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The Role of Routine Programme for Monitoring and Evaluation on Sub-national Water Services in Kenya

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Abstract

Routine programme for monitoring and evaluation involves data gathering, analysis and reporting to ensure progress and ultimately achievement of project goals. This study determined the influence of routine programme for monitoring and evaluation on sub-national water services in Nyamira South Sub County, Kenya. A mixed method, cross-sectional and correlational design was used. Study findings were generated using quantitative interviews from a total of 480 household heads; and staff from the local water services company. Qualitative information was generated from discussions with 40 village elders. The study established that provision of water services in the study area was not sustainable, with only about 23 percent of households accessing water services. The study findings also revealed poor monitoring of the water services. However, the findings demonstrated a linear, positive, and significant association between routine programme for monitoring and evaluation and sustainability of water services. The Pearson correlation coefficient was 0.724 and p-values were 0.000 for both correlation and regression analyses. The findings support the strengthening of routine programme for monitoring and evaluation as a way of reinforcing the long-term management of water resources at sub-national level.

Keywords: routine programme, monitoring, evaluation, sustainability

1. Introduction

Within the water sector, Routine Programme for Monitoring and Evaluation (RPME) practice involves the regular and continuous activities employed for end-to-end water resources and services data management. For purposes of this study, the scope of RPME for water supply is defined to include the individual work plan, routine data collection, application of innovations and technology for systematic data collection, analysis, routine use of data and the evidence generated. Monitoring of water quality remains one of the most researched areas; is well captured in early literature and is still at the top of research charts (Lu, Elliott, & Perlman, 2017; Mutekhele, 2018; Abalang, 2016; and Njama, 2015). Sanders et al., 2003). However, hardly any of these studies have tried to establish the links between the practice of RPME and sustainable water resources management. The establishment of the long-term influence of the practice on sustainability of water systems is therefore elusive in the absence of specific evidence; hence, the justification for conducting the study in Nyamira South Sub-County (NSSC), Kenya.

The focus of monitoring quality of water has remained mainly on issues around microbes, followed by interest in the elements and other water contaminants. Consequently, the subject of study and academic discourse gravitates towards applying technology, innovations and tests, processes, procedures for these and related monitoring activities. For example, Omatola and Olaniran (2022) demonstrated the importance of specific viruses in water and sewage. Based on the implications and threat of these viruses, Omatola and Olaniran (2022) justified the need for continuous tracking of the existence of these viruses in the water and waste reservoirs as a water quality concern; and significant threat to human life. The study by Gabrielli, Trovò, and Antonelli (2022) was also concerned about improving the approaches in tracking water impurities.

Following the global COVID-19 pandemic outbreak, routine monitoring approaches were deployed to establish and follow up on the virus-causing COVID-19 as a matter of global importance. Kantor et al. (2022) published their laboratory work for monitoring the virus in wastewater. Given the devastating impact of COVID-19, researchers developed an interest in establishing effective ways of continuously following up on the status of the virus in water masses and managing the COVID-19-causing virus and other viruses. (Liu, Qu, Rose, & Medema, 2022).

Besides monitoring microbes and developing the technologies needed to undertake more effective monitoring, Grabicová et al. (2022) and other researchers conducted studies on the continuous tracking of chemicals in water and the environment, including drugs and pesticide residuals. Periolatto et al. (2022) examined the subject of routine monitoring of traces of arsenic in water; while Ezzaouini et al. (2022) applied machine learning to assess levels of suspended sediments. Bibi et al. (2022) devoted their study to routine analysis of pesticide residuals using advanced technology and methods.

The research community has developed and tested indexes for routine monitoring of the quality of water, including precipitation (Wang et al., 2022; & von Freyberg et al., 2022). Other similar indexes were developed to capture in a simple format the effectiveness of monitoring and evaluation driven water resources management practices (Cude, 2001). The study by Kannel et al. (2007) examined the use of oxygen as a component of the index for monitoring water quality. Kannel et al (2007) established that use of oxygen as a marker produced similar trends to those generated by other markers and therefore undoubtedly useful for periodic monitoring.

