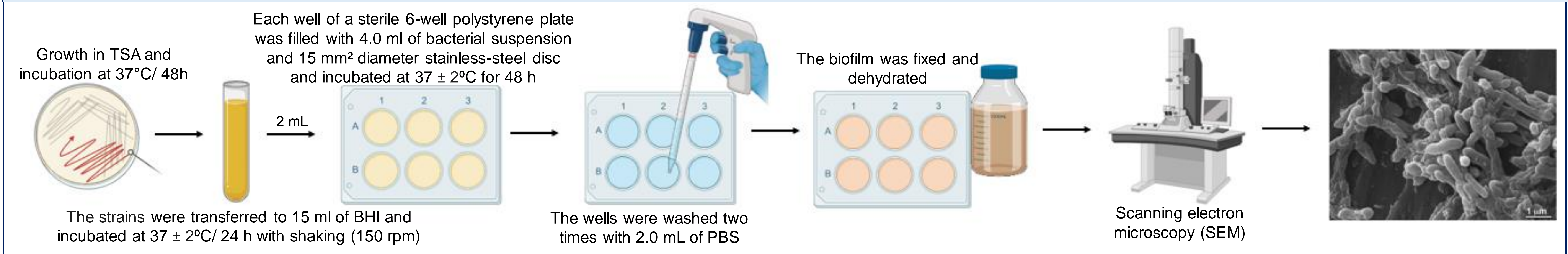


INTRODUCTION

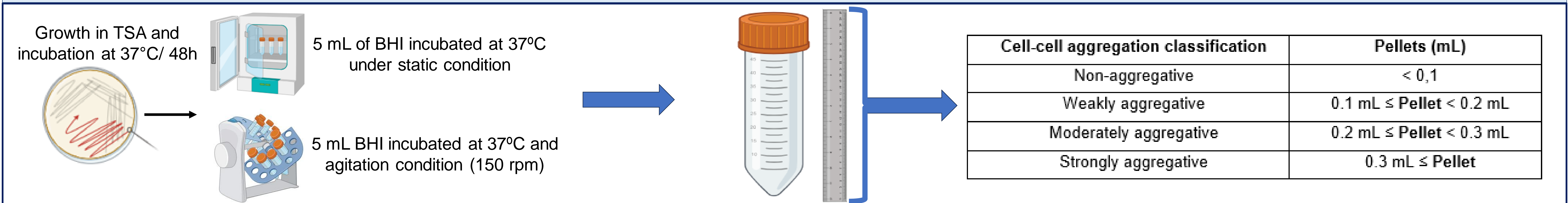
The Gram-negative bacterium *Stenotrophomonas maltophilia* is frequently isolates from pharmaceutical facilities, especially in water systems (COSTA et al., 2017; SELIM et al., 2020). The biofilms formed by these microorganisms help them to acquire greater resistance to the action of physical and chemical agents, which may contribute to the prevalence of these pathogens in some environments. After biofilm formation, additional microorganisms can proliferate by aggregation and detach from the surface in different stages of the production chain. This event can limit the efficiency of random sampling in quality control and affect the release of a batch (PDA, 2015; VASCONCELLOS et al., 2021). This study aimed to evaluate the aggregative capacity and the structure of the biofilm by Scanning Electron Microscopy (SEM).

METHODOLOGY

SCANNING ELECTRON MICROSCOPY (Costa et al., 2021)



AGGREGATIVE CAPACITY (Umeda et al., 2017)



RESULTS AND CONCLUSIONS

All strains presented sediment < 0.1 mL in both incubation conditions and were classified as non-aggregative. SEM revealed that *S. maltophilia* formed biofilms characterized by homogeneous distribution of bacteria's on the surface with the formation of few aggregates for all strains analyzed, except one. The analysis by SEM showed small aggregates, although the strains were classified in this study as non-aggregative. This information may be of great use for the pharmaceutical facility, since the formation of these small aggregates can impact on intermittent contamination at different steps of the production chain, due to their detachment from the surface. The SEM seems to be an efficient technique that can be applied for biofilm understanding and can be used as part of the contamination control strategy of the pharmaceutical facility to developing of preventive and corrective measures to eliminate microbial biofilms on stainless-steel surfaces.

