

Implementation Dosage of Competency-Based Curriculum for Nursing and Midwifery Programme among Nurse Educators in Tanzania

Mmari, Vumilia, Bettuel^{1,2,*}, Mselle, Lillian Teddy³, Kibusi, Stephen, Mathew¹, Osaki, Kalafunja, Mlang'a⁴

¹Department of Nursing & Midwifery, College of Health Sciences, University of Dodoma, Dodoma, Tanzania

²Ministry of Health, Community Development, Gender, Elderly and Children, Directorate of Human Resource Development, Nursing and Midwifery Training section, Dodoma, Tanzania

³ Department of Clinical Nursing, Muhimbili University of Health and Allied Sciences, Dar es Salaam, Tanzania

⁴St. Augustine University Tanzania (SAUT), Post Graduates Department, Dar es Salaam, Tanzania

ABSTRACT

It is now more than ten years since Tanzania adapted Competency-Based Education and Training (CBET). The CBET is valuable approach that enable learners to gain required competencies specifically for their professional. Among competencies required for nurses they include cognitive or thinking competencies, such as deciding what to do in certain circumstances, doing competencies with performance of clinical procedures correctly as well as professionally, and affective competencies such as empathy, respect and attentiveness to client demands. Before implementation, various activities were carried out to ensure the nursing and midwifery CBET curriculum is effectively implemented. However, no systematic study was conducted to assess implementation dosage of the nursing and midwifery CBET curriculum. Therefore, this study aimed to assess implementation dosage of the same among nurse educators in Tanzania. This was a descriptive cross-sectional study design using a partial convergent mixed methods research approach. Out of 264 participants, 24 were interviewed, while 240 participated in the questionnaire. Research participants were drawn from 40 out of 94 nursing and midwifery schools. Both descriptive and inferential analyses were used to analyze quantitative data and thematic framework was used to analyze the qualitative data. Results from the study revealed that majority (83%) of participants provided less number of sessions, only 17 percent delivered number of sessions as per curriculum description. The participants who attended training on implementation of the CBET curriculum were more likely to deliver full dosage than those who did not have training (OR=2.51, p=0.1481) though results were not statistically significant. For qualitative data, nurse educators were unable to explain how they determined number of sessions per module they taught. Based on findings from this study, it is concluded that implementation dosage was lower than the intended original designed curriculum. Participants who attended training on implementation of the CBET curriculum were more likely to deliver full dosage than those who did not attend the training. In due regard, such pattern underscores the need to build capacity of nurse educators on implementation dosage of Nursing and Midwifery CBET curriculum.

Keywords: competency-based curriculum, implementation dose, nurse educator, Tanzania

Corresponding AuthorE-mail: vumiliammari@yahoo.com*

INTRODUCTION**Background Information**

In 2008, the Ministry of Health, Community Development, Gender, Elderly and Children (MoHCDGEC) adapted Competency-Based Education and Training (CBET) approach. The CBET approach involves educational changes in the curriculum and instructional approaches to integrate outcome- or skill-based learning rather than content or knowledge based (1). Before implementation, the MOHCDGEC prepared standardized training manuals to guide implementation of nursing and midwifery CBET curriculum and trained nurse educators on their effective use.

Nursing and midwifery CBET curriculum was designed to be delivered based on a learning package (module) so as to provide activities including hands on practices that are appropriate for the task being learnt by a learner (1,2). According to the existing nursing and midwifery CBET curriculum, number of sessions to be delivered by nurse educators is one of particular important elements for effective curriculum implementation. The nursing and midwifery CBET curriculum was designed in a modular form to maximize learners' attainment of desired outcomes (3).