Some of the studies that have documented the application of innovative solutions and technology to facilitate the monitoring of water utilities include Peletz, Kumpel, Bonham, Rahman, and Khush (2016); Kumpel, Peletz, Bonham, Fay, Cock-Esteb, and Khush (2015); & Bin, Longshuang, Wenliang, Huiting, Xin (2012). However, the use of technology and other processes for data collection in the water sector results in large volumes of data but with limited analysis, hence the limited evidence and information that seem to persist in this study area (Ward, Loftis, McBride, 1986).

The study scope included two partitions with RPME on one side and sustainable access to water on the other. In line with the globally binding sustainable development goals, water continues to be of great interest in Kenya. The country missed its Millennium Development Goals targets in 2015; and is on the countdown to the Sustainable Development Goal in 2030 with similar suboptimal performance (Chepyegon & Kamiya, 2018). The water situation at the sub-national level in Kenya is dire. Nyamira county was estimated to have 65 percent of its population lacking access to water (Department of Environment, Energy, Water, Mining and Natural Resources Bulletin [DEEWMNR], 2016). This study based in Nyamira County, examined access to water with the findings contributing new insights in the study area.

2. Methodology

The design and execution of the study examining the potential role of RPME in improving the performance of water services was informed by the theory of evaluation (Miller and Caracelli, 2012; & Wholey, 1979). The study's conceptual framework was designed to assume that strengthening RPME (independent variable) will improve sustainability (dependent variable) of sub-national water utilities with the water policy moderating the relationship. The data on sustainability of water services and RPME was generated using mixed method and correlational research designs. Quantitative data was collected from a total of 480 respondents (380 household heads and 100 local water services' company staff) using closed-ended questions. The questions partitioned the data for RPME and sustainability into ten sub-elements each. The consolidated data was subjected to descriptive, correlation, and regression analyses to test the assumption and relationship between the variables. Each of the sub-elements was analyzed separately and then collectively. Focus group discussions were the source of qualitative data where 40 village elders were involved. The qualitative data was then subjected to narrative analysis informed by Roe's theory of narrative analysis (Roe, 1994). This then generated qualitative findings used to validate and triangulate the quantitative findings.

3. Study Findings and Discussion

3.1 Study Findings on the Sustainability of NSSC Water Services

The study established that water supply in Nyamira South Sub-County (NSSC) was not sustainable. A similar conclusion has been drawn by Motari, Rambo, and Nyonje's (2022) study on work plan for monitoring and evaluation of the NSSC water services.

