INSTITUTO DE INVESTIGACIÓN NUTRICIONAL

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Performance of saliva samples for weekly surveillance of SARS-CoV-2 in a peri-urban community study in Lima-Perú
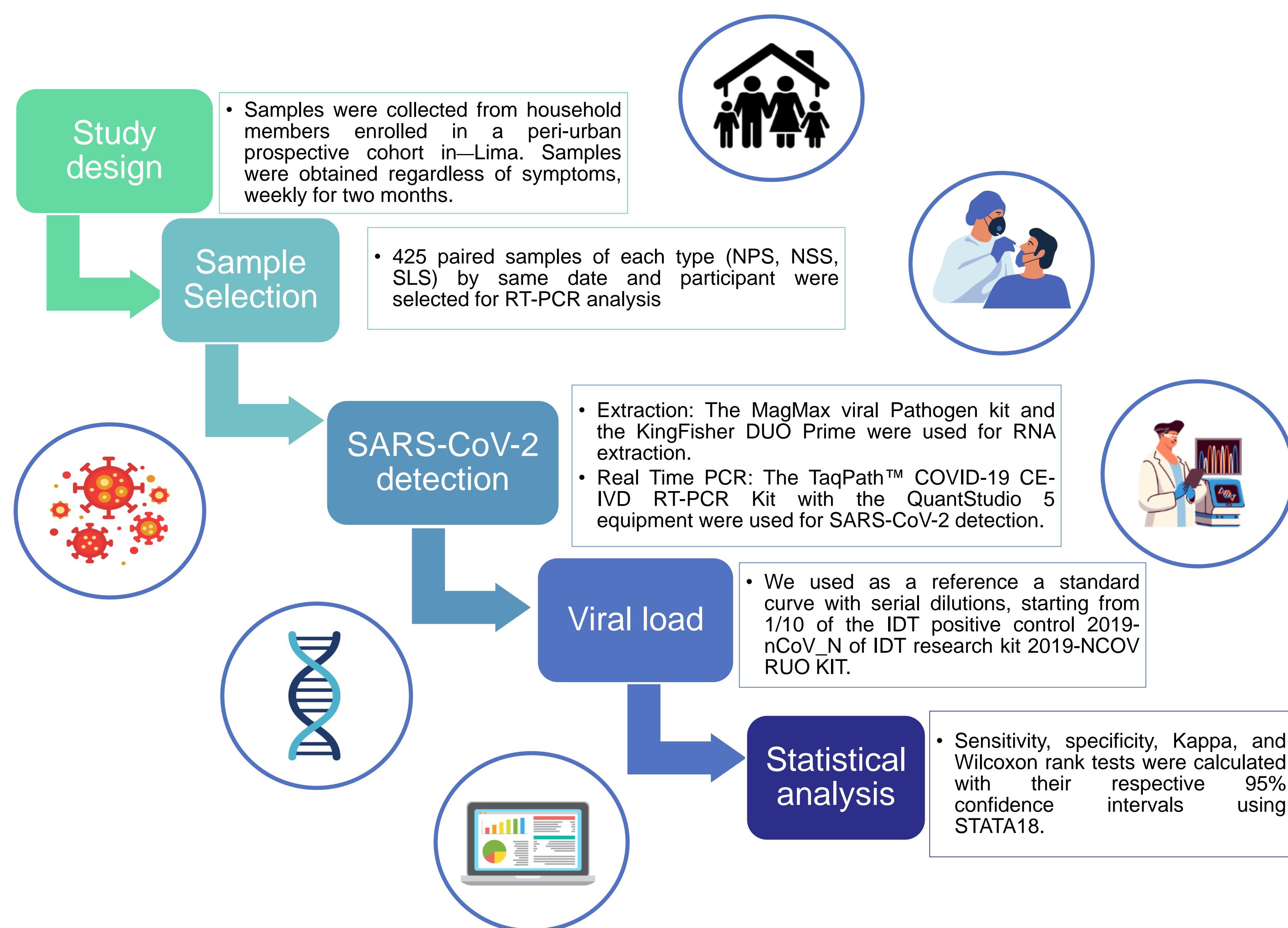
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1. INTRODUCTION

- With the constant emergence of new SARS-CoV-2 variants, it is important to consider practical and affordable specimen collection options.

