Occurrence of On-site Sanitation Technologies in Poor Urban Communities: A case of the Biofil Toilet Technology

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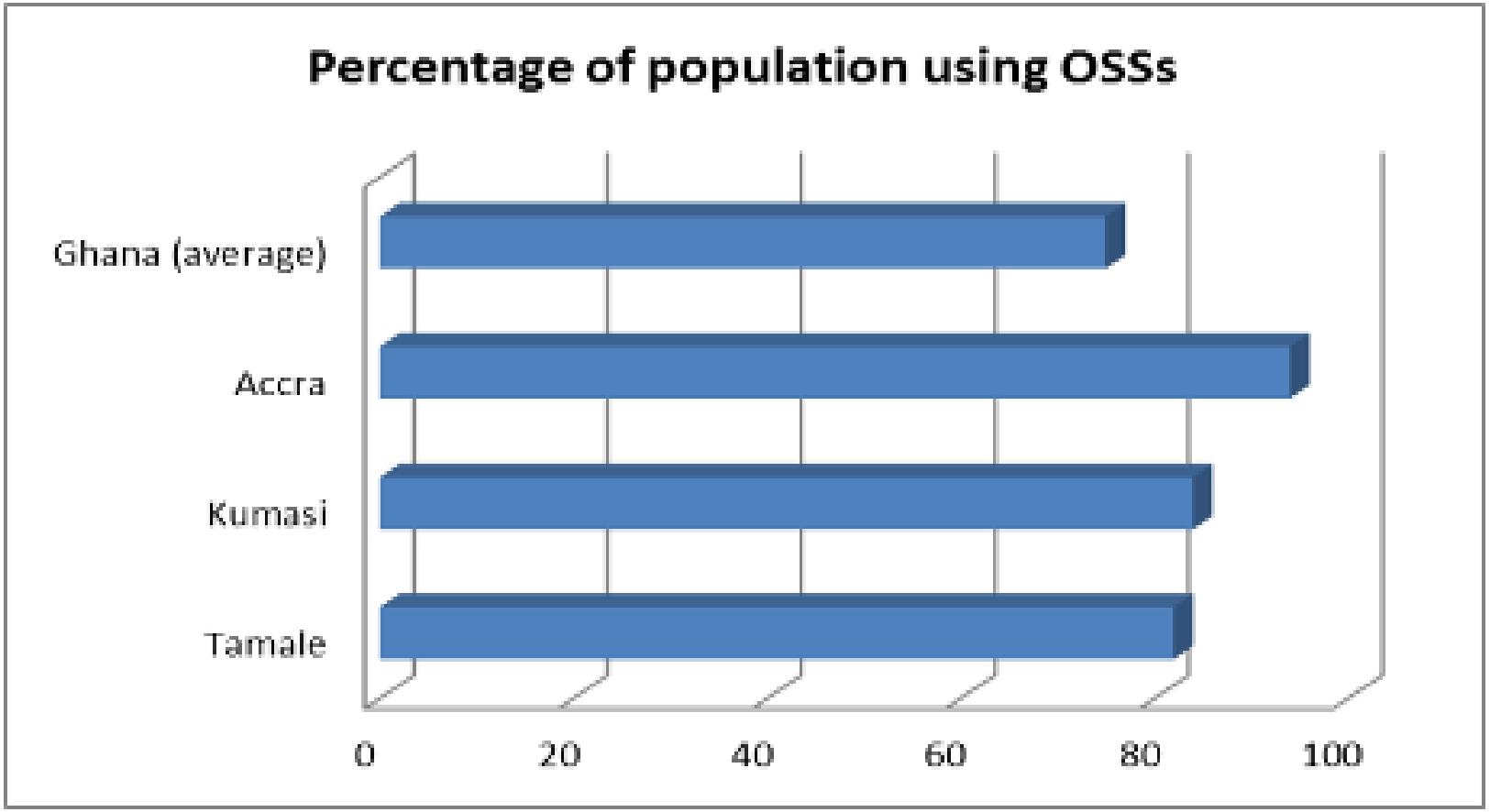
Introduction

