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Effect of Data Collection Practices on the Performance of Health Projects in Rwanda; A Case of Indoor Residual Spraying Project

Nahimana Jules[1], Dr. Patrick Mulyungi[2]

[1]Student, Jomo Kenyatta University of Agriculture and Technology

[2]Lecturer, Jomo Kenyatta University of Agriculture and Technology

Abstract: ***This study sought to establish the effect of data collection practices on the performance of health projects in Rwanda. The study was anchored on the following objectives: to establish the effect of mobile data collection on the performance of health projects in Rwanda; to determine the effect of paper based data collection on the performance of health projects in Rwanda; and to determine the effect of personal digital assistants data collection on the performance of health projects in Rwanda. The study used a descriptive case survey design. A sample size of 310 respondents was drawn from a population of 1,383 using Yamane formula. Stratified random sampling was employed to sample the survey respondents from the target population. Data was collected using structured questionnaires and document reviews. The reliability and validity of the data collection instruments were tested using Cronbach's Alpha coefficient at an index of 0.70 and based on a 5-point Likert Scale for multiple items obtained from a pilot survey. The content validity of the questionnaires was done by supervisors from the University. Multiple regression analysis and Correlation analysis were used to establish the effect of data collection practices on the performance of health projects in Rwanda. The findings provided significant implications for future research and practice on how data collection practices on the performance of health projects would be improved.***

1. Introduction

Today's organizational environment is very dynamic and turbulent. This calls for making right and informed decisions. To make the right and informed decisions, every organization would require timely and accurate data (Seljeskog et al. 2006). Data collection is therefore one of the important components of managing public health systems. Decision makers, policy makers and health service providers need accurate and timely data in order to improve the quality of their services. Health data can be used as input on health systems in a policy making process. Health data can also be used in analyzing and predicting the health outcomes such as mortality rates and diseases outbreaks and in return prepare prophylactic, diagnostic and anticipated interventions like indoor residual spaying against malaria(Abouzahr, 2005). Health data could also be used for monitoring and evaluating the health services coverage. Drugs stock level data could be used to track and plan drugs distribution logistics in remote healthcare centers. Furthermore the statistical health data can be used to detect and track diseases outbreaks. The Current practices of collecting health data include mobile data collection, paper based data collection and personal digital assistants (PDAs). Mobile data collection involves use of mobile technology (mobile phones) to collect data (Byrne and Sahay, 2007). Bradley et al., (2012) supports this definition that mobile data collection is the method of gathering any type of information using a mobile device, such as a smart-phone or tablet. It is the intersection of "Data + Mobile Technology + Population" where population refers to people, or statistically speaking, your sample. Paper based data collection involves use of pen and paper to collect data then transcripted on notebooks. Digital data collection involves use of PDAs to collect data (Jumbe & Perry, 2012). Data collection is mostly done within the health facilities when clients/patients visit the facilities. Within facilities, there are well-structured mechanisms (form and registers) that are used to collect data. Outside the facilities, the systems used to gather information for the management of health services are too many and uncoordinated, and the HMIS thus needs to integrate all vertical systems into one (Chaulagai, 2015).Evidence is clear that there are some anomalies and errors that occur during data collection. Some of the anomalies and errors observed in the registers at this level include additional information errors and omission errors like data for certain dates having not been captured. In health sector, data on the prognosis of such common diseases like malaria is critical for its management. Rwanda's entire population of 12 million is at risk of malaria. Young children and pregnant women are particularly vulnerable to the disease. The President's Malaria Initiative began supporting Indoor Residual Spraying (IRS) in Rwanda since 2007. Indoor Residual Spraying (IRS) is the application of insecticide to the inside of dwellings, on walls and other surfaces that serve as a resting place for malaria-infected mosquitoes. IRS kills mosquitoes when they come in contact with treated surfaces, preventing disease transmission. The objective of the project is to limit exposure to malaria vectors and reduce the incidence and prevalence of malaria. Declining malaria incidence since 2008 in some areas prompted adjustments from district-wide blanket IRS coverage to focal spraying targeting high risk areas. Over time, PMI reconsidered the focal targets because of generalized increases in malaria caseloads. However, expansion to cover entire districts depended on the availability of resources.

