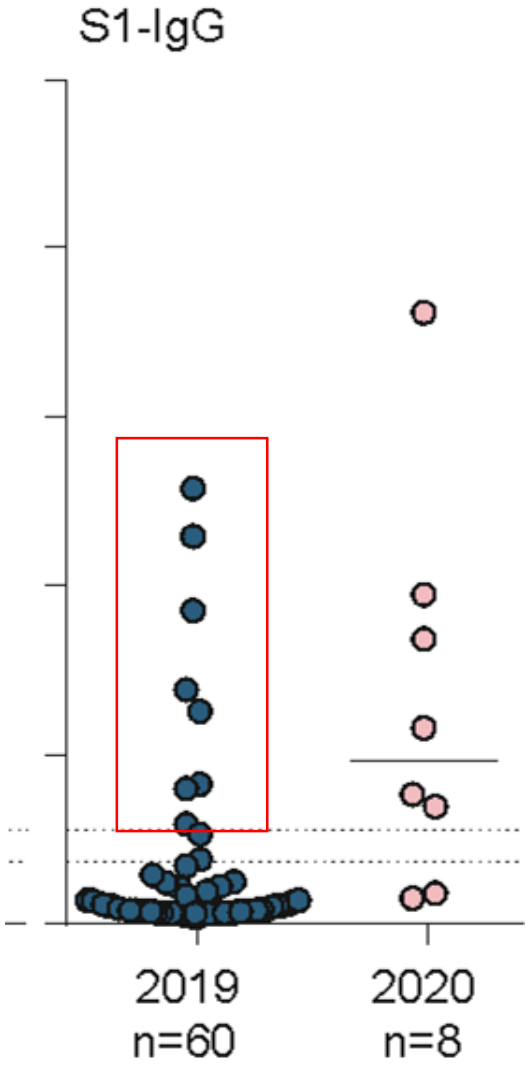
Source: MoH Benin

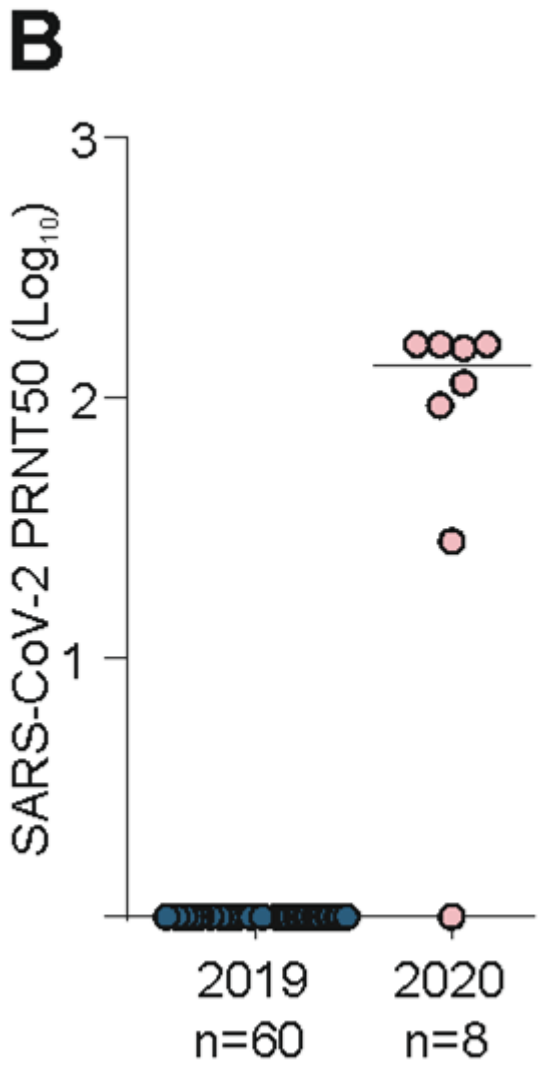


Delta in Benin: 3% May - 60% July!

Yadouleton, Sander, Moreira-Soto et al. EID, 2021

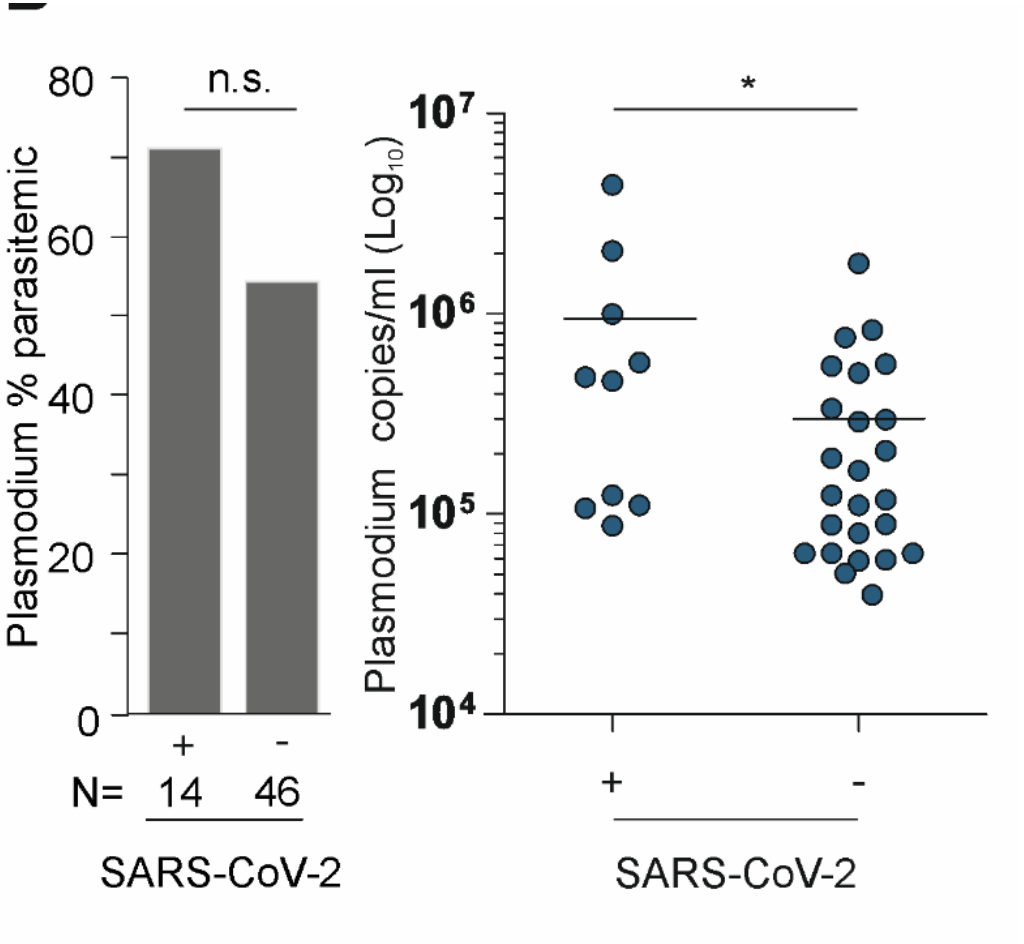
Commercial tests not validated for use in African settings!

