

EFFECT OF PROJECT QUALITY CONTROL ON PUBLIC HEALTH SERVICE DELIVERY BY THE MALARIA CONTROL PROGRAMME IN WESTERN EQUATORIA STATE IN SOUTH SUDAN. A CROSS-SECTIONAL STUDY.

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Abstract.

Background.

Quality control involves monitoring specific project results to determine whether they comply with relevant quality standards and identifying ways to eliminate causes of unsatisfactory results. This study aimed to assess the effect of project quality control on public health service delivery by the Malaria Control Programme in Western Equatoria state in South Sudan.

Methodology.

A cross-sectional survey was adopted under which quantitative and qualitative methods were applied in data collection and analysis—a study comprised of 84 respondents. A simple random method was used to select staff in non-managerial positions of the MCP in Western Equatoria State while purposive sampling was used to select staff in managerial positions. Quantitative data analysis mainly consisted of descriptive statistics and inferential statistics. Content analysis was used to analyze qualitative data.

Results.

(67.9%) of the respondents were females, (96.2%) of the participants had at least an A level of education. There was a moderate positive significant correlation ($\rho = .560$) between project quality control and health service delivery. Project quality control accounted for a 31.4% change in health service delivery of the MCP in Western Equatoria state. There was a strong linear relationship (Multiple R = .614) between the combined dimensions of project quality control and health service delivery of the MCP in Western Equatoria state. The combined dimensions of project quality control account for a 36.1% change in health service delivery of the MCP in Western Equatoria state.

Conclusion.

Project quality control plays an important role in the health service delivery of the MCP in western Equatoria state.

Recommendations.

MCP management should improve project quality control to enhance its health service delivery of the MCP in Western Equatoria state.

Keywords: Project Quality Control, Public Health Service Delivery, Malaria Control Programme, Western Equatoria State, South Sudan.

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Backgrounds.

Quality control involves monitoring specific project results to determine if they comply with relevant quality standards and identifying ways to eliminate causes of unsatisfactory results. Quality control should be performed throughout the project (Cooper, 1993). Project results include both product results such as deliverables and management results such as cost and schedule performance. Phillips (2008) was of the view that in project management, quality control requires

the project manager and the project team to inspect the accomplished work to ensure its alignment with the project scope. In practice, projects typically have a dedicated quality control team that focuses on this area.

Quality control is all about keeping mistakes out of the customers' hands (Ford, 1995). Project managers and the project team must work diligently to ensure that all of the work is accurate, on-scope, and meets the objectives that the customer has defined. Quality control is a continuous

process that starts and ends with the project. It is more about preventing and avoiding than measuring and fixing poor quality outputs (Ford, Lander & Voyer, 2004). It is part of every project management process from the moment the project is initiated to the final steps in the project closure phase. It focuses on improving stakeholder satisfaction through continuous and incremental improvements to processes, including removing unnecessary activities; it achieves that by the continuous improvement of the quality of material and services provided to the beneficiaries. It is not about finding and fixing errors.

The ultimate judge of quality is the beneficiary, who represents how close the project outputs and deliverables come to meeting the beneficiaries' requirements and expectations (Matta & Ashkenas, 2003). Thus, the main principle of project quality control is to ensure the project will meet or exceed stakeholder's needs and expectations. The project team must develop a good relationship with key stakeholders, especially the donors and the beneficiaries of the project, to understand what quality means to them. One of the causes for poor project evaluations is the project focuses only in meeting the written requirements for the main outputs and ignores other stakeholder needs and expectations for the project.

The first step in quality control is to define quality, the project manager and the team must identify what quality standards will be used in the project (Matta & Ashkenas, 2003). They look at what the donor, beneficiaries, the organization, and other key stakeholders need to come up with a good definition of quality. In some instances, the organization or the area of specialization of the project may have some standard definitions of quality that can be used by the project. Identifying quality standards is a key component of quality definition that will help identify the key characteristics that will govern project activities and ensure the beneficiaries and donors will accept the project outcomes.

Quality control implies the ability to anticipate situations and prepare actions that will help bring the desired outcomes. The goal is the prevention of defects through the creation of actions that will ensure that the project team understands what is defined as quality. One source for the definition of quality comes from the donor; the project must establish conversations with the donor to be familiar with and come to a common understanding of what the donor defines as quality. The donor may have certain standards of what is expected from the project and how the project delivers the expected benefits to the beneficiaries. This is in line with the project's ultimate objective that the project outcomes can satisfy the stated or implied needs.

Another source for quality definition comes from the beneficiaries; the project team must be able to understand how the beneficiaries define quality from their perspective, a perspective that is more focused on fitness for use, the project outcomes must be relevant to the current needs of the

beneficiaries and must result in improvements to their lives. The team can create, as part of the baseline data collection, questions that seek to understand how the beneficiaries define the project will meet their needs and a question that also helps define what project success looks like from the perspective of a beneficiary.

The organization may have quality standards that can reflect the technical and managerial nature of the project. The organization may require from the project timely and accurate delivery of project information needed for decision-making or compliance with international or locally recognized quality standards that define specific technical areas of the project. All materials or services have characteristics that facilitate the identification of their quality. The characteristics are part of the conditions of how the material, equipment, and services can meet the requirements of the project and are fit for use by the beneficiaries. Quality characteristics relate to the attributes, measures, and methods attached to that particular product or service.

