Strategies to Prevent (STOP) Spillover

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Expanding access to wastewater monitoring in countries with low levels of sanitation infrastructure: Effectiveness of active and passive wastewater effluent sampling in Côte d'Ivoire

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Introduction/Background

STOP Spillover project

- Multi-country consortium of partners funded by USAID to identify risks associated with emerging infectious diseases.
- Aims to understand and address the threats posed by zoonotic viral diseases.
- In Côte d'Ivoire, AFROHUN is working with the government on waste effluent surveillance as part of STOP Spillover.

Wastewater

- Means of detecting viral pathogens, and in response to the COVID pandemic.
- surveillance of wastewater has expanded rapidly in high-income countries with good sanitation infrastructures.

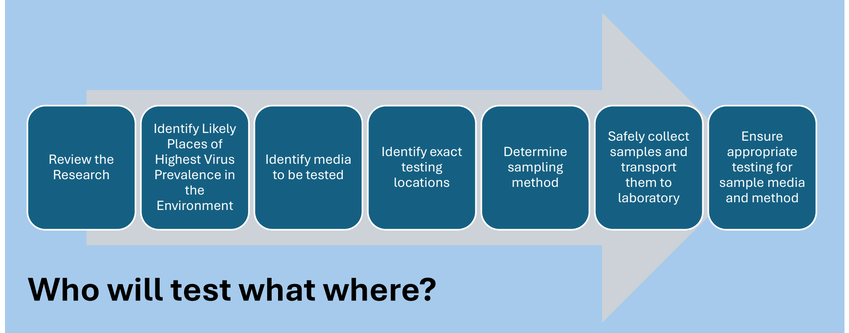
Problem

✓ Little is known about sampling in at-risk areas lacking sanitation infrastructure, particularly in Africa.

Aim of work

✓ Extend benefits of wastewater surveillance to unserved areas in Côte d'Ivoire, using new frameworks and methods.

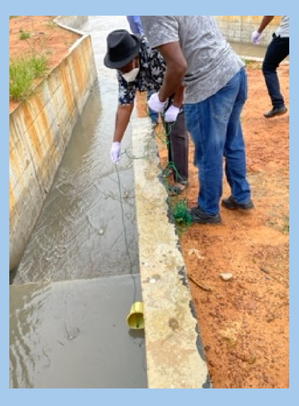
Process for "highest potential for success"



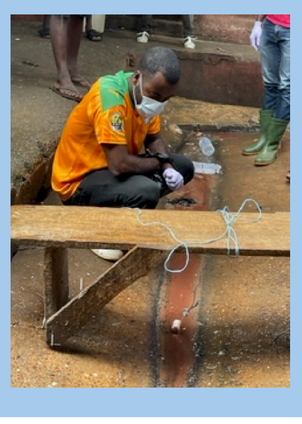
Who will test what where?

Location	Description	Pathogen	Lab	Sampling Type
1	Open small canals that contain human wastewater from slums in Abidjan	COVID-19	IPC	Active and passive
2	Open very small waste streams that contain chicken slaughtering liquid wastes in markets in Grand Bassem	HPAI	LANADA	Passive

1. Institut Pasteur de Côte d'Ivoire (IPCI) sampling (Yopougon canal)

2. Laboratoire National d'Appui au Développement Agricole (LANADA) sampling (poultry market)




Methods

- **STEP 1**:

identified high-risk waste effluent streams for sampling priority pathogens.

- **STEP 2**

Developed a protocol to test waste effluent streams, including: identifying environmental virus prevalence and waste effluent locations for testing.

- **STEP 3**

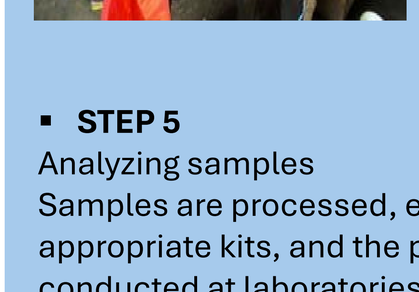
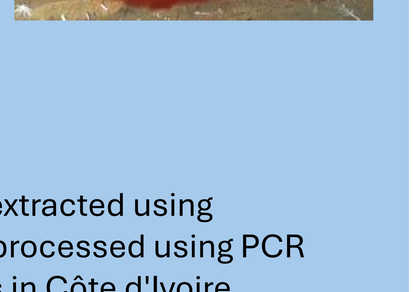
Determining appropriate sampling methods
✓ Active or grab sampling/
✓ Passive sampling: using organic cotton to increase recovery in intermittent/small waste streams.