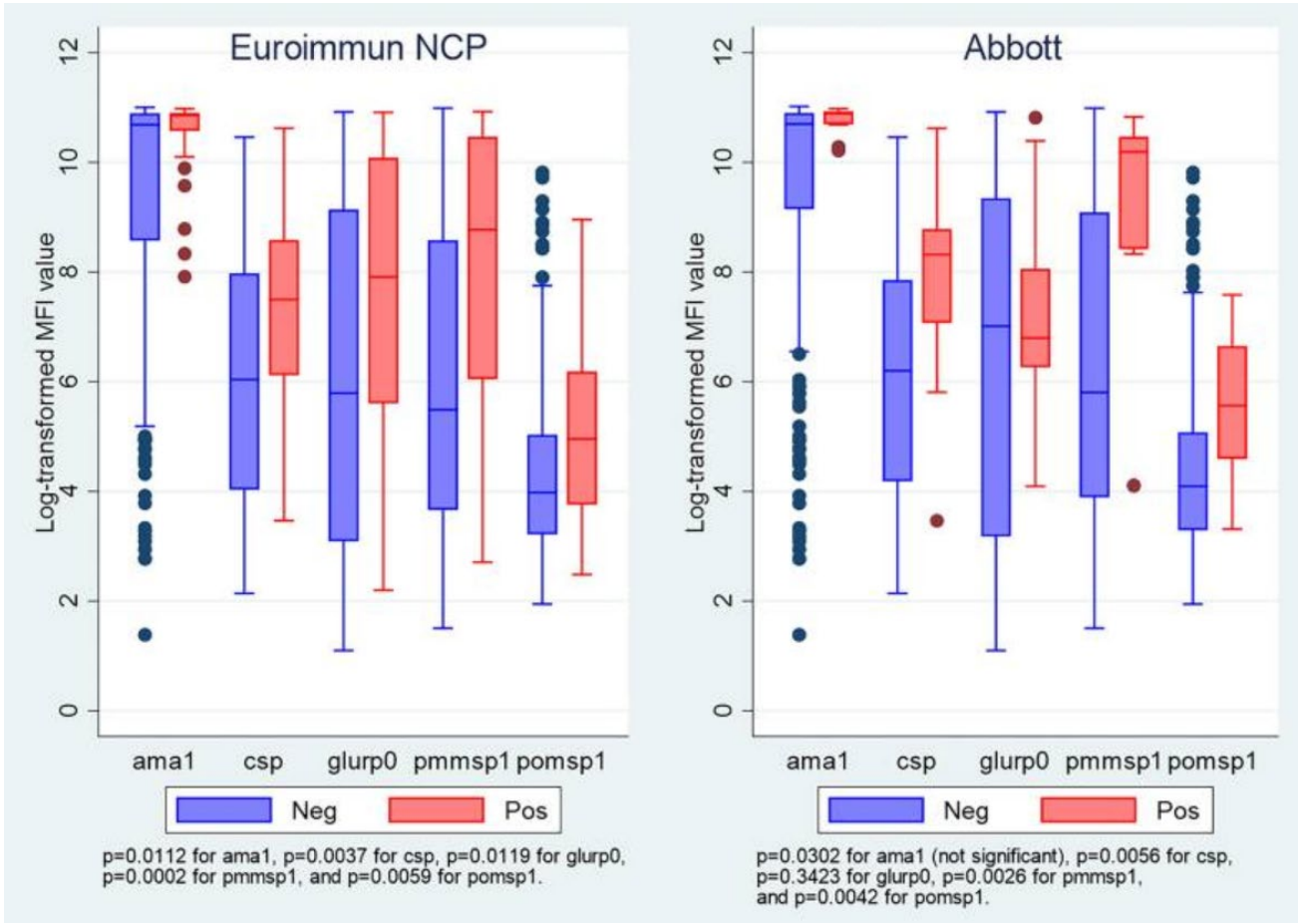




→ Up to 25% unspecific ELISA Results in pre-pandemic sera from Benin…

Yadouleton, Sander, Moreira-Soto et al. EID, 2021



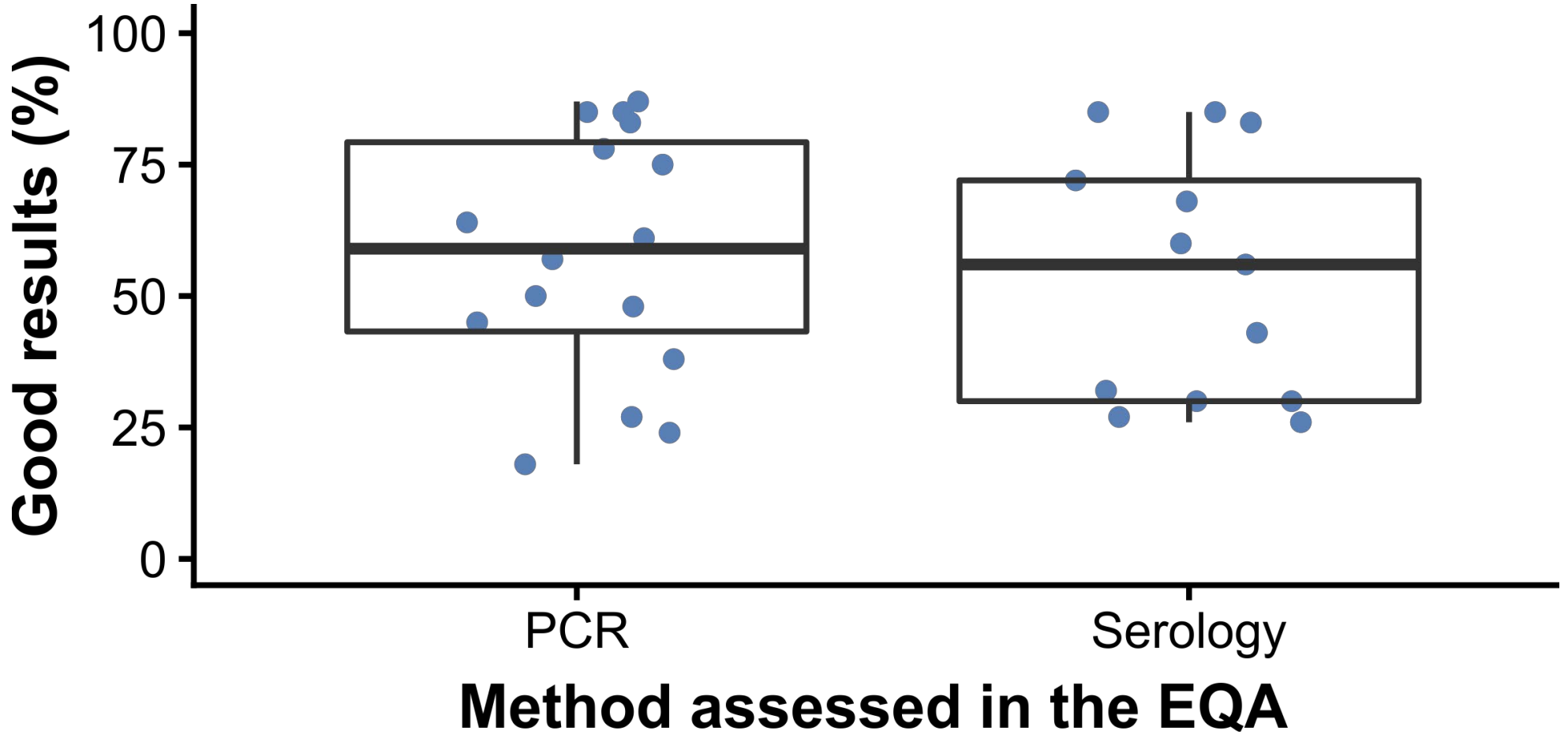


…potentially due to Malaria!