According to Smith (2024), these include functionality, which is the degree, by which equipment performs its intended function. Performance is how well a product or service performs the beneficiary's intended use. Reliability is the ability of the service or product to perform as intended under normal conditions without unacceptable failures. Relevance is the characteristic of how a product or service meets the actual needs of the beneficiaries, it should be pertinent, applicable, and appropriate to its intended use or application. Timeliness is how the product or service is delivered in time to solve the problems when it's needed and not after. Suitability is the fitness of its use - that is the appropriateness and correctness of the product or service. Completeness is the quality that the product or service is complete and includes the entire scope of services. Consistency that is services are delivered in the same way for every beneficiary. Part of defining quality involves developing a quality plan and a quality checklist that will be used during the project implementation phase. This checklist ensures the project team and other actors are delivering the project outputs according to the quality requirements. Once the project has defined the quality standards and quality characteristics, it should create a project quality plan that describes all the quality definitions and standards relevant to the project. It highlights the standards that must be followed to comply with regulatory requirements set by the donor, the organization, and external agencies such as the local government and professional organizations. The quality plan also describes the conditions that the services and materials must possess to satisfy the needs and expectations of the project stakeholders. It describes the situations or conditions that make an output fall below quality standards. This information is used to gain a common understanding among the project team to help

them identify what is above and what is below a quality standard.

The quality plan also includes the procedure to ensure that the quality standards are being followed by all project staff. The plan also includes the steps required to monitor and control quality and the approval process to make changes to the quality standards and the quality plan. This study aimed to assess the effect of project quality control on public health service delivery by the Malaria Control Programme in Western Equatoria state in South Sudan.

Methodology.

Research design.

A cross-sectional survey was used. Yin (1984) defines the case study research method as an empirical inquiry that investigates a contemporary phenomenon within its real-life context. A case study focuses on only one specific instance of the phenomenon to be studied or on only a handful of instances to study a phenomenon in depth. In the case study, the researcher is inclined for example to study some riots, some young people, some traffic accidents, or only a handful of schools by probing into the details of the process (i.e. the phenomenon) of interest. Each instance is studied in its specific context, and in detail rather than in extensive research. Thus, applied in the context of this study, the case study design was used because in this study not all public health projects but only one, that is MCP, was studied. In addition, only one state (Western Equatoria state) was used instead of all states in South Sudan or Western South Sudan. On the other hand, cross-sectional research is a research method in which a researcher utilizes different groups of people who differ in the variable of interest, but share other characteristics such as socioeconomic status, educational background, and ethnicity (Amin, 2005). The cross-

sectional survey was used in this study because it enabled to target of a large group of respondents to obtain information without making a follow-up of the respondents once information from them is obtained (Sekaran, 2003). Therefore, this survey helped to save time and resources during data collection. Both quantitative and qualitative methods were used in the study. Quantitative methods are an objective approach to data collection used to quantify the problem by way of generating numerical data or data that can be transformed into useable statistics while qualitative methods are a subjective approach, data collected is expressed in text or symbols (Amin, 2005). In this study, the quantitative approach was used because it allowed the researcher to solicit more information that was quantified while the qualitative approach was used because it allowed the researcher to solicit in-depth information that was expressed in textual format (Mugenda & Mugenda, 1999). Combining numerical and textual information helped the researcher enrich the interpretation of the findings of the study (Mugenda & Mugenda, 1999).

Study Population

The study population is composed of all staff responsible for the implementation of the MCP in Western Equatoria state. These included nine staff in managerial positions and 117 staff in nonmanagerial positions of the MCP in Western Equatoria state (Human Resource Department Ministry of Health, 2023).

Determination of the Sample Size.

Using the Krejcie & Morgan sample size table, the following sample size of staff responsible for the implementation of the MCP activities in Western Equatoria.

Table 1: Sample size and techniques for collection

Category	Population	Sample	Sample Technique
Staff in managerial positions	9	9	Purposive sampling
Staff in non-managerial positions	117	90	Simple random sampling
Total	126	99	

Source: researcher's construct using Human Resource Department Ministry of Health (2023) and guided by Krejcie and Morgan (1970) sampling method

The selected sample size staff responsible for the implementation of the MCP in Western Equatoria state covered two categories of respondents. These categories included staff in managerial positions and other staff in non-managerial positions of the MCP in Western Equatoria state. This study targeted a sample of 99 respondents.

Sampling Techniques and Procedure.

A simple random sampling method was used to give an equal chance of staff in non-managerial positions of the MCP in Western Equatoria state to be selected given that number was big and not all staff in non-managerial positions were selected. Purposive sampling was used to select staff in managerial positions. This was because these staff members held the responsibility that one expected to have

more knowledge about the running of the MCP including issues as regards project control systems and public health service delivery of public health project.

Data Collection Methods.

Questionnaire survey.

A questionnaire survey research method was used for collecting information from a selected group of staff in non-managerial positions of the MCP in Western Equatoria state using standardized questionnaires. This method involved collecting information from this category of respondents where respondents had to provide information to a set of similar close-ended questions. A questionnaire survey was used for these categories of respondents to save time because their number was too big to interview.

Face-to-face interview

Onen and Oso (2008) stated that face-to-face interviews help the researcher to collect textual information. Face-to-face interviews were used to collect data from staff in managerial positions of the MCP in Western Equatoria state. It enabled the researcher to establish rapport with these categories of respondents and therefore gain their cooperation. It also allowed the researcher to clarify ambiguous answers and obtain in-depth information through probing. Semi-structured interviews were designed to collect data for this study. Open-ended questions were used so that other valuable questions emerged from the dialogue between interviewer and interviewee. Semi-structured interviews are the most widely used interviewing formats for qualitative research (DiCicco-Bloom & Crabtree, 2006). In this study, the probing interviewing tactic was used extensively to obtain a deeper explanation of the issue at hand from the respondents of the MCP in Western Equatoria state. This was largely because the respondents often needed stimuli to expand or clarify their answers and ideas more broadly so that a broader understanding was more easily reached later on in the findings of this study.

Documentary Review.