The PMI AIRS Project scaled-up mHealth interventions. AIRS Rwanda launched a mobile supervision application which helped supervisors conduct their supervision visits in a standardized way. Supervision results were automatically sent to project staff that then made immediate recommendations for improvement based on findings. AIRS

Rwanda also used a mobile performance tracker to monitor key spray campaign indicators real-time on a daily basis. Daily message reminders were sent to spray operators related to spray quality, proper use of personal protective equipment, among others.

Given the 80/20 rural-urban dichotomy of Rwanda's population and the fact that there are insufficient health facilities most mothers in rural settings face challenges to access health facilities. This insufficiency of health facilities may lead to an increase in data that are not recorded in the health management information system (Chipo, 2011).

2. Statement of the Problem

To make the right decisions, every business depends on timely and accurate data. However, many organizations still use paper-based methods to enter, access, and manipulate data which can result in inaccurate and incomplete information. To resolve these issues, many manufacturing, distribution, retail, and field services operations apply proper data collection solutions to drive more timely and accurate information into their enterprise systems. Data collection is mostly done within the health facilities when clients/patients visit the facilities. Within facilities, there are well-structured mechanisms (form and registers) that are used to collect data. Outside the facilities, the systems used to gather information for the management of health services are too many and uncoordinated, and the HMIS thus needs to integrate all vertical systems into one (Chaulagai, 2015). Evidence is clear that there are some anomalies and errors that occur during data collection. Some of the anomalies and errors observed in the registers at this level include additional information errors and omission errors like data for certain dates having not been captured. However, maternal and child data are not always generated only at the health facility level but also with Community Health Workers (CHWs).

Over 80% of Rwanda's population lives in the rural areas and given the fact that there are insufficient health facilities, most mothers in rural settings face challenges to access health facilities. This insufficiency of health facilities leads to an increase in data that are not recorded in the health management information system. In addition to this, since a substantial percentage of malaria cases are treated by CHWs, such data needs to be captured and recorded as well in a timely manner. As a consequence a high prevalence of malaria cases are not recognized by the health sector. This study thus seeks to establish the effect of data collection practices on the performance of health projects in Rwanda while looking at the case of Rwanda's Indoor Residual Spraying Project.

Table 1: Target Population

Categories/Sectors	Population		Total Population
	Kirehe	Nyagatare	
Project Staff	5	5	**10**
District & Sector Support Staff	18	20	**38**
Community Health Workers	763	572	**1,335**
TOTAL	**786**	**597**	**1,383**

Source: AIRS, (2018)

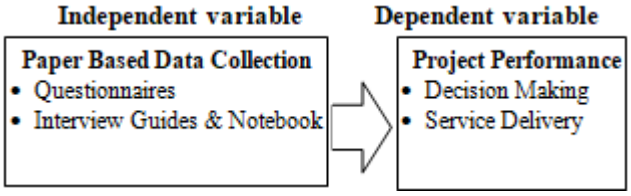
3) Sampling Techniques and Sampling Size

The study used stratified random sampling where the respondents were stratified into two categories of Kirehe and Nyagatare. Yaro Yamane, (1967) formula was used in determining the sample size. The sample size in each stratum was then proportionately determined.

3. Objective of the Study

To determine the effect of paper based data collection on the performance of health projects in Rwanda.

4. Conceptual Framework



1) Research Design

To undertake the study, a descriptive survey research design was used based on a case study which will help to depict the participants in an accurate way. The method is preferred as it permitted the gathering of data from the respondents in natural settings. The design is relatively easy to carry out within limited time and the results can be easily generalized to the whole population. More simply put, descriptive survey research design is all about describing people who take part in the study. It is also defined as an in-depth study of an individual or group of individuals.

2) Target Population

The research was carried out in Rwanda's Health Indoor Residual Spraying Project comprising of 1,383 people from the following categories: project staff, district and sector support staff and Community Health Workers of target districts (Kirehe and Nyagatare) of Indoor Residual Spraying Project.

According to Yamane, (1967): $n = \frac{N}{\left[1 + \left(Ne^2\right)\right]}$

Where, n = is the sample size
N = is the population
e = is the error limit (0.05 on the basis of 95% confidence level)
Therefore, $n = 250 / [1 + 1383 (0.05)^2]$
$n = 1383/4.4575$
$n = 310$
From the above calculation, a sample size of 310 respondents was used within an error limit of 0.05.