- Approximately 2.4 billion dwellers rely on on-site sanitation (OSS) installations such as pit latrines, aqua privies and septic tanks (Strauss *et al*., 2004)
- In Ghana, 74% of households (HHs) are served by OSS, with 6% served by sewerage systems and the remaining 20% resorting to Open Defecation
- Citywide sewered sanitation is neither affordable nor feasible for the majority of communities in Ghana (Koné and Strauss 2004) especially remote and built-up areas
- 80% of such systems are dysfunctional



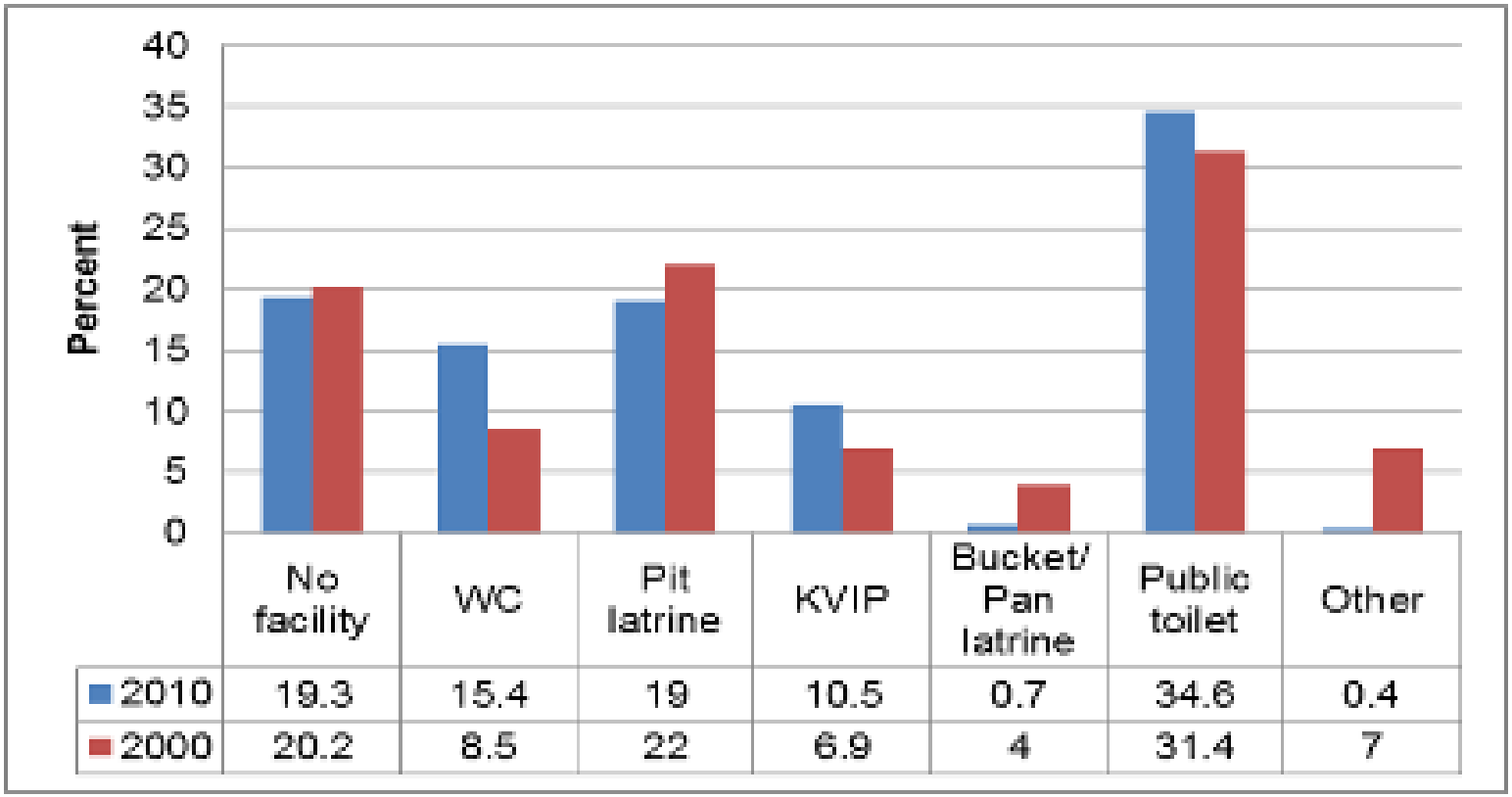
(Source: adapted from Cofie *et al.*, 2009)

