# INFLUENCE OF EMPLOYEE CHARACTERISTICS ON TRAINING OUTCOME IN TUBERCULOSIS VACCINE RESEARCH IN KEMRI/CDC, KISUMU, KENYA

**ROSE KAZIRIKA ABWUNZA**

**A RESEARCH PROJECT REPORT SUBMITTED IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE AWARD OF DEGREE OF MASTER OF ARTS IN PROJECT PLANNING AND MANAGEMENT OF THE UNIVERSITY OF NAIROBI**

**2013**

# DECLARATION

This research project report is my original work and has not been submitted for an award in any other University.

Signature…………………………………………Date…………………………….

**Rose Kazirika Abwunza**

**L50/69451/2011**

This Research project report has been submitted with our approval as University supervisors

Signature……………………………………………….Date……………………

 **Raphael Nyonje; PhD.**

**Senior Lecturer,**

**Department of Extra-mural studies,**

**University of Nairobi.**

Signature…………………………………………………Date…………………….

**Dr Benson Ojwang,**

**Senior Lecturer,**

**Department of Linguistics,**

**Maseno University.**

## DEDICATION

I dedicate this work to my husband Godfrey and lovely daughters Ashley and Gloria for allowing me time to pursue this noble cause.

# ACKNOWLEDGEMENT

# TABLE OF CONTENTS

# LIST OF TABLES

# LIST OF FIGURES

**LIST OF ABBREVIATIONS AND ACRONYMS**

AIDS        Acquired Immune Deficiency Virus

ANOVA       Analysis of Variance

CBR         Community Based Rehabilitation

CDC         centers for Disease Control and Prevention

CQMP        Clinical Quality Management Plan

EmOC        Emergency Obstetric Care

GCP         Good Clinical Practice

HIV         Human Immunodeficiency Virus

IT          Information Technology

KEMRI       Kenya Medical Research Institute

LHW         Lady Health Worker

MNCH        Maternal, Newborn and Child Health

MO          Medical Officer

NHS         National Health Services

RCA         Root Cause Analysis

RNM         Registered Nurse Midwives

SBA         Skilled Birth Attendant

SSA         Sub-Saharan Africa

TB          Tuberculosis

US          United States

WHO         World Health Organization

# ABSTRACT

Training is a critical element for every employee working in any organization and it results in outcomes that need to be evaluated so as to understand the influence of certain factors on the outcome. The purpose of this study was to assess employee characteristics influencing training outcomes among Tuberculosis (TB) vaccine research employees in TB branch, KEMRI/CDC, Kisumu Kenya. The objectives of the study were, to assess how demographic characteristics of KEMRI/CDC TB branch employees influence training outcomes, to establish whether nature of work performed by KEMRI/CDC TB branch employees influences training outcomes, to determine the extent to which KEMRI/CDC tuberculosis branch employee experience influences training outcomes with the assumption that scores obtained in the posttests are assumed to be influenced only by the training offered, that the delivery mechanism employed for various courses was standardized and that there was no variability among trainers for different courses. This study employed a one group pretest-posttest study design with a saturated sample of 76 employees who work on the TB vaccine trial and have undergone the same assessment. Primary data were collected on nature of work, employee experience, demographic characteristics and scores obtained in CQMP, Registry protocol and version 6.0 using researcher administered semi-structured questionnaires. All participant identifiers were removed. Data was analyzed using quantitative methods. Proportions of employees attaining a pass mark of 70% were computed and ANOVA test to compare variations in mean differences obtained in all variable categories in all the courses taken. The results showed that no gender variations were found in pretest-posttest mean differences, The pretest-posttest mean differences in all age groups ($<$30years, 30-33years and $>$33 years) were not different from each other for all the courses. In the education level category, differences in means for secondary certificate, diploma and degree holders were observed in CQMP (p=0.015), an indication of association between education level and training outcome. The mean differences derived from all the courses for the two categories of employees having experience $<$3 years and $\geq$ 3 years in TB Branch were not statistically different in the two categories (p=0.484, p=0.518 and p=0.459 in CQMP, Registry and version 6.0 respectively). Similar findings were obtained for the two categories of employees with $<$3 years and $\geq$ 3 years experience elsewhere before joining the branch, (p=0.410, p=0.488 and p=0.487 for CQMP, Registry and version 6.0 respectively). Employee experience, whether in TB branch or experience prior to joining the branch, did not influence variations in mean differences. The results showed that only registry protocol had mean differences derived in the nature of work category were statistically different (p=0.005) compared to CQMP (p=0.801) and version 6.0 (p=0.913), thus nature of work had an influence on training outcome in registry protocol. An overall test of hypotheses showed that there was no significant difference between gender and training outcome (p=0.785), age and training outcome (p=0.406), level of education and training outcome (p=0.154), employee experience in TB and training outcome (p=0.487), employee experience elsewhere and training outcome (p=0.462) and nature of work and training outcome (p=0.573), at 0.05 level of significance. The study recommended that trainings related to registry be moderated to suit staff performing different roles in the study. CQMP also needs to be adapted to the different education levels.

**CHAPTER ONE**

**INTRODUCTION**

### 1.1    Background of the study

According to ICH-GCP guidelines, every employee must be qualified by education, training and experience. Globally, several factors have been found to influence training outcomes, though differently in each setting. Baldwin *et al*. (1988) in a meta-analysis of twenty studies from different parts of the world including China found that individual trainee characteristic was a component of training transfer. The individual trainee characteristics include skill and motivation level, ability to learn an apply knowledge, learning styles, personality factors (attitudes and values), level of education, age, life experiences, degree of burnout, and training expectations. Individual, team, department, and agency goals influence the relevance and value given to training evaluated (Curry, *et al*. 1994).

A conceptual model of information technology training was constructed in Hong Kong, by Leung (2006), in an organizational context to fully reflect organizational influences on training outcomes where these variables were grouped twofold: individual characteristics and organizational factors. Individual characteristics have long been found influential on training effectiveness. Some of these characteristics such as age, educational background, work experience, IT-related ability, and self-efficacy, have already been studied in IT-related training research. Other characteristics, such as job tenure, Organizational factors have been studied quite extensively in management training research. The conceptual model showed a relationship between the influential factors − namely, individual characteristics and organizational factors and the outcomes of IT training (Leung, 2006).

Training in most Jordanian organizations is still not important as a function which contributes to organization success (Altarawneh, 2009). A study conducted at Aqaba Special Economic Zone Authority (ASEZA) tried to determine the work environment factors that influence the training programs' effectiveness. The study explored among others the influence and the relationship between work environment factors and the training effectiveness, and the effect of demographic variables as factors that may influence training effectiveness as well as differences in work environment factors influencing the effectiveness of human resource training programs in terms of selected demographic characteristics, such as, age, gender, education level, experience, and number of hours in the training programs. A sample of 263 employees working in five and four star hotels in Aqaba city was used. All of them had attended training programs in different specific courses suitable to their jobs in the hotels. The study revealed that age, gender, education, and time in attending training courses did not influence training effectiveness. In contrast, experience was found as variable factor of opportunity to perform and reward system (Shariff and Makhadmah, 2012).

In Nigeria and Kyrgyzstan the need to evaluate the contribution of training to improving health workers' productivity and the quality of tuberculosis control programs is emphasized (Awofeso *et al* 2008).

Since 1979, the Kenya Medical Research Institute collaborating with the US Centers for Disease Control and Prevention (KEMRI/CDC) have been conducting research on a wide spectrum of illnesses including Malaria, HIV and Tuberculosis (Adazu *et.al* 2005). Whereas there are broad guidelines governing the conduct of research within the institutions, teams working in each of the disease areas may develop additional sets of regulations for specific research activities. This may be borne out of sponsor requirements, or stringent requirements in the case of clinical trials (ICH-GCP guidelines E6). Some of the TB vaccine research

activities within the branch involve several clinical trial studies. As part of staff capacity building, ongoing training and assessment was done. As with all evaluations, the starting point must be to define clearly why the evaluation was being performed, what is being evaluated, when the evaluation would be performed, and how it would be performed (Rubin, 1997, Dietz 1998).

Pre-tests have commonly been used to assess the extent to which learners have prior knowledge of the subject, while post tests measure the extent to which participants gain cognitive knowledge about the subject (Barton *et.al*, 2001). Dietz (1998) notes that the crucial first goal to assure practice efficacy is to ensure that participants gain knowledge about the subject but still we can look at these overall percentages in more detail to determine if they are telling us anything about this exam.

The goal of this is the application of knowledge gained into practice to improve performance (Mueller 1985, Bibus *et. al* 1985). It was on this basis that employees were assessed on various research aspects before and in the course of the research activities. Long term improvement of practice was the ultimate goal of much of continuing professional education. Employees were trained on the research protocol, Good Clinical Practice (GCP), Clinical Quality management Plan (CQMP) among several other courses. The courses were tailored to suit the requirements of research pertaining to the clinical trials. CQMP was a quality course that targeted addressing errors that had been identified and putting in place stringent systems that would ensure data collected was verified at certain time points. Protocol trainings arose mainly due to amendments or sometimes acted as periodic refreshers. Before the start of a course, employees were examined to gauge their knowledge of the course matter. At the end of the course, a second assessment was done to measure how much had been learnt or gained. The pre- and post-assessments were the metrics used to quantify changes in

cognitive knowledge. Thus, the employee nature of work, work experience and demographic characteristics are examined for possible influence on training outcomes.

## 1.2    Statement of the Problem

Every new employee hired in KEMRI/CDC TB branch must undergo training before being assigned any tasks (ICH GCP sec 2.8).   Continuous training and education sessions were offered to refresh employees on study procedures. These trainings which entailed pre and post tests include Clinical Quality Management Plan (CQMP) training, study protocol version 6.0 following amendments to the existing protocol, and Registry protocol training that prepared employees for participant transition to a longitudinal study. The pre-test was a set of questions given to participants before the training began in order to determine their knowledge level of the course content. After the completion of the course, participants were given a post-test to answer the same set of questions.

There was, therefore, need for the examiner to ascertain variations in pre- and post-tests so as to inform strategies to use in future to  moderate such tests to suit employees who perform different tasks and ultimately to measure knowledge change in employees. Such evaluations would further inform trainers on whether certain employees performing particular tasks need to be included or exempted from certain examinations by virtue of not directly performing the tasks. Dietz (1998) notes that the crucial first goal to assure practice efficacy is to ensure that participants gain knowledge about the subject but still we can look at these overall percentages in more detail to determine if they are telling us anything about this exam.

It was also not clear how these changes in scores varied among various employees with different demographic characteristics such as age, gender and education level given that the team has employees with diverse qualifications. Furthermore, it was not clear as to whether the nature of work done by certain individuals would give them an advantage over

counterparts performing different functions on the same study. Finally, no such evaluation had been done to establish whether having served in the branch for longer and gaining more experience influenced such variations or whether the magnitude of change was similar for various courses offered among TB branch employees at KEMRI/CDC. This study therefore intended to explore how the employee characteristics influenced training outcome.

### 1.3 Purpose of the Study

The purpose of this study was to assess employee characteristics influencing training outcomes in tuberculosis research vaccine in TB branch, KEMRI/CDC, Kisumu Kenya.

### 1.4 Objectives of the Study

This study was guided by the following three objectives:

1. To assess how demographic characteristics of KEMRI/CDC TB branch employee influence training outcome

2. To determine the extent to which employee experience as an employee characteristic influence training outcome in TB vaccine research in KEMRI/CDC

3. To establish how nature of work performed by an employee influence training outcome in TB vaccine research in KEMRI/CDC

### 1.5 Research questions

This study was guided by the following three research questions:

1. How does demographic characteristics of employees influence training outcome in TB vaccine research in KEMRI\CDC?

2. To what extent does employee experience influence training outcome in TB vaccine research in KEMRI/CDC?

3. How does the nature of work performed by an employee influence training outcome in TB vaccine research in KEMRI/CDC

## 1.6    Null Hypotheses

This study was built on the following six null hypotheses:

$H_o$:     There is no significant difference between employees' gender and training outcome

$H_o$:     There is no significant difference between employees' age and training outcome

$H_o$:     There is no significant difference between employees' education level and training outcome

$H_o$:     There is no significant difference between employees experience in TB and training outcome

$H_o$:     There is no significant difference between employees' experience elsewhere and training outcome

$H_o$:     There is no significant difference between employees' nature of work and training outcome

## 1.7    Significance of the Study

It was hoped that the study may inform trainers on the need to change strategies that could improve training outcome assessments in order to gain more insight beyond the superficial pretest posttest scores. The study findings would also be used to gauge the value added by the training programme within the TB branch at KEMRI/CDC and inform future delivery mechanisms for similar courses. The findings would also provide knowledge on how to tailor future courses with similar content to suit certain categories of employees with different job responsibilities and individual characteristics.

In addition, the study would help identify which category of employees require additional training and whether prior experience would influence training outcome, and if so how many years of experience would be ideal.

Finally the findings of this study would add to the body of knowledge in the field of evaluation of training outcomes.

### 1.8    Basic Assumptions of the study

This study had two main assumptions. The first was that the scores obtained in the posttests are assumed to be influenced only by the training offered. Being a vaccine trial based on a common protocol for the study team, it was expected that all employees, regardless of their nature of work, should understand the study processes.   Training for individual courses was thought to be the only intervention influencing posttest outcomes. The second assumption was that the delivery mechanism employed for various courses was standardized and that there was no variability among trainers for different courses.

### 1.9    Limitations of the Study

The study only used a subset of employees working in the TB branch at KEMRI/CDC. The findings of this study therefore cannot be extrapolated to the entire branch or the entire institution of KEMRI/CDC. The second limitation was that while the one group pretest-posttest design may be applicable in many settings, the results obtained here may not be replicated in other settings as they may not necessarily have similar set-ups.

### 1.10  Delimitations of the Study

This study was conducted within KEMRI/CDC Kisumu in TB Branch. The Branch comprises teams that work at the project's clinics, field site, and laboratory and at the office

for study support services.  The branch also had a professional development program that provided education, training and communication support.

### 1.11  Definitions of Terms

**Demographic characteristics**　　These were population characteristics that are attributed to an individual. The researcher used gender, age and education level.

**Employee experience**　　This was the number of years an employee has accumulated since he/she started working in TB branch as well as the number of years completed prior to joining TB branch.

**Nature of work**　　The research team comprised employees performing different duties as assigned by the principal investigator. The research team was grouped into three categories: Recruitment, Clinical and Other category.

**Training outcome**　　This was the variation between pre and post test scores

**Pass mark**　　A pass mark of 70% was be employed as the set passing score which was in line with the TB branch set pass mark.

**CQMP**　　A clinical quality management manual that was followed by all employees to assure high standards in the results obtained

**Registry protocol**　　This was a protocol for a longitudinal study that enrolls volunteers who have completed the active vaccine trial.