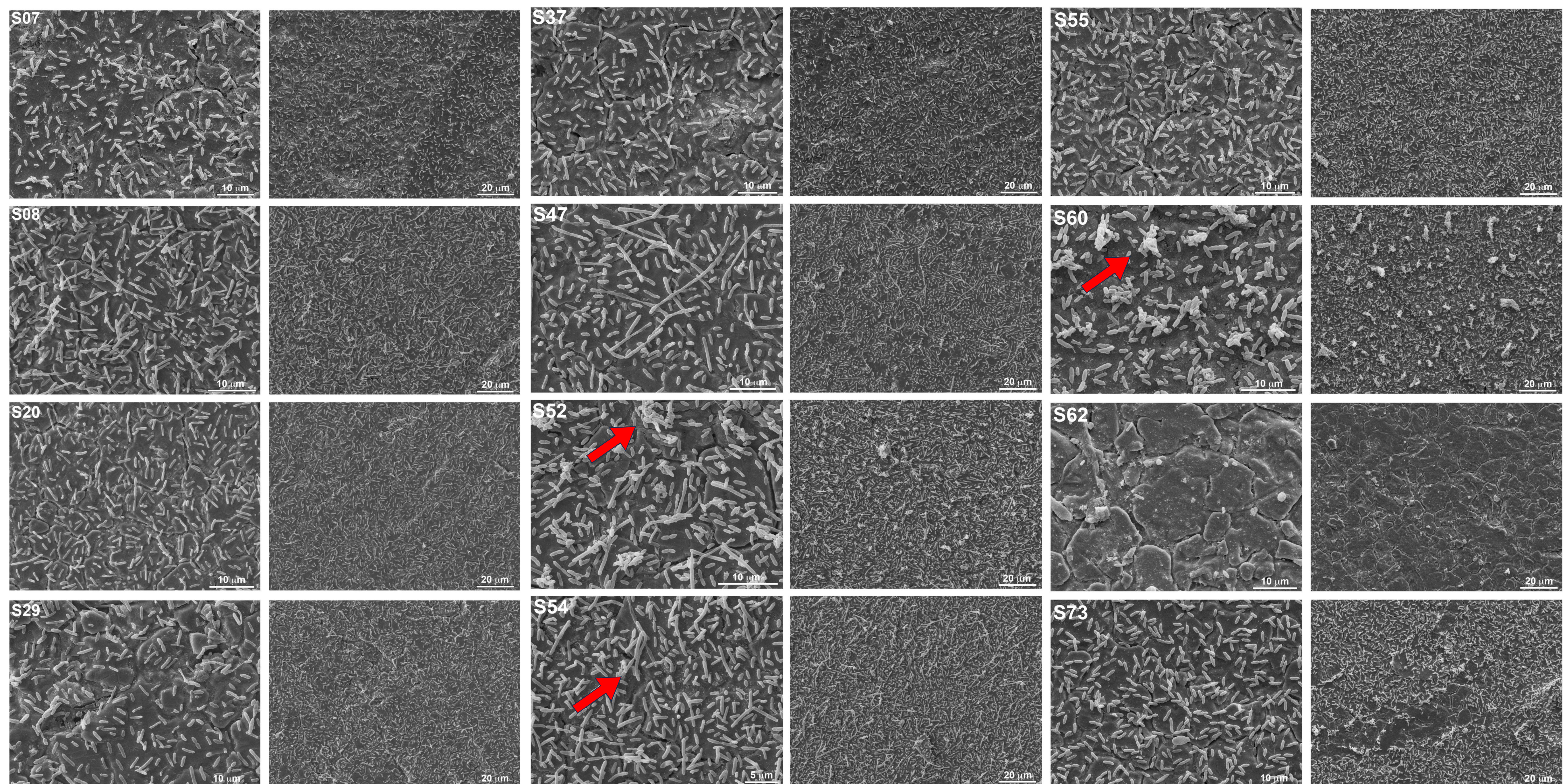


Figure 1. Morphological analysis of *S. maltophilia* biofilm formation in stainless steel surface. Scanning electron microscopy of different strains (S07, S08, S20, S29, S37, S47, S52, S54, S55, S60, S62, S73) cultivated in stainless steel surfaces. Note, that the only one that does not present biofilm formation was S62 strain. The biofilm produced by other strains was characterized by a homogeneous distribution of bacteria on the surface with small aggregates (arrows).