Secondary data was obtained from the MCP resource center and records at the Ministry of Health, which was mainly used to provide documented evidence about the role of the MCP, malaria in Western Equatoria state prevalence and consequences, activities of the MCP related to malaria control and service delivery of the MCP. All these were captured in the contextual background and statement of the problem in this study. Sources like journals, articles, reports, and books were used in gathering and compiling the information.

Data collection instruments.

Two types of data collection instruments were used in the study. These included questionnaires and interview guides, which are briefly explained in the following subsection.

Questionnaires

Structured self-administered questionnaires (SAQs) were used to collect quantitative data focusing on project quality control, project risk management, project resource control, and health service delivery from the staff in non-managerial positions of the MCP in Western Equatoria state. SAQs were used for this category of respondents to save time because their number was too big to be interviewed and because they could read and write in English and thus fill in the questionnaires by themselves without any assistance. All questions in the SAQs were close-ended. The structure of the SAQs was divided into five sections. Section A comprised questions about respondents' backgrounds. Section B comprised of questions about project quality control accompanied by a five-response scale from strongly disagree to strongly agree and Section C comprised of questions about health service delivery accompanied by a five-response scale from strongly disagree to strongly agree.

Interview guide.

Semi-structured interview guides were used to collect qualitative data from staff in managerial positions of the MCP in Western Equatoria state who were in a position to provide in-depth information through probing during the face-to-face interview. The collected data focused on project quality control, project risk management, project resource control, and health service delivery. The interview guide contained six open-ended questions. The researcher presented questions to the interviewees of the MCP in Western Equatoria state and their views were written down by the researcher. Data obtained during the interview supplemented that obtained through the questionnaire.

Documentary analysis guides.

This involved a list of expected articles, annual reports, journal publications, service brochures, and magazines with information about this study. This list was presented to MCP officials to help search for the documents.

Validity and Reliability

Validity

Validity is the ability to produce findings that are in agreement with theoretical or conceptual values; in other words, to measure what is supposed to be measured (Amin, 2005). Validity in this study was determined to find out whether the instruments would obtain the intended information about MCP's project control systems and health service delivery from the respondents. That is if all or most of the respondents gave similar responses. This helped to

determine the legitimacy of the information obtained from the field. For the instruments to yield relevant and correct data, they were given to two lecturers conversant with the study area to comment on the content, ambiguity, difficulty, and relevancy of questions to ensure content, construct, and face validity. The rating of relevancy of questions was then

used to calculate the Content Validity Index (CVI) using the formula below.

CVI = $\frac{\text{Item rated relevant by both rates}}{\text{Total number of items in the questionnaire}}$.

The following table presents the ratings used to calculate the CVI.

Table 2: Content validity index results

	Relevant	Not relevant	Total
Rater 1	40	8	48
Rater 2	38	10	48
Total	78	18	96

Thus, $CVI = \frac{78}{96} \approx .813$

The CVI was found to be .813, which was greater than the recommended .70 (Nunnally as cited in Kent, 2001). Thus, this implied that the questionnaire was valid for data collection.

Reliability

According to (Mugenda & Mugenda, 1999) reliability refers to the measure of the degree to which a research instrument yields consistent results or data after repeated trials. In this study, reliability concerns the consistency among the questions on each variable. All the questions related to each variable were expected to have all the answers to be

consistent. To ensure the degree to which questionnaires produced consistent results if used under the same conditions, they were pilot-tested on 20 respondents, and the results were subjected to Cronbach alpha reliability. The questionnaires were given to 20 respondents to fill in and were collected for analysis. Raw data from these questionnaires were entered into a statistical program known as the Statistical Package for Social Scientists (SPSS). Using this program, the internal consistency (reliability) of the instrument was measured using Cronbach's Alpha coefficients for each variable, which were compared to a recommended Alpha coefficient by Nunnally (as cited in Kent, 2001) which was .70 or above.

Table 3: Reliability results

Variable	Total No of items	Alpha
Project quality control	14	.709
Project risk management	11	.802
Project resource control	14	.761
Health service delivery	9	.784

Source: Primary data

Table 3 shows that project quality control yielded Cronbach's Alpha value of .709, project risk management yielded Cronbach's Alpha value of .802, and project resource control yielded Cronbach's alpha value of .761. Finally, health service delivery yielded Cronbach's Alpha of .784. Since the results were higher than the value of .7, the questionnaire was deemed to have excellent stability and consistency.

Procedure of Data Collection.

A letter of authorization from the Team University was provided to authorities at the MCP in Western Equatoria state as a request for permission to conduct the study. A cover letter accompanied the data collection instruments explaining the purpose of the study. Once permission to conduct the study was given, the questionnaires were distributed directly to the staff in nonmanagerial positions

of the MCP in Western Equatoria state for filling and were collected once they were completed. The cover letter was also used to provide access to the interview processes, which were done on appointment with managers of the MCP in Western Equatoria state. The data collected using the questionnaires and interview guides was analyzed.

Data Analysis.

Quantitative data analysis.

Quantitative data analysis mainly consisted of descriptive statistics (frequencies and percentages) and inferential statistics (Spearman correlation and regression). The frequencies and percentages were used to determine the respondents' views on the project control system and health service delivery. Spearman correlation (ρ) and coefficient of determination (ρ^2) were used to test the hypotheses. The correlation coefficient (ρ) was used to determine the

strength of the relationship between the variables because the scale (that is strongly disagree, disagree, not sure, agree, and strongly agree) that accompanied the questionnaire was ordinal. The responses were merely arranged in order whereby one could not exactly determine how much one disagreed or agreed and as such adding or subtracting the responses such as strongly disagree from disagree does not make sense. It is recommended that with an ordinal scale, Spearman rank order correlation is suitable for determining relationships because it does not involve means and standard deviations, which are meaningless with ordinal data. The sign of the correlation coefficient (+ or -) was used to determine the nature of the relationship. The coefficient of determination (r^2) was used to determine the percentage change caused by the independent variables on the dependent variable in this study. The significance of the correlation coefficient (p) was used to determine the statistical significance and confidence in the findings. The regression beta values (β) were used to determine whether the indicators of each of the independent variables significantly affected the health service delivery of the MCP in Western Equatoria state. This was then squared and adjusted to determine how much variance is in the dimension-dependent variable caused by the independent variables.