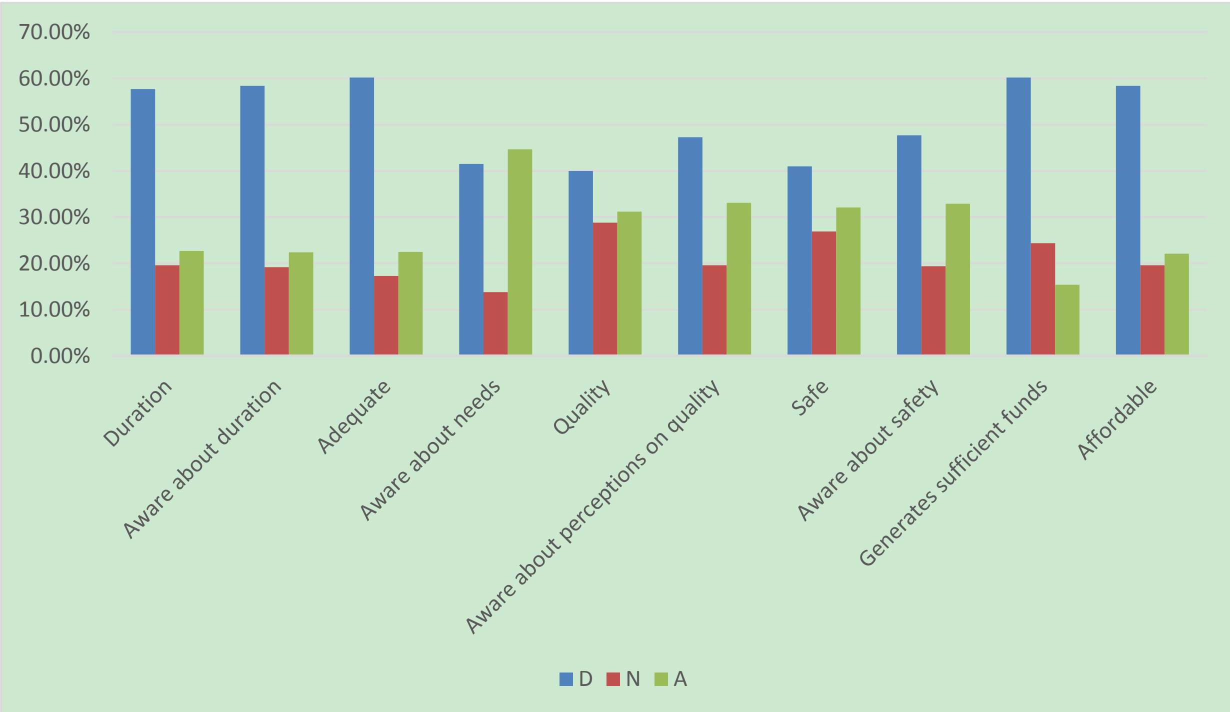

Figure 1. Sustainability of water services based on responses categorized as Disagree (D), Neutral (N), and Agree (A)

As shown in figure 1, most of the respondents disagreed that water supplied to the sub-county residents was: of acceptable duration, adequate, of good quality, safe, and affordable. More specifically, about 23 percent of respondents perceived that the community received sufficient water that was long enough to meet their needs, a finding same as that of Motari, Rambo, and Nyonje (2022). The disagreement proportion was close to 60 percent for awareness about the duration, adequacy of water, generation of sufficient income, and affordability. These are the essential drivers of sustainable water resources management, yet, for this specific sub-county, all were on the negative end. The awareness about community's needs was almost equally divided between agree and disagree at just over 40 percent. The agreement on the quality and safety of the water was just over 30 percent for both parameters. The quantitative findings were supported by qualitative results from focus group discussions which also showed that the community perceived the water services as inadequate, of short duration, often only available during the rainy season, and generally unaffordable.

3.2 Study Findings on RPME and Sustainable Water Supply

The operational and functional status of RPME was assessed using a 10-point question template based on disagree, neutral, and agree.