Yadouleton, Sander, Moreira-Soto et al. EID, 2021

Steinhardt et al., JCM, 2021

European reference laboratories: Variable EQA performance



http://www.enivd.de; ENVID EQAs between 1999-2014, Own graphic

Own EQA background

Zika virus EQA, Brazil(qPCR, 2018)

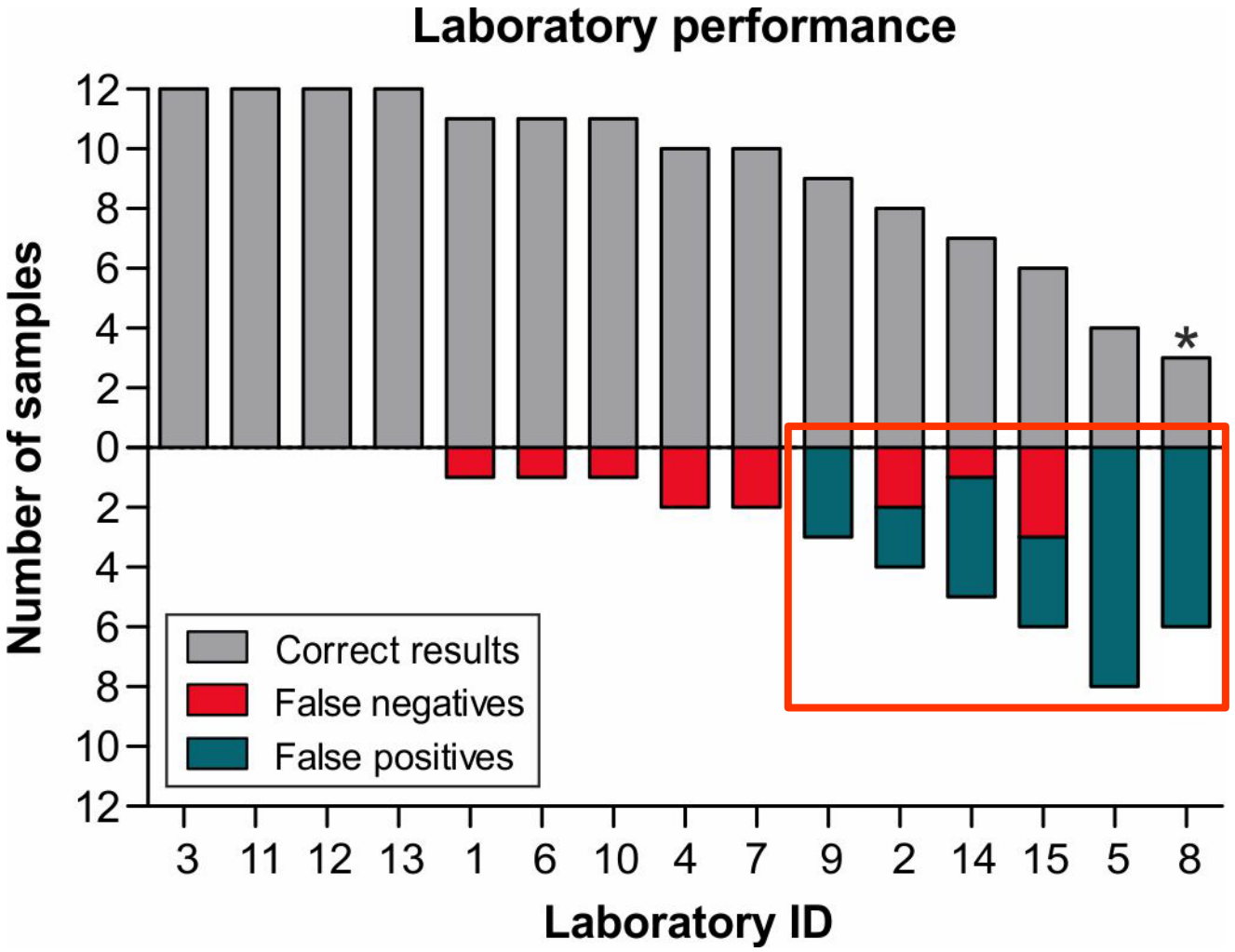
SARS-CoV-2 EQA, ECDC (qPCR, 2020)

SARS-CoV-2 EQA, ECDC (qPCR+Typing, 2021)

Zika virus PCR EQA 2018 in Brazil

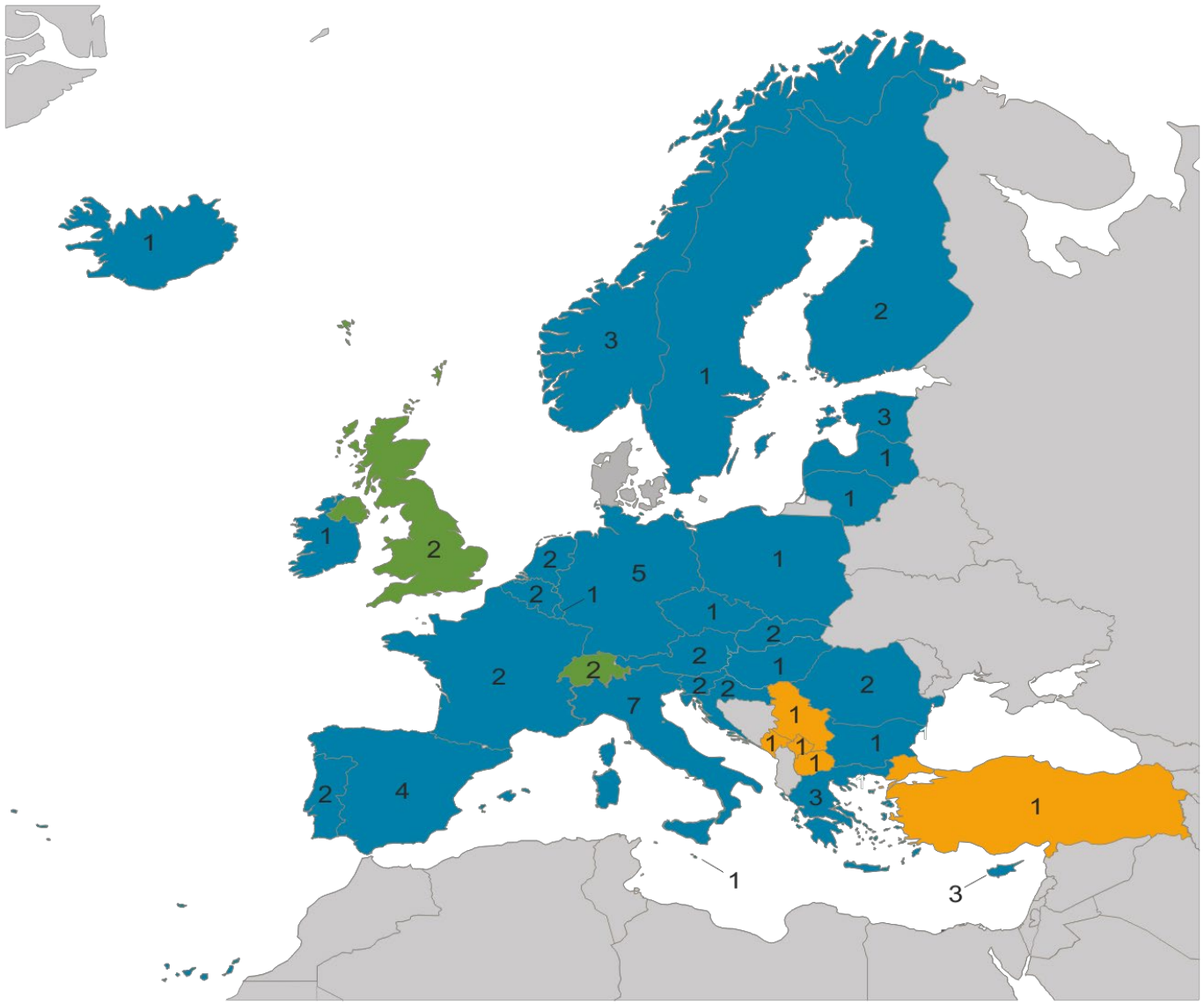
→ **Potential implications on abortion requests**