Qualitative data analysis

This involved content analysis, which was used to edit qualitative data and reorganize it into meaningful shorter sentences. In other words, a thematic approach was used to analyze qualitative data where themes, categories, and patterns were identified. The recurrent themes, which emerged about each guiding question from the interviews were presented in the results, with selected direct quotations from interviewees presented as illustrations.

Measurement of variables

Items for each variable were developed in the questionnaire accompanied by an ordinal measurement, which categorizes and ranks the variables. Thus, a Likert scale was used to collect opinion data on the study variables using the five scales: 5 = strongly agree; 4 = agree; 3 = undecided; 2 = disagree; 1 = strongly disagree.

Ethical approval.

A letter of authorization from the Department of Higher Degrees was provided as a request for permission to conduct the study. A cover letter accompanied the research instruments explaining the purpose of the study and the questionnaires were distributed directly to the respondents in their respective areas for filling and were collected immediately after the filling-in was completed. The cover letter was also used to provide access to the interview process, which was done on appointment.

Informed consent.

Participants received full disclosure of the nature of the study, the risks, benefits, and alternatives, with an extended opportunity to ask pertinent questions regarding the research. The researcher treated all information provided by participants with maximum confidentiality. This was achieved by assigning respondents codes instead of using the actual names of the respondents, which were known to other people. Honesty was maintained throughout the research process; in reporting data, results, methods, and procedures to avoid fabrication, falsification, or misrepresentation of data. All quotations used and sources consulted were distinguished and acknowledged using references.

Results.

Background Findings.

Table 4: Distribution of staff in non-managerial positions of the MCP in Western Equatoria state by gender.

Gender	Frequency	Percent
Male	53	67.9
Female	25	32.1
Total	78	100.0

Source: Data from respondents

Table 4: shows that more male respondents (67.9%) participated in the study compared to the proportion of female respondents of the MCP staff. Thus, the implication of these findings is that information about project quality control, project risk management, project resource control,

and health service delivery by the MCP in Western Equatoria state was obtained from a sample that reflected the distribution of people by gender engaged in MCP activities.

Table 5: Level of education of staff in non-managerial positions of the MCP in Western Equatoria state Staff.

Highest qualification	Frequency	Percent
Primary	0	0
O-Level	3	3.8
A-Level	11	14.1
Tertiary	16	20.5
University	48	61.5
Total	78	100.0

Source: Data from respondents

Table 5: shows that more respondents of the MCP staff in Western Equatoria state (96.2%) who participated in the study had at least an A level of education. In addition, most of the participants in this study had an education. Therefore, the educational background of the respondents indicates that

they ably responded to the questions about project quality control, project risk management, project resource control, and health service delivery because it is expected that they understood the issues that they were asked. Thus, the information obtained was reliable.

Table 6: Distribution of staff in non-managerial positions of the MCP in Western Equatoria state by tenure.

Tenure	Frequency	Percent
Less than 1 year	8	10.3
1-2 years	3	3.8
3-5 years	28	35.9
5-10 years	19	24.4
Above 10 years	20	25.6
Total	78	100.0

Source: Data from respondents

Table 6: shows that most respondents of the MCP staff in Western Equatoria state (over 89.7%) who participated in the study had worked with the MCP for at least 1 year. This indicates that most of the respondents in the state had been around for quite some time to learn about what happens at the organization including issues about project quality control, project risk management, project resource control,

and health service delivery the study sought to obtain. Therefore, the staff in non-managerial positions of the MCP in Western Equatoria state who participated in this study provided dependable information about project quality control, project risk management, project resource control, and health service delivery.

Table 7: Distribution of staff in non-managerial positions of the MCP in Western Equatoria state by age

Age	Frequency	Percent
20-30 years	27	34.6
31-39 years	27	34.6
40-49 years	12	15.4
50 years and above	12	15.4
Total	78	100.0

Source: Data from respondents

Table 7: shows that nearly three-quarters of the respondents in the State (65.4%) who participated in the study were aged above 30 years. Thus, these findings imply that information about project quality control, project risk management,

project resource control, and health service delivery was obtained from respondents of the MCP staff in Western Equatoria state who were mature. The assumption is that the information obtained was dependable Project quality control

and Health Service Delivery Before determining the effect of project quality control on health service delivery, descriptive statistics for each variable are presented to show the respondent's views on each of the variables. This way they helped to state in exact terms what the inferential statistics meant. Thus, this approach was adopted for every objective and the descriptive statistics that were used were

frequencies and percentages because the scale that accompanied the questionnaire was ordinal.