**Version 6.0**　　This was the sixth amendment to the active vaccine protocol following new changes that affect volunteers in the research

### 1.12 Organization of the Study

This document is organized into five chapters: Chapter one is the introduction and includes background of the study, statement of the problem, purpose of the study, objectives of the research, research questions, significance of the study, basic assumptions of the study, limitations of the study, delimitations of the study and definition of key terms. Chapter two contains literature review with a brief background on pretest and posttests, and then delves into three areas; influence of demographic characteristics on training outcome, influence of work experience on training outcome and influence of nature of work on training outcome. It also highlights the theoretical and conceptual frameworks upon which the study is anchored. Chapter three focuses on research methodology to be employed. This is covered in the following sub areas; research design, target population, sample size and sample selection, data collection and data analysis technique. Ethical considerations are also discussed in this chapter. Chapter four comprises data analysis, presentation and interpretation and lastly chapter five contains summary of findings, contribution to knowledge, conclusions and discussions. It also contains references and appendices.

# CHAPTER TWO

# LITERATURE REVIEW

## 2.1 Introduction

The literature review analyzes what has been written in the area of study. It begins with the concept of training outcomes in TB vaccine Research and a broad overview of pretest and posttest designs then delves into the effects of nature of work, work experience in the organization and elsewhere and demographic factors influencing training outcomes. Thereafter the chapter evaluates the theoretical framework, conceptual framework and the operational framework and finally summarizes the reviewed literature.

## 2.2 Concept of training outcomes in TB Vaccine Research

Training outcomes resulting from training of students, organizational staff and other teams is often accepted as a viable tool to assess the extent to which an educational intervention has had an impact on their learning (Denning, 1993, Feucht *et.al* 1991, McCowan *et.al.* 1982). Professional development programs at the national, regional, and local levels are as diverse as the participants attending the programs. Training and delivery mechanisms at such programs are varied in terms of length of training, participant interaction, group work and other variables.

As these programs conclude and participants return to their duties, administrators may be left wondering what effect these programs had on their learners/participants: did the participants like the program? Did they gain any new knowledge, attitudes, or skills? Will the participants' on-the-job behavior change? What organizational improvements are likely to occur? Answering these questions requires that such programs be evaluated at multiple levels

(Kirkpatrick and Kirkpatrick, 2006). Common to the majority of these evaluation levels is the concept of change. One of the most common techniques to measure change is the traditional pretest-posttest model.

As an assessment tool the use of pre-tests enables researchers to establish a baseline level of knowledge and determine, by comparison to the post-test results, whether the instructional design produced the desired results. Evaluating change using a pretest-posttest model includes three phases: (a) administration of a pretest measuring the variable(s) of interest, (b) implementation of the intervention (or program), and (c) administration of a posttest that measures the variable(s) of interest again (Gall *et.al* 2003). Pre-post testing refers to academic achievement tests that are given to students to assess their academic progress from the beginning to the end of a program of instruction. From a broad perspective, the tests may be administered to students when they enter the facility and then again at exit from the facility. Both administrations should involve the use of the same test with alternative, comparable forms to ensure that the results from the administrations will be comparable and that the student is not taking the same test twice.

Implementing programme evaluations to measure change using a traditional pretest-posttest model can be difficult to plan and execute (Lynch, 2002; Martineau 2004). Not only must program evaluators gain stakeholders' support to obtain reliable measures of change (Martineau, 2004), but they must also respond to the challenges associated with garnering repeated measures when participants arrive late or leave early and developing instruments that are sufficiently sensitive to detect small program outcomes (Lynch, 2002). The practical response to these challenges is that some programmes do not benefit from a formal evaluation process, thereby leaving administrators with little information regarding programme effectiveness. Despite this, pre-post-test procedures are a commonly used method to evaluate

learner outcomes of educational programmes. This procedure provides feedback to the instructor by measuring the initial knowledge level of the learner and what knowledge the learner gained from the workshop or presentation.

Globally a number of scholars have used the pretest-post test design. One such scholar is Calabro *et al.* (2002) who conducted a study in south western United States on 180 hospital staff who attended training on two programmes on prevention and control of disruptive behavior of clients as well as a combination of self-defense skills and methods of restraint for staff who work with potentially assaultive patients. A one group, pre-test/posttest study design was used and at post-test, all of the variables measured, including knowledge, attitude, self efficacy, and behavioral intention showed positive significant change as reported by respondents.

In Australia Lavalle, *et al* (2002) report on a two-day training course delivered to 103 nurses, allied, medical and ancillary staff in Australia.  A recognized program was delivered that included content legal issues, characteristics of aggression, prediction, managing aggression, reporting and self-care. On this occasion a 14- item knowledge test was administered pre and immediately post course in a between and within group design along with a course evaluation form. Results showed that nurses scored highest on the tests, all groups improved significantly, and staff without prior training had greatest improvement, particularly in the prediction, management and reporting aspects of aggression.

In Scotland, Collins (1994) reported on an established five-day course delivered to mixed groups of 31 mental health staff and student nurses. The program included prediction and assessment, verbal and non-verbal de-escalation, legal issues, breakaways and restraint. Measures were administered pre/post-course and at six months follow-up, and included staff attitudes towards violence prediction, patient responsibility for aggression, staff anxiety and

fear, staff confidence. Results were positive in all areas except attitude towards expectation of assault and patient responsibility for violent behavior.

To gather evidence for the evaluation, assessors have two primary means of measurement; direct and indirect (Walvoord, 2004). Direct measures are meant to directly assess the students' learning. This is most often done through tests. Gronlund (1998) has two ways of describing direct measuring which he calls the pen and pencil model and the performance model. In the pen and pencil model, students are given tests which are designed to assess their broad understanding of a topic (Gronlund, 1998). Within this method there are many avenues open to the researchers to perform their evaluations including the use of pre- and post-tests, controls and variables reflected in the test questions, and the selection of the test takers themselves (Walvoord, 2004). This method of assessment is often used in college education settings as it allows departments with broad disciplines the opportunity to look at their entire curriculum (Gronlund, 1998). This was in fact the method of assessment employed by the TB branch at KEMRI/CDC, where a pre-test and post-test were administered to employees in the branch.

## 2.3 Demographic characteristics and training outcomes in Tuberculosis Vaccine Research

Deutschlander (2009) conducted an analysis of training effects on school personnel's knowledge, attitudes, comfort, and confidence levels toward educating students about HIV/AIDS in Pennsylvania. This study explored the knowledge, attitudes, confidence, and comfort levels of school personnel regarding the teaching of HIV/AIDS to school aged children, how do HIV/AIDS trainings affect the knowledge, attitude, confidence, and comfort levels of school personnel, the extent to which demographics of the school personnel influence their knowledge, attitude, confidence, and comfort levels in teaching HIV/AIDS and

whether knowledge of HIV/AIDS predicts confidence, attitudes, and comfort levels. The subjects (N=341) included in this study were part of the "HIV Update: A Workshop for Educators" sponsored by the Pennsylvania Department of Education. These trainings were made available to school personnel across the state of Pennsylvania during a three year period. Data was gathered from pre- and post-tests and included measures that targeted subjects' knowledge, attitudes, comfort levels, and confidence levels associated with HIV/AIDS. Pre-test results showed the lowest confidence level mean score for women was explaining to students how to use a condom.

A study conducted in USA examined the attitudes toward physical activity and exercise of university students enrolled in Personal Wellness classes. 1, 625 undergraduate students completed the Attitudes toward Exercise and Physical Activity (ATEPA) inventory on the first and last day of the class. Paired-samples t test results comparing the mean pretest ATEPA score to the mean posttest score revealed a significant improvement, ($\bar{t}$ (1624) = 2.91, $\bar{p}$ < .01). A repeated measure of multivariate analysis of variance (MANOVA) also revealed significant between-subjects effects for gender, $\bar{F}$ (1, 1579) = 30.23, $\bar{p}$ < .01, and exercise history, $\bar{F}$ (2, 1579) = 35.16, $\bar{p}$ < .01. Results suggest that students showed a significant improvement in attitude toward physical activity and exercise following completion of the university-required personal wellness course. Both exercise history and gender appeared to have influenced these effects. (Mick, *et. al* 2004).

Mick, *et. al* (2004) found that females had higher pre and post test scores than males, and also displayed significant improvements over the semester. Females may have taken the course and instructors more seriously while males were indifferent. Another possible explanation is that though MANOVA interaction effects were not statistically significant, a higher percentage of females had inactive/light exercise histories than did males. Specifically,

21.5% of females reported an inactive/light exercise history, 47.8% moderate, and 30.7% heavy/vigorous. In contrast, only 12.1% of males classified themselves as inactive/light while 49.7% were vigorous. A final explanation could be that males were more inclined to use the post test to express their displeasure with the required class than females.

Another study was conducted in Spain evaluating the existence of gender differences in socioemotional factors during adolescence, to analyze developmental factors, and to apply a program of education for peace and prevention of violence to determine whether the pretest–posttest change in socioemotional developmental factors differ as a function of gender. The sample comprised 285 adolescents, aged 15–16 years, including 162 experimental subjects and 123 control subjects. An experimental design of repeated pre–posttest measures with a control group was used, and four assessment instruments were administered. Analyses of variance confirmed significantly higher scores in the female adolescents in cognitions of rejection of violence, prosocial cognitions, cooperative conflict solving, positive strategies for coping with violence, and positive social behaviors. Male adolescents obtained significantly higher scores in cognitions of acceptance of violence, aggressive conflict solving, and aggressive strategies for coping with violence, and negative social behaviors. The pre–post change in most of the factors of socioemotional development assessed was similar in both sexes (Garaigordobil 2008).

In Sweden, an evaluation of the effects of naturalistic educational interventions on attitudes towards persons with mental illness was done. A pre- post test design was employed on 456 students in vocational university programmes to become nurses, social workers, occupational therapists and public health workers.  A mental course in mental illness using questionnaires focusing on familiarity with mental illness and attitudes towards the mentally ill in general and towards schizophrenia in particular was completed. Results revealed a

significant improvement (p<0.001) for the total group in their being afraid of people with mental illness in general and being more positive towards having mentally ill people living in their neighborhood. However, familiarity, age and gender did not influence the results (Gyllensten, *et al*, 2011).

In Pakistan, a study on performance of LHWs in knowledge of MNCH found that their performance was good with 30% scoring more than 70%. The Medical Officers (MOs), in comparison, performed poorly in their knowledge of MNCH with only 6% scoring more than 70% but performed far better in counseling skills compared to the LHWs (Ariff et al, 2010) in contrast to their level of education.

An investigation of the effect of assertive training on early-adolescents' improvement of resilience was conducted in Nigeria. The training which consisted of 10 sessions of 50 minutes each was conducted at Army Day Secondary School in Obio/Akpor Local Government Area of Rivers State. A total of 24 students aged 10-12 years were used for the study. Pre-test post test experimental and control group design was used with some observation also made Randomization assignment was used to draw the 14 (8 male and 6 female) students to experimental and 10 (male and female) student to control groups. The summary of the research questions and hypothesis answered showed that there was positive effect of assertiveness training on improvement of resilience on respondents. The assertiveness training showed more improvement on resilience of the girls than that of the boys (Chikwe Agbakwuru 2012).

A quasi-experiment employing pre-test and post-test research design to evaluate reproductive health awareness for adolescence was conducted at Ilala Municipal; Dar es Salaam, Tanzania where data was collected from 300 students aged 11 to 16. First, students took the pre-test followed by a 45 minute program lecture. Reproductive health materials used

included a Maggie apron picture. An anonymous 23-item questionnaire was used to collect the data. Descriptive data were used to describe the characteristics demographics. A post test was then administered. The results indicated that girls' mean score in the knowledge pre-test was 5.9, and 6.8 in post-test, which increased significantly (t = 7.9, p = 0.000) while that of boys was 25.6 in pre test and 26.4 in post-test, which showed a significant increase (t = 2.4, p = 0.019). ( Madeni *et al*, 2011).

## 2.4 Employee experience and training outcomes in Tuberculosis vaccine Research

Literature suggests that the amount of time invested in an organization influences mastery of various organizational aspects. Extensive experience of activities in a domain is necessary to reach very high levels of performance.

In a cross-sectional study conducted in Scotland, UK, Bowie, P. (2013) examined post-training experiences, benefits and attitudes. The aim was to capture and learn from the reported experiences, benefits and attitudes of Root Cause Analysis (RCA)-trained staff and the perceived impact on healthcare systems and safety. A questionnaire was adapted from a published Australian research study to undertake a cross sectional online survey of health care professionals (e.g. nursing & midwifery, medical doctors and pharmacists) formally trained in RCA by a single territorial health board region in National Health Services (NHS) Scotland. A total of 228/469 of invited staff completed the survey (48%).

Data on respondent characteristics and demographics together with background information on when they attended RCA training, the type of training received and how long the training lasted was collected. The great majority of participants were female (176, 77.2%), with the largest group of respondents coming from the nursing & midwifery professions (99, 43.4%), and those based in the acute sector (91, 39.9%). Most participants attended a one-day

in-house RCA training event (181, 81.1%) A comparison of the professional characteristics and demographic details was done and it was found that three factors were statistically associated with a greater likelihood of involvement in or leading an RCA: being based in the acute sector or NHS Board head quarters (P<0.001); increasing duration of time since training (P<0.05) and belonging to the management or nursing & midwifery professional groups (P<0.05). Other factors such as the type and duration of training and respondents' gender and job experience were not statistically associated with RCA involvement or leadership.

In other studies conducted in the US, job experience was identified as major positive contributor to work performance (Dokko *et. al* 2008), and the longer people worked, the more skill they gained. They also note however, that prior work experience may include not only relevant knowledge and skill, but also routines and habits that do not fit in the new organizational context. Indeed, these routines and habits may limit the positive effect of prior experience on performance, suggesting that when individuals move across firm boundaries, their prior experience may not be wholly beneficial.

In one study in Pakistan conducted by Iqbal (2010), length of service was found to be significantly associated with organizational commitment and performance.

## 2.5 Assessment of training outcomes based on nature of work performed in Tuberculosis vaccine Research

Pre and post-tests have been applied in several contexts globally and have been used to test suitability of some employees with particular skill sets for certain tasks where different cadres of staff are subjected to the same assessment to see how well they executed a specific task.

In Pakistan, Ariff *et al,* (2010) conducted a training needs assessment analysis in the public health sector of Pakistan to recognize gaps in the processes and quality of Maternal

Newborn and Child Health (MNCH) care provided. An assessment of Knowledge, Attitude, and Practices of Health Care Providers on key aspects was evaluated through a standardized pragmatic approach. Three tiers of health care personnel providing MNCH in the community and across the public health care system were identified as follows: the Lady Health Workers (LHWs) form the first tier of trained cadre that provides MNCH at primary care level. Majority of healthcare providers (LHW, LHV, midwives, nurses and doctors/medical officers) are employed in the public health sector that is centralized under the federal and provincial ministries of health, Jalil F.(2004), Jan (2007). The Lady Health Visitor (LHVs), nurses, midwives cadre follow next and provide facility based MNCH care at secondary and tertiary level (RHCs, Taluka/Tehsil, and DHQ Hospitals). The physician/doctor is the specialized cadre that forms the third tier of health care providers positioned in secondary and tertiary care hospitals (Taluka/Tehsil and DHQ Hospitals).

