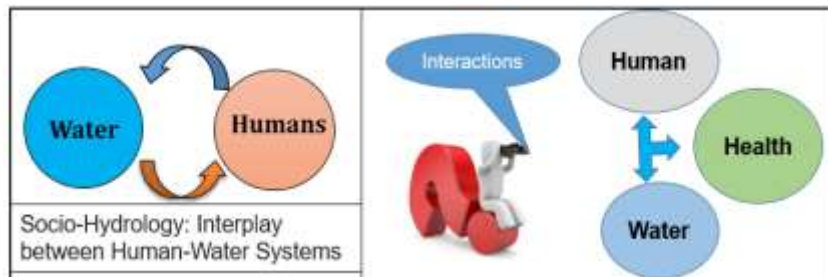


# Land use dynamics, urban transformation and the complexity of surface water pollution: identifying risks and developing integrated solutions to water-borne disease in Accra, Ghana

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**Presenter:** Joshua Ntajal



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# Introduction

- Since 1980, Accra and its peri-urban areas have experienced huge physical and socioeconomic transformations (Kleemann et al., 2017)
- These transformations huge pose challenges to water systems and health
- Water is essential for life and the survival of ecosystems
- Access to safe and clean water has been a fundamental cornerstone within the UN development goals (i.e. both MDGs and SDGs (6))
- Fragmented strategies failed to protect and promote water quality and health (Appiah et al., 2014; Asumadu, 2015)
- Collaborative and integrated strategies are required