Descriptive results about project quality control Staff in non-managerial positions of the MCP in Western Equatoria state

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Table 8: Findings about project quality control of the MCP in Western Equatoria state

Items about project quality definition	SD	D	NS	A	SA	Total
1. Quality standards are always identified to govern the MCP execution of its activities	7 (9%)	27 (35%)	5 (6%)	27 (35%)	12 (15%)	78 (100%)
2. The local community is consulted about quality standards that govern the MCP execution of its activities	17 (22%)	37 (47%)	3 (4%)	12 (15%)	9 (12%)	78 (100%)
3. The donors are consulted about quality standards that govern the MCP execution of its activities	18 (23%)	33 (43%)	1 (1%)	15 (19%)	11 (14%)	78 (100%)
4. The MCP employees are consulted about quality standards that govern the MCP execution of its activities	21 (27%)	23 (29%)	6 (8%)	17 (22%)	11 (14%)	78 (100%)
5. The MCP services/products are appropriate to the beneficiaries needs	23 (29%)	35 (45%)	7 (9%)	11 (14%)	2 (3%)	78 (100%)
6. The MCP services/products are reliable to the beneficiaries	24 (31%)	38 (48%)	6 (8%)	6 (8%)	4 (5%)	78 (100%)
7. The MCP services/products are timely to the beneficiaries	19 (24%)	25 (31%)	2 (3%)	16 (21%)	16 (21%)	78 (100%)
8. The MCP services/products are suitable to the beneficiaries	20 (26%)	27 (34%)	5 (6%)	13 (17%)	13 (17%)	78 (100%)
Items about project quality assurance	SD	D	NS	A	SA	Total
9. Evaluations are conducted to provide evidence that MCP quality-related activities are being performed effectively	13 (17%)	31 (39%)	4 (5%)	16 (21%)	14 (18%)	78 (100%)
10. Donors are provided evidence that MCP quality related activities are being performed effectively	16 (21%)	28 (36%)	3 (4%)	19 (24%)	12 (15%)	78 (100%)
11. The local community is provided evidence that MCP quality-related activities are being performed effectively	14 (18%)	32 (41%)	4 (5%)	13 (17%)	15 (19%)	78 (100%)
12. MCP employees are provided evidence that MCP quality-related activities are being performed effectively	19 (24%)	26 (33%)	7 (9%)	10 (13%)	16 (21%)	78 (100%)
13. Safeguards are in place to make sure that the expected levels of quality in MCP activities will produce quality outputs	22 (28%)	36 (47%)	4 (5%)	12 (15%)	4 (5%)	78 (100%)
14. Corrective action is taken to make sure that the expected levels of quality in MCP activities will produce quality outputs	20 (26%)	35 (44%)	6 (8%)	10 (13%)	7 (9%)	78 (100%)

Source: Data from respondents

Key: SD = Strongly disagree, D = Disagree, NS = Not sure, A = Agree, SA = Strongly agree

To analyze the findings, for each item, strongly disagreed and disagreed were added together into one category called “respondents who opposed the items” and strongly agreed

and agreed were also added into another category called “respondents who concurred to the items”. Thus, three categories of respondents were compared, which included

“respondents who opposed the items”, “respondents who were not sure about the items” and “respondents who concurred with the items”. Interpretation was then drawn from the comparisons of the three categories as shown in the following paragraph.

Findings show fewer staff in non-managerial positions of the MCP in Western Equatoria state opposed one item about product quality definition (that is item 1) compared to staff in nonmanagerial positions of the MCP in Western Equatoria state who concurred with item 1 while a small percentage were not sure about this item. A comparison on this item shows that the percentage of respondents that opposed was 44% while the percentage of respondents that were not sure ranged was 6% and the percentage of respondents that concurred was 50%. From these comparisons, it can be seen that the percentages that opposed the items were lower compared to the percentages that concurred while the percentages that were not sure were small. Thus, from this analysis, the following is the interpretation. Findings show that quality standards were always identified to govern the MCP execution of its activities. However, findings show more staff in non-managerial positions of the MCP in Western Equatoria state opposed seven items about product quality definition (that is items 2 to 8) compared to staff in non-managerial positions of the MCP in Western Equatoria state who concurred with these items while a small percentage were not sure about these items.

A comparison of items 2 to 8 shows that the percentages of respondents that opposed ranged from 55% to 79% while the percentages of respondents that were not sure ranged from 1% to 9% and the percentages of respondents that concurred ranged from 13% to 42%. From these comparisons, it can be seen that the percentages that opposed the items were higher compared to the percentages not sure and the percentages that concurred. Thus, from this analysis, the following is the interpretation. Findings show that the local community, donors, and MCP employees were not consulted about quality standards that govern the MCP execution of its activities and that the MCP services/products were not appropriate, reliable, and suitable to the beneficiaries. Thus, these findings show that the product quality definition by MCP was poor. In addition, findings show that more staff in non-managerial positions of the MCP in Western Equatorial state opposed all six items about project quality assurance (that is items 9 to 14) compared to staff in non-managerial positions of the MCP in Western Equatoria state who concurred with these items while a small percentage were not sure about these items. A comparison of items 9 to 14 shows that the percentages of respondents that opposed ranged from 56% to 75% while the percentages of respondents that were not sure ranged from 4% to 9% and the percentages of respondents that concurred ranged from 20% to 39%. From these comparisons, it can be seen that the percentages that

opposed the items were higher compared to the percentages not sure and the percentages that concurred. Thus, from this analysis, the following is the interpretation.

Findings show that evaluations were not conducted to provide evidence that MCP quality-related activities were being performed effectively and donors, the local community, and MCP employees were not provided evidence that MCP quality-related activities were being performed. In addition, findings show that safeguards were not in place to make sure that the expected levels of quality in MCP activities would produce quality outputs, and corrective action was not taken to make sure that the expected levels of quality in MCP activities would produce quality outputs. Thus, these findings show that resource project quality assurance was poor.

Interview findings shed more light on project quality control. For example, when key informant A from the MCP in Western Equatoria state was asked about the issues related to satisfaction with project control, the response was, *I am satisfied with the project quality control because currently quality assurance programs are largely run and take various forms. The major one is mainly support supervision. However, there are also policies and several non-government organizations that deal with the issue of project quality control. There are national supervision guidelines, which are supposed to ensure the efficacy of quality assurance programs in the MCP. The monitoring teams are required to visit each state every quarter to provide support supervision and monitoring MCP services* (Interview with key informant A, 6th September 2024).