Evaluation tools were designed to provide quantitative estimates across various domains of knowledge and skills with the pass mark set at 70%. The study found that the performance of LHWs in knowledge of MNCH was good with 30% scoring more than 70%. The Medical Officers (MOs), in comparison, performed poorly in their knowledge of MNCH with only 6% scoring more than 70% but performed far better in counseling skills compared to the LHWs. Only 50% of LHWs could secure competency scale in this critical component of skills assessment. This evaluation highlighted the need for periodic assessment of health worker training and skills across various cadres to address gaps and develop targeted continuing education modules.

According to Lavalle, *et al* (2002) report on a two-day training course delivered to 103 nurses, allied, medical and ancillary staff in Australia. A recognized program was delivered that included content legal issues, characteristics of aggression, prediction, managing

aggression, reporting and self-care. A fourteen-item knowledge test was administered pre and immediately post course in a between and within group design long with a course evaluation form. Results showed that nurses scored highest on the tests, all groups improved significantly, and staff without prior training had greatest improvement, particularly in the prediction, management and reporting aspects of aggression.

Within the African continent, Adegoke *et al*, (2012) conducted a cross sectional, descriptive study which was carried out between 2009–2011 to study the definitions and roles of skilled birth attendants (SBA) from several Sub Saharan African (SSA) countries, a region which contributes to 57% of the 358, 000 global maternal deaths while having only 17% of the global births, (WHO UNICEF 2010) and where the life time risk of dying during pregnancy, childbirth or in the early post natal period is very high in this setting; 1 in 31 compared to 1 in 4300 in developed regions. In addition, more than a third of the approximately 2.65 million stillbirths and 3.3 million neonatal deaths globally, occur in SSA, (Lawn, *et al* 2011 and Oestergaard, 2011).

This study aimed at, among other things, mapping the cadres of health providers considered SBAs in SSA. Information collected included: the definition of a SBA, cadres of staff reported to be SBA in each country, the existence of regulatory bodies, which of the nine EmOC signal functions were expected to be performed by each cadre and whether these cadres were legislated to perform these signal functions namely  parenteral administration of an oxytocic, antibiotic and anticonvulsant, manual removal of a retained placenta, removal of retained products of conception, assisted delivery, resuscitation of a baby using a bag and mask, blood transfusion and caesarean section  Campbell, O. *et al* (2005). Information on entry requirements and length of training for the various cadres of SBAs was also collected.

The study revealed that there were at that time more than twenty different cadres of health care providers (HCP) who were reported to be work as a SBA in the nine surveyed sub-Saharan African countries. Performance of some signal functions among different cadres of nurses varied substantially among countries. The Registered Nurse Midwives (RNMs) in Gambia, Ghana, Kenya, Malawi and Tanzania for example were legislated to and did provide signal functions such as manual removal of placenta and removal of retained products, where as they were legislated to but not perform these functions in Nigeria. The same cadres, i.e. RNM, were not legislated to perform assisted vaginal delivery e.g. vacuum extraction in Nigeria, Gambia and Zimbabwe, legislated to but did not perform signal function 6 in Tanzania and perform it though not legislated to do so in Sierra Leone.

There was a proportion of different cadres of nurse-midwifery health care providers who can provide a signal functions for each country and for each of the eight EmOC signal functions they could potentially perform (i.e. excluding caesarean section). In all the countries, parenteral antibiotics could be offered by all cadres of nurses. However in three of the nine countries provision of an oxytocic is not a signal function currently provided by 100% of the available cadres of nurses expected to function as SBA (20% in Gambia, 60% in Malawi, 80% in Somaliland). Similarly, only 80% of the available cadres of nurses administered anticonvulsants in Ghana, Kenya, Tanzania and Somaliland, and this is only 40% in Zimbabwe and 60% in Malawi respectively.

The proportion of available cadres of nurses performing manual removal of placenta, removal of retained products, and assisted vaginal delivery (vacuum extraction) was low in all the countries with the exception of Ghana. There were other cadres of nurses such as enrolled midwives, enrolled nurse midwives and nurse midwife technicians who were traditionally not trained to perform certain functions, but who are reported to now provide these signal

functions if they have attended additional in-service training either in Life Saving Skills (LSS) or in Basic Emergency Obstetric Care (BEmOC).

The legislation status, however, has not yet changed. This was observed in Kenya, Malawi and Somaliland. Except for the cadres: obstetricians, medical doctors and registered nurse- midwives, there was lack of consensus among KI regarding which signal functions were being provided by cadres of staff and which of these they were legislated to perform. This was especially so for signal functions 3 (parenteral anticonvulsants), 4 (manual removal of placenta), 5 (removal of retained products) and 6 (assisted vaginal delivery) respectively. Finally, in some countries, it was noted that there were cadres of providers which were not reported to be SBA but who were conducting deliveries and providing some of the EmOC signal functions, especially in rural and hard to reach areas. Examples include auxiliary midwives and medical attendants in Somaliland and Tanzania who conducted deliveries and Community Health Extension Workers (CHEWs) in Nigeria who conduct deliveries and can administer parenteral antibiotics, oxytocics and anticonvulsants as well as perform manual removal of retained placenta,( Scott and  Ronsmans 2009).

Further studies were recommended to document whether cadres of health care provider in principle reported to be SBA are really able to provide skilled birth attendance for which an enabling environment is also needed and which of whether these health care providers have the necessary skills and competency to effectively work as SBA and which of the EmOC signal functions they should and can perform to ensure improved maternal and newborn health outcomes (Scott and Ronsmans 2009).

In another study, two-year training programme in Community Based Rehabilitation (CBR) in South Africa, Dolan et al (1995) suggested that while the programme had imparted useful skills to CRWs, questions remained as to the adequacy of its coverage overall and

among people with different types of disability. The study population included all current and former clients of rehabilitation workers trained through the programme. From the population of 383 clients, a random sample of one former client and four current clients was taken from each rehabilitation worker's case load, so that the total client sample numbered 40 cases. All clients were then interviewed individually using a structured interview schedule.

The findings suggested that rehabilitation workers had a significant impact on the reduction of the functional limitations of the persons with disabilities in their care and contributed to improving their daily living activities. Of those who received care, 60% regarded their increased mobility as the most important benefit of working with a CRW. Additionally, the rehabilitation workers helped to increase their clients' self esteem and their reintegration into community and family life.

Tjoa (2010) developed a model to forecast the size of the public sector health workforce in Zambia over ten years to identify a combination of interventions that would expand the workforce to meet staffing targets. The key forecasting variables are training enrolment, graduation rates, and public sector entry rates for graduates, and attrition of workforce staff. The effects of changes in these variables on the projected number of doctors, clinical officers, nurses and midwives in the public sector workforce in 2018 were modeled. The analysis showed that with no changes to current training, hiring, and attrition conditions, the total number of doctors, clinical officers, nurses, and midwives will increase from 44% to 59% of the minimum necessary staff by 2018. No combination of changes in staff retention, graduation rates, and public sector entry rates of graduates by 2010, without including training expansion, is sufficient to meet staffing targets by 2018 for any cadre except midwives.

Per cadre analysis revealed that training enrolment needs to increase by a factor of between three and thirteen for doctors, three and four for clinical officers, two and three for

nurses, and one and two for midwives by 2010 to reach staffing targets by 2018. The study concluded that meeting the minimum need for health workers in Zambia this decade will require an increase in health training school enrolment. Supplemental interventions targeting attrition, graduation and public sector entry rates can help close the gap (Tjoa, 2010).

Chankova (2009) conducted a study on the reasons for Health workforce attrition in the public sector in Kenya. This study analyzed data from a human resources health facility survey conducted in 2005 in 52 health centers and 22 public hospitals (including all provincial hospitals) across all eight provinces in Kenya. The study looked into the status of attrition rates and the proportion of attrition due to retirement, resignation or death among doctors, clinical officers, nurses and laboratory and pharmacy specialists in surveyed facilities.

The results indicated that overall health workers attrition rates from 2004 to 2005 were similar across type of health facility: provincial hospitals lost on average 4% of their health workers, compared to 3% for district hospitals and 5% for health centers. However, there are differences in the patterns of attrition rates by cadre. Attrition among doctors and registered nurses was much higher at the provincial hospitals than at district hospitals or health centers, whereas the opposite pattern was observed for laboratory and pharmacy staff (Chankova 2009).

In provincial hospitals, doctors had higher attrition rates than clinical officers, and registered nurses had higher attrition rates than enrolled nurses. In contrast, attrition of enrolled and registered nurses in district hospitals and health centers was similar. The main reason for health worker attrition (all cadres combined) at each level of facility was retirement, followed by resignation and death. However, resignation drives attrition among doctors and clinical officers; retirement accounts for the main share of attrition among nurses

and pharmacy staff; and death is the primary reason for attrition among laboratory staff, particularly in district hospitals. (Chankova 2009).

## 2.6    Theoretical framework

This study was anchored on cognitive theory propounded by Gestalt psychologists led by Max Weithmer. The theory was developed in Germany in the early 1900s. Gestalt is roughly translated as "configuration," or "pattern," and emphasizes "the whole" of human experience, (Yount, W. 1996). Gestalt psychologists viewed the whole as being greater than the sum of its parts. Gestalt psychologists proposed looking at the patterns rather than isolated events. Gestalt views of learning have been incorporated into what have come to be labeled cognitive theories. Two key assumptions underlie this cognitive approach: (1) that the memory system is an active organized processor of information and, (2) that prior knowledge plays an important role in learning. This theory argues that there may be biological and psychological experience that could confound ones results while trying to measure associations.

In this study biological factors such as gender were studied in order to establish their influence on training outcomes. It was on this basis that such factors such as one's nature of work, education level, gender, and previous work related experience among employees attending the same training on a particular subject matter were tested to determine whether they have any influence on training outcomes.

## 2.7    Conceptual framework

The conceptual framework applied here was derived from the Gestalts psychologists' theory. In brief, several factors including nature of work, work experience and demographic characteristics are thought to indirectly influence training outcomes. This is presented below.

**Figure 1 Conceptual framework**

**Independent variables**                                          **Dependent variable**

*Other category comprises employees performing other tasks that are related to each other.

In this study the independent variables which are component of employee characteristics include; Nature of work referring to the tasks performed by employees including recruitment tasks, clinical procedures and quality assurance tasks; Employee experience refers to number of years served in TB branch and number of years served elsewhere before joining TB branch; Demographic characteristics include age, gender and education level of employees. A measure of training outcome will be determined by these factors.

On the other hand factors like staff motivation and training venue can also influence training outcomes. For example the desire to attain a passing score of 70% so as to avoid being retrained or barred from performing study procedures as well as whether the training is done at the field station or at a hotel will determine training outcome.

### 2.8    Summary of literature review

The literature reviewed showed that employee characteristics may influence training outcome but direction of influence and the setting varies form study to study and may also vary differently globally.  The studies discussed in this section tended to focus on cadre and demographic characteristics with little focus on length of service. Not many studies however report analysis of variations in scores but tend to quickly focus on transfer of learning to task execution. As a result, there was a dearth of detail on how various employees carrying out certain tasks perform in health research related trainings given that the background of the research team is quite diverse. Focus seemed to be on research outcomes rather than training outcomes. Not much literature was available on Kenyan setting for any analysis of variations in test scores in the health sector thus there is need for research organizations to go beyond provision of training to employees and analyze such variations in scores obtained, alongside the organizations core goals.

# CHAPTER THREE

## RESEARCH METHODOLOGY

### 3.1    Introduction

This chapter describes the research design employed in this study, the population targeted, the method of sampling used, how data was collected, data analysis techniques and ethical issues surrounding this study.

### 3.2    Research Design

In this study, one group pretest-posttest design (Best & Kahn, 2003) was used. This study design has been used by researchers such as Calabro et al. (2002) who conducted a study in south western United States. on 180 hospital staff who attended training on two programmes, firstly, 'Nonviolent Crisis Intervention (NVCI)' that teaches staff how to prevent and control the disruptive behavior of clients and secondly, 'Handle with Care' which teaches a combination of self-defense skills and methods of restraint for staff who work with potentially assaultive patients.  This study design was considered suitable because it is the simplest form of research design. A single group was observed subsequent to some training presumed to cause change.

In this research study, an employee was observed at two time points, one before the treatment (pre-test score) and one after the treatment (post test score). Changes in scores obtained are presumed to be as a result of the treatment. No control or comparison group was employed. As an exploratory approach, it was a cost-effective way to discern whether a potential explanation was worthy of further investigation. The change in scores could be as a

result of historical changes unrelated to the treatment, the maturation of the subject, or an artifact of the testing.

The study participants in this study had several similar characteristics including belonging to one research branch at KEMRI/CDC, all of them participated in clinical trial studies within the branch, and all of them underwent the same trainings and assessments.

### 3.3    Target Population

The population targeted in this study included all the employees participating in vaccine trials within the Tuberculosis Research (TB) branch at KEMRI/CDC in Kisumu. There were a total of 76 employees working on the TB Vaccine Clinical trial who were all included in the analysis. Among these employees were several sections.  These include clinical, nursing, dispensing and electronic data capture for those in the 'clinical arm'. Community mobilization and participant recruitment for the ones in 'recruitment arm' and source data verification, quality control checks among other duties for those in 'other category'. All staff in this study had served for at least one year in the vaccine trial. The lowest education level for the group was secondary education while the highest was master's degree.

### 3.4    Sample size and Sampling Procedure

A sample is a section of the population that is suitable enough to represent the characteristics of the whole population. According to Mugenda and Mugenda (2003), a sample size must be large enough to represent the salient characteristics of the accessible population. Generally the sample size selection depends on such factors as the number of variables, in the study, the purpose of the study, population size, the risk of selecting a bad

sample, the type of research design, method of data analysis and the size of accessible population and the allowable sampling error(Israel,1992.)

Based on the above factors sample size selected here includes the entire population as the sample. A census was suitable for this population since the population size was small and would eliminate sampling error and provides data on all the individuals in the population (Israel, 1992.). There were 76 employees involved in clinical trials within the TB branch at KEMRI/CDC. The researcher used the entire population as the sample since the population size was considered small.

## 3.5   Research Instruments

The study used semi-structured questionnaires (Appendix II) as instruments for collecting data. The questionnaire was administered by the researcher.

### 3.5.1   Pilot testing

To ensure data collection instruments were reliable, pre-testing and practical interviewing was conducted by the researcher with 10 employees working on a drug trial within the tuberculosis branch. This captured important comments and suggestions from the respondents that enabled the researcher to improve efficiency of instruments, adjust strategies and approaches to maximize response rate.

Nachmias and Nachmias (1996) noted that pilot-testing is an important step in the research process because it reveals vague questions and unclear instructions in the instruments.