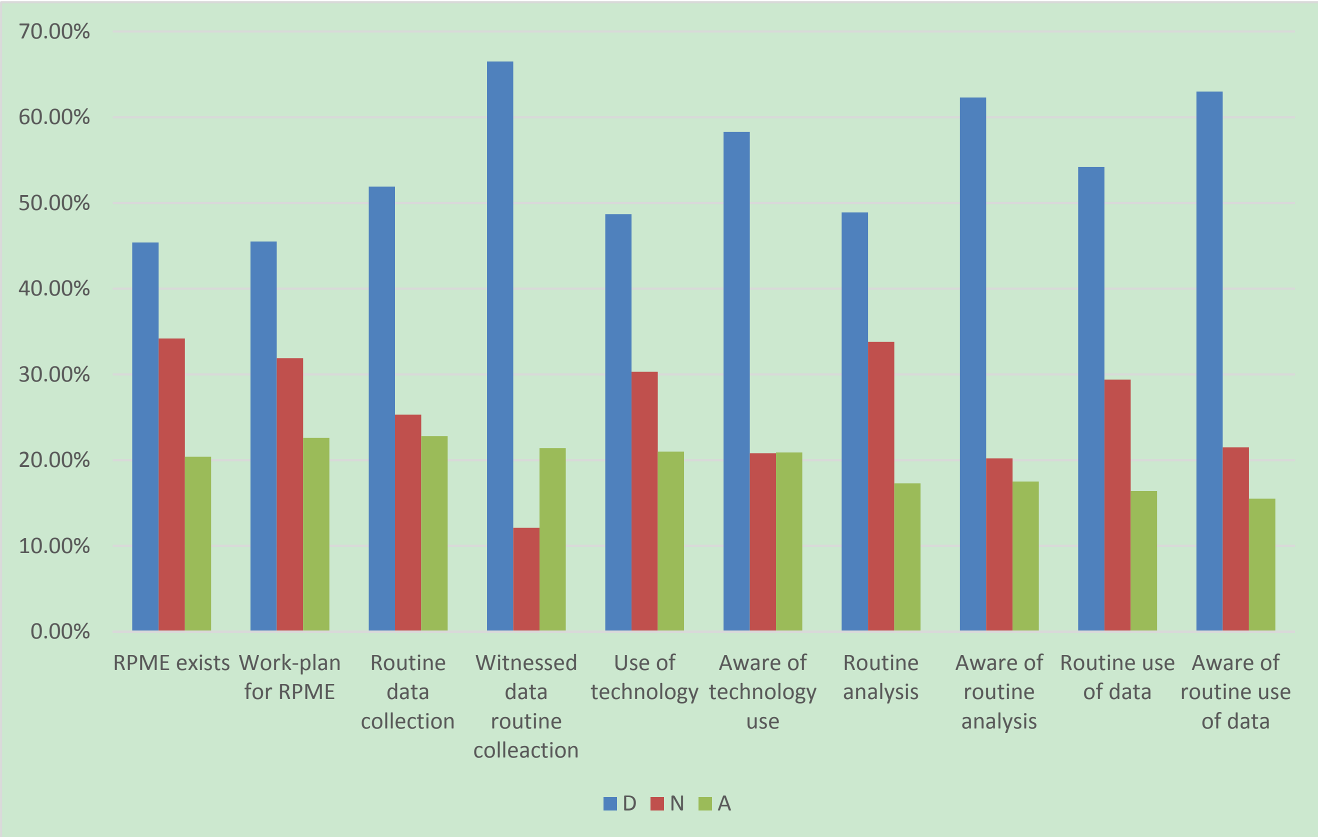

Figure 2. Routine Programme for Monitoring and Evaluation of Nyamira South Sub-County water services based on responses categorized as Disagree (D), Neutral (N), and Agree (A)

The disagreements on the operational status of RPME ranged from 45 percent upwards to 66.5 percent, with eight parameters over 48 percent and only two at 45 percent (figure 2). The findings signal a high level of consensus among the respondents on the nonperformance of the RPME.

The assessment of the functional and operational status of RPME was further analyzed and summarized into means and standard deviations.