→ **>100% increase, illegal in most countries**



Fischer et al., EID 2020

SARS-CoV-2 PCR EQA 2020

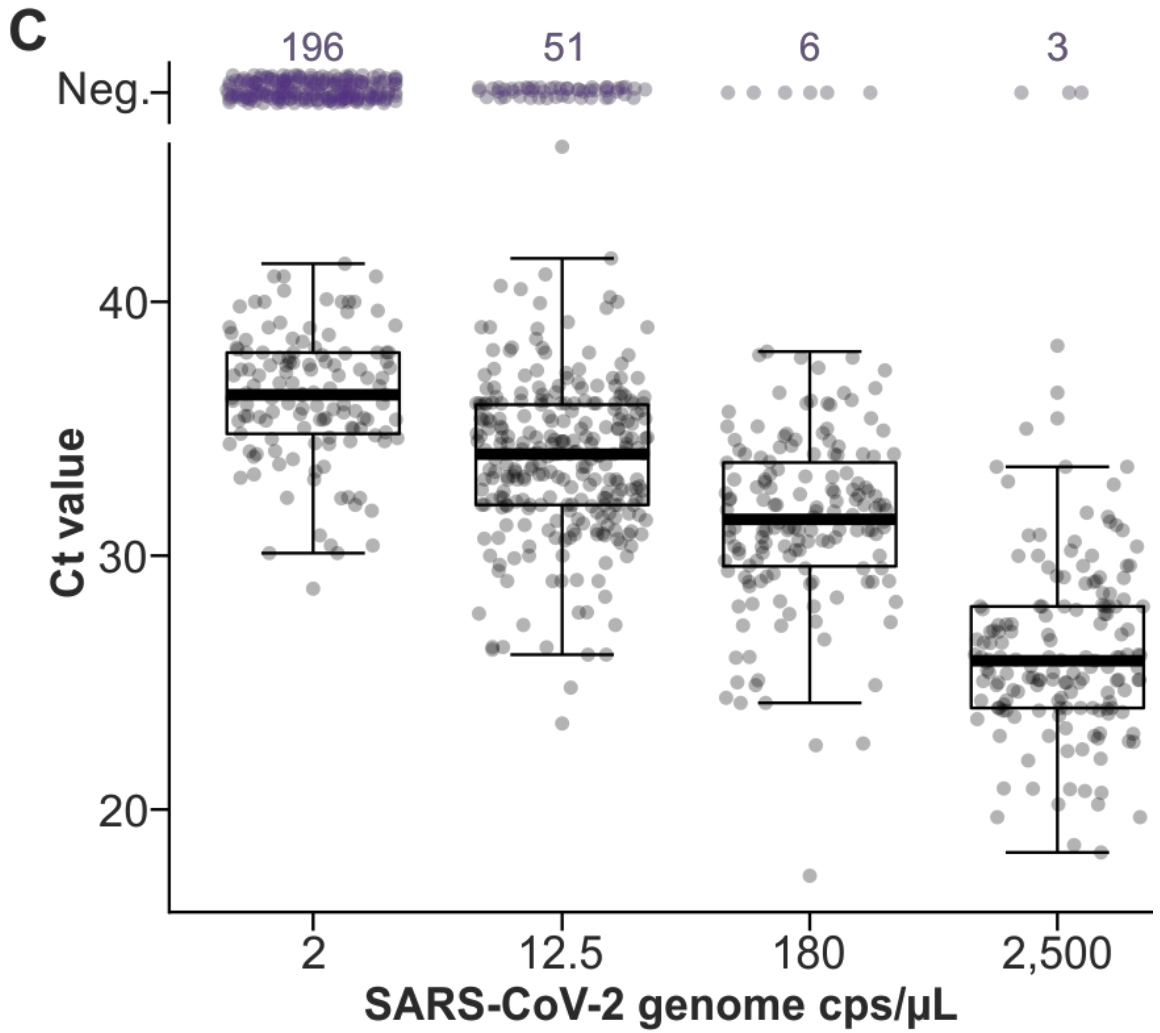


Fischer, Mögling et al., JCM 2021

Variable performance among laboratories

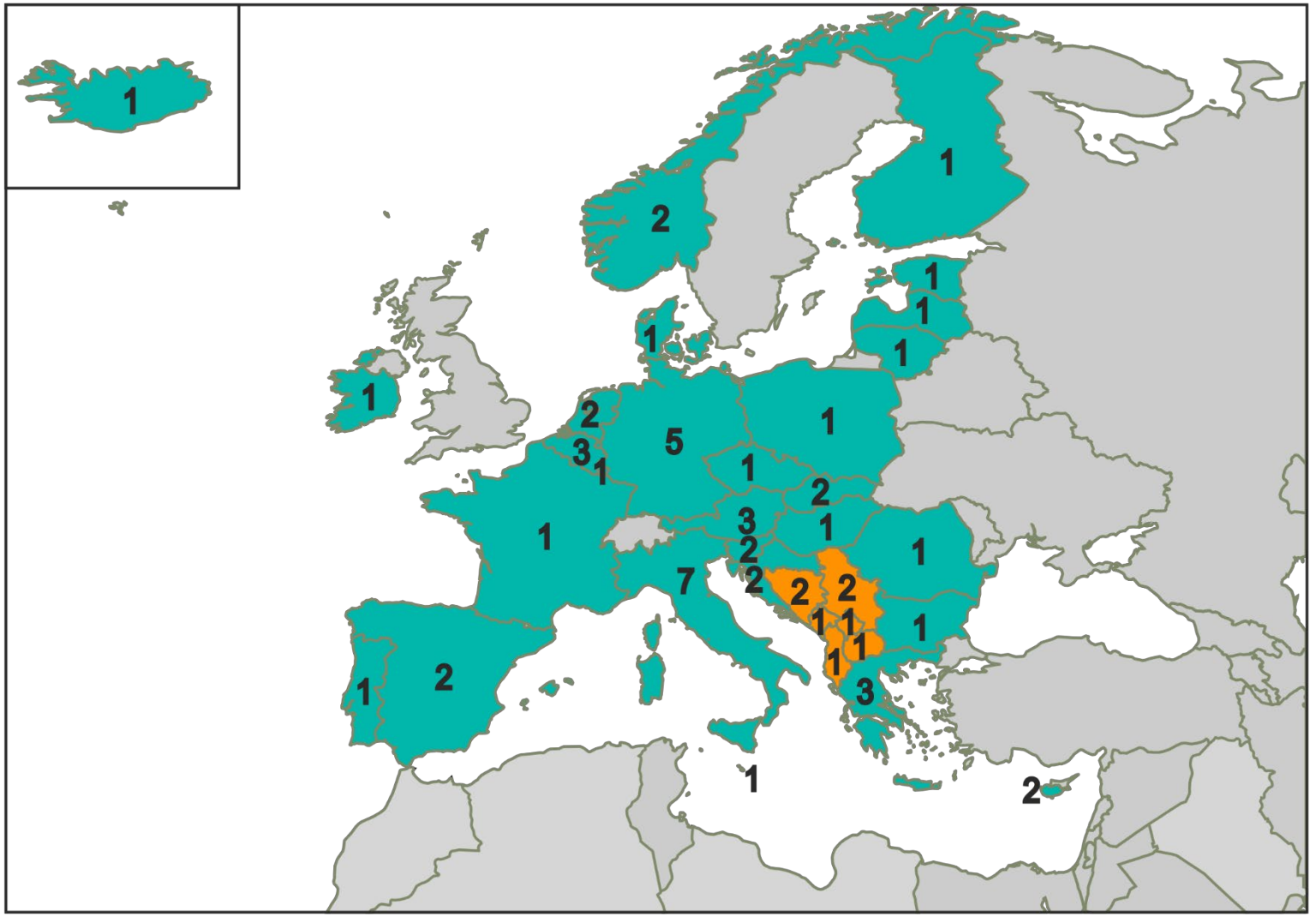