### 3.5.2 Validity of the Instruments

Validity is the accuracy and meaningfulness of inferences, which are based on the research results. In other words, validity is the degree to which results obtained from the analysis of data actually represents the phenomena under study (Mugenda & Mugenda, 2003).

In this study pilot-testing was used as an important step in making the instrument valid for the purposes of the study. During the pilot testing vague questions and unclear instructions were revealed. Important comments and suggestions were captured from the respondents that enabled the researcher to improve efficiency of instruments, adjust strategies and approaches to maximize response rate. The responses from different participants were analyzed and a generalized position which stood the validity test was reached.

The study ensured that the questionnaire captured all the intended respondents. The questions were simplified by the study to enable respondents comprehend all the questions.

### 3.5.3 Reliability of Instruments

Reliability is a criterion that refers to the consistency of data from the use of a particular method. A measure of reliability is the extent to which its repeated application under the same condition by different researchers will give the same results (Taylor, 2008)

To measure reliability this study used the test-retest method which involved selecting 10 respondents from Tuberculosis drug trial and administering the same instrument twice to the same group of participants after some two week time lapse.

The results of the test-retest were analyzed using statistical package for social sciences (SPSS). The results of the first test will be correlated with that of the re-test. The Karl Pearson's formula for correlation was used as follows;

$$r = \frac{\sum(X - \overline{X})(Y - \overline{Y})}{\sqrt{\sum(X - \overline{X})^2 \sum(Y - \overline{Y})^2}}$$

r= Karl Pearson coefficient of correlation

Y=values of the first test

X=values of the retest

$\overline{Y}$  =Mean of the first test

$\overline{X}$  =Mean of the retest.

## 3.6   Data Collection Procedure

Data for this study was collected from primary sources. A researcher administered questionnaire (Appendix II) was used to collect the data from employees.

An official request was made to TB branch supervisors to permit access to records and use of data for purposes of confirmation of scores. The scores in the questionnaire were compared to the scores in records for consistency and any discrepancies were verified and corrected by the researcher.

## 3.7   Data Validity

Validity is the accuracy and meaningfulness of inferences, which are based on the research results. In other words, validity is the degree to which results obtained from the analysis of data actually represents the phenomena under study (Mugenda and Mugenda, 2003).

A split half technique was used to measure reliability of the test questions that were administered. The test was divided or split the test into half (even and odd numbers). The

scores on one half were correlated with those on the other half. This correlation was used in estimating the reliability of the test. Spearman-Brown Formula was employed when estimating the reliability using the split half method.

$$r_{xx} = k\ r\ /\ (1 + (k-1))r$$

Where:

k = number of items in the 'new' split-half test (i.e., usually the original number of questions the test had before being split) divided by the number of original items in the split-half test (i.e., the number of question in your split-half correlation)

r = the correlation between the original split-halves.

At KEMRI/CDC TB branch all pre-test and post-test questions for each course were the same in structure and all courses had test questions and training content derived from the course objectives. The difference was that the pretest test paper was labeled pre-test and the post-test test paper was labeled post-test. CQMP aimed at introducing stringent quality control measures in order to assure data integrity. The test questions for all the courses were set by the study coordinator. Protocol trainings were aimed at introducing employees to the new protocol, communicating amendments or transitioning study participants to another protocol. A training Standard Operating Procedure (SOP) exits and clearly stipulates that for any employee to be allowed to perform certain procedures he/she must attain a passing score of 70%, failure to which a retraining must be done. The researcher, however, did not use data from the retrained employees.

Pretest questions are collected at the end of the specified time, thus while undergoing the training there was no reference to the questions. All areas covered in the pre and post-test

were taught during the training and test papers are marked using a standard marking scheme. Employees are allocated the same amount of time within which to complete the examinations and are spaced out during examination sessions so as to avoid possibility of copying from each other.

### 3.8    Data analysis Techniques

The analysis focused on a critical examination, rather than a mere description, of the documents. Data on pretest and post test scores for each individual for each of the courses is on file. The courses included in the analysis comprise clinical quality management plan (CQMP), TB vaccine trial protocol version 6.0 and the registry protocol. For each course, a pretest assessment was done for each individual and a score obtained. Then following training, a post test assessment was conducted and participants' individual scores recorded.

Quantitative techniques of data analysis were used to analyze the data collected. The quantitative data was analyzed using SPSS for windows version 13.0.

The first objective examined whether demographic characteristics influenced variation between pre and post test scores. The demographic attributes that were used in this analysis were gender, age and education level. The age for research team was classified into following age categories: <30years, 30-33years, >33 years. Using the set pass mark, frequencies were generated for both pre and post test scores. Pretest-posttest mean differences were also computed. Variations in the mean differences obtained were also analyzed.   The same analysis was repeated for highest level of education attained; secondary certificate, diploma and higher diploma and degree levels.

The second objective assessed whether length of service influenced variation between pre and post test scores. Employee experience was measured as the number of years completed with the TB branch clinical trials group on one arm and number of complete years

served elsewhere on the other arm. Employees with experience in TB were grouped into two groups; those who have served less than 3 years versus those with 3 or more years in both categories. Again using set pass mark of 70% for both pre and post-tests, frequencies were generated for those attaining pass marks for the course offered. Pretest-posttest mean differences were computed. Variations in the mean differences obtained were analyzed using ANOVA test. The same process was repeated for the other arm with work related experience gained prior to joining TB branch.

The last objective examined whether nature of work influenced variation between pre and post test scores. This objective derived frequencies of those attaining a pass mark of 70% by nature of work in both pre and post tests. The mean scores obtained between pre and post-test for each course were computed per category of nature of work. The magnitude of change between the pre and post-tests mean differences were compared by nature of work were compared using ANOVA test. A p-value less than 0.05 was considered indicative of statistically significant association between employee`s nature of work and performance scores for each course.

### 3.9    Ethical Considerations

Data that was used in this study came from protocols implemented following approvals from KEMRI National Ethics Review Committee as well as the CDC Institutional Review Board. All participant identifiers were removed from the dataset for purposes of confidentiality. Additionally, a research permit was obtained from the Ministry of Higher Education under Department of National Council for science and Technology which was granted approval for the research to be conducted. Permission to confirm the test score data was obtained from the TB branch supervisors before commencement of analysis.

## CHAPTER FOUR

## DATA ANALYSIS, PRESENTATION, INTERPRETATION AND DISCUSSION

### 4.1 Introduction

This chapter presents data analyzed in the following subsections: Questionnaire response return rate, distribution of employees by demographic characteristics, the influence of demographic characteristics on training outcome, influence of employee experience on training outcome and the influence of nature of work on training outcome.

### 4.2 Questionnaire response return rate

A total of 76 interviews were conducted with the employees. Semi-structured questionnaires were administered by the researcher and collected on the spot forming a questionnaire return rate of 100%. The study realized this high return rate due to the fact that the employees for a cohort of study team working on the same protocol thus ease in reaching them.

### 4.3 Distribution of employees by demographic characteristics, years of experience and nature of work

This section describes the distribution of employees by demographic characteristics, years of experience and nature of work. The demographic information was collected on gender, age, and level of education. The results were presented in three sections as follows: employees' gender, employees' age and employees' level of education.

### 4.3.1 Distribution of employees by gender

The study found it important to analyze gender distribution of the employees. This was important because the study wanted to compare the training outcome in TB research

Vaccine between males and females. Employees were asked to state their gender and the results were given in table 4.1.

**Table 4.1      Distribution of employees by gender**

| Gender | Frequency | Percentage |
|---|---|---|
| Male | 39 | 51.3 |
| Female | 37 | 48.7 |
| **Total** | **76** | **100.0** |

*Source: Field Survey (2013)*

Table 4.1 shows that, there was an even distribution of males and females among the employees interviewed. This may have happened by chance since KEMRI/CDC is an equal opportunity employer.

### 4.3.2   Distribution of employees by age

The study sought to establish the ages of the employees who were interviewed. Employees were asked to state their date, month and year of birth. A computation of age as at 30th June 2012 was done. The study analyzed the age distribution of employees because it was important when evaluating training outcomes as this would inform about the age of the employees at the time of taking the trainings. The results are as summarized in table 4.2

**Table 4.2      Distribution of employees by age**

| Age (years) | Frequency | Percentage |
|---|---|---|
| <30 | 26 | 34.2 |
| 30-33 | 24 | 31.6 |
| >33 | 24 | 31.6 |
| No response obtained | 2 | 2.60 |
| **Total** | **76** | **100.0** |

*Source: Field Survey (2013)*

The findings in table 4.2 show that respondent ages were evenly distributed across the three age groups examined ranging between 31.6%-34.2%. A small number of employees 2(2.6%) did not state their age. Majority of the employees 50(65.8%) were aged 33 years and below. This age balance could be attributed to the fact that the project activities are based in out of town and mainly involves frequent travelling to the field site.

### 4.3.3   Distribution of employees by education level

The study found it important to analyze the level of education of the employees as a factor that could influence training outcome. The employees were asked to state the highest level of education they had attained by $30^{th}$ June 2012. The analysis of the results is as indicated in table 4.3.

**Table 4. 3      Distribution of employees by highest education level**

| Highest education level | Frequency | Percentage |
|---|---|---|
| Secondary | 9 | 11.8 |
| Diploma | 44 | 57.9 |
| Higher Diploma& Degree | 23 | 30.3 |
| **Total** | **76** | **100.0** |

*Source: Field Survey (2013)*

Table 4.3 shows that majority of the employees possessed diploma certification 44(57.9%) while secondary certificate holders formed the lowest representation 9(11.8%). The nature of work in TB vaccine Research project requires certain technical skills and possession of a minimum of diploma certification is essential for execution of projects technical tasks.

## 4.4    Demographic characteristics and training outcome

One of the objectives was to establish the extent to which demographic characteristics of employees influence training outcome. The demographic characteristics studied here were gender, age and highest education level. The results are presented in three sections as follows: employees' gender and training outcome; employees' age and training outcome; employees' education level and training outcome.

### 4.4.1    Gender and training outcome

The study sought to establish the extent to which gender influences training outcome. Employees were asked to state their gender. The data obtained from the employees was matched with the corresponding scores obtained in CQMP, registry protocol and version 6.0. Frequencies of employees attaining a passing score of 70% were derived. A summary of the analysis is as presented in table 4.4

**Table 4. 4  Frequencies of employees obtaining a passing score of 70%in pretest and posttest by gender**

| Gender | CQMP | | Registry | | Version 6.0 | |
|---|---|---|---|---|---|---|
| | Pre | Post | Pre | Post | Pre | Post |
| | N=56 | N=58 | N=69 | N=66 | N=70 | N=71 |
| Male n (%) | 5(8.9) | 20(34.5) | 3(4.3) | 25(37.9) | 10(14.3) | 21(29.6) |
| Female n(%) | 6(10.7) | 24(41.4) | 8(11.6) | 34(51.5) | 14(20.0) | 28(39.4) |
| Total  n (%) | **11(19.6)** | **44(75.9)** | **11(15.9)** | **59(89.4)** | **24(34.3)** | **49(69.0)** |

*Source: Field Survey (2013)*

The findings in table 4.4 show that 5(8.9%) females attained a passing sore of 70% in pretest and 20(34.5%) posttest while 6(10.7%) males attained the set pass mark in pretest and 24(41.4%) attained the set mark in CQMP, showing an higher increase in the proportions from pretest to posttest in females compared to males. A similar pattern was observed in registry and version 6.0 protocols. Females also attained the highest proportion in registry protocol post test (34, 51.5%). Females may have taken the course more seriously while males may have been indifferent.

This result is similar to that of Mick, *et. al* (2004) in a study conducted in USA examining the attitudes toward physical activity and exercise of university students enrolled in Personal Wellness classes.  1, 625 undergraduate students completed the Attitudes toward Exercise and Physical Activity (ATEPA) inventory on the first and last day of the class. The study found that females had higher pre and post test scores than males, and also displayed significant improvements over the semester. Females may have taken the course and instructors more seriously while males were indifferent.

Overall, version 6.0 had the highest number of employees attaining the set pass mark in pretests for all the courses, 24(34.3%) compared to 11(19.6) and 11(15.9) in CQMP and registry protocols.

### 4.4.1.1 Comparison of pretest means versus post test means stratified by age

The study found it important to compute mean differences for CQMP, registry and version 6.0. Comparisons were done to check for variations in pretest-posttest mean differences in the courses taken. The summary of the results for CQMP, Registry protocol and version 6.0 protocol are as indicated in table 4.5.

**Table 4. 5    Mean differences between gender and performance in CQMP, Registry and version 6.0**

| Gender | | Mean | | *β | ANOVA test | |
|---|---|---|---|---|---|---|
| | | Pretest | Posttest | | F | p-value |
| CQMP | N=56 | | | | | |
| | Male (N=25) | 53.52 | 73.36 | 19.84 | 0.064 | 0.801 |
| | Female (N=31) | 54.39 | 75.03 | 20.65 | | |
| Registry | N=66 | | | | | |
| | Male (N=31) | 53.48 | 78.81 | 26.33 | 0.158 | 0.692 |
| | Female (N=35) | 58.40 | 86.17 | 27.77 | | |
| Version 6.0 N=68 | | | | | | |
| | Male (N=32) | 61.16 | 71.72 | 10.56 | 0.030 | 0.863 |
| | Female (N=36) | 64.94 | 74.83 | 9.89 | | |

*Source: Field Survey (2013)*                    *\* β-mean difference*

The results in table 4.5 show that, in CQMP, males had pretest mean of 53.52 and a posttest mean of while that of 73.36 while the pretest mean for females was 54.39 and the posttest mean was 75.03. The mean difference for men was 19.84 while that of females was

20.65. An ANOVA was done to compare the mean differences and found p>0.05. Based on the findings in table 4.5, it is evident that there were no gender differences in performance in CQMP.

In registry protocol, females had a pretest mean of 58.40 and a posttest mean of 86.17 with a mean difference of 27.77 compared to a mean difference of 26.33 in males. Analysis of variance in the mean differences found no variation in the mean differences in Registry protocol, thus gender had no influence on performance in registry protocol training (p=0.692) as shown in table 4.5.

In version 6.0, the males had a pretest mean of 61.16 and a posttest mean of 71.72 a mean difference of 10.56. Females had a pretest mean of 64.94 and a posttest mean of 74.83 with a mean difference of 9.89. An ANOVA test showed that the pretest-posttest mean difference in males was not different from that of females, (p=0.863) as shown in table 4.5.

**4.4.1.2 Testing of Hypothesis one**

The following hypothesis was tested: *$H_o$:      there is no significant difference between employees' gender and training outcome.* In order to test this hypothesis, the average pretest scores for CQMP, Registry protocol and version 6.0 were computed. An average of all the posttest scores was also computed. The mean differences in the pretest-posttest averages were generated and an analysis of variance, by gender, was done with a p-value of 0.946 being realized, (F=0.005). This was then compared with 0.05 level of significance. The results showed that there were no significant differences between gender and training outcome and thus the researcher failed to reject $H_o$. A further ANOVA of the individual test showed no significant differences between CQMP and gender (p=0.802), registry protocol and gender (p=0.692) and version 6.0 and gender (p=0.863) when compared with 0.05 level of significance. Thus gender did not influence outcome of training in the individual tests.