The findings from the interviews that quality assurance was always conducted through supervision concurs with findings obtained from the questions where some staff in nonmanagerial positions were of the view that evaluations were conducted to provide evidence that MCP quality-related activities were being performed effectively. However, these interview findings were contrary to those staff in non-managerial positions whose response was negative. Similarly, key informant B from the MCP in Western Equatoria state had this to say,

“International donors play a large role in financing MCP projects. Therefore, they implement their programs to improve upon quality assurance for the MCP projects (Interview with key informant B, 7th September 2024)”.

This finding is similar to that obtained from staff in non-managerial positions using questionnaires who were of the view that donors provided evidence that MCP quality-related activities were being performed effectively but contrary to staff in non-managerial positions who disagreed or strongly disagreed. From the interview findings, it has been shown that efforts have been adopted to ensure project quality control for the MCP. These efforts are at the national level, the organizational level, and by some stakeholders such as non-government organizations. The interview findings show that project quality control was mainly in the

form of policies and supervision. However, despite the positive response from the two key informants, challenges to the MCP project quality control were cited during the interviews. For example, it was revealed during the interviews,

Some monitoring teams are not able to cover all the MCP activities due to two reasons. Firstly, these are widely scattered and secondly, funding is not adequate to cover all MCP activities in Western Equatoria state (Interview with key informant C, 8th September 2024)".

Hence, the monitoring teams found difficulties in covering all MCP activities within the state. An average travel time for a monitoring trip within Western Equatoria state ranged between 14 hours. Normally, the state laboratory monitoring teams used motorbikes for visiting the MCP activities, except in some situations where public transport was preferred for far-off activities. Key informant F had this to say with respect:

Some activities within the state are far away with poor roads, which requires the motoring team to use 1-4 hours. It is very difficult to go by motorbike, so monitoring teams travel by public means. For some areas, monitoring teams can't return on the same day and they have to spend a night there (Interview with key informant F, 15th September 2024) The involvement of the State Malaria Focal Person (DLS) in the MCP in Western Equatoria state, as an administrative supervisor of the MCP, was found helpful in monitoring teams, field activities, and external quality assurance of the

MCP activities in Western Equatoria state. *"The DLS has followed the external quality assurance guidelines to maintain records and cross-check MCP activities (Interview with key informant D, 13th September 2024)".*

However, human resource and logistic challenges were faced in arranging regular visits of the monitoring teams within the state. "Difficulties in making travel and accommodation arrangements limit the monitoring teams' opportunity to supervise the quality assurance of MCP within the states. Furthermore, guidelines and tools for conducting the state supervisory visit need more attention (Interview with key informant E, 14th September 2024)".

These findings generally show that project quality control at MCP in Western Equatoria state was not well handled despite efforts to ensure quality in MCP. This is because most of the employees held a negative view of all items about project quality control. Poor project quality control can contribute to poor health service delivery. This will be proved after testing the second hypothesis.

Descriptive results about health service delivery

Staff in non-managerial positions of the MCP in Western Equatoria state responded to five items about health service delivery by indicating their agreement using a five-point Likert scale.

Table 9: Findings about the health service delivery of the MCP in Western Equatoria state

Items about health service delivery	SD	D	NS	A	SA	Total
1. There have been no complaints about mosquito net delivery to the beneficiary	10 (13%)	31 (40%)	6 (8%)	12 (15%)	19 (24%)	78 (100%)
2. The number of mosquito nets delivered to the beneficiary has been increasing	15 (19%)	32 (42%)	5 (6%)	19 (24%)	7 (9%)	78 (100%)
3. The number of people who received mosquito nets has been increasing	11 (14%)	28 (36%)	3 (4%)	17 (22%)	19 (24%)	78 (100%)
4. There have been no complaints about malaria drug delivery to the beneficiary	11 (14%)	36 (47%)	7 (9%)	12 (15%)	12 (15%)	78 (100%)
5. The quantity of drugs given to people has been increasing	23 (29%)	38 (49%)	4 (5%)	10 (13%)	3 (4%)	78 (100%)
6. The number of people who received drugs has been increasing	14 (18%)	45 (57%)	6 (8%)	4 (5%)	9 (12%)	78 (100%)
7. There have been no complaints about management of malaria	15 (19%)	29 (37%)	3 (4%)	16 (21%)	15 (19%)	78 (100%)
8. The cases of malaria treated has reduced	9 (12%)	43 (54%)	6 (8%)	11 (14%)	9 (12%)	78 (100%)
9. The prevalence of malaria has reduced	16 (21%)	24 (31%)	8 (10%)	26 (33%)	4 (5%)	78 (100%)

Source: Data from respondents

Key: SD = Strongly disagree, D = Disagree, NS = Not sure, A = Agree, SA = Strongly agree

Table 9: shows that more staff in non-managerial positions of the MCP in Western Equatoria state opposed all nine

items about health service delivery (that is items 1 to 9) compared to staff in non-managerial positions of the MCP

in Western Equatoria state who concurred with these items or who were not sure about these items. A comparison of these items shows that the percentages of respondents that opposed ranged from 50% to 78% while the percentages of respondents that were not sure ranged from 4% to 10% and the percentages of respondents that concurred ranged from 17% to 46%. From these comparisons, it can be seen that the percentages that opposed the items were higher compared to the percentages that were not sure and the percentages that concurred.

Thus, from this analysis, the following is the interpretation. Findings show that there have been complaints about mosquito net delivery to the beneficiary, the number of mosquito nets delivered to the beneficiary has not been increasing, the number of people who received mosquito

nets has not been increasing and there have been complaints about malaria drug delivery to the beneficiary. In addition, findings show that the quantity of drugs given to people has not been increasing, the number of people who received drugs has not been increasing, there have been complaints about the management of malaria, the cases of malaria treated have not reduced and the prevalence of malaria has not reduced. In general, these findings show that the health service delivery of the MCP in Western Equatoria state was poor.