The learning package (module) is a well-designed learning aspect that gives detailed instructions to guide nurse educators through teaching and learning process and how much to cover in terms of credits for each module (4). It focuses on identifiable workplace activities, which require use of professional knowledge, skills, attitude and wider attributes (4). Credit is measurement unit for average learning time, which includes all activities

that a learner is expected to undertake in order to achieve learning outcomes (5). This is important to be known by the nurse educators because to determine the number of sessions, they must know the credits for each specific module they would teach as narrated in the scheme of study. The scheme of the study is the matrix in the nursing and midwifery CBET curriculum that indicates distribution of hours to be taught per week in a semester. Furthermore, the scheme of study illustrates sessions to be spent in classroom, skills laboratory, clinical teaching, tutorial, learners' self-study and assignments per week in the semester (6). Moreover, the scheme of study is a road map and central point to translate the curriculum for its effective implementation. Therefore, understanding of the description of the module, credits and scheme of study in nursing and midwifery CBET curriculum is of paramount importance for effective implementation dosage of the same.

Previous studies documented various implemented programmes that were less effective when students did not receive the intended dosage (7,8). One example of the less amount of the dosage was reported by Wang and colleagues (9) in their study on factors influencing implementation dose and fidelity. Findings from the study indicate that, among the total of eight sessions conducted, only 1 percent of the sessions completed all core activities and covered all eight sessions and 3 percent did not teach any activities in their classes. Overall, 18 percent of teachers instructed less than eight core activities and two sessions. Furthermore, Wilson and co-workers (10) in their study on programme improvement in dose and fidelity in three

schools revealed that dose delivered (completeness of programme delivery) was captured through 49 observations. The goal was to reach a target dose of 75 percent or higher. However, it was found out that two schools did not attain the targeted dose as they scored less than 75 percent of the targeted dose (*op cit.*). Therefore, with such findings, it was concluded that the school programme goal was not met (*ibid.*). In a study conducted by Powers *et al* (11) in the field of Science, Technology, Engineering and Mathematics (STEM) focusing on implementation of three constructs, namely, Curriculum and instructions; Teachers' professional development; and administrative support; it was uncovered that level of implementation dosage for teachers was at 100 percent exceeded standards and 95 percent of teachers met programme standards. As such, the programme objective was met.

Assessment of nursing and midwifery CBET curriculum is one of pertinent elements that provides assurance of validity of the implementation dosage. Therefore, assessment methods administered to evaluate learners' achievement of the competencies are very crucial (12). Generally, assessment in nursing and midwifery training is a necessary aspect to predict development of professional competencies prior to their placement in real clinical settings. In nursing and midwifery training programme that deals with life of human beings practical and clinical assessment is of paramount important. Moreover, teaching and learning methods like simulation, case studies and skills laboratory teaching are pertinent to ensure that learners should acquire necessary competencies prior to actual handing of a real patient practice (13). Jeggles (14) argues that simulation allows learners to practice clinical techniques without exposing patients to risks

associated with health care training. Moreover, assessment in nursing and midwifery CBET curriculum is administered in conditions, which are close to the real world of work (4).

Dusenbury and co-authors (15) define dosage as the amount of sessions and duration received by students as fully prescribed by curriculum designers. Coverage of dosage in each module is important to ensure learners are exposed adequately to specific desired outcomes and acquire necessary competencies. As far important as the dosage is concerned in implementing nursing and midwifery CBET curriculum, nurse educators implementing the same curriculum are responsible to ensure students receive the full dose designed by curriculum developer (16). Dosage of sessions delivery in competency-based curriculum for nursing and midwifery is very important, yet, it is often an overlooked aspect of curriculum implementation. Recently, there has been concern about nurse and midwives graduates in their clinical performance (17). Hence, it is unclear whether or not the dosage of the CBET curriculum for nursing and midwifery programme is implemented as it was prescribed by designers in the original curriculum or not. Thus, it was the aim of this study to assess implementation dosage of the nursing and midwifery CBET curriculum among nurse educators in Tanzania.