These findings are consistent with those of Garaigordobil (2008) in a study conducted in Spain evaluating the existence of gender differences in socioemotional factors during adolescence, to analyze developmental factors, and to apply a program of education for peace and prevention of violence to determine whether the pretest–posttest change in socioemotional developmental factors differ as a function of gender. The pre–post change in most of the factors of socioemotional development assessed was similar in both sexes.

Similar results were also reported by Madeni *et al,* 2011) in quasi-experiment employing pre-test and post-test research design to evaluate reproductive health awareness for adolescence was conducted at Ilala Municipal; Dar es Salaam, Tanzania where data was collected from 300 students aged 11 to 16. Students took the pre-test followed by a 45 minute program lecture. A post test was then administered. The results indicated that girls' mean score in the knowledge pre-test was 5.9, and 6.8 in post-test, which increased significantly (t = 7.9, p = 0.000) while that of boys was 25.6 in pre test and 26.4 in post-test, which showed a significant increase (t = 2.4, p = 0.019).

### 4.4.2 Age and training outcome

The study sought to establish the age of employees in order to determine how it influenced training outcome. In order to address this, employees were asked to state their date, month and year of birth. Age was computed with reference to end of June 2012 and matched with individual scores in the pretest and posttest for all the courses taken. Frequencies of those attaining a passing score of 70% were computed. The results are summarized in table 4.6.

**Table 4. 6    Frequencies of employees obtaining a passing score of 70%in pretest and posttest by age**

| Age (years) | | CQMP | | Registry | | Version 6.0 | |
|---|---|---|---|---|---|---|---|
| | | Pre | Post | Pre | Post | Pre | Post |
| | | N=56 | N=57 | N=68 | N=65 | N=70 | N=71 |
| <30 | n(%) | 5(8.9) | 16(28.1) | 3(4.4) | 22(33.8) | 12(17.1) | 15(21.1) |
| 30-33 | n(%) | 5(8.9) | 18(31.6) | 5(7.2) | 22(33.8) | 6(8.6) | 18(25.4) |
| >33 | n(%) | 1(1.8) | 9(15.8) | 3(4.4) | 14(21.5) | 6(8.6) | 15(21.1) |
| missing*(n%) | - | | 1(1.7) | - | 1(1.5) | 0 | 1(1.4) |
| Total | n(%) | 11(19.6) | 43(75.5) | 11(16.2) | 58(89.1) | 24(34.3) | 48(67.6) |

*Source: Field Survey (2013)                missing\*-no response obtained for age*

The results in table 4.6 show employees aged >33 years represented a low proportion of employees attaining a pass mark of 70% in CQMP pretest l1 (1.8%) and posttest 9(15.8%). Similar results were obtained in registry protocol pretest 3 (4.4%) versus posttest 14(21.5%) and version 6.0 protocol pretest 6(8.6%) versus posttest 15(21.1%). Thus being older reduced one's chances of attaining a pass mark of 70% in the courses taken. This could be due to the fact that the older employees may have been used to some routines, acquired over time, that they may have found difficult to let go and adapt to the new knowledge.

**4.4.2.1 Mean differences between age and performance in CQMP, registry and version 6.0**

The pretest means and post test means were computed and compared to check for statistically significant differences in various age categories in CQMP, registry and version 6.0.  The results are as summarized in table 4.7.

**Table 4. 7**      **Mean differences between age and performance in CQMP, registry and version 6.0**

| Age (years) | | Mean | | *β | ANOVA test | |
|---|---|---|---|---|---|---|
| | | Pretest | Posttest | | F | p-value |
| **CQMP** | **N=56** | | | | | |
| | <30 (N=20) | 53.50 | 73.00 | 19.50 | 0.182 | 0.834 |
| | 30-33 (N=21) | 55.90 | 77.43 | 21.52 | | |
| | >33(N=15) | 52.00 | 71.60 | 19.60 | | |
| **Registry** | **N=65** | | | | | |
| | <30 (N=23) | 54.83 | 85.78 | 30.95 | 1.292 | 0.282 |
| | 30-33 N=23) | 59.57 | 83.70 | 24.13 | | |
| | >33 (N=19) | 53.16 | 79.42 | 26.26 | | |
| **Version 6.0 N=67** | | | | | | |
| | <30 (N=25) | 64.04 | 69.56 | 5.52 | 2.531 | 0.103 |
| | 30-33 (N=20) | 62.9 | 78.5 | 15.6 | | |
| | >33 (N=22) | 62.41 | 72.14 | 9.27 | | |

*Source: Field Survey (2013)*          *\* β-mean difference*

Table 4.7 shows that in CQMP, employees under 30 years had a pretest mean of 53.50 and a posttest mean of 73.00. Employees aged >30 years had a pretest mean of 52.00 and a posttest mean of 71.60. A mean difference of 19.50 for employees aged <30 years and 19.60 for employees above 33 years of age was observed. This close range was similar to that observed previously in the gender category. Employees aged 30-33 had a mean difference of 21.52. The mean differences were compared using ANOVA test and the results showed that the mean differences were not different for the three age categories (p=0.834). This implies that there were no age differences in performance in CQMP across all age groups.

In registry protocol, employees aged <30 years had a pretest mean of 54.83, a post test mean of 85.78 and a mean difference of 30.95, which was higher compared to those aged 30-33 years ( $\beta$=24.13) and those over 33 years of age ($\beta$=26.26). An analysis of variance showed that the pretest-posttest mean differences for employees aged <30 years compared with that of employees aged 30-33 and that the one derived from those aged >30 years showed no significant difference in registry protocol training.

In version 6.0, employees aged <30 years had a pre test mean of 64.04, a posttest mean of 69.56 a mean difference of 5.52 version 6.0 protocol. Employees in the 30-33 years age group had a pretest mean of 62.9 and a posttest mean of 78.5 with a mean difference of 15.6 compared to those aged <30 years and the ones aged > 33 years. A ANOVA test was done to compare the three mean differences. Based on the findings, the three mean differences are not statistically different (p=0.013). Therefore in version 6.0, age had no influence on variations in pretest posttest mean differences.

**4.4.2.2 Testing of Hypothesis two**

The following hypothesis was tested: *H$_o$: there is no significant difference between employees' age and training outcome.* In order to test this hypothesis, the average pretest scores for CQMP, Registry protocol and version 6.0 were computed. An average of all the posttest scores was also computed. The mean differences in the pretest-posttest averages were generated and an analysis of variance, by age, was done realizing a p-value of 0.270, (F=1.347). This was then compared with 0.05 level of significance. The results showed that there were no significant differences between age and training outcome and thus the researcher failed to reject H$_o$. An ANOVA of the individual test showed no significant differences between CQMP and age (p=0.834), registry protocol and age (p=0.282) and

version 6.0 and age (p=0.103) when compared with 0.05 level of significance. This shows that regardless of the course taken, age would not influence variation in mean differences.

This finding was consistent with that of a study conducted by Shariff & Makhadmah (2012) at Aqaba Special Economic Zone Authority (ASEZA) which tried to determine the work environment factors that influence the training programs' effectiveness. The study explored among others the influence and the relationship between work environment factors and the training effectiveness, and the effect of demographic variables as factors that may influence training effectiveness as well as differences in work environment factors influencing the effectiveness of human resource training programs in terms of selected demographic characteristics, such as, age, gender, education level, experience, and number of hours in the training programs. The study revealed that age, gender, education, and time in attending training courses did not influence training effectiveness. In contrast, experience was found as variable factor of opportunity to perform and reward system (Shariff & Makhadmah 2012).

### 4.4.3 Education level and training outcome

The study sought to determine the education level of the employees. To achieve this, employees were asked to state the highest level of education attained by June 2012. Three categories were derived from the data obtained; secondary, diploma, higher diploma and degree.

Frequencies of those attaining a passing score of 70% were computed. The results are summarized in table 4.8.

**Table 4. 8** **Frequencies of employees attaining a passing score of 70%in pretest and posttest by Education level**

| Education level | CQMP | | Registry | | Version 6.0 | |
|---|---|---|---|---|---|---|
| | **Pre** | **Post** | **Pre** | **Post** | **Pre** | **Post** |
| | N=56 | N=58 | N=69 | N=66 | N=70 | N=71 |
| **Secondary n(%)** | 0(0) | 2(3.4) | 0(0) | 7(10.6) | 0(0) | 3(4.2) |
| **Diploma n(%)** | 5(8.9) | 30(51.7) | 6(8.7) | 38(57.6) | 17(24.3) | 32(45.1) |
| **HD* & Deg n(%)** | 6(10.7) | 12(20.7) | 5(23.8) | 14(21.2) | 7(10.0) | 14(19.7) |
| **Total n(%)** | **11(19.6)** | **44(75.9)** | **11(15.9)** | **59(89.4)** | **24(34.3)** | **49(69.0)** |

*Source: Field Survey (2013)*        *HD*&Deg-Higher Diploma and Degree*

The findings in table 4.8 show that of the employees who did CQMP the employees who attained 70% pass mark were diploma holders 30(51.7%). A similar results was observed in version 6.0 38(57.6%). Thus having a minimum of diploma certification increased the chances of attaining a 70% pass mark in examinations. None of the staff with secondary education attained a passing score of 70% in the pretest across all courses. This could be attributed to the fact the content of the trainings was more inclined to the clinical aspects, thus having attained secondary level certification without further pursuant of college education may have limited their chances of scoring higher.

### 4.4.3.1 Comparison of pretest means versus post test means stratified by education level

The study compared the differences in pretest means and the posttest means in order to determine whether there were significant differences in the groups with regard to courses taken. The results for CQMP, Registry and version 6.0 are as summarized in table 4.9.

**Table 4. 9     Mean differences between highest education level and performance in CQMP, Registry and Version 6.0**

| Education level | Mean | | *β | ANOVA test | |
|---|---|---|---|---|---|
| | Pretest | Posttest | | F | p-value |
| **CQMP N=56** | | | | | |
| Secondary (N=7) | 41.43 | 52.00 | 10.57 | 4.52 | 0.015 |
| Diploma (N=37) | 53.08 | 76.27 | 23.19 | | |
| *HD&degree(N=12) | 64.17 | 81.17 | 17.00 | | |
| **Registry    N=66** | | | | | |
| Secondary (N=8) | 47.75 | 80.38 | 32.63 | 4.305 | 0.180 |
| Diploma (N=40) | 55.78 | 85.40 | 29.62 | | |
| *HD&degree(N=18) | 60.50 | 79.50 | 19.00 | | |
| **Version 6.0 N=66** | | | | | |
| Secondary (N=8) | 48.38 | 65.63 | 17.25 | 1.341 | 0.267 |
| Diploma (N=41) | 66.44 | 74.39 | 7.95 | | |
| *HD&Degree(N=19) | 62.32 | 74.42 | 12.10 | | |

*Source: Field Survey (2013)        * β- mean difference        *HD&degree -Higher diploma and Degree*

Table 4.9 shows that the diploma holders had a pretest mean of 53.08, a posttest mean of 76.27 and a mean difference of 23.19 in CQMP. This mean difference was higher than that of employees with higher diploma and degree education level ($\beta=17.00$) and those with secondary certification ($\beta=10.57$).  A comparison of the three mean differences using an ANOVA test showed that the mean differences were dissimilar in the education level category,( F=4.52, p=0.015). Important to note is that the pretest mean was 64.17 which was higher than the posttest mean for secondary certificate holders (52.00). Thus having a

minimum of diploma certification increases ones probability of performing better than one with lower qualification.

In registry protocol, employees with secondary certification had a pretest mean of 47.75 and a posttest mean of 80.38 with a mean difference of 32.63 in registry protocol. This shows that they had little knowledge about the content of the training but exhibited high knowledge gain evidenced by the mean difference. This result is consistent with that of a training needs assessment study by Ariff et al (2010) on in Pakistan that reported good performance from Lady Health Workers (LHW) in the knowledge of Maternal, Newborn and Child Health (MNCH) compared to medical officers despite their level of education. The LHW formed the first tier of trained cadre that provides MNCH at primary care level. Employees with higher diploma and degree certifications had a pretest mean of 60.50 and a posttest mean of 79.50 with the lowest mean difference of 19.00. A Comparison of the groups' mean differences showed no variations in the secondary, diploma. Higher diploma and degree holders (p=0.180) thus education did not influence variations in mean differences in registry protocol.

In version 6.0 protocol, it was observed that the diploma holders had a pretest mean of 66.44 and a posttest mean of 74.39. This group of employees had the lowest mean difference ($\beta$=7.95) compared to the secondary certificate holders ($\beta$=17.25) and the higher diploma and degree holders ($\beta$=12.10) as shown in table 4.18. A comparison of the mean differences showed no variations (p=0.267) as shown in table 4.9.

Overall, table 4.9 shows that there was little knowledge gain in Registry and version 6.0 evidenced by the mean differences among the groups, compared to CQMP.

**4.4.3.2 Testing of Hypothesis three**

The following hypothesis was tested: *H$_o$: there is no significant difference between employees' level of education and training outcome.* In order to test this hypothesis, the average pretest scores for CQMP, Registry protocol and version 6.0 were computed. An average of all the posttest scores was also computed. The mean differences in the pretest-posttest averages were generated and an analysis of variance, by level of education, was done realizing a p=0.274 was realized (F=1.332). This was then compared with 0.05 level of significance and the results showed that there were no significant differences between level of education and training outcome. The researcher thus failed to reject H$_o$. This result contrasted with that of a training needs assessment study by Ariff et al (2010) on in Pakistan that reported good performance from Lady Health Workers (LHW) in the knowledge of Maternal, Newborn and Child Health (MNCH) compared to medical officers despite their level of education. The LHW formed the first tier of trained cadre that provides MNCH at primary care level.

An ANOVA of the individual test showed no significant differences between registry protocol and level of education (p=0. 180) when compared with 0.05 level of significance. A similar result was found in version 6.0 and level of education (p=0. 267) when compared with 0.5 level of significance. However in the analysis of variance in CQMP, a p=0.015 was realized and compared with 0.05 level of significance. It was evident that for this particular course there was a significant difference between an employees' level of education and training outcome.

**4.5    Employee experience and training outcome**

One of the objectives of this study was to determine the extent to which employee experience in TB branch and elsewhere prior to joining the branch, influenced training

51

outcome in TB vaccine research in KEMRI/CDC. The data obtained was analyzed under the following sub-sections: experience in TB branch and experience elsewhere before joining TB Branch.