Descriptive results about health service delivery.

Table 10: Findings about the health service delivery of the MCP in Western Equatoria state

Items about health service delivery	SD	D	NS	A	SA	Total
1. There have been no complaints about mosquito net delivery to the beneficiary	10 (13%)	31 (40%)	6 (8%)	12 (15%)	19 (24%)	78 (100%)
2. The number of mosquito nets delivered to the beneficiary has been increasing	15 (19%)	32 (42%)	5 (6%)	19 (24%)	7 (9%)	78 (100%)
3. The number of people who received mosquito nets has been increasing	11 (14%)	28 (36%)	3 (4%)	17 (22%)	19 (24%)	78 (100%)
4. There have been no complaints about malaria drug delivery to the beneficiary	11 (14%)	36 (47%)	7 (9%)	12 (15%)	12 (15%)	78 (100%)
5. The quantity of drugs given to people has been increasing	23 (29%)	38 (49%)	4 (5%)	10 (13%)	3 (4%)	78 (100%)
6. The number of people who received drugs has been increasing	14 (18%)	45 (57%)	6 (8%)	4 (5%)	9 (12%)	78 (100%)
7. There have been no complaints about management of malaria	15 (19%)	29 (37%)	3 (4%)	16 (21%)	15 (19%)	78 (100%)
8. The cases of malaria treated has reduced	9 (12%)	43 (54%)	6 (8%)	11 (14%)	9 (12%)	78 (100%)
9. The prevalence of malaria has reduced	16 (21%)	24 (31%)	8 (10%)	26 (33%)	4 (5%)	78 (100%)

Source: Data from respondents

Key: SD = Strongly disagree, D = Disagree, NS = Not sure, A = Agree, SA = Strongly agree

Table 10: shows that more staff in non-managerial positions of the MCP in Western Equatoria state opposed all nine items about health service delivery (that is items 1 to 9) compared to staff in non-managerial positions of the MCP in Western Equatoria state who concurred with these items or who were not sure about these items. A comparison of these items shows that the percentages of respondents that opposed ranged from 50% to 78% while the percentages of respondents that were not sure ranged from 4% to 10% and the percentages of respondents that concurred ranged from 17% to 46%. From these comparisons, it can be seen that the percentages that opposed the items were higher compared to the percentages that were not sure and the percentages that concurred.

Thus, from this analysis, the following is the interpretation. Findings show that there have been complaints about mosquito net delivery to the beneficiary, the number of mosquito nets delivered to the beneficiary has not been increasing, the number of people who received mosquito nets has not been increasing and there have been complaints about malaria drug delivery to the beneficiary. In addition, findings show that the quantity of drugs given to people has not been increasing, the number of people who received drugs has not been increasing, there have been complaints about the management of malaria, the cases of malaria treated have not reduced and the prevalence of malaria has not reduced. In general, these findings show that the health service delivery of the MCP in Western Equatoria state was poor.

Testing the first hypothesis.

The hypothesis stated, “There is a positive significant effect of project quality control on public health service delivery by the Malaria Control Programme in Western Equatoria state in South Sudan”. The Spearman Rank Order Correlation Coefficient (ρ) was used to determine the

strength of the relationship between project quality control and health service delivery. The coefficient of determination was used to determine the effect of project quality control on health service delivery. The significance of the coefficient (p) was used to test the hypothesis by comparing the coefficient to the critical significance level at .05. This procedure was applied in testing the other hypotheses. Table 11 presents the test results for the first hypothesis.

Table 11: Correlation between project quality control and health service delivery of the MCP in Western Equatoria state

Dependent variable	Independent variable Project quality control
Health service delivery	$\rho = .560$ $\rho^2 = .314$ $p = .000$ $n = 78$

Source: Data from respondents

Table 11: shows that there was a moderate positive significant correlation ($\rho = .560$) between project quality control and health service delivery of the MCP in Western Equatoria state. The coefficient of determination, which is a square of the correlation coefficient ($\rho^2 = .314$), was also computed and expressed as a percentage to determine the change in health service delivery due to project quality control. Thus, findings show that project quality control accounted for a 31.4% change in health service delivery of the MCP in Western Equatoria state. These findings were subjected to a test of significance (p) and it is shown that the significance of the correlation ($p = .000$) is less than the recommended critical significance at .05. Thus, the effect was significant. Because of this, the hypothesis “There is a positive significant effect of project quality control on public health service delivery by the Malaria Control Programme in Western Equatoria state in South Sudan”.

These findings imply that the moderate effect implied that a change in project quality control contributed to a moderate change in health service delivery of the MCP in Western Equatoria state. The positive nature of the effect implied that the change in project quality control and health service delivery was in the same direction whereby better project quality control contributed to better health service delivery of the MCP in Western Equatoria state and poor project quality control contributed to poor health service delivery of the MCP in Western Equatoria State.

A further analysis was conducted using regression to determine the effect of the dimensions of project quality control (product quality definition and project quality assurance) on the health service delivery of the MCP in Western Equatoria state. Findings are presented in Table 12, accompanied by an analysis and interpretation.

