

## Factors Affecting Harvested Rain Water Quality and Quantity in Yatta Area, Palestine

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**Abstract :** Yatta is the study area for this research, located 9 km south of Hebron City in the West Bank in Palestine. It has been connected to a water network since 1974 serving nearly 85% of the households. The water network is old and inadequate to meet the needs of the population. The water supply made available to the area is also very limited, estimated to be around 20 l/c.d. Residents are thus forced to rely on water vendors which supply water with a lower quality compared to municipal water while being 400% more expensive. As a cheaper and more reliable alternative, rainwater harvesting is a common practice in the area, with the majority of the households owning at least one cistern. Rainwater harvesting is of great socio-economic importance in areas where water sources are scarce or polluted. The quality of harvested rainwater used for drinking and domestic purposes in the Yatta area was assessed throughout a year long period. A total of 100 water samples were collected from (50 rainfed cisterns) with an average capacity of 69 m<sup>3</sup>, adjacent to cement-roof catchment with an average area of 145 m<sup>2</sup>. Samples were analyzed for a number of parameters including: pH, Alkalinity, Hardness, Turbidity, Total Dissolved Solids (TDS), NO<sub>3</sub>, NH<sub>4</sub>, chloride and salinity. Microbiological contents such as Total Coliforms (TC) and Fecal Coliforms (FC) bacteria were also analyzed. Results showed that most of the rainwater samples were within WHO and EPA guidelines set for chemical parameters while revealing biological contamination. The pH values of mixed water ranged from 6.9 to 8.74 with a mean value of 7.6. collected Rainwater had lower pH values than mixed water ranging from 7.00 to 7.57 with a mean of 7.21. Rainwater also had lower average values of conductivity (389.11 µScm<sup>-1</sup>) compared to that of mixed water (463.74 µScm<sup>-1</sup>) thus indicating lower values of salinity (0.75%). The largest TDS value measured in rainwater was 316 mg/l with a mean of 199.86 mg /l. As far as microbiological quality is concerned, TC and FC were detected in 99%, 52% of collected rainwater samples, respectively. The research also addressed the impact of different socio-economic attributes on rainwater harvesting using information collected through a survey from the area. Results indicated that the majority of homeowners have the primary knowledge necessary to collect and store water in cisterns. Most of the respondents clean both the cisterns and the catchment areas. However, the research also arrives at a conclusion that cleaning is not done in a proper manner. Results show that cisterns with an operating capacity of 69 m<sup>3</sup> would provide sufficient water to get through the dry summer months. However, the catchment area must exceed 146 m<sup>2</sup> to produce sufficient water to fill a cistern of this size in a year receiving average precipitation.

**Keywords :** rainwater harvesting, runoff coefficient, water quality, microbiological contamination

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