- Samples that are easy to collect are particularly relevant for low- and middle-income countries (LMICs).

- Nasopharyngeal swab (NPS) and nasal swab samples (NSS) have been the most common respiratory samples used to identify SARS-CoV-2 infections. However, some cross-sectional studies have shown that saliva could be used as an alternative and suggest that saliva could be particularly useful for longitudinal community-based surveillance studies that require frequent and repeated collection of samples.

- In this study, we evaluated the sensitivity and specificity of saliva samples (SLS) for detection of SARS-CoV-2 compared with NSS and NPS in a community-based cohort study with weekly collections irrespective of symptoms in San Juan de Lurigancho, Lima, Peru, during 2021.

2. METHODS

Study design — Samples were collected from household members enrolled in a peri-urban prospective cohort in—Lima. Samples were obtained regardless of symptoms, weekly for two months.

Sample Selection — 425 paired samples of each type (NPS, NSS, SLS) by same date and participant were selected for RT-PCR analysis

SARS-CoV-2 detection — Extraction: The MagMax viral Pathogen kit and the KingFisher DUO Prime were used for RNA extraction. Real Time PCR: The TaqPath™ COVID-19 CE-IVD RT-PCR Kit with the QuantStudio 5 equipment were used for SARS-CoV-2 detection.

Viral load — We used as a reference a standard curve with serial dilutions, starting from 1/10 of the IDT positive control 2019-nCoV_N of IDT research kit 2019-NCOV RUO KIT.

Statistical analysis — Sensitivity, specificity, Kappa, and Wilcoxon rank tests were calculated with their respective 95% confidence intervals using STATA18.

3. RESULTS

- The SLS showed a sensitivity of 95% compared to the NSS and 79% compared to the NPS. On the other hand, the specificity was 97% compared to NSS and NPS (Table 1).

- We did not observe differences in viral loads among SLS and NPS or NSS. The medians were 6.12 for NSS (IQR; 11.73 – 4.10), 6.64 for NPS (IQR; 12.10 – 3.20) and 5.78 for SLS (IQR; 9.66 – 3.11) (Figure 1).

- We obtained a high concordance between SLS and NSS (Kappa=0.75), in the same way SLS and NPS (Kappa=0.64).

Table 1. Performance of saliva samples for detection of SARS-CoV-2 and concordance with nasopharyngeal and nasal swabs.

Nasal swab	N	Saliva		Sensitivity	Specificity	Kappa	CI 95%
		Detected	No Detected				
Positive	22	21	1	0.95	0.97	0.75	0.62 - 0.88
Negative	403	12	391				