History of Sanitation in Ghana

- Before colonial rule, pit-latrines located at the outskirts of the community were common (Okechukwu *et al*, 2012) due to their stench.
- “Bucket latrine” system with “night soil” collection, became dominant (Ayee and Crook 2003) at homes due to the inconvenience of having to travel long distances.
- With increasing population, public toilets were constructed by the Government in populous cities of Ghana (Accra & Kumasi) in the 1930s through to the post-colonial period.
- Since then, many technologies have evolved:

1. Ventilated Improved Pits (VIP) was a modification of the traditional pit latrines with a vent pipe to eliminate odour from the privies
2. Kumasi Ventilated Improved Pit (KVIP) incorporated a double chamber with vent pipes to eliminate sinking multiple pits when they are full
3. Most recently are the water closet and ecosan toilets (compost latrines)

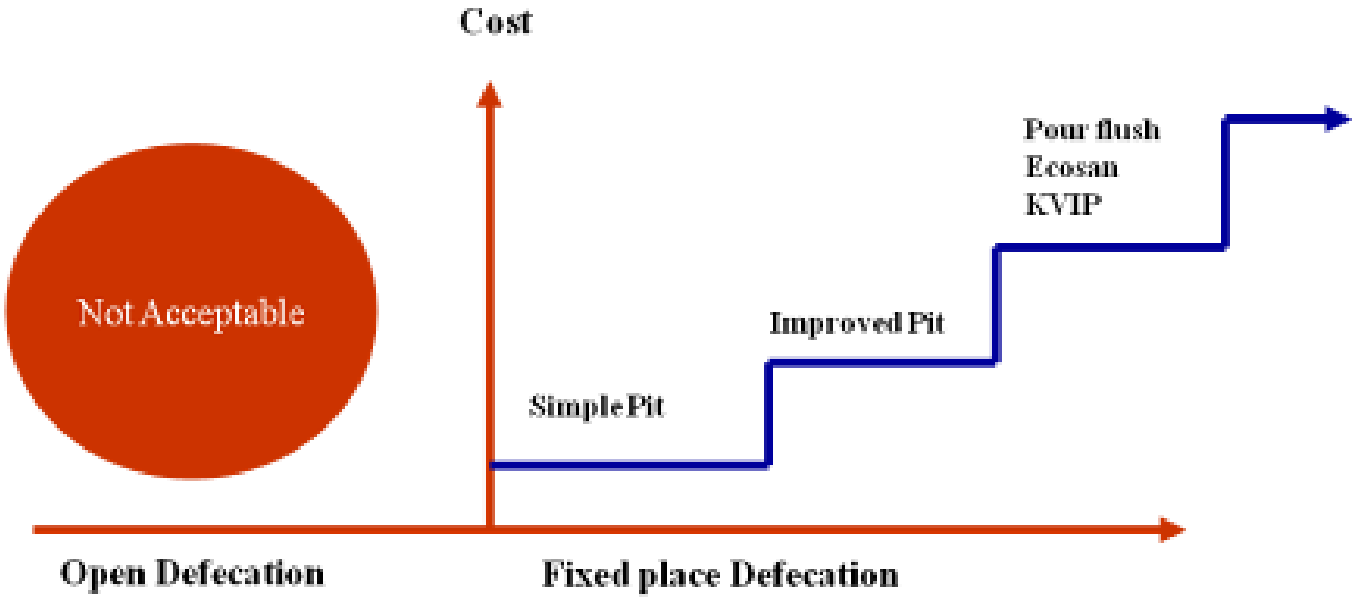
Existing toilet facilities in urban poor areas