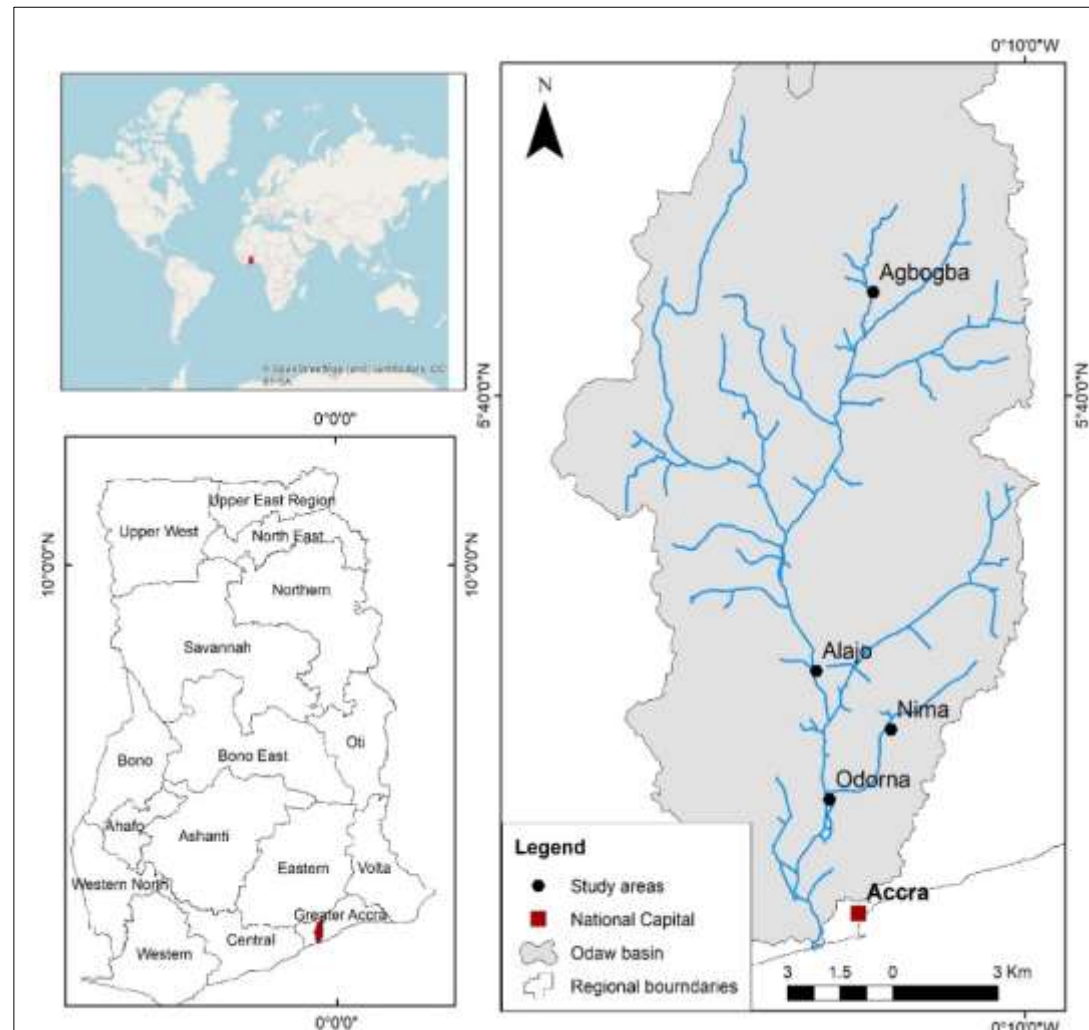
# Study area

- The **Odaw basin**: over 80% of the industries in Accra and are located in this basin (World Bank, 2018)
- High rate of urbanization (4.2%)

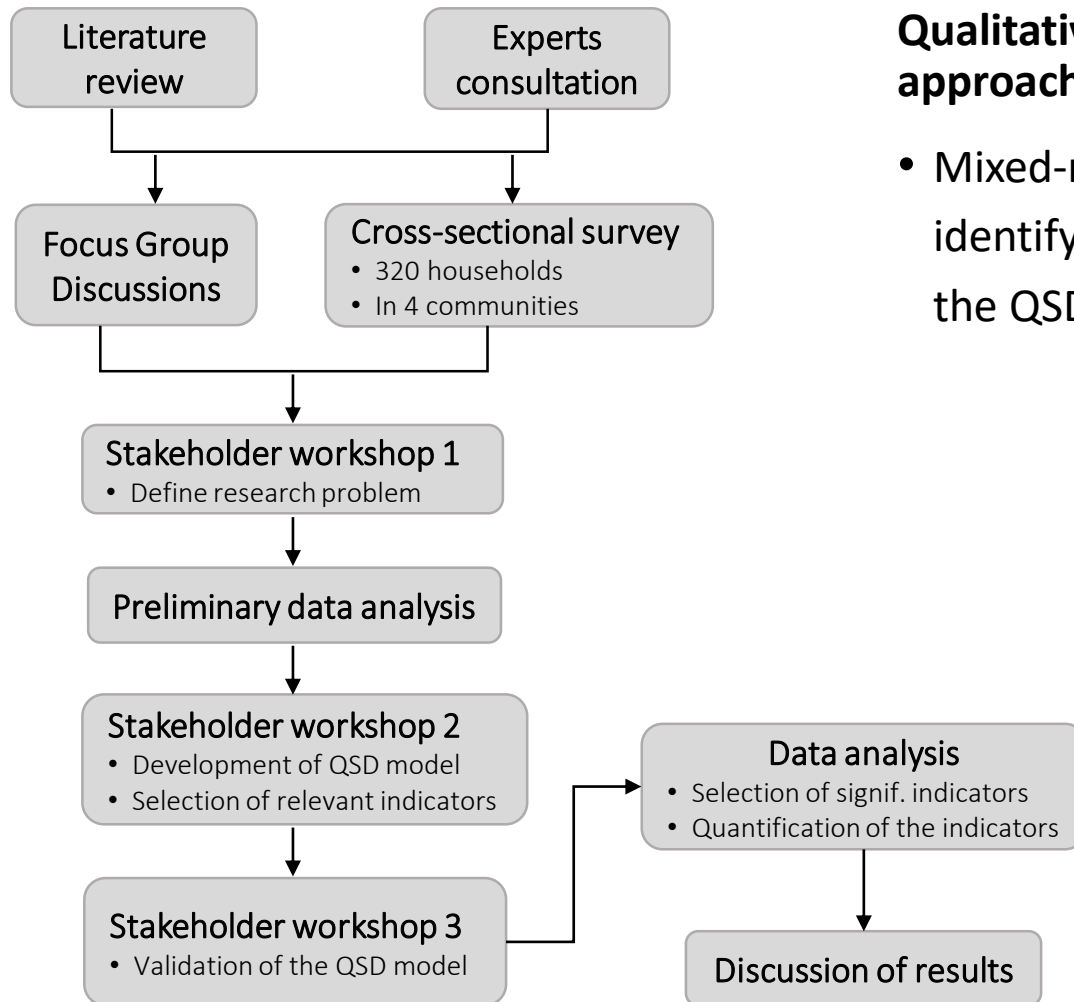


A section of the Odaw River in Accra

Photo by J. Ntajal, March 2019



# Methodological steps



## Qualitative system dynamic (QSD) approach

- Mixed-methods were used to identify the indicators/variables for the QSD modeling