Nasopharyngeal swab	N	Saliva		Sensitivity	Specificity	Kappa	CI 95%
		Detected	No Detected				
Positive	24	19	5	0.79	0.97	0.64	0.50 - 0.79
Negative	401	14	387				
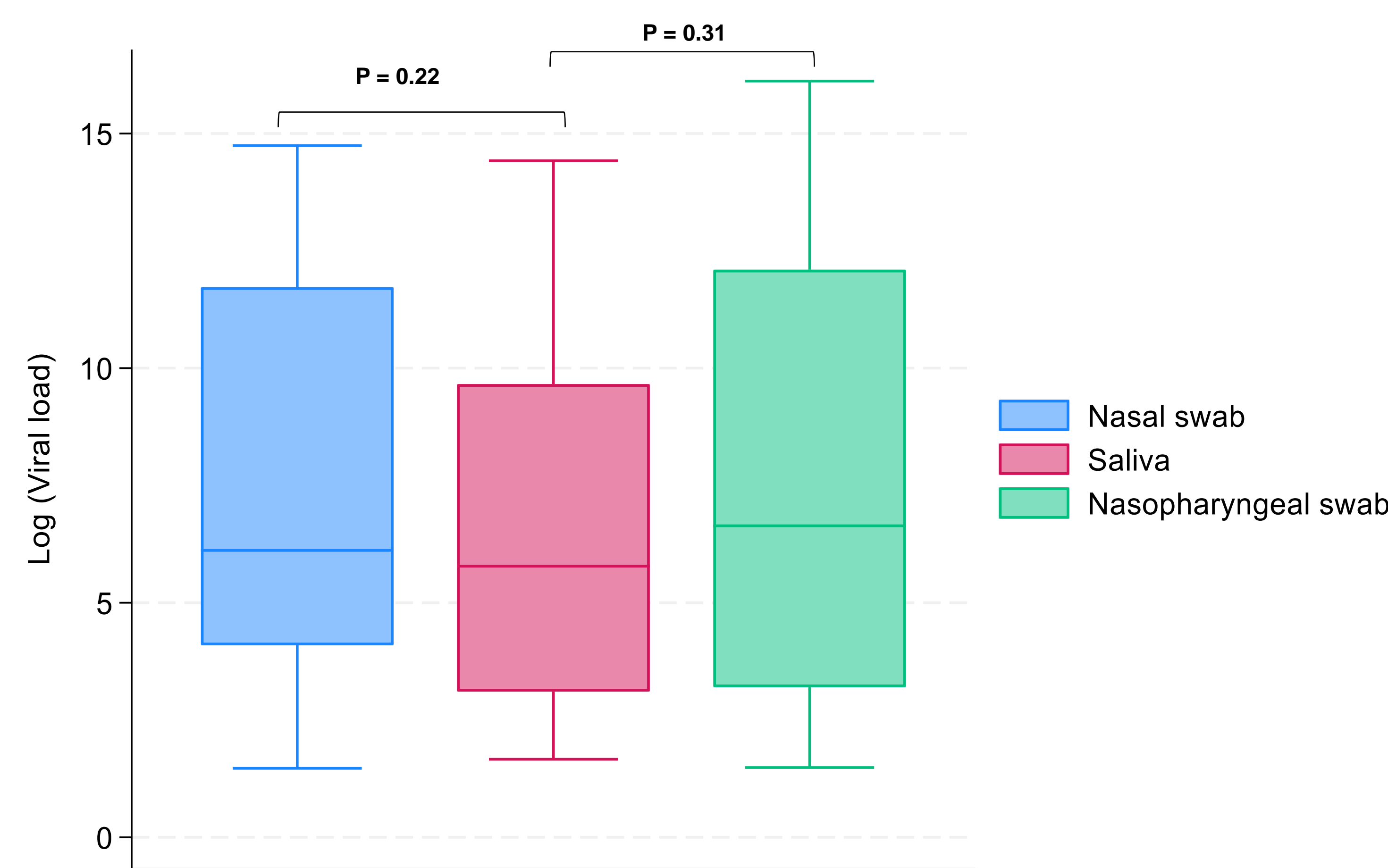
Figure 1. Comparison of viral load on a log 10 between Saliva, Nasal swab and Nasopharyngeal swab.

4. DISCUSSION

- Saliva samples (SLS) has been considered as an alternative for SARS-CoV-2 diagnosis in symptomatic populations, as shown by previous studies.[1,2]

- There are few studies of SARS-CoV-2 focusing on asymptomatic populations that suggest that SLS may be a better option for active surveillance, either analyzed individually or in pooled samples, contributing to cost reduction, which is particularly appealing in LMICs. [3,4,5] Our study support the use of saliva as an effective option for SARS-CoV-2 detection than nasal and nasopharyngeal swabs in community populations.

- Our study's limitations include a small sample size and the short surveillance period.

5. CONCLUSIONS

- In this study, saliva samples demonstrated good performance with a high concordance and no differences in viral load compared to traditional respiratory samples for the surveillance of SARS-CoV-2 infections at the community level, particularly as a simpler option for LMICs

6. REFERENCES

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