	No facility	WC	Pit latrine	KVIP	Bucket/ Pan latrine	Public toilet	Other
2010	19.3	15.4	19	10.5	0.7	34.6	0.4
2000	20.2	8.5	22	6.9	4	31.4	7

Percentage distribution of toilet facilities by type
Source: Ghana Statistical Service (2012)

Exiting facilities-Cont'd



Bucket | Pit latrine | VIP | KVIP | ECL | WC/Septic tank | Biofil

Factors limiting uptake of HH toilet facilities

- Poor physical site conditions and complicated site layouts;
- Limited water availability;
- High-density population;
- Legal land tenure and lack of government recognition and services
- Low income levels and reliance on the Informal Economy.
- Excavatability

Complex layout (Limited space) **Rocky grounds** **High Water Table**

Growing trends in urban sanitation

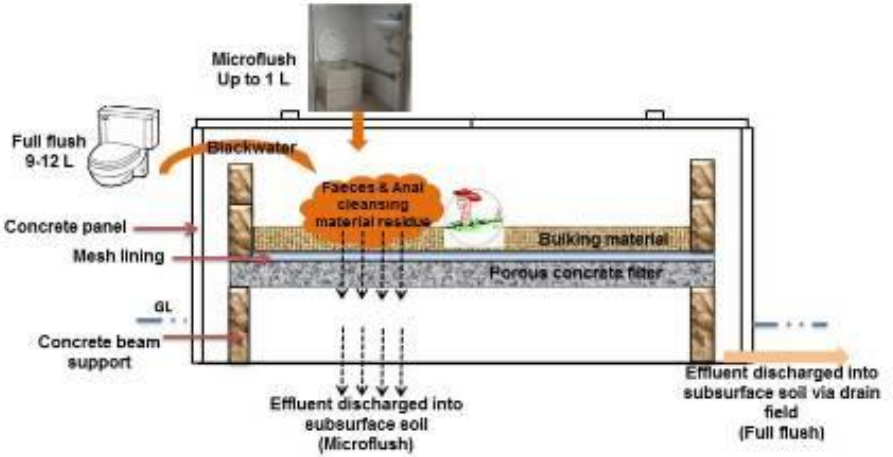
- Policy shift that seeks to recommend water-based sanitation solutions
- Governments and City Authorities favour conventional sewerage systems though expensive and technically difficult to operate, as they rarely benefit the poor (ADB report, 2005).

Future of urban sanitation

- Technologies which have minimum or null energy cost, simple operational and maintenance procedures, high treatment efficiency and a potential for reuse (Li, 2012)
- Sanitation systems that use negligible quantities of water, promote cycling of nutrients, and envisage utilization of human excreta.
- Technologies with small foot print while maintaining effective treatment of waste

The Biofil Toilet Technology (BTT)

- An initiative of a local entrepreneur (Kweku Akuam Anno, BIOFILCOM) in Accra.
- An on-site faecal matter treatment facility which comes as a normal flush and microflush unit
- Measures 0.6m x 0.6m x 1.8m
- Undergoes rapid solid-liquid separation by a porous filter
- Solids retained and undergoes accelerated decomposition by the activities of micro and macro-organisms.
- Effluent undergoes biological filtration



Key possible issues addressed by the BTT

- Limited land space
- Stench problems
- Frequent desludging
- Personal handling of waste
- Negative impacts on the environment
- High recurrent operation & maintenance costs

Current study on BTT at KNUST

- The potential of subsurface infiltration for the treatment of biofil toilet technology effluent
- Effect of different filtering materials and bulking materials on contaminant removal from the blackwater
- Effect of the solid loading rate on the treatment performance of the BTT
- The robustness and recovery rates of the BTT to bactericidal chemical constituents in the blackwater

Optimization and process design, control and operation of vermicomposting need to be addressed (Abbasi *et al*., 2008).

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