## Stakeholder workshop

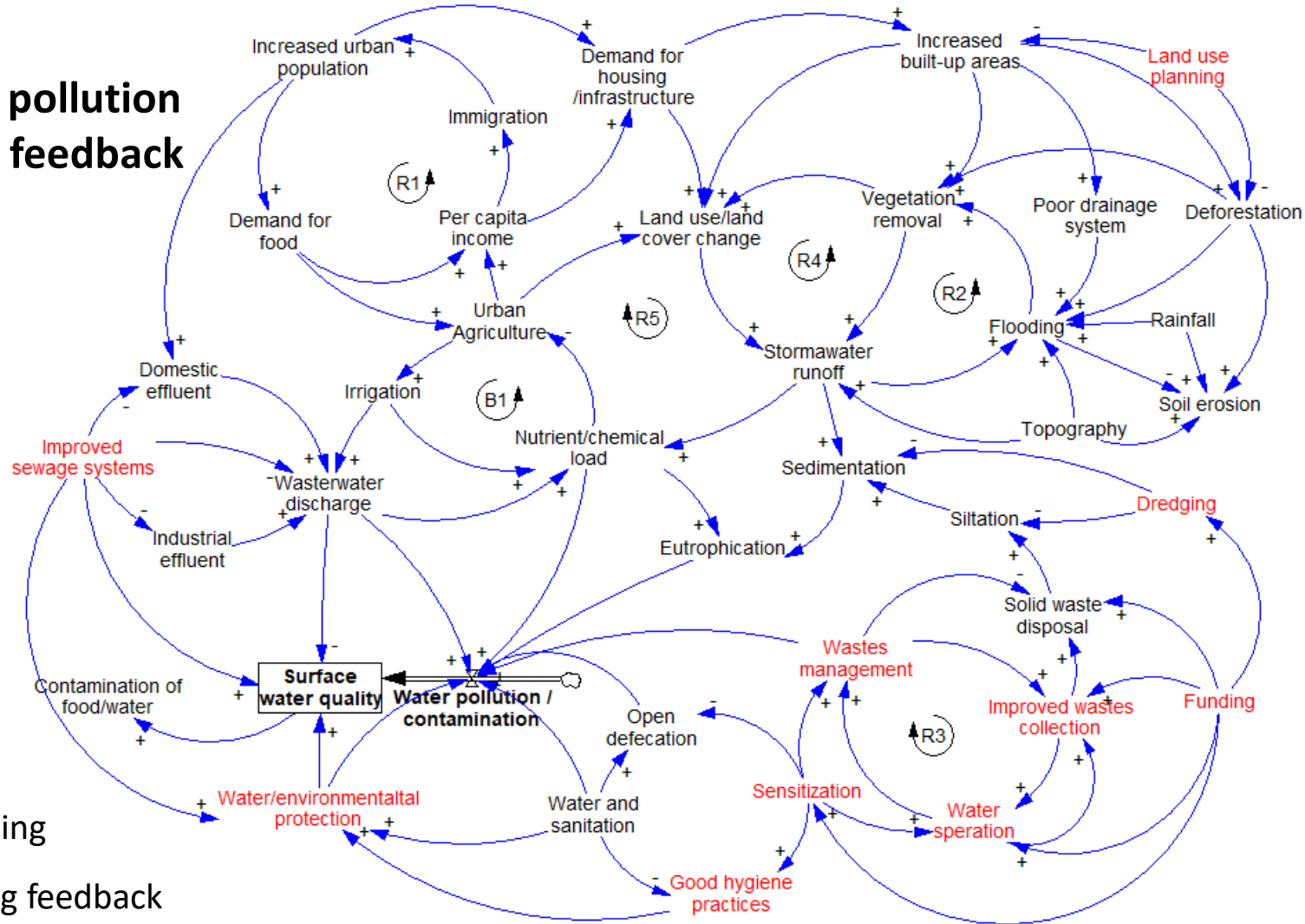
- Identification and selection of variables for the QSD modeling
- Development of the system networks - DPSEIR