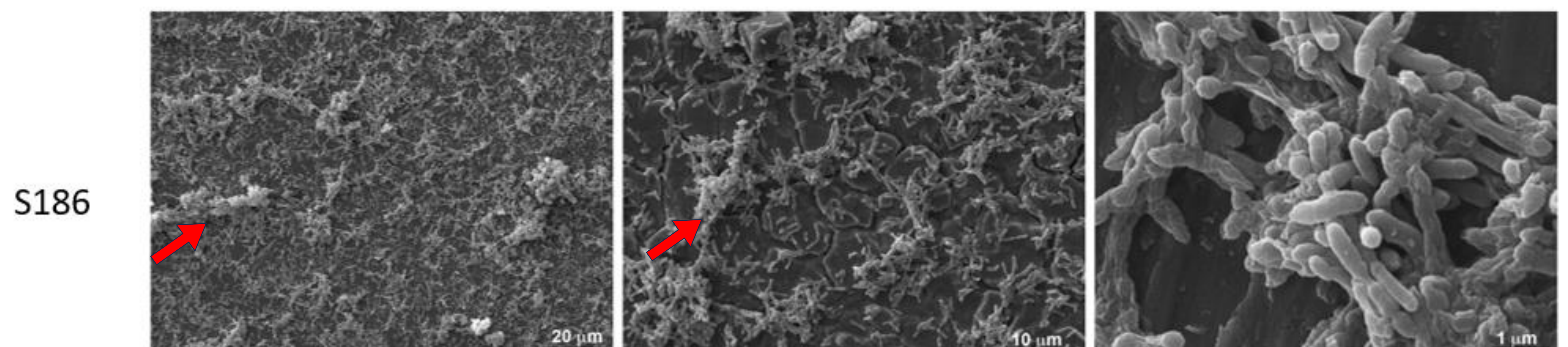


Figure 2. Morphological analysis of *S. maltophilia* biofilm formation in stainless steel surface. Scanning electron microscopy of strain S186 showed a homogeneous distribution of bacteria on the surface with aggregates (arrows).

BIBLIOGRAFY

- COSTA, L. V. et al. Avaliação da diversidade microbiana presente em sistema gerador de água purificada de uma indústria farmacêutica. REVISTA BRASILEIRA DE FARMÁCIA (ON LINE), v. 98, p. 1919-1937, 2017.
- COSTA, P.V., et al. Cytotoxicity profile of *Cronobacter* species isolated from food and clinical specimens in Brazil. J Appl Microbiol., v. 130, n. 5, p. 1758-1769, 2021.
- PARENTERAL DRUG ASSOCIATION (PDA). Bioburden and Biofilm Management in Pharmaceutical Manufacturing Operations. Technical Report No. 69, 2015.
- SELIM, N. A. et al. Monitoring and controlling bacteria in pharmaceutical industries water system. Journal of Applied Microbiology, v. 129, n. 4, p. 1079-1090, 2020.
- VASCONCELLOS, L. et al. Caracterização molecular e avaliação da formação e tolerância a biocida do biofilme de *Pseudomonas aeruginosa* isoladas de águas minerais naturais. Revista Científica do Centro Universitário Barra Mansa, v. 23, n. 44, p. 193-205, 2021b.
- UMEDA, N. S. et al. Phenotypic characterization of *Cronobacter* spp. strains isolated from foods and clinical specimens in Brazil. Food Research International, v. 102, p. 61-67, 2017.

ACKNOWLEDGMENT

The authors are grateful to Bio-Manguinhos, IOC and the Postgraduation Program in Health Surveillance of the INCQS/Fiocruz for supporting the development of this research. FAPERJ: "Grant PROGRAMA JOVEM CIENTISTA DO NOSSO ESTADO, N.º do Processo E-26/201.307/2021-BOLSA". This study was financed in part by the Coordenação de Aperfeiçoamento de Pessoal de Nível Superior - Brasil (CAPES) - Finance Code 001.