Table 2: Sample Technique

Categories/Sectors	Population		Total Population	Sample Size $n = \frac{X}{1383} x310$
	Kirehe	Nyagatare		
Project Staff	5	5	10	2
District & Sector Support Staff	18	20	38	9
Community Health Workers	763	572	1,335	299
Total	786	597	1,383	310

Source: AIRS (2018)

4) Data Collection Instruments

Structured questionnaires and documentary review were used to collect data among the 310 respondents. Structured questionnaires are relatively faster in collecting standardized data. In addition, both structured questionnaires and documentary reviews are more objective compared to other tools of data collection. The study collected both primary and secondary data. Primary data was collected using the structured questionnaires while secondary data was collected from the GoR annual reports and other Ministry of Health reports on health information systems management. A Five-Point Likert-Scale Rating of structured questionnaires was used in this study to collect the views of respondents. Structured questionnaires were administered to the respondents because of their advantage of being able to obtain wide responses. The Five-Point Likert-Scale Rating enabled the researcher to ask respondents on how strongly they agree or disagree with a statement or series of statements. The Likert-Style Rating questionnaire also enables numerical values to be assigned to cases for easy quantitative analysis, (Onditi, 2014).

3. Research Findings and Discussion

3.1 Paper Based Data and Project Performance (Service Delivery)

Linear regression analysis model used to investigate the effect of Paper Based Data Collection on Project Performance in Rwanda is indicated below:

$$PP_{SERVICEDELIVERY} = \beta_0 + \beta_2 X_2 + \varepsilon_2 \quad \text{.....Eq. (iii)}$$

Table 3: Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.845[a]	0.714	0.711	0.311

Table 4: ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	P-value
1	Regression	63.123	1	23.123	9.082	.000[b]
	Residual	7.285	96	0.097		
	Total	80.408	97			

Table 4: Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	P-value
		B	Std. Error	Beta		
1	(Constant)	2.141	.227		1.742	.000
	Paper Based Data Collection	2.432	.0435	.415	2.157	.000

The study sought to establish the effect of Paper Based Data Collection on Project Performance (Service Delivery) in Rwanda. An R-square =.714, indicates that 71.4% of variation in Project Performance (Service Delivery) can be explained by the variation in Paper Based Data Collection leaving only 28.6% of the variation in Project Performance (Service Delivery) not explained by the model. Therefore, the model equation derived was:

$$RD_{SERVICE\ DELIVERY} = 2.141 + 2.432\ Paper\ Based\ \ Data\ Collection$$

The beta of In Mobile Data Collection is 0.432 with a statistically significant (p=0.000) and t-statistic of 4.157. The positive coefficient of determination indicates that there is positive correlation between Mobile Data Collection and Health Project Performance (Service Delivery) in Rwanda. The positive coefficient further demonstrates that a one unit change in Mobile Data Collection will increase health Project Performance (Service Delivery) in Rwanda by 2.432 units in Rwanda. This supports Shaw et al., (2009) in their study on Health Information Systems in Developing Countries which established that collecting health data is mostly done through paper based methods where physical forms are filled and collected manually. The transcription of data for analysis is difficult and leads to low quality of data especially when the data volume is large. Shaw et al., (2009) further established that supervision of multiple data collections from multiple locations is difficult and may lead to large time lag for data to be available for use. Further, he established that Data quality is acknowledged as a major challenge in HIS, and a shortage of qualified personnel is cited as the primary cause.

4. Conclusion

Considering the significant role that data/information plays in economic growth of the country, the study sought to establish the effect of Data Collection Practices on Project Performance in Rwanda. The study concludes that Data Collection Practices have statistically significant effect on Project Performance in Rwanda. It also concludes that improving the various Data Collection Practices would eventually increase Project Performance in Rwanda in the order of Digital Data Collection, Paper Based Data Collection and lastly Mobile Data Collection Health Projects in Rwanda.

5. Recommendation

The study sought to establish the effect of Data Collection Practices on Project Performance in Rwanda. Since there was a positive and significant relationship between Data Collection Practices and Project Performance in Rwanda, project management stakeholders should strive to ensure that the extent of integration of the three Data Collection Practices parameters (Mobile Data Collection, Paper Based Data Collection and Digital Data Collection) are enhanced in Health Projects.

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