Photos by James Aggrey, March 2019, Accra

# Results of the qualitative system dynamic modeling

## Surface water pollution pathways and feedback loops



R → Reinforcing

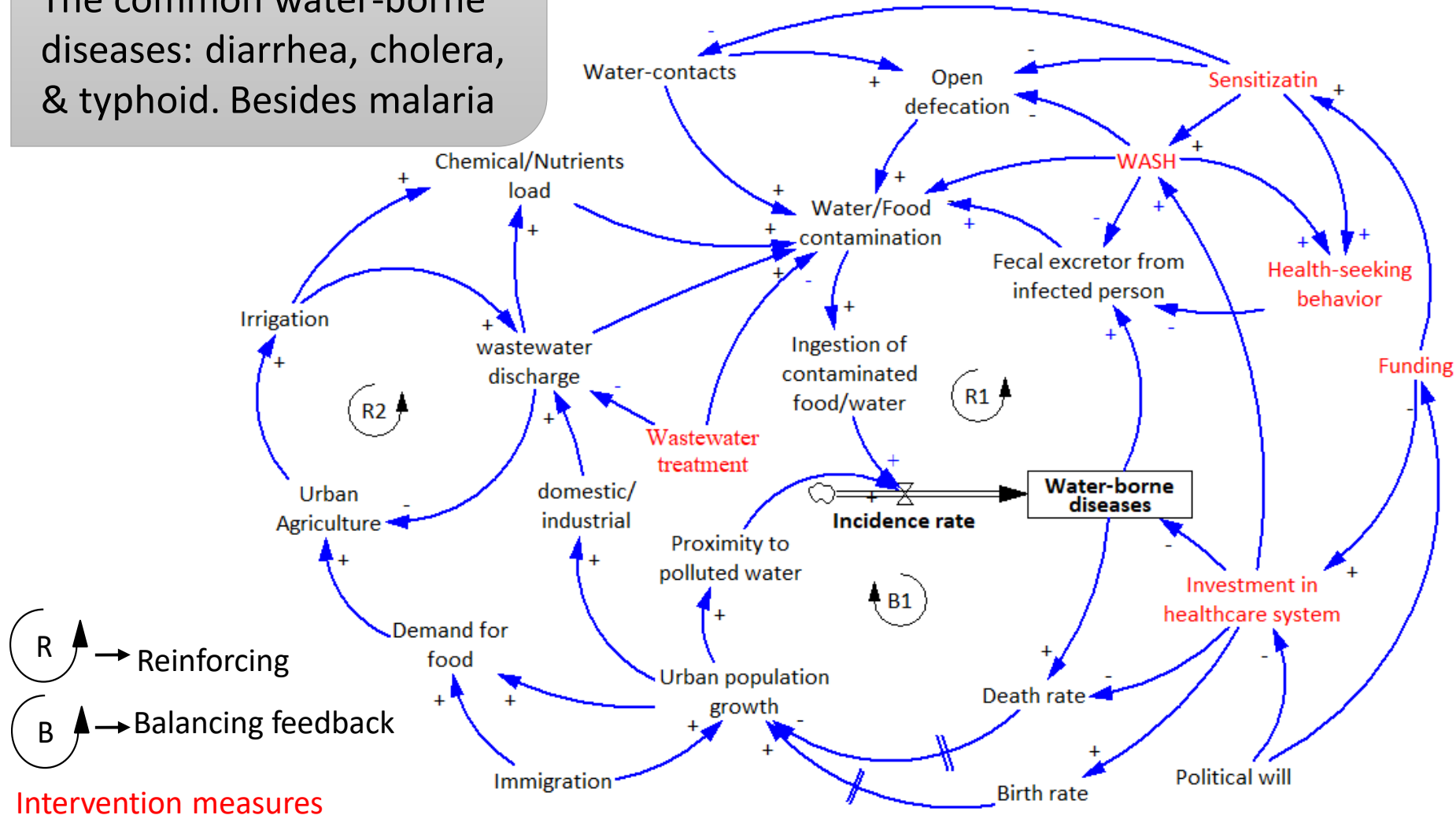
B → Balancing feedback

Intervention measures

Surface water pollution sub-model

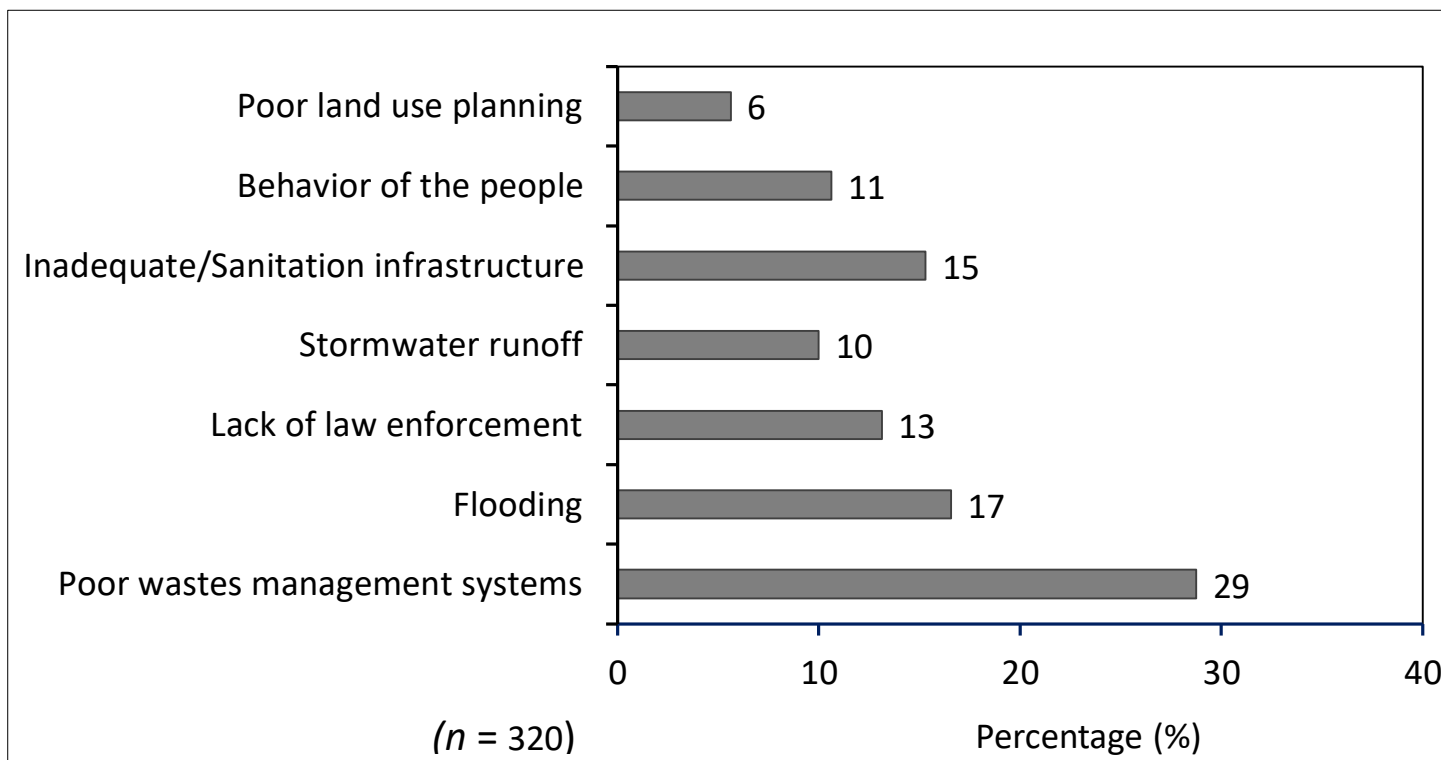
# Risk of water-borne diseases

The common water-borne diseases: diarrhea, cholera, & typhoid. Besides malaria