Fischer, Mögling et al., JCM 2021

SARS-CoV-2 detection depends on RNA concentration



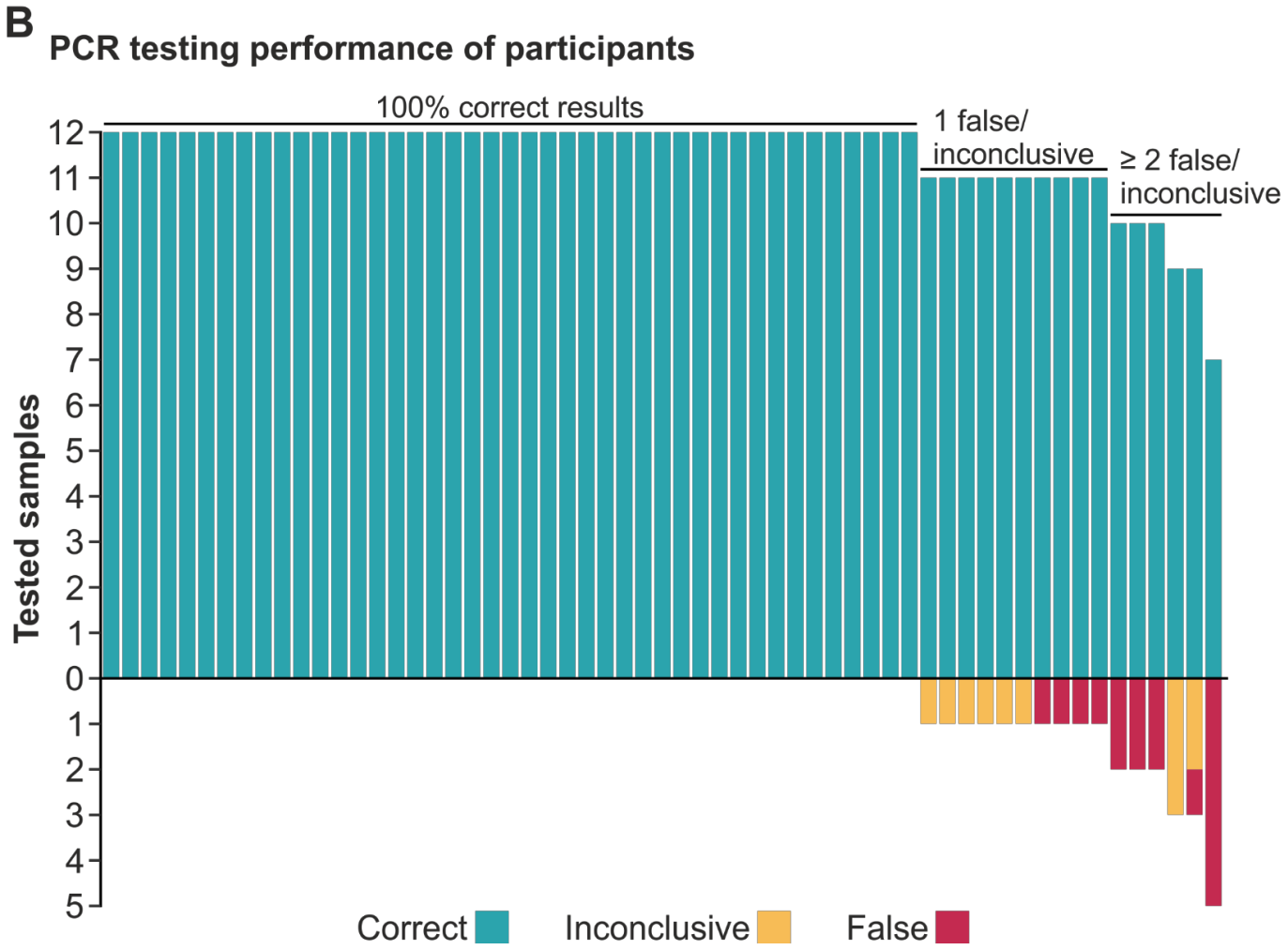
Fischer, Mögling et al., JCM 2021

SARS-CoV-2 EQA 2021



Mögling, Fischer, Stanoeva et al., unpublished 2022