Conceptual Framework on Implementation Dosage of the Nursing and Midwifery CBET Curriculum

A Conceptual Framework for implementation fidelity proposed by Carroll and colleagues (18) includes the following five elements: adherence, dosage/exposure, quality of delivery, participants' responsiveness and programme differentiation. This study

adapted Carroll’s Conceptual Framework for implementation fidelity because it is in line with the study objectives(19). However, this study adapted only one element, namely, dosage (20). Azano, Callahan and Foster (21) argued that although there are five elements in the conceptual framework for implementation fidelity, it is unnecessary to assess all of them. Even a single element could be measured depending on interest, scope of the study and can include various sources (*ibid.*). The conceptual framework was modified to fit the context of the study and thus, the modifications were on dosage. Additionally, nurse educators’ characteristics were added in the conceptual framework as they play a key role in curriculum implementation (22,23). Focus of this study was on dosage as part of the three elements of implementation fidelity of the CBET curriculum for

nursing and midwifery curriculum (20). Figure 1 illustrates the conceptual framework of implementation fidelity of the competency-based curriculum for nursing and midwifery programme in Tanzania.

MATERIALS AND METHODS

Study Design

This study applied mixed research approach. It was important for this study on implementation dosage of the nursing and midwifery CBET curriculum in Tanzania. Both quantitative and qualitative data were collected simultaneously from different samples and integration of findings occurred during interpretation phase. Triangulation of data collection methods was done to facilitate understanding of implementation dosage of the nursing and midwifery CBET curriculum (24, 25).

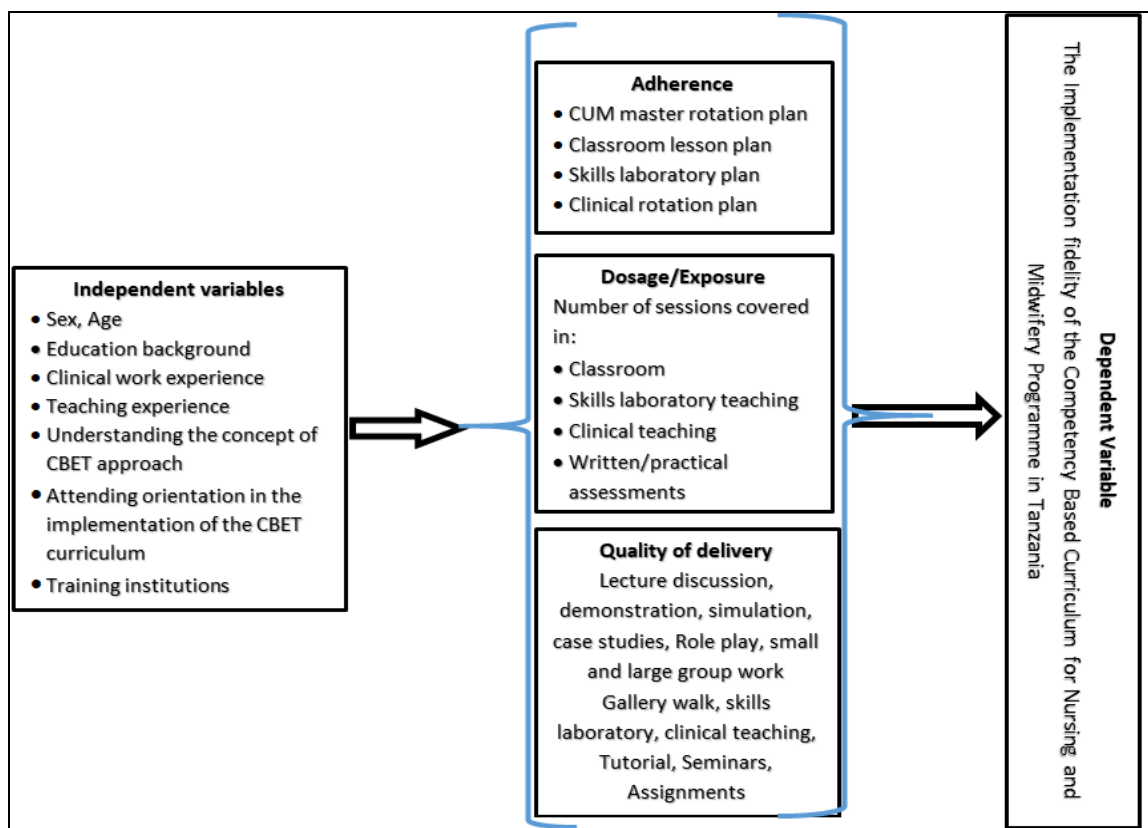


Fig. 1. Conceptual framework for implementation fidelity of the competency-based curriculum for nursing and midwifery programme in Tanzania.