Water-borne diseases sub-model

# Contributing factors to water pollution in the Odaw river in Accra

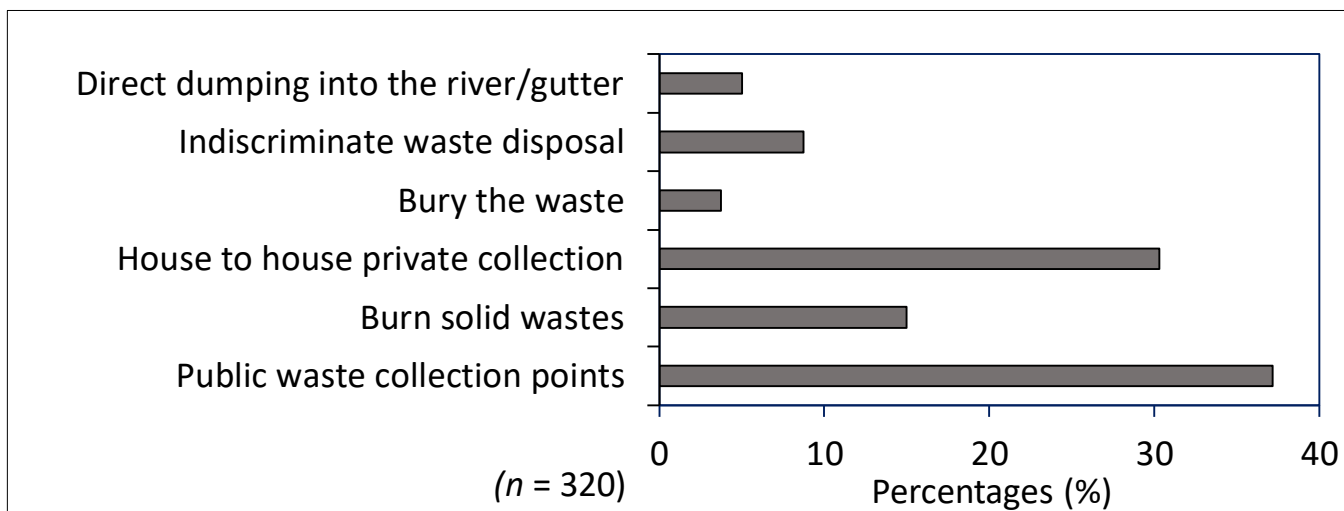


Data source: Household survey in Accra in April, 2019

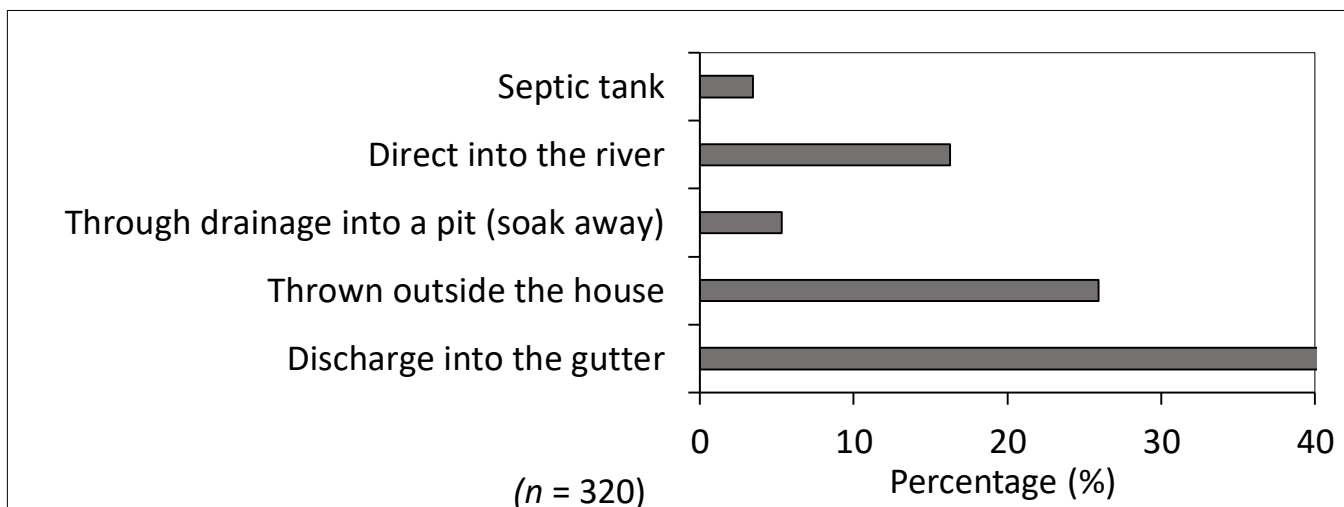


# Wastes management options – households level

## Household solid waste disposal



## Households wastewater management



# Conclusion

- The complex interactions among urban transformation, land use, water quality and the risk of water-borne diseases
- Poor land use planning, wastes management system, governance issues, floods, behavioral and inadequate WASH created high exposure to risk of diseases
- Multi-sectoral stakeholder collaboration is required to develop solution to protect urban surface water systems and promote human and environmental health in Accra

# Thank you

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