### 4.5.1 Experience in TB Branch and training outcome

The study sought to establish the extent to which employee experience in TB influenced training outcome in TB Vaccine research in KEMRI/CDC. This study found it important to analyze number of years served in TB Branch versus the scores obtained in various courses. To achieve this, the employees were asked to state the date, month and year they joined TB branch. This was aimed at establishing whether the experience gained over time in TB branch and elsewhere could influence training outcome. The distribution of employees was as shown in table 4.10.

**Table 4. 10    Distribution of employees by years of experience in TB Branch**

| Employee experience in TB | Frequency | Percentage |
|---|---|---|
| <3 years | 34 | 44.7 |
| ≥3 years | 41 | 54.0 |
| No response obtained | 1 | 1.3 |
| **Total** | **76** | **100.0** |

*Source: Field Survey (2013)*

Table 4.10 shows that most of the employees 41(53.9%) had served in the branch for more period of three years or more. This could be due to the fact that the branch had several studies that lasted at least two years and coming in at different but overlapping time points thus retained majority of staff thus guaranteeing stability of staff.

Using the data generated on pretest and post test scores for CQMP, Registry and Version 6.0 protocol trainings, frequencies of those attaining a pass mark of 70% in pretest and posttest per for the employee experience categories were derived. The summary of the analysis of frequencies at a passing score of 70% is shown in table 4.11.

**Table 4. 11    Frequencies of employees obtaining a passing score of 70%in pretest and posttest by years served in TB branch**

| | CQMP | | Registry | | Version 6.0 | |
|---|---|---|---|---|---|---|
| | **Pre** | **Post** | **Pre** | **Post** | **Pre** | **Post** |
| **Experience in TB** | N=56 | N=58 | N=69 | N=66 | N=69 | N=70 |
| **<3 years n(%)** | 6(10.7) | 20(34.5) | 6(8.7) | 27(40.9) | 13(18.6) | 22(31.0) |
| **≥3years n(%)** | 5(8.9) | 24(41.4) | 5(7.2) | 32(48.5) | 11(15.7) | 26(36.6) |
| **Total   n(%)** | **11(19.6)** | **44(75.9)** | **11(15.9)** | **59(89.4)** | **24(34.3)** | **49(69.0)** |

*Source: Field Survey( 2013)*

Table 4.11 shows that majority of the employees who attained a passing score of 70% in all pretests for all courses had <3 years experience in TB branch, compared to those who had served for ≥3 years in the branch (6(10.7%) versus 5(8.9%), 6(8.7%) versus 5(7.2%) 13(18.6%) versus 11(15.7%) for <3 years and ≥3 years categories respectively. This could be due to the fact that employees who had served a shorter period in the branch were more open to learning new ideas and remember them compared to those who had served in the branch for a longer period of time.

**4.5.1.1 Comparison of pretest means versus post test means for employee experience in**

**TB**

A further analysis was conducted to test for significant differences in pretest and posttest means for each of the courses was done.  The summary of results for CQMP, Registry and Version 6.0 is shown in table 4.12

**Table 4. 12    Mean differences between employee experience in TB and performance in CQMP, Registry and Version 6.0**

| Employee experience in TB | | Mean | | *β | ANOVA test | |
|---|---|---|---|---|---|---|
| | | Pretest | Posttest | | F | p-value |
| CQMP    N=56 | | | | | | |
| | <3years (N=25) | 51.12 | 72.64 | 21.52 | 0.496 | 0.484 |
| | ≥3 years (N=31) | 56.32 | 75.61 | 19.29 | | |
| Registry    N=66 | | | | | | |
| | <3years (N=30) | 57.93 | 83.73 | 25.8 | 0.423 | 0.518 |
| | ≥3 years (N=36) | 54.56 | 82.72 | 28.17 | | |
| Version 6.0 N=67 | | | | | | |
| | <3years (N=31) | 64.35 | 72.71 | 8.36 | 0.554 | 0.459 |
| | ≥3 years (N=36) | 62.14 | 73.39 | 11.25 | | |

*Source: Field Survey( 2013)*

The findings in table 4.12 show that the employees who had served in TB branch for <3 years had a pretest mean of 51.12 and a mean increase of 21.52. A similar trend was observed in the group that had served for ≥3 years**.** An analysis of variance showed that the mean differences for employees who had served for <3years and those with ≥3 years were not different ($P>0.05$). It would be expected that the longer an employee served in an

organization, the more experience they gain and thus expected to perform better. This was not the case thus employees with longer experience may have been used to certain routines that did affect their performance prior to the training. This result contrasts with that of a study by Dokko et. al (2008) conducted in the US, where job experience was identified as major positive contributor to work performance and the longer people worked, the more skill they gained.

In registry protocol training, employees who had served in TB branch for ≥3 years had a pretest mean of 54.56 and a posttest mean of 82.72 with mean difference of 28.17. Based on the findings the mean differences were not different, a result that is similar to that obtained in CQMP.

In version 6.0 employees who had stayed in TB branch for ≥3 years had a pretest mean of 62.14 a post test mean of 73.39 with a mean difference of 11.25. A similar pattern was observed among those with <3 years experience in TB branch. A comparison of the mean differences for the two categories showed no significant differences between the employees who had less than three years prior experience and those with three of more years, p>0.05. Thus the experience an employee gained over time before in the branch had no effect in the employees' performance with regard to mean differences.

**4.5.1.2 Testing of Hypothesis four**

The following hypothesis was tested: *$H_o$: there is no significant difference between employees' experience in TB and training outcome.* In order to test this hypothesis, the average pretest scores for CQMP, Registry protocol and version 6.0 were computed. An average of all the posttest scores was also computed. The mean differences in the pretest-posttest averages were generated and an analysis of variance, by employee experience in TB, was done realizing a p=0.295, (F=1.125). This was then compared with 0.05 level of

significance and the results showed that there were no significant differences between level of education and training outcome and thus the researcher failed to reject $H_o$. Separate ANOVAs of the individual test also showed no significant differences between CQMP and experience in TB (p=0.484), registry protocol and experience in TB (p=0. 518) and version 6.0 and experience in TB (p=0.459) when compared with 0.05 level of significance. The lack of differences could be attributed to the fact that the trainings were on completely new protocols such that experience gained over tine could not automatically translate to transfer of knowledge.

This finding contrasts with that of a study conducted by Shariff and Makhadmah, (2012) at Aqaba Special Economic Zone Authority (ASEZA) tried to determine the work environment factors that influence the training programs' effectiveness. The study explored among others the influence and the relationship between work environment factors and the training effectiveness, and the effect of demographic variables as factors that may influence training effectiveness as well as differences in work environment factors influencing the effectiveness of human resource training programs in terms of selected demographic characteristics, such as, age, gender, education level, experience, and number of hours in the training programs. A sample of 263 employees working in five and four star hotels in Aqaba city. All of them had attended training programs in different specific courses suitable to their jobs in the hotels. The result showed that two of four factors had significant differences at p< .05 in factors influencing training effectiveness in terms of employee experience The study revealed experience was a variable factor of opportunity to perform and reward system (Shariff and Makhadmah, 2012).

### 4.5.2 Experience elsewhere and training outcome

The study sought to establish whether the number of years an employee had served elsewhere prior to joining TB branch would influence training outcome. Employees were asked to state the number of complete years they had served elsewhere. Data was categorized into two: <3years and ≥3years. A summary of the results is as shown in table 4.13.

**Table 4. 13  Distribution of employees by years of experience in elsewhere prior to joining TB branch**

| Employee experience elsewhere | Frequency | Percentage |
|---|---|---|
| <3 years | 32 | 42.1 |
| ≥3 years | 42 | 55.3 |
| No response obtained | 2 | 2.6 |
| **Total** | **76** | **100.0** |

*Source: Field Survey (2013)*

The distribution shows that majority of employees had served elsewhere for ≥3 years before joining TB Branch,(42, 55.3%) as shown in table 4.13. A further analysis showed that 44 employees aged 33 years and below had diploma certification. Thirty five of the employees aged 30 years and above had more than ≥3 years of experience. Thus majority of the 42 employees with ≥3 years could be partly diploma holders aged thirty and above thus guaranteeing them ≥3 years of service prior to joining TB branch.

Frequencies of employees attaining a passing score of 70% were computed. The results are summarized in table 4.14.

**Table 4. 14    Frequencies of employees obtaining a passing score of 70%in pretest and posttest by employee experience elsewhere**

| Employee | CQMP | | Registry | | Version 6.0 | |
|---|---|---|---|---|---|---|
| **experience** | **Pre** | **Post** | **Pre** | **Post** | **Pre** | **Post** |
| **elsewhere** | N=56 | N=58 | N=69 | N=66 | N=70 | N=71 |
| **<3 years n(%)** | 3(5.4) | 19(32.8) | 4(5.8) | 22(33.3) | 9(12.9) | 20(28.2) |
| **≥3years n(%)** | 8(14.3) | 24(41.4) | 7(10.1) | 35(53.5) | 14(20.0) | 28(39.4) |
| **Missing\*n(%)** | 0 | 1(1.7) | 0 | 2(3.0) | 1(1.4) | 1(1.4) |
| **Total   n(%)** | **11(19.7)** | **44(75.9)** | **11(15.9)** | **59(89.4)** | **24(34.3)** | **49(69.0)** |

*Source: Field Survey (2013)*                 **missing\* no response obtained for years served elsewhere**

The results in table 4.14 show that those who had ≥3years of experience elsewhere and attained a passing score of 70% in CQMP were pretest 8(14.3%) in pretest and 24(41.4%) in posttest.  These frequencies were higher than those of employees with <3 year experience, pretest 3(5.4%) and posttest 19(32.8%).  A similar result was found in registry and version 6.0. This shows that the longer the employee`s experience prior to joining TB branch the higher the chances  one attaining a 70% pass mark in the courses taken.

**4.5.2.1 Comparison of pretest means versus post test means for employee experience elsewhere**

A comparison of pretest mean and post test mean was computed for CQMP, Registry protocol and version 6.0 protocol with a statistically significant p-value set at $p<0.05$.  The results are as summarized in table 4.15.

**Table 4. 15    Mean differences between employee experience elsewhere and performance in CQMP**

| Employee experience | Mean | | *β | ANOVA test | |
|---|---|---|---|---|---|
| | Pretest | Posttest | | F | p-value |
| **CQMP     N=56** | | | | | |
| <3years (N=22) | 54.64 | 76.55 | 21.91 | 0.690 | 0.410 |
| ≥3 years  (N=34) | 53.59 | 72.82 | 19.23 | | |
| **Registry   N=   66** | | | | | |
| <3years (N=25) | 54.32 | 83.12 | 28.80 | 0.487 | 0.488 |
| ≥3 years (N=39) | 56.82 | 82.95 | 26.12 | | |
| **Version 6.0 N=67** | | | | | |
| <3years (N=31) | 59.68 | 71.23 | 11.55 | 0.488 | 0.487 |
| ≥3 years (N=36) | 65.86 | 74.67 | 8.81 | | |

*Source: Field Survey (2013)          * β          mean difference*

Table 4.15 shows that even though the pretest means for both group were at a close range (54.64 for <3 years and 53.59 for ≥3 years),  those who had  <3 years experience elsewhere had a slightly higher pretest-posttest mean difference (21.91) than those who had served ≥3 years (19.23) in CQMP. An ANOVA test to compare the mean differences showed no significant differences in the two employee experience categories, $p > 0.05$.

In registry protocol, those who had served <3 years pretest mean of 54.32 and a posttest mean of 83.12 with a mean difference of 28.80 in registry protocol training. There was a nearly similar trend for those with experience ≥3 years having a pretest mean of 56.82 and a mean difference of 26.12. No variations were found in the mean differences for the two categories.

In version 6.0, those who had served <3 years pretest mean of 59.68 and a posttest mean of 71.23 with a mean difference of 11.55. This trend was not different from those with more experience.

**4.5.2.2 Testing of Hypothesis five**

The following hypothesis was tested: *$H_o$: there is no significant difference between employees' experience elsewhere and training outcome.* In order to test this hypothesis, the average pretest scores for CQMP, Registry protocol and version 6.0 were computed. An average of all the posttest scores was also computed. The mean differences in the pretest-posttest averages were generated and an analysis of variance, by employees' experience elsewhere, was done and a p=0.685 was realized (F=0.166).This was then compared with 0.05 level of significance. The results showed that there were no significant differences between level of education and training outcome and thus the researcher failed to reject $H_o$. Separate ANOVAs of the individual test also showed no significant differences between CQMP and experience elsewhere (p=0.410), registry protocol and experience elsewhere (p=0.488) and version 6.0 and experience elsewhere (p=0. 487) when compared with 0.05 level of significance. This could be due to the fact that the courses taken are in a unique field of vaccine trials and are protocol specific thus the experience one may have gained elsewhere does not naturally translate to transfer of learning. All procedures are done according to the protocol and study specific standard operating procedures.

Dokko et al (2008), in a study conducted in the US, notes that prior work experience may include not only relevant knowledge and skill, but also routines and habits that do not fit in the new organizational context. Indeed, these routines and habits may limit the positive effect of prior experience on performance, suggesting that when individuals move across firm boundaries, their prior experience may not be wholly beneficial.

### 4.6 Nature of work performed and training outcome

One of the objectives of this study was to establish how nature of work performed by an employee influences training outcome in TB vaccine research in KEMRI/CDC. To achieve this, the employees were asked which tasks they performed in the study. These were grouped in three categories defined as: recruitment, clinical and other category. The data obtained was analyzed under the following sub-sections: employees performing recruitment tasks; employees performing clinical procedures and training outcome, employees performing other tasks and training outcome. Other category comprised employees who performed similar tasks such as data entry, running queries in the project. The employees were distributed as shown in table 4.16.

**Table 4. 16    Distribution of employees by nature of work**

| Nature of work | Frequency | Percentage |
|---|---|---|
| **Recruitment** | 19 | 25.0 |
| **Clinical** | 34 | 44.7 |
| ***Other** | 23 | 30.3 |
| **Total** | **76** | **100.0** |

*Source: Field Survey (2013)*

**\***Other category comprises employees who perform similar tasks such as data entry, running queries in the project.

Table 4.16 shows that the largest proportions of employees were employees performing clinical procedures 34(44.7) while the smallest were those performing recruitment tasks 19(25.0%). This could be due to the fact that the bulk of the procedures such as medical and physical examination, vaccine administration, onsite monitoring of adverse events following vaccine administration, data entry and query resolutions with quality checks at every desk, thereby requiring more staff.

Achievement of a passing score of 70% in pretest and posttest was an important element. Employees were asked to state their pretest and posttest scores in each of the courses taken. For accuracy of figures permission was sought to counter-check the figures obtained from employees and the scores on test questions and discrepancies resolved before the analysis commenced. Frequencies of employees attaining a passing score of 70% were computed. The summary of the analysis is presented in table 4.17.