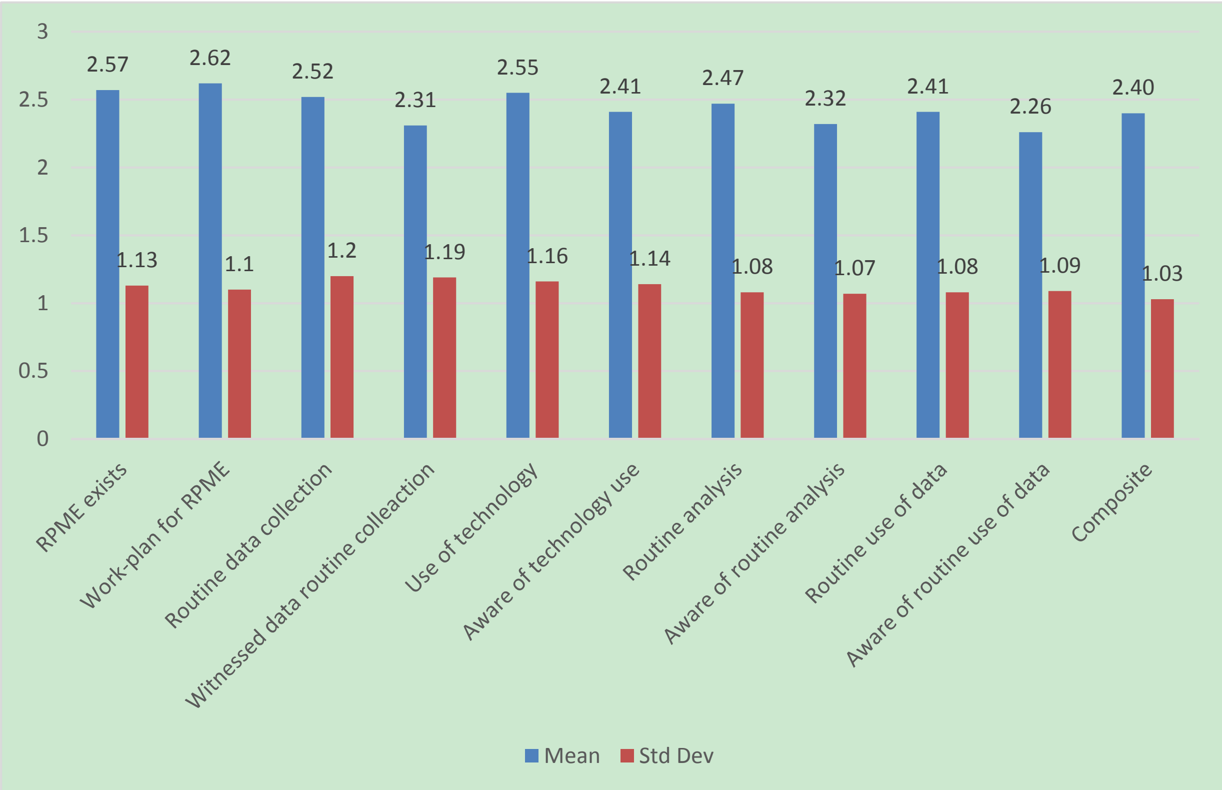

Figure 3. Means and standard deviations of Routine Programme for Monitoring and Evaluation of Nyamira South Sub- County water services

As shown in figure 3, all means are below three on a scale of 1 to 5, implying a lower than average operational performance of the RPME in the study area. At 2.40, the composite mean has the lowest standard deviation at 1.03, implying consistency in the assessment that only a tiny proportion of the respondents perceive RPME as being operational. The highest standard deviation was at 1.19 on witnessing regular data collection. All the line-item standard deviations were higher than the composite standard deviation of 1.03, indicating a divergence in opinion among the respondents for the different RPME elements. The spreading out of the respondents' perceptions, implied suboptimal operations. The little visibility of routine data collection was echoed during the FGDs. A respondent was quoted saying the community members do not see the staff of the local water service provider undertaking systematic data collection.

This study established low perceptions on the use of technology in the study area; as demonstrated by responses on the same. Contrary to the study findings, technology is heavily deployed elsewhere on regular monitoring of different aspects of water and its environment (Peletz *et al.,* 2016; Kumpel *et al.,* 2015; Bin et al., 2012;). Technology is increasingly finding applications for both simple and advanced analysis and reporting of evidence in the water sector and its environment. This, therefore, seems to be an improvement from earlier observations on data collection with little analysis and use in the water sector (Ward, Loftis, McBride, 1986). Mgoba and Kabote (2020); Wells et al. (2013) and Silva et al. (2013) established that; perceptions that data collected in the water sector was regularly analyzed, and the findings used; were not always accurate, and additionally, communities hardly participated in data-driven management of water resources. As demonstrated by the literature review, quality and safety considerations are attracting much interest among researchers and innovators working on water monitoring.

3.3 Inferential Analysis of RPME and Sustainable Water Supply

The study sought to determine the relationship between RPME and sustainable water supply. Pearson correlation and regression analyses scores were computed as a summation of the individual scores on each item by the respondents at 95% level of confidence.