Table 12: Effect of dimensions of project quality control on health service delivery of the MCP in Western Equatoria state

Regression Statistics	
Multiple R	.614
R Square	.377
Adjusted R Square	.361
Standard Error	4.224
Observations	78

ANOVA					
	df	SS	MS	F	Sig F
Regression	2	810.92	405.46	22.73	.000
Residual	75	1338.07	17.84		
Total	77	2148.99			

		Beta (B)	Standard Error	t Stat	P-value
Intercept		10.31	2.09	4.94	.000
Project quality definition	quality	.20	.10	2.09	.040
Project quality assurance	quality	.61	.15	4.13	.000

Source: Data from respondents

Table 12 shows a strong linear relationship (Multiple R = .614) between the combined dimensions of project quality control (product quality definition and project quality assurance) and health service delivery of the MCP in Western Equatoria state. Going by the adjusted R Square, it is shown that the combined dimensions of project quality control (product quality definition and project quality assurance) account for a 36.1% change in health service delivery of the MCP in Western Equatoria state. These findings were subjected to an ANOVA test, which showed that the significance (Sig F = .000) of the Fishers ratio (F = 22.73) was less than the critical significance at .05. Hence, it is concluded that the combined dimensions of the project quality control (product quality definition and project quality assurance) affected health service delivery of the MCP in Western Equatoria state.

The p-values of Beta (B) values show that both product quality definition and resource project quality control singularly had a significant effect on health service delivery of the MCP in Western Equatoria state because the significant p-values (p-value = .040 and p-value = .000) were less than the critical significance at .05. However, project quality assurance more significantly affected health service delivery of the MCP in Western Equatoria state compared to resource project quality definition because it had a higher Beta-value (B = .61) compared to that of product quality definition (B = .20).

Discussion of results.

Project quality control and health service delivery.

The positive effect of project quality control on health service delivery of the MCP in Western Equatoria state established in this study shows that an effective way to control a project is to continuously measure the progress of its work and the teams working on it; comparing that progress against the plan and then adjusting the development parameters to correct any deviation from the project plan. Ashton and Sung (2002) observed that the aspect of project quality control has been identified as extremely important in determining the success of virtually all businesses. The findings of this study also concur with several studies such as those by Ansoff (as cited in Boselie, Paauwe & Jansen, 2001) and by Layton (1991) that showed that a formal project quality control system was an important

factor in leading to corporate success, as measured by performance.

Findings of this are contrary to other researchers of the project quality control activity such as Watts (as cited in Farias, 1998) and Malik and Karger (as cited in Goddard, 2004) who have reported conflicting evidence which both supports and refutes the significance of a project quality control process on the corporate success of an organization. Farias (1998) following an exhaustive review of the area, concluded that little attention has been paid to analyzing the cost-benefit ratio of project quality control in service delivery. Thus, it is not always true that project quality control affects service delivery positively or negatively. On the other hand, Malik and Karger (as cited in Goddard, 2004) wondered whether project control affected organizational performance. This arose after a review of contradicting arguments and evidence about the effect of project control on organization performance.

The positive relationship between project quality control and health service delivery of the MCP in Western Equatoria state established in this study supports research findings of other studies and assumptions of other authors and academicians. For example, the findings of this study support Butler, Corke, Peterson, and Rus (2004) who argued that the ultimate raison d'être underpinning project quality control in organizations is performance maximization. In addition, the findings support Ashton and Sung's (2002) underlying assumption that project quality control necessarily gives rise to positive improvements in health service delivery.

Ashton and Sung (2002: p. 17) were unequivocal in stating that first and foremost, stringent scientific research has now established a moderate link between the use of project management practices such as project quality control and enhanced performance across a range of indicators. Put plainly, investment in these practices pays off on the bottom line. The findings of this study concur with Boselie, Paauwe, and Jansen (2001) who emphasized that project quality control is used to provide a structured approach to the attainment of the desired level of performance in an organization. Fuller and Phipps (2001) observed that project quality control if well conducted would enhance health service delivery.

That project quality control has the potential to deliver organizationally benign outcomes thus appears to be settled

in this study and other studies. Echoing this study's findings and position, Whitfield and Poole (1997, p. 755) have similarly concluded that extant research is supportive of the hypothesis that firms adopting a better project quality control approach have better outcomes than those that do not (Farias, 1998; Goddard, 2004). The findings of this study are supported by other studies conducted elsewhere. For example, the seminal early works on project quality control processes that support the findings of this study include Ansoff (1995), Ogus (1995), Steiner (1999), and Lorange (2010). Like these studies, the importance of project quality control to health service delivery of the MCP in Western Equatoria state has been emphasized.

Conclusion.

The findings of this study revealed that project quality control plays an important role in the health service delivery of the MCP in western Equatoria state. The positive nature of the effect implied that the change in project quality control and health service delivery was in the same direction whereby better project quality control contributed to better health service delivery of the MCP in Western Equatoria state and poor project quality control contributed to poor health service delivery of the MCP in Western Equatoria state. This shows that if project quality control is poorly handled in organizations, the health service delivery of the MCP in Western Equatoria state will be poor.

Recommendation.

MCP management should improve project quality control to enhance its health service delivery of the MCP in Western Equatoria state.

Priority should be project quality assurance given that more significantly affected health service delivery of the MCP in Western Equatoria state compared to project quality definition. More specifically, MCP management should conduct evaluations to provide evidence that MCP quality-related activities and donors, the local community, and MCP employees should provide evidence that MCP quality-related activities are being performed effectively.

MCP management should put in place safeguards and corrective action should be taken to make sure that the expected levels of quality in MCP activities would produce quality outputs. Lastly, MCP management should consult the local community, donors, and MCP employees about quality standards that govern the MCP's execution of its activities.

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List of abbreviations.

CVI: Content Validity Index.
MCP: Malaria Control Programme
SAQs: Self-administered questionnaires.
SPSS: Statistical Package for Social Scientists
ANOVA: Analysis of variance.

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There is no source of funding.

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The authors declare no conflict of interest.

Availability of data.

Data used in this study is available upon request from the corresponding author.

Authors contribution.

JTK designed the study, conducted data collection, cleaned and analyzed data, and drafted the manuscript, SAK supervised all stages of the study from conceptualization of the topic to manuscript writing and SM submission and supported in study conceptualization general supervision and mentorship

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