**Table 4. 17     Frequencies of employees attaining a passing score of 70%in pretest and posttest by nature of work**

|  |  | CQMP | | Registry | | Version 6.0 | |
|---|---|---|---|---|---|---|---|
|  |  | Pre | Post | Pre | Post | Pre | Post |
| **Nature of work** |  | N=56 | N=58 | N=69 | N=66 | N=70 | N=71 |
| **Recruitment** | **n(%)** | 3(5.4) | 14(24.1) | 0 | 17(25.8) | 5(7.1) | 11(15.5) |
| **Clinical** | **n(%)** | 5(8.9) | 24(39.7) | 6(8.7) | 30(45.5) | 14(20.0) | 26(36.6) |
| **Other** | **n(%)** | 3(5.4) | 7(12.1) | 5(7.2) | 12(18.2) | 5(7.1) | 12(16.9) |
| **Overall** | **n(%)** | **11(19.6)** | **44(75.9)** | **11(15.9)** | **59(89.4)** | **24(34.3)** | **49(69.0)** |

*Source: Field Survey (2013)*

**4.6.1.1 Comparison of pretest means versus post test means for nature of work**

The mean scores obtained between the pretest ad the posttest were compared per category of nature of work. This was important because the magnitude of change at a p-value of less than 0.05 would be indicative of association between employees' nature of work and performance scores for each course. The findings for the data obtained for each of the three courses are summarized in table 4.18.

**Table 4. 18    Mean differences between nature of work and performance in CQMP, registry and version 6.0**

| Nature of work | Means | | *β | ANOVA test | |
|---|---|---|---|---|---|
| | Pretest | Posttest | | F | p-value |
| **CQMP  (N=56)** | | | | | |
| Recruitment (N=17) | 57.18 | 73.76 | 16.58 | 0.064 | 0.801 |
| Clinical  (N=29) | 50.69 | 73.31 | 22.62 | | |
| Other (N=10) | 58.20 | 78.00 | 19.80 | | |
| **Registry (N=56)** | | | | | |
| Recruitment (N=19) | 48.74 | 81.95 | 32.21 | 5.772 | 0.005 |
| Clinical (N=31) | 58.06 | 86.26 | 28.19 | | |
| Other (N=16) | 61.00 | 78.69 | 17.69 | | |
| **Version 6.0 (N=68)** | | | | | |
| Recruitment (N=17) | 61.12 | 71.18 | 10.06 | 0.092 | 0.913 |
| Clinical (N=31) | 68.55 | 78.03 | 9.48 | | |
| Other (N=20) | 56.55 | 68.00 | 11.45 | | |

*Source: Field Survey (2013)          * β          mean difference*

### 4.6.2   Employees performing recruitment tasks and training outcome

The TB vaccine research project had a team of employees performing similar tasks. These tasks relate to data entry, query resolution and data quality control procedures.  The study sought to establish whether performing recruitment tasks could influence training outcome.

Table 4.17 shows the frequencies of staff attaining a passing score of 70% among employees performing recruitment tasks, clinical and other tasks. Of the 11(15.9%) employees who attained a passing score of 70% in registry protocol training, none of them belonged to recruitment team. The registry protocol was a completely new concept to the

recruitment team but the content was little owing to the few procedures (two participant follow up visits in a year) compared to the vaccine protocol that has more than ten scheduled visits in a year. This result was consistent with those of a five day course done in Scotland by Collins (1994) on staff attitude, aggression, anxiety and fear and found positive results for aggression anxiety and fear.

**4.6.2.1 Comparison of pretest means versus post test means for employee experience in TB**

The study then computed the pretest mean scores and the posttest mean scores for the courses offered. The summary is as shown in table 4.18. The results indicate that in CQMP, the recruitment team had a pretest mean of 57.18, a posttest mean of 73.76 and a mean difference of 16.58. In registry recruitment team had a pretest mean of 48.74, a posttest mean of 81.95and a mean difference of 32.21, while in version 6.0 the team had a pretest mean of 61.12, a posttest mean of 71.18 and a mean difference of 10.06.

**4.6.3   Employees performing clinical procedures and training outcome**

The study sought to establish whether the involvement of this category of employees at that level would influence variations in mean differences. Based on the findings in table 4.33, the clinical team had 5(8.9%) and 24(39.7%) employees attaining a pass mark of 70% in CQMP pretest and posttest respectively; 6(8.7%) and 30(45.5%) employees attaining the set pass mark in Registry pretest and posttest respectively and a further 14(20.0%) and 26(36.6%) employees attaining the set pass mark in version 6.0 pretest and posttest respectively. The employees performing clinical tasks had the highest number of employees attaining the set pass mark. This result is consistent with that of a training need analysis study conducted by Ariff et al (2010) in Pakistan on Lady Health Workers (LHW), Lady Health Visitors (LHV),

midwives, nurses and doctors/medical officer on knowledge of MNCH and found that LHWs knowledge on MNCH was good with 30% attaining a pass mark of 70%.

### 4.6.4    Employees performing other tasks and training outcome

The results in table 4.28 show that the proportion of employees who attained a pass mark in CQMP from pretest 3(5.4%) to posttest 7(12.1%) compared to Registry from 5(7.2%) to 12(18.2%) and version 6.0 from 5(7.1%) to 12(16.9%) performed other tasks.  These were low compared to those of clinical team.

### 4.6.4.1 Comparison of pretest means versus post test means for employees performing other tasks

The study then computed the pretest mean scores and the posttest mean scores for the courses offered.  The summary is as shown in table 4.18.  The results indicate that in CQMP, employees performing other tasks had a pretest mean of 58.20, a posttest mean of 78.00 and a mean difference of 19.80. In registry protocol employees performing other tasks had a pretest mean of 61.00, a posttest mean of 78.69 and a mean difference of 17.69, while in version 6.0 the team had a pretest mean of 56.55, a posttest mean of 68.00 and a mean difference of 11.45. The least mean difference was observed in version 6.0. The researcher went further to test for significant differences in means.

### 4.6.4.2 Testing of Hypothesis six

The following hypothesis was tested: *H$_o$:      there is no significant difference between employees' nature of work and training outcome.* In order to test this hypothesis, the average pretest scores for CQMP, Registry protocol and version 6.0 were computed. An average of all the posttest scores was also computed.  The mean differences in the pretest-posttest averages were generated and an analysis of variance, by nature of work, was done realizing a p=0.405,

(F=0.922). This was then compared with 0.05 level of significance. The results showed that there were no significant differences between employees' nature of work and training outcome and thus the researcher failed to reject $H_o$.

However, separate ANOVAs of the individual test showed no significant differences between CQMP and employees nature of work (p=0. 801), and version 6.0 and employees nature of work (p=0. 913) when compared with 0.05 level of significance. Analysis of variance in registry protocol, p=0. 005 was realized and compared with 0.05 level of significance. It was evident that for registry there was a significant difference between employees' nature of work and training outcome. This could be due to that fact the whole team participated in the development of the CQMP and thus may have gained prior access to the content.  Version 6.0 was a build-up of the trainings that had been conducted in the past and that only amendments were being communicated.  Registry protocol on the other hand was a completely new concept to all and some groups may have had an advantage over the other given the clinical aspects.

This result is consistent with that of a study by Lavalle et al (2002) on a two day 14-item knowledge test on legal issues, aggression and self care administered to 103 nurses allied, medical and ancillary staff in Australia which showed that all groups improved significantly.

Calabro et al. (2002) also conducted a study in south western United States on 180 hospital staff who attended training on two programmes: prevention and control of disruptive behavior of clients as well as a combination of self-defence skills and methods of restraint for staff who work with potentially assaultive patients, and found similar results. A one group, pre-test/posttest study design was used and at post-test, all of the variables measured,

including knowledge, attitude, self efficacy, and behavioral intention, showed positive significant change as reported by respondents.

# CHAPTER FIVE

## SUMMARY OF THE FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

### 5.1   Introduction

In this section the subtopics were discussed as follow: summary of findings, conclusions of the study and recommendations for further research and contribution to body of knowledge.

### 5.2   Summary of findings

This study had three major group variables: the influence of demographic characteristics on training outcome, influence of employee experience on training outcome and the influence of employees' nature of work on training outcome.

The first objective was to assess how demographic characteristics influence training outcome in TB vaccine research in KEMRI/CDC, Kisumu Kenya. The demographic attributes studied were age, gender and education level. Pretest-posttest mean differences were computed for all the courses done. An ANOVA was done to compare the mean differences and found no significant gender differences in CQMP ($p=0.801$), Similar results were found in Registry ($p=0.692$) and Version 6.0 ($p=0.863$). The following hypothesis was tested: $H_o$:*there is no significant difference between employees' gender and training outcome.* In order to test this hypothesis, an analysis of variance on the average of the pretest and posttests of the three trainings namely CQMP, registry and version 6.0 were computed and a p-value of 0.946 was realized. This was then compared with 0.05 level of significance. The results showed that there were no significant differences between gender and training outcome and thus the researcher failed to reject $H_o$.

Age was also studied as a component of demographic characteristics. The following hypothesis was tested: $H_o$: *there is no significant difference between employees' age and training outcome.* In order to test this hypothesis an analysis of variance on the average of the pretest and posttests of the three trainings namely CQMP, registry, and version 6.0 were computed and a p=0.270 was realized. This was then compared with 0.05 level of significance. The results showed that there were no significant differences between age and training outcome and thus the researcher failed to reject $H_o$. An ANOVA of the individual test showed no significant differences between CQMP and age (p=0.834), registry protocol and age (p=0. 282) and version 6.0 and age (p=0. 103) when compared with 0.05 level of significance.

Employees' level of education was also studied. The following hypothesis was tested: $H_o$: *there is no significant difference between employees' level of education and training outcome.* In order to test this hypothesis an analysis of variance on the average of the pretest and posttests of the three trainings namely CQMP, registry, and version 6.0 were computed and a p=0.274 was realized. This was then compared with 0.05 level of significance and the results showed that there were no significant differences between level of education and training outcome and thus the researcher failed to reject $H_o$. An ANOVA of the individual test showed no significant differences between registry protocol and level of education (p=0. 180) when compared with 0.05 level of significance. A similar result was found in version 6.0 and level of education (p=0. 267) when compared with 0.5 level of significance. However in the analysis of variance in CQMP, a p=0.015 was realized and compared with 0.05 level of significance. It was evident that for this particular course there was a significant difference between an employees' level of education and training outcome.

The second objective was to determine the extent to which employee experience influences training outcome in TB vaccine research in KEMRI/CDC, Kisumu Kenya. The following hypothesis was tested: *$H_o$: there is no significant difference between employees' experience in TB and training outcome.* In order to test this hypothesis the p-values of the tests on outcome regarding the three trainings namely CQMP, registry and version 6.0 were computed and a p-value of 0.295 was realized. This was then compared with 0.05 level of significance and the results showed that there were no significant differences between employee experience in TB and training outcome and thus the researcher failed to reject $H_o$. Separate ANOVAs of the individual test showed no significant differences between CQMP and experience in TB ($p=0.484$), registry protocol and experience in TB ($p=0.518$) and version 6.0 and experience in TB ($p=0.459$) when compared with 0.05 level of significance.

Employee experience elsewhere was also studied. The hypothesis: *$H_o$: there is no significant difference between employees' experience elsewhere and training outcome* was tested for CQMP, Registry, and version 6.0 and a p-value of 0.685 was realized. This was then compared with 0.05 level of significance. The results showed that there were no significant differences between level of education and training outcome and thus the researcher failed to reject $H_o$. Separate ANOVAs of the individual test showed no significant differences between CQMP and experience elsewhere ($p=0.410$), registry protocol and experience elsewhere ($p=0.488$) and version 6.0 and experience elsewhere ($p=0.487$) when compared with 0.05 level of significance. Dokko et al (2008), in a study conducted in the US, notes that prior work experience may include not only relevant knowledge and skill, but also routines and habits that do not fit in the new organizational context. Indeed, these routines and habits may limit the positive effect of prior experience on performance, suggesting that when individuals move across firm boundaries, their prior experience may not be wholly beneficial.

The last objective of this study was to establish how nature of work performed by an employee influences training outcome in TB vaccine research in KEMRI/CDC, Kisumu Kenya. The following hypothesis was tested in CQMP, Registry, and version 6.0: *$H_o$: there is no significant difference between employees' nature of work and training outcome* and a p-value of p=0.405 was realized. This was then compared with 0.05 level of significance. The results showed that there were no significant differences between employees' nature of work and training outcome and thus the researcher failed to reject $H_o$. However, separate ANOVAs of the individual test showed no significant differences between CQMP and employees nature of work (p=0. 801), and version 6.0 and employees nature of work (p=0. 913) when compared with 0.05 level of significance. Analysis of variance in registry protocol, p=0. 005 was realized and compared with 0.05 level of significance. It was evident that for registry there was a significant difference between employees' nature of work and training outcome.

## 5.3    Conclusions

From the present findings, no gender differences were found in pretest-posttest mean differences for males and females, thus gender factor did not influence performance in all the courses taken (p>0.05).  The pretest-posttest mean differences in all age groups (<30years, 30-33years and >33 years) were not statistically different from each other for all the courses, thus there is no association between age and training outcome. In the education level category, differences in means for secondary certificate, diploma and degree holders were observed in CQMP (p=0.015), an indication of association between education and training outcome.

Employees experience in TB branch or elsewhere played no role in influencing training outcomes as there was no difference in pretest-posttest means for all the courses for the

stratified employee categories. The results obtained from a comparison of the stratified pretest-posttest mean differences showed no significant differences for all the courses, (p>0.05). This therefore suggested that one's length of experience in TB or elsewhere did not influence training outcome in any of the courses offered.

There is also sufficient evidence that nature of work had an influence on training outcome in registry protocol. It was also evident that there was an increase in means from pretest to posttest in all courses. However, while comparing the mean differences obtained for the courses stratified by recruitment, clinical and other category it was worth noting that there were significant differences observed in registry protocol(p=0.005), thus future trainings need to be tailored to bridge these differences.

### 5.4 Recommendations

Having considered the theoretical framework, conceptual framework alongside the literature review and the study findings, the following recommendations can be made:

Evaluation of training outcomes proves to a critical step beyond the superficial pretest and posttest scores.

### 5.5 Recommendation for policy issues and practice

From the findings, the highest education level attained by an individual influenced performance, F=4.52, p=0.015). There is need to adapt courses related to CQMP to the varied education levels in the research team so as to realize standard results and bridge these gaps. There is also need to encourage the secondary certificate holders to upgrade themselves in order to improve in their cognitive abilities.

This being a research team with a common goal, there is need to tailor future trainings, related to registry protocol, to the various group differences in order to bridge the differences observed in training outcomes that relate to the nature of work an employee performs.

Employee experience seemed to have no effect in the pretest-posttest mean difference analysis. There is need for other branches to conduct similar evaluations and compare the results.

### 5.6    Suggestions for further research

This study did not explore certain areas that were equally important.  The areas were left out because the scope and delimitation of this study warranted.  Time and resources were also limited. In view of this fact the study recommends the following areas for further research:

An evaluation needs to be conducted on performance on the test questions and compare the performance for the pre-post pair questions.

A similar comparative study of training outcomes should be undertaken in similar settings so as to compare the results generated.