Improved performance in second SARS-CoV-2 EQA



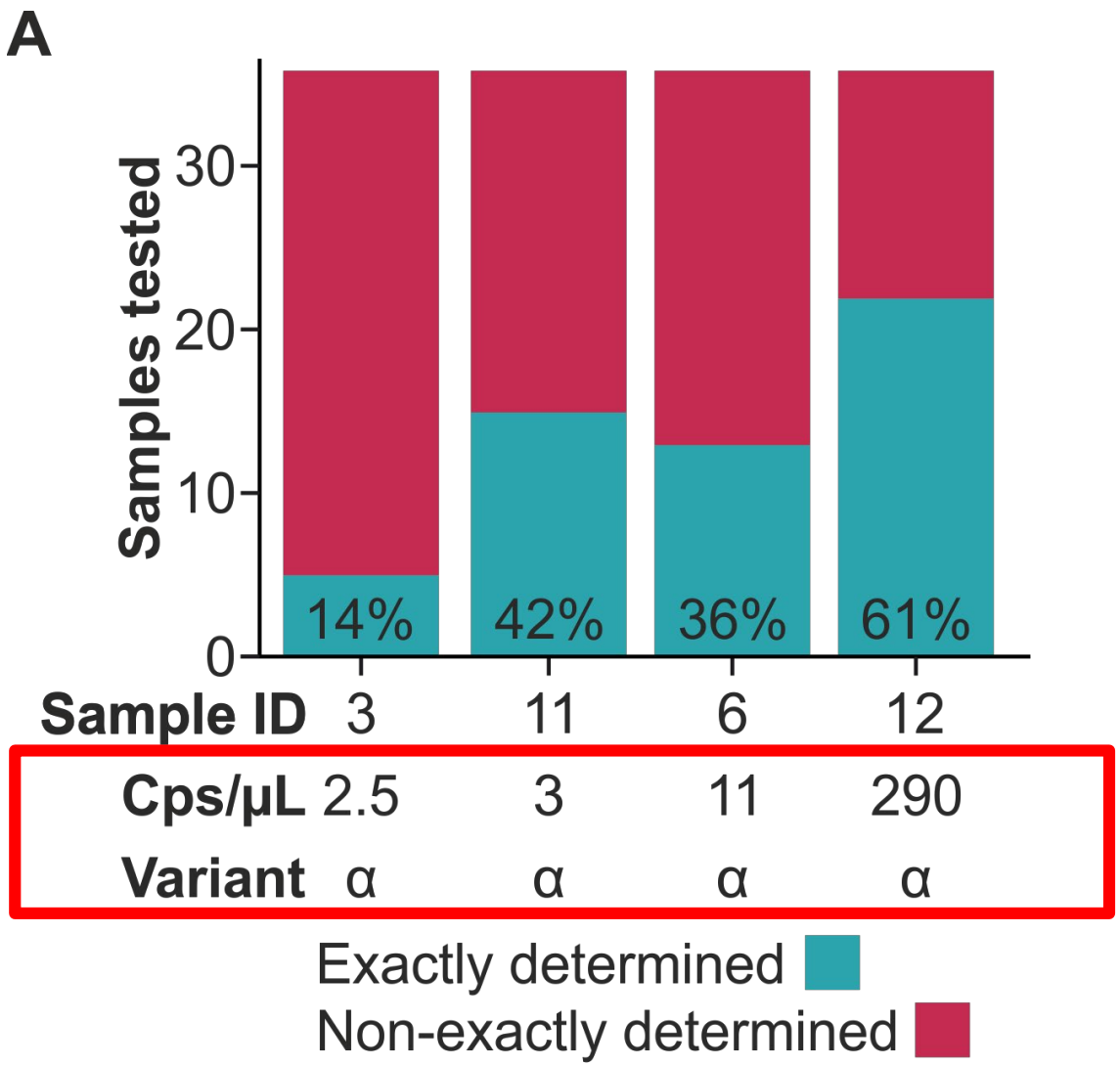
Correct samples

2020: 90.3%

2021: 96.1%

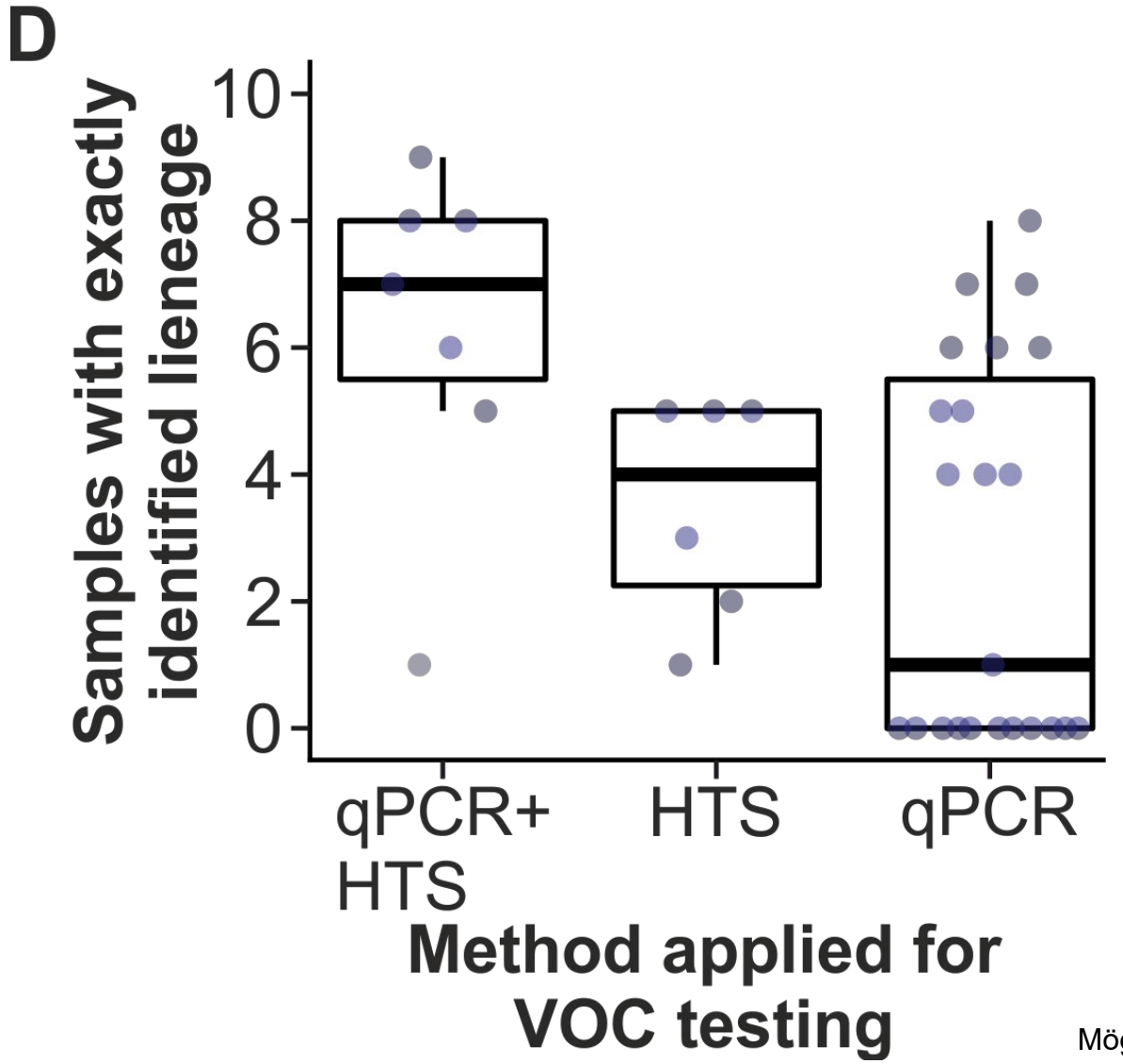
Mögling, Fischer, Stanoeva et al., unpublished 2022