Table 1. Results by type of analysis of the relationship between Routine Programme for Monitoring and Evaluation and sustainability of water services in Nyamira South Sub-County

Statistics	**Correlation**	**Regression**	**ANOVA-Regression**	**ANOVA-Residual**	**ANOVA-total**	**The coefficient for Regression-constant**	**The coefficient for Regression-RPME**
N	480						
Pearson correlation	0.724						
R		0.724					
R Square		0.524					
Adjusted R Square		0.523					
Std. The error in the Estimate		0.696					
Sum of Squares			255.469	231.631	487.100		
Df			1	478	479		
Mean Square			255.469	0.485			
F			527.192				
Unstandardized Coefficients B						0.649	0.791
Unstandardized Coefficients Std. Error						0.090	0.034
Standardized Coefficients Beta							0.724
t						7.216	22.961
Significance- 2 tailed	0.000		0.000			0.000	0.000

The study established a positive overall correlation (r=0.724) which was statistically significant (P value=0.000<0.05) and the regression variable (*P-value*, 0.00<0.005 between routine programme for M&E and sustainable water supply in NSSC, Kenya. This implies that when RPME increases by one unit, sustainability increases by 0.724. There is therefore a significant relationship between routine programme for M&E and sustainable water supply in NSSC, Kenya.

A linear, positive, and significant relationship between RPME and sustainability was demonstrated given the Pearson correlation coefficient of 0.724 and p-value of 0.000. The demonstrated association between these two variables implies that when RPME increases by one unit, sustainability increases by 0.724. The association between these variables is further complemented by statistically significant findings with p-values of 0.000 following regression analysis of variance (ANOVA); and for the standardized and unstandardized coefficients beta. The analyses results suggest that RPME has a critical role in strengthening the management and sustainability of water resources. Investments in improving the monitoring functions are a valuable addition to the long-term management of water resources. Similar results were demonstrated in studies conducted on community-based water projects (Muniu, Gakuu, & Rambo, 2018 & Muniu, Gakuu, & Rambo, 2017). The predicting ability of routine monitoring practices on long-term progression of water resources demonstrated in the study was also replicated in previous studies by Mutekhele (2018), Muniu, Gakuu, and Rambo (2018), Mugo (2017), Muniu (2017), Muniu, Gakuu, and Rambo (2017).

4. Conclusions

This study's finding that about 23% of the population accessed water in NSSC indicated a potential stagnation or deterioration of the situation compared to the 2016 estimate that indicated 35% of the population having access to water in the greater Nyamira County. (Department of Environment, Energy, Water, Mining and Natural Resources Bulletin [DEEWMNR], 2016). The water supply situation in NSSC was due to several factors, as suggested by the study findings. First, findings from the FGDs with village elders indicated that water supply in NSSC wasn't sustainable eventually, since it was primarily obtainable during the rainy season. The elders' insights pointed to possible insufficient water during the dry seasons, limited sources of water to rain-filled reservoirs, and variations in the amount of water available for distribution between the seasons. As suggested from the FGDs, most households in the sub-county were not connected to water.

The study findings also suggested the sub-optimal sustainability of the sub-county water supply could result from inadequate evidence to inform the water supply system and inefficient use of the evidence. Examining how RPME influenced sustainable water supply in NSSC highlighted this possibility. The qualitative findings were confirmed by results from FGDs, with the village elders indicating they hadn't seen or witnessed systematic collection of M&E data in NSSC. The findings through FGDs implied limited awareness and limited community participation in water supply affairs. The FGDs findings identified a gap in participatory routine programme for M&E in NSSC. The establishment of a significant relationship between routine programme for M&E and sustainable water supply through correlation, ANOVA, and simple regression coefficients suggested the need to strengthen routine programme for M&E; as a way of ensuring long term efficient and effective management of water resources.

5. Recommendations

- The local water services provider should consider strengthening community awareness, ownership, involvement, and effective engagement in the regular monitoring activities for its water supply.

- The local water services provider should consider strengthening routine programme for monitoring and evaluation activities as a way of generating evidence to inform improvements in its' water supply services.

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