**Table 5.1      Contribution to body of knowledge**

| Objectives | Contribution to body of knowledge |
|---|---|
| 1. Establish how nature of work performed by an employee influences training outcome in TB vaccine research in KEMRI/CDC | There were differences in training outcomes among recruitment, clinical and employees performing other tasks with regard to registry protocol thus need to consider such differences when setting and moderating examinations. There is also need to integrate the teams in daily activities so that each team is aware of the procedures performed by other teams. |
| 2. Determine the extent to which employee experience as an employee characteristic influences training outcome in TB vaccine research in KEMRI/CDC | This factor did not influence training outcome since there were no differences in the means for varying years of service. Employees are quick in letting go of the routines leant in previous work stations and embrace ideas. |
| 3. Assess how demographic characteristics of KEMRI/CDC TB branch employee influence training outcome | Education played a key role and having observed differences in means for the CQMP among all education levels, it shows that the content in this course and future courses related to it would need to be moderated to achieve the set training objective. |

.

# REFERENCES

Adazu K, Lindblade K. A, Daniel H. Rosen A.D, Frank Odhiambo F, Ofware P, Kwach J, Van Eijk A.M, Decock K.M, Amornkul P, Karanja D, Vulule J.M & Slutsker L (2005); Health and Demographic Surveillance in rural western Kenya: A platform for evaluating interventions to reduce morbidity and mortality from infectious diseases. Am J Trop Med Hyg 73.

Adegoke A, Utz B, Msuya S.E, Van den Broek N (2012); Skilled Birth Attendants: Who is Who? A Descriptive Study of Definitions and Roles from Nine Sub Saharan African Countries. PLoS ONE 7(7): e40220. doi:10.1371/journal.pone.0040220

Agbakwuru C &Ugwueze S(2012) Effect of assertiveness training on resilience mong early-adolescents, European Scientific Journal May edition vol. 8.

Altarawneh I. (2009); Training and Development Evaluation in Jordanian Banking Organizations. Research and Practice in Human Resource Management Journal, 17(1), 1-23.

Ariff S, Soofi S.B, Sadiq K, Feroze,A.B, Khan S, Jafarey,S.N, Ali, N & Bhutta Z.A. (2010); Evaluation of health workforce competence in maternal and neonatal issues in public health sector of Pakistan: an Assessment of their training needs.

Baldwin T.T & Ford J.K. (1998); Transfer of training. A review and directions for future research. Personnel Psychology. 41(1) 63-105

Best, J. W., & Kahn, J. V. (2003). Research in education (9th ed.). Pearson Education, New Delhi, India.

Bibus,A.A. B& Rooney,R.H.(1985);Training Child Welfare Practioners in work with involuntary clients, Journal of Continuing Social Work Education 6(4), 13-22

75

Bowie P, Skinner J & Wet C (2013); Training health care professionals in root cause analysis: a cross-sectional study of post-training experiences, benefits and attitudes.BMC         Health Services Research Volume 13.

Calabro, K., Mackey, T. A., & Williams, S. (2002). Evaluation of training designed to prevent and manage patient violence. Issues in Mental Health Nursing, 23, 3-15.

Campbell O, Gipson R, Issa AH, Matta N, El Deeb B, et al. (2005); National maternal mortality ratio in Egypt halved between 1992–93 and 2000. Bulletin of the World Health Organization 83: 462–471

Chankova S, Muchiri S & Kombe G (2009); Health workforce attrition in the public sector in Kenya: a look at the reasons

Collins, J. (1994). Nurses attitudes towards aggressive behaviour, following attendance at the prevention and management of aggressive behavior programme. Journal of Advanced Nursing, 20, 117– 131.

Curry D. H, Caplan P, and Knuppel J,(1994); "Transfer of Training and Adult Learning (TOTAL)," Journal of Continuing Social Work Education. vol. 6 (1), pp. 8-14.

Denning J.W, (1993); Statewide family preservation training; The staff response. Journal of Continuing Social Work Education, 5(4), 5-10.

Deutschlander S (2009).An analysis of training effects on school personnel's knowledge, attitudes, comfort, and confidence levels toward educating students about HIV/AIDS in Pennsylvania

Dietz T.J(1998); Incorporating follow up to evaluate the impact continuing professional education programs have on social work practice. The professional Development. The international Journal of Continuing Social Work Education, 1(1) 16-21

Dokko W, and Rothbard 2008; How Career History Affects Job Performance, Organization Science, New York, USA.

Dolan C, Concha M.E, Nyathi E,(1995); Community rehabilitation workers: do they offer hope to disabled people in South Africa's rural areas? Int J Rehabil Res 18:187-200.

Feutch,T.E., Stephens R.C.& Gibs,B.H.,(1991); Knowledge about AIDS among intraveneous drug users: An evaluation of an educational Program. AIDS Education and Prevention 3(1), 10-20.

Gall, M. D, Gall, J. P, & Borg, W. R. (2003); Educational research: An introduction (7th ed.). New York: Allyn and Bacon. Lamb, T. A., & Tschillard, R. (2005, Spring).

Evaluating learning in professional development workshops: Using the retrospective pretest. Journal of Research in Professional Learning

Garaigordobil M, Maganto C, Pe´rez, J.I, Sansinenea, E (2008); Gender Differences in Socioemotional Factors During Adolescence and Effects of a Violence Prevention Program, Donostia-San Sebastia´n, Spain.

Gyllensten A, Svensson B, Bjorkman T, Hansson L, Leufstadius C, Bejerholm U, Markstrom U, Ostman M, Eklund M, Brunt D, Sandlund M, (2011); Attitudes in health care students towards mental illness-A pre and post multicenter university program survey. The internet journal of Allied Health Sciences and practice. Volume 9 Number 3

http://ichgcp.net/ (1996)

Iqbal A, 2010; An Empirical Assessment of Demographic Factors, Organizational Ranks and Organizational Commitment International Journal of Business Management

Israel,G.D. (1992); Determining Sample size. University of Florida IFAS extension.

Jalil F, (2004); Perinatal health in Pakistan: a review of the current situation. Acta Paediatr , 93:1273-1279. PubMed Abstract  Publisher

Jan R (2007); Midwifery Education and Maternal and Neonatal Health Issues: Challenges in Pakistan. Journal of Midwifery & Women's Health 2007, 52:398-405.

Kirkpatrick D. L, & Kirkpatrick J. D (2006); Evaluation training programs: The four levels (3rd ed.). San Francisco, Berrett- Koehler Publishers, Inc.

Lavalle O.I, Grenyer, B. F. S., & Graham, L. (2002). Does prior training and staff occupation influence knowledge acquisition from an aggression management training program? International Journal of Mental Health Nursing, 11, 233–239.

Lawn J.E, Blencowe H, Pattinson R, Cousens S, Kumar R. (2011); Stillbirths: Where? When? Why? How to make the data count? Lancet 377: 1448–1463.

Leung, A (2006); A Conceptual Model of Information Technology Training Leading to Better Outcomes. International Journal of Business and Information.Volume 1 Number 1, 2006 pp 74-95

Lynch K. B. (2002); When you don't know what you don't know: Evaluating workshops and training sessions using the retrospective pretest methods. Paper presented at the meeting of the American Evaluation Association Annual Conference, Arlington, VA

Martineau, J. (2004); Evaluating leadership development programs: A professional guide. Greensboro, NC: Center for Creative Leadership.

McCowan R.J., McGregor E.N. & LoTempio J. (1982); Competency based evaluation of social services training, Journal of Continuing Social Work Education, 2(1), 11-13.

Mick M.G & Ann S.L (2004); Changes in short-term attitudes toward physical activity and exercise of university personal wellness students. Volume: 38 Source Issue: 4

Mueller B.J,(1985); Participant action planning: A qualitative method to evaluate retention of learning, Journal of Continuing Social Work Education, 3(2), 9-14.

Mugenda A. & Mugenda O. (2003). Research methods: Quantitative and Qualitative Approaches,   Nairobi; Acts Press.

Oestergaard M.Z, Inoue M, Yoshida S, Mahanani W.R, Gore F.M,   (2011); Neonatal mortality     levels  for 193 countries in 2009 with trends since 1990: a systematic analysis of     progress, projections, and priorities. PLoS Medicine 8.

Rubin A & Babbie E.(1997); Research methods for social work (3$^{rd}$ ed.) Pacific groove, CA:brooks/Cole publishing Co.

Sackett, P. R, Gruys, M. L., & Ellingson, J. E. (1998); Ability-personality interactions when predicting job performance. Journal of Applied Psychology, 83(4), 545–556.

Scott S, Ronsmans C (2009); The relationship between birth with a health professional and maternal mortality in observational studies: a review of the literature. Tropical Medicine     & International Health 14: 1523–1533.

Shariff N.B.M & Al-Makhadmah.I.M (2012); Work environment factors influencing in achieving Training effectiveness in aqaba special economic zone Authority aseza, vol 2 No 3.

Tjoa A,  Kapihya M,  Libetwa M, Schroder K, Scott C, Lee J  and  Mc Carthy E, (2010); Meeting human resources for health staffing goals by 2018: a quantitative analysis of policy options in Zambia

Walvoord B. E,(2004). Assessment Clear and Simple: A Practical guide.

WHO UNICEF (2010); Countdown to 2015 decade report (2000–2010) with country profiles taking stock of maternal, newborn and child survival. Geneva; New York: World Health Organization;  UNICEF.

WHO UNICEF, The World Bank (2010) Trends in maternal mortality 1990 to 2008: estimates.     Geneva: World Health Organization.

Yount W. R,(1996); Created to Learn.  pp. 192.

# APPENDICES

## APPENDIX I  Letter of transmittal

UNIVERSITY OF NAIROBI

P.O. BOX 30197-00100

NAIROBI, KENYA

23 FEB 2013

TO…………………………….


**RE: INFLUENCE OF EMPLOYEE CHARACTERISTICS ON TRAINING OUTCOMES IN TUBERCULOSIS RESEARCH VACCINE IN KEMRI/CDC,KISUMU, KENYA**


I am currently a student pursuing a Masters of Arts Degree in Project Planning and Management at the University of Nairobi. I am carrying out the above study in KEMRI/CDC TB Branch Kisumu as part of the requirements for the fulfillment of Masters of Arts Degree. The purpose of this letter is to request your participation in the study.

All information collected will be treated as strictly confidential.

Your cooperation and support in this study will be highly appreciated.


Yours faithfully,


Rose Kazirika Abwunza

**APPENDIX  II          Questionnaire for KEMRI/CDC TB Vaccine Research employees**

My name is………………………………….. Thank you for agreeing to participate in this interview. I am currently a student pursuing a Masters of Arts Degree in Project Planning and Management at the University of Nairobi. I am carrying out a study in KEMRI/CDC TB Branch Kisumu as part of the requirements for the fulfillment of Masters of Arts Degree whose purpose of this study is to assess employee characteristics influencing training outcomes in tuberculosis research vaccine in tuberculosis branch, KEMRI/CDC, Kisumu Kenya. During the interview we will focus on four main areas: (1) Nature of work done by employee (2) Years of experience both in TB branch and elsewhere and (3) Demographic characteristics. (4) Scores obtained in CQMP, Version 6.0  and registry protocols.

Before we begin, I would like to reassure you that your identity and the information you provide in this interview will be kept strictly confidential and for the purposes of research only.  Do you have any questions at this point?

Staff                                                                                                      code:

_____

## SECTION A

**Demographic questions**

1.  Date of birth( dd,mm,yyyy)  _____

2.  What is your gender? (please tick one)

           Male            (  )

            Female         (  )

3. (a)     What is the highest education level completed by June 2012? (please tick one)

        Secondary        ( )

        Diploma        ( )

        Higher diploma        ( )

        Bachelors        ( )

        Masters        ( )

        Other (specify)        -

_____

## SECTION B

## Nature of work done in the study

4. Which tasks do you perform in the study? (please tick one)

        Clinical        ( )

        Recruitment        ( )

        Other        role        (specify)

_____

## SECTION C

## Year of experience

5. When did you join TB Branch (please state the month and year)

_____

6. By June 2012, how many complete years had you served elsewhere before joining TB Branch? _____

**SECTION D**

**Scores obtained in CQMP, Version 6.0 protocol and Registry protocol**

7. During the initial CQMP training, what percentage score did you obtain in the pre-test? _____%

8. During the initial CQMP training, what percentage score did you obtain in the post-test? _____%

9. During the initial Version 6.0 training, what percentage score did you obtain in the pre-test? _____%

10. During the initial Version 6.0 training, what percentage score did you obtain in the post-test? _____%

11. During the initial Registry training, what percentage score did you obtain in the pre-test? _____%

12. During the initial Registry training, what percentage score did you obtain in the post-test? _____%

Thank you for taking time to participate in this study

**APPENDIX III      Letter of Research Authorization**

REPUBLIC OF KENYA

# NATIONAL COUNCIL FOR SCIENCE AND TECHNOLOGY

Telephone: 254-020-2213471, 2241349, 254-020-2673550
Mobile: 0713 788 787 , 0735 404 245
Fax: 254-020-2213215
When replying please quote
secretary@ncst.go.ke

P.O. Box 30623-00100
NAIROBI-KENYA
Website: www.ncst.go.ke

Our Ref: **NCST/RCD/14/013/731**

Date: **20th May 2013**

Rose Kazirika Abwunza
University of Nairobi
P.O Box 30197-00100
Nairobi.

**RE: RESEARCH AUTHORIZATION**

Following your application dated **6th May, 2013** for authority to carry out research on *"Influence of employee characteristics on training outcome in tuberculosis vaccine research in KEMRI/CDC, Kisumu, Kenya."* I am pleased to inform you that you have been authorized to undertake research in **Kisumu District** for a period ending **31st August, 2013.**

You are advised to report to **the Director, Kenya Medical Research Institute/CDC** before embarking on the research project.

On completion of the research, you are expected to submit **two hard copies and one soft copy in pdf** of the research report/thesis to our office.

**DR. M. K. RUGUTT, PhD, HSC.**
**DEPUTY COUNCIL SECRETARY**

Copy to:
The Director
Kenya Medical Research Institute/CDC.

*"The National Council for Science and Technology is Committed to the Promotion of Science and Technology for National Development".*

## APPENDIX IV          Research Permit



**PAGE 2**

THIS IS TO CERTIFY THAT:
Prof./Dr./Mr./Mrs./Miss/Institution
Rose Kazirika Abwunza
of (Address) University of Nairobi
P.O Box 30197-00100, Nairobi.
has been permitted to conduct research in

Location          District
Kisumu
Nyanza          Province

on the topic: Influence of employee
characteristics on training outcome
in tuberculosis vaccine research
in KEMRI/CDC, Kisumu, Kenya.

for a period ending: 31st August, 2013.

**PAGE 3**
Research Permit No. NCST/RCD/14/013/731
Date of issue          20th May, 2013
Fee received          KSH. 1,000

Applicant's          Secretary
Signature          National Council for
Science &Technology