Typing success depends on RNA concentrations



Mögling, Fischer, Stanoeva et al., unpublished 2022

HTS is laborious but more precise than typing qPCRs

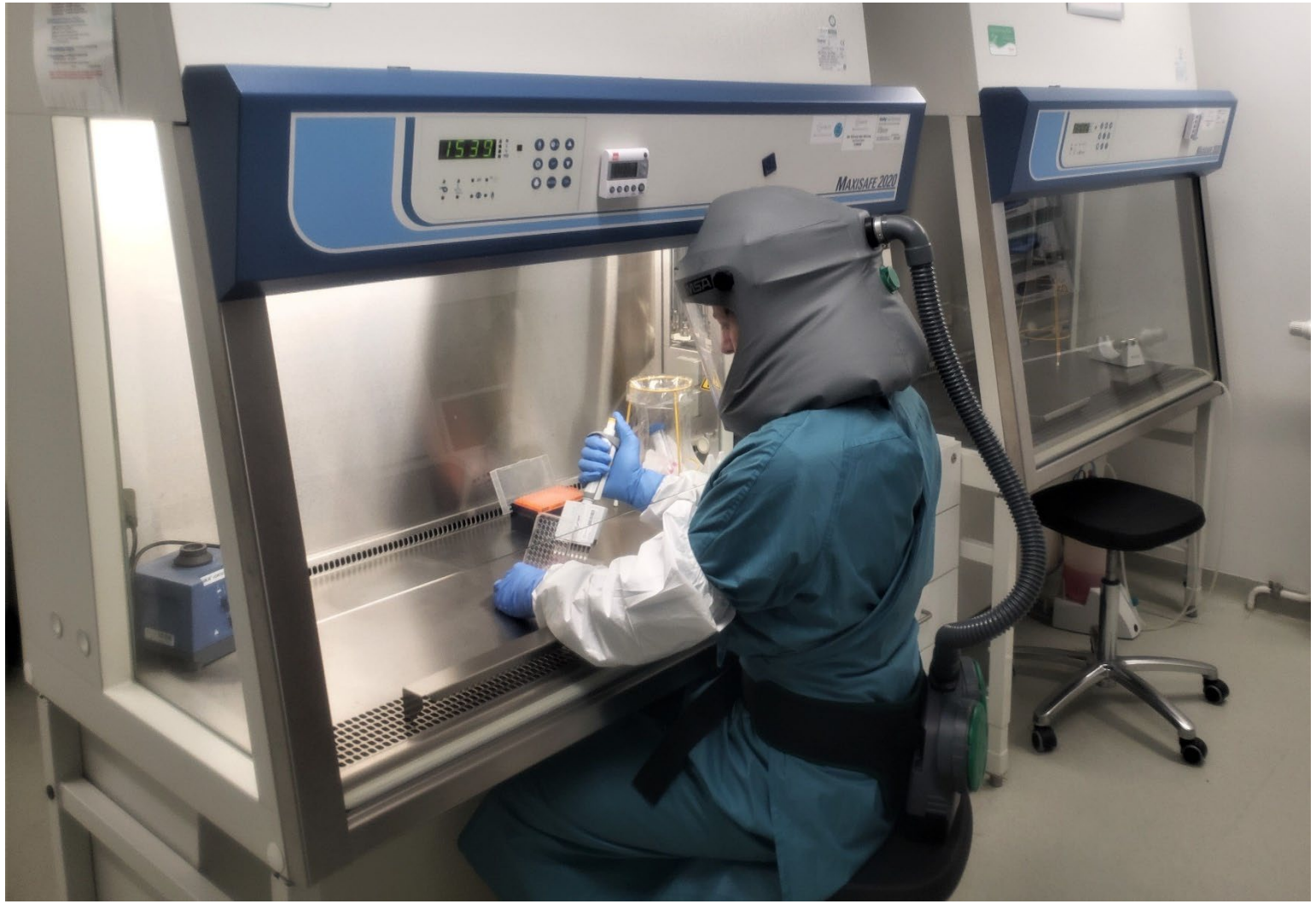


Mögling, Fischer, Stanoeva et al., unpublished 2022

“…90% of laboratories had adequate technical skills to function as neglected tropical diseases reference laboratory, almost all lacked systems for external verification…” Dean et al., F1000R, 2018

→ Challenges in EQA preparation

Virus growth and inactivation requires BSL3 conditions



Selection of tubes

Shipment

Country-specific requirements:

Donation declarations
Customs invoices
Importation restrictions

→ Lengthy delays during shipment and at customs can occur

Need for lyophilization

Not technically trivial: Blow out

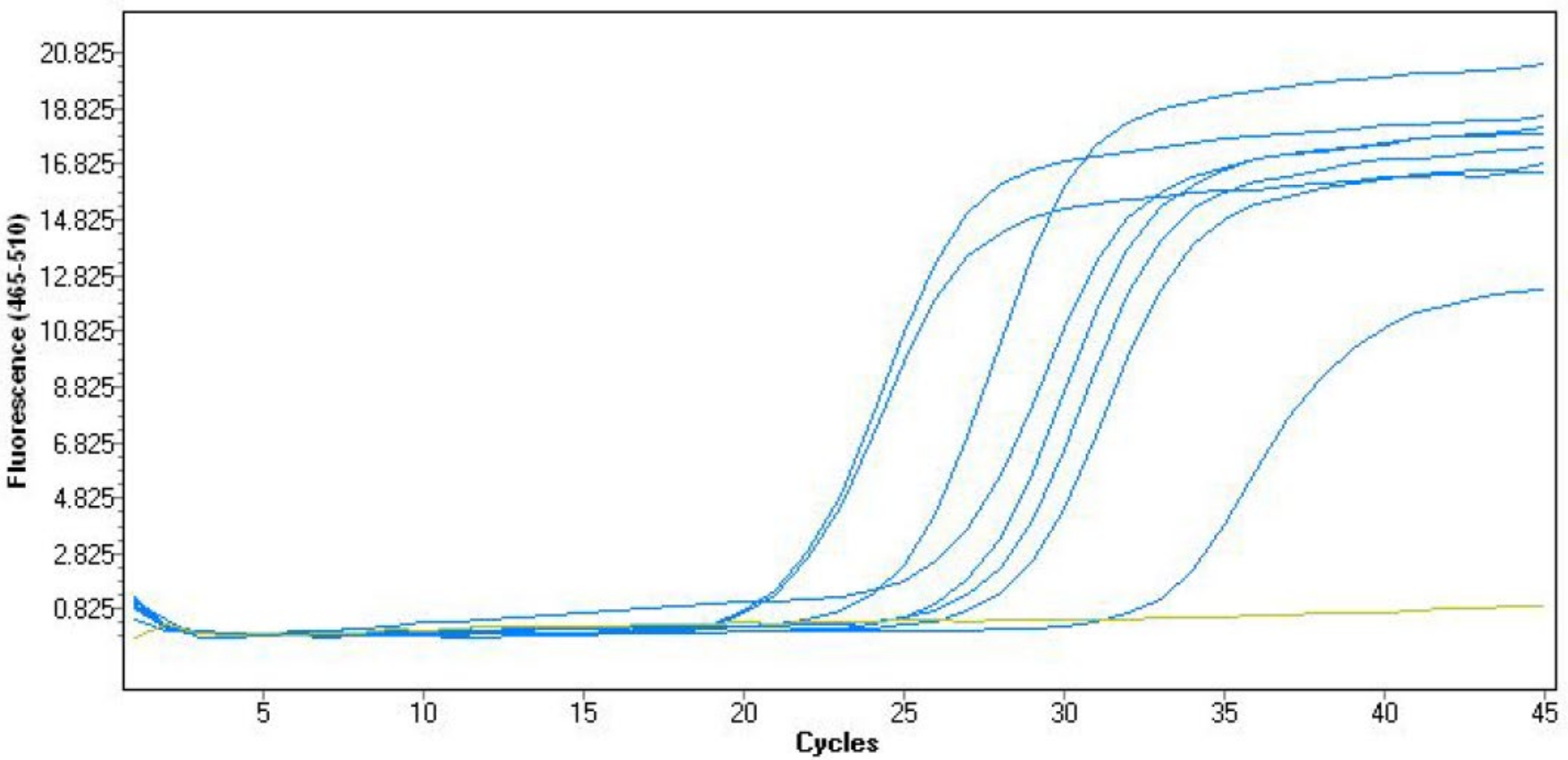
https://pharmaceuticalmanufacturer.media

