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Title: Drivers and Barriers of House Onsite Grey Water Treatment and Reuse in Palestinian Rural Areas

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ABSTRACT

Wastewater management in Palestinian rural communities is highly neglected, where they still depend on cesspits. In the last fifteen years, house onsite wastewater management systems have been blooming over the West Bank in rural areas. Some of these projects were not successful, and there is a waste of funds and efforts, but some others are still operational very successfully. The aim of this research is to assess the impacts and social acceptance of onsite GWTPs on the environment, health, society (from beneficiaries' perception), to find out the drivers and barriers of implementing GWTPs, success and failure lessons. Applied methodology consisted of two parts, two workshops and two questionnaires, the first questionnaire targeted the households served with GWTPs, and the other one targeted the owners of cesspits.

Reuse of treated grey water in irrigation was the main incentive for applying GWTPs as stated by 88.0% of beneficiaries. The second incentive is the saving of cesspit discharge frequency and its financial consequences as stated by 71.3%. 72.5% of the beneficiaries stated that they had a water shortage before providing GWTPs; and the GWTPs contribute to solve it. Availability of fund was an important driver, as stated of 70.7% of the interviewers. Education level has an impact on GWTPs acceptance, 73% of not educated beneficiaries are satisfied, and (58.8%) of educated people. Islamic religion considered a driver; as the majority of people (70%) accept reuse of treated grey water in irrigation. Women play a major role on GWTPs management; 68.9% of the treatment systems are running by men side by side with women (fathers and mothers), and 24% is running completely by women. The majority of GWTP's beneficiaries (70.4%) are satisfied of GWTPs. Little efforts are required for operation and maintenance, with only an average 0.4 working hour per week.

The findings show that 13% of the total constructed treatment plants were not operated. The most important barrier as mentioned by 66.5% is odour emission and insect's infestation. 25.1% of the implementing agency never monitor or check the treatment plants, and 59.3% of them monitor and check the plants only at the first 2-3 months, followed by inadequate beneficiaries' experience in operation and maintenance. A health concern of crop quality irrigated by treated grey water was another barrier as well.

For people who still depend on cesspits, 75.7 % of interviewed people complained from high disturbance and intensive odour emission during discharge of the cesspits. The results show that the average number for emptying the cesspit per year before construction of onsite GWTP was 6.9, where the people pay 6% out of their monthly income on cesspit's emptying, which decreased to 4.1 after providing onsite GWTPs. 55.4% of the interviewers accept construction of onsite GWTPs supported by external funding. Water shortage is a main driver for providing GWTPs, 71.2% of cesspits owners accept using of treated grey water in irrigation. The majority of people (74.8%) prefer sewerage

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networks for wastewater management, 15.5% of people prefer onsite GWTPs, and 9.5% prefer cesspits.

From "Logistic Regression" analysis, the following variables were considered significant for acceptance of onsite GWTPs, garden availability, utilization of untreated grey water for irrigation, preference of central wastewater network for sanitation system, acceptance of separation of house piping system, knowledge of sanitation systems.

House onsite grey water management systems is acceptable in rural communities, therefore, a more proper system is required to handle the wastewater and replace cesspits and its harmful implications on environment, ground water and public health.