- **STEP 4**

Safely collecting at three sites
✓ Two waste canals for SARS-CoV-2 (grab and passive comparison)
✓ Two waste streams for HPAI (passive method only).
✓ Duration of Sampling : 12 weeks

Active collection technique by IPCI


Positioning of passive sampler by IPCI

Positioning the passive sampler by LANADA

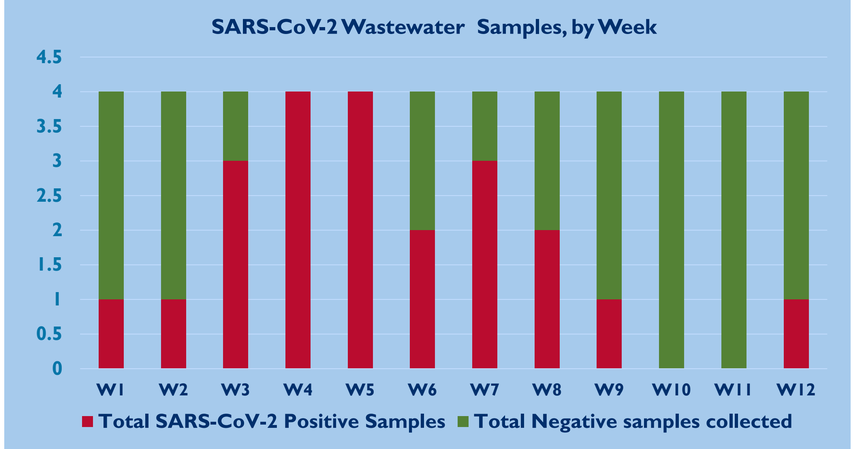

- **STEP 5**

Analyzing samples
Samples are processed, extracted using appropriate kits, and the processed using PCR conducted at laboratories in Côte d'Ivoire.

Results

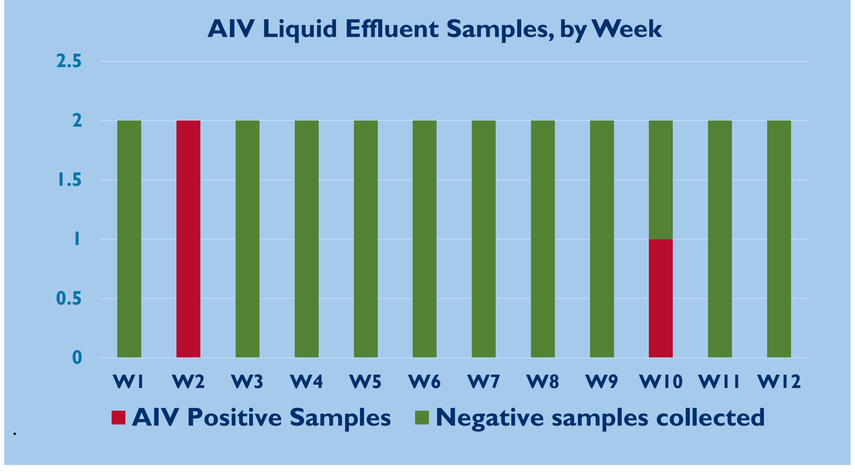
❑ **SARS COV 2 ACTIVE AND PASSIVE SAMPLES**

➢ **22/48** SARS-CoV-2 samples tested positive (45,83%)
- ✓ **13 / 24** active sample tested positive
- ✓ **9/24** passive sample tested positive
- ✓ **Ct values : 28.2-35.1**



❑ **IAV PASSIVE SAMPLES**

- ✓ **03/24** sample tested positive (12.5%)
- ✓ **Ct values : 29.3-32.4**



Conclusions

Our work provides proof-of-concept for sampling priority pathogens in waste effluent streams in LMIC and humanitarian emergency contexts without wastewater infrastructure using passive sampling methods. Further research is needed on refining methods (including quantitative PCR), collaborative training and partnerships, testing additional pathogens, and sequencing. Our work using passive samplers in LMIC is unique, innovative and provides a pathway the extend the gains of wastewater surveillance to LMIC and humanitarian emergency contexts.

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