Sample matrix

Affects lyophilization speed and RNA stability

E.g., DMEM or PBS – or biological sample

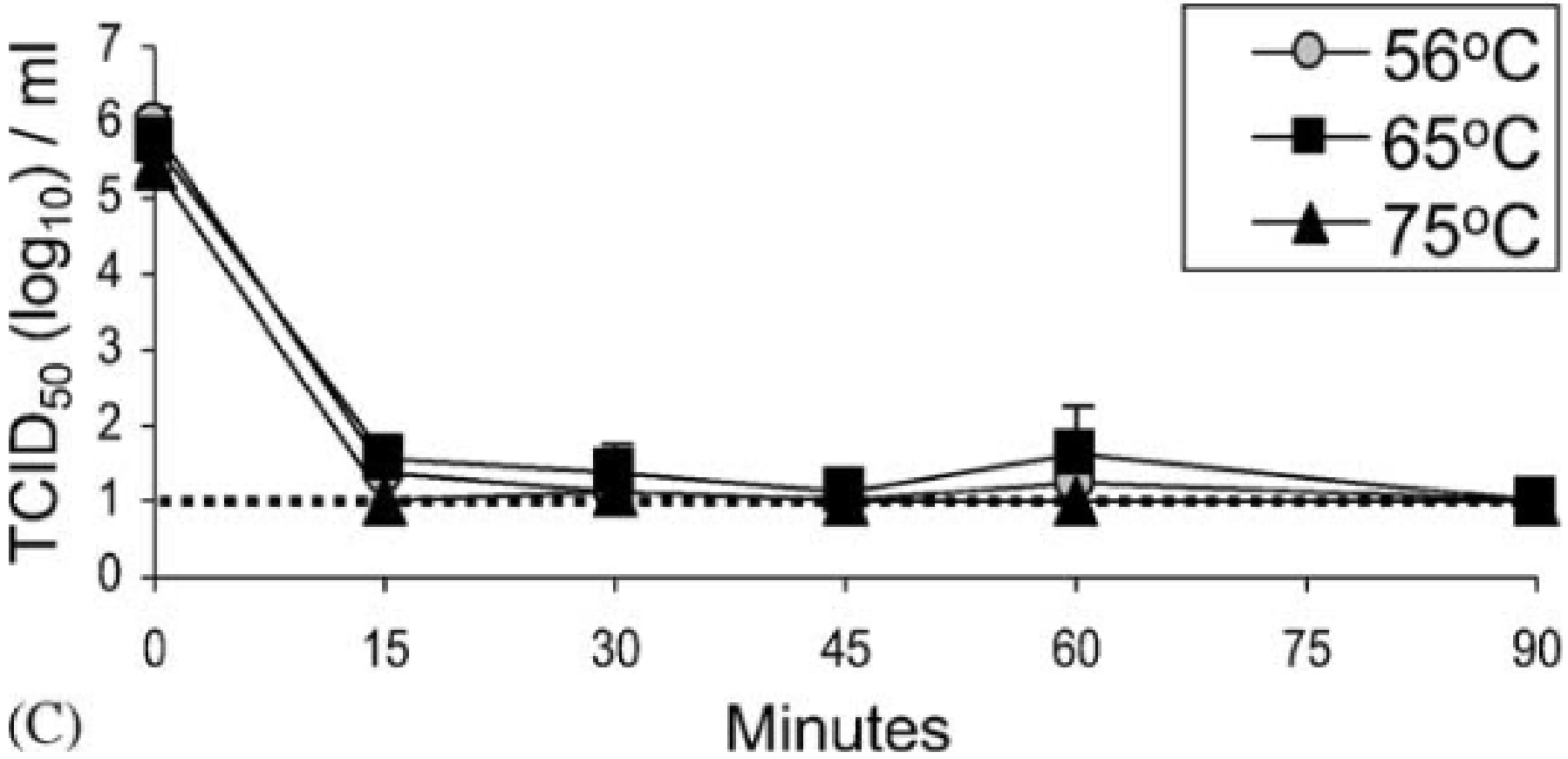
Lyophilization: RNA loss in general…



1-15 fold variable concentration change

Fischer, 2022

…and according to sample inactivation



Darnell et al., JVM 2004; SARS-CoV-1

Need to expand transnational EQA programmes

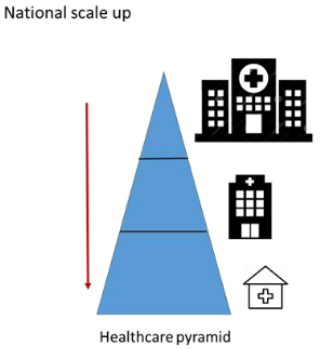
→ Comparability

→ Cost-efficiency

Need to expand transnational training programmes

WHO EQAP
178 labs in 45 countries

ASLM
355 labs in 23 countries



Dr Marguerite Massinga Loembé
Senior Laboratory Advisor
African Society for Laboratory Medicine

- In synergy with WHO:
  - WHO EQAP: reference level laboratories
  - ASLM EQAP: extension (lower lab tiers, private sector etc..)

Bundesministerium für wirtschaftliche Zusammenarbeit und Entwicklung

Auswärtiges Amt

Bundesministerium für Bildung und Forschung

DFG Deutsche Forschungsgemeinschaft

DZIF

HORIZON 2020
The EU Framework Programme for Research and Innovation

DAAD

BILL & MELINDA GATES foundation

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Drexler Lab – Virus epidemiology

Virology, Berlin
Christian Drosten
Victor Max Corman
Tobias Bleicker
Marcel Müller

FLI, Riems
Rainer Ulrich
Martin Beer

AMU, Marseille
Bruno Coutard
X. De Lamballerie

KCCR, Kumasi
Augustina Annan

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Virology, Giessen
Dieter Glebe

Virology, Heidelberg,
Ralf Bartenschlager

Benin
Anges Yadouleton

RIVM, Netherlands
Chantal Reusken

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