Source: Mmari and colleagues (20).

Study Setting

This study was conducted in schools of nursing and midwifery implementing nursing and midwifery CBET curriculum approved by National Council for Technical Education (NACTE) and Tanzania Nursing and Midwifery Council (TNMC). There are 94 nursing and midwifery schools in Tanzania, out of them, 40 nursing and midwifery schools were involved in this study (20,26). Among them, 14 were government, 8 Private (non-Faith-Based) and 18 Faith-Based owned nursing and midwifery schools (20). The reason to include Faith-Based schools (FBOs), Private and Government schools in this study was because all are implementing the CBET curriculum for nursing and midwifery programme approved by NACTE and TNMC (19).

Study Participants and Sample Size

Participants of this study were nurse-educators implementing competency-based curriculum for nursing and midwifery programme in Tanzania (20,26). In this study, nurse educators included those with nursing and nursing education backgrounds. The study included nurse educators with working experience of three years or more of implementing nursing and midwifery competency-based curriculum (27). Sample size of participants in the quantitative study used a formula documented by Fox *et al.*, (28). In addition, proportionate formula suggested by Cochran and colleagues (29) was used to obtain number of nurse educators in each selected nursing and midwifery school. This is because the number of nurse educators is unequal in all nursing and midwifery schools (26).

Sampling Procedures

Sampling was done using a three stage (or multi-stage) sampling procedure. The first step was selection of regions from the

eight training zones of Tanzania. The second step involved selection of nursing schools whereby they were selected purposively to ensure equal representation of private, faith-based and government owned schools (30). The third stage was selection of nurse educators implementing competency-based curriculum. Simple random sampling procedure was used to select 240 nurse educators (31,32). The list of nursing educators who met inclusion criteria was obtained from nursing and midwifery schools (19). At the school level, pieces of paper written with “Yes” or “No” written on them were prepared and put in a box (19). Nurse educators were required to pick only one piece of paper in the box. Those who picked piece of paper written “Yes” were assigned numbers to be involved in the study. Thereafter, all sampled nurse educators were identified by numbers and not their names (19).

Purposive sampling technique was used to recruit 24 nurse educators with rich experience for the qualitative study (33–35). Specifically, they were nurse educators who had nursing education background and teaching experience of five years and more. However, the principle of saturation guided the sampling process (36). The school heads were asked to provide a list of nurse educators who had experience of five years or more in implementing the nursing and midwifery CBET curriculum (20,26). Thereafter, the researcher met the identified nurse educators, explained objectives of the study, and the study procedures and those who agreed to take part in the study were requested to provide written consent. That was followed by scheduling of interviews.

Data Collection Methods

Self-administered questionnaire

A modified questionnaire, which was used to assess the proficiencies of learners in

the field of Science, Technology, Engineering and Mathematics (STEM), was used to collect quantitative and qualitative data. The questions were modified to suit the nursing and midwifery programmes in the Tanzania context. The questionnaire included questions on nurse-educators' characteristics, number of classroom sessions, skills laboratory and clinical sessions covered in a module. Also, Nurse Educators were required to disclose challenges encountered when they facilitated the module. The questionnaire had 28 items with both open-ended and close-ended questions. It was used because all participants were asked the same set of questions in the same sequence and thus, such pattern increased objectivity of the collected data even though the data were triangulated with information from interviewers (37). The questionnaire was tested for reliability using Cronbach's alpha test and scored $r=0.712$. Furthermore, the pilot study was conducted to check for consistency of questions, content validity and time estimate. The sample size for the pilot study was 5 percent of the main study sample that involved 12 nurse educators at one nursing and midwifery school (38). The findings from the pilot study was not included in the major study, rather helped to modify questions in the questionnaire.

Nurse educators were followed up at their schools, where they taught for completion of the questionnaire. At school level, research assistants' team identified nurse educators who met criteria and were randomly selected to answer the questionnaire (20, 26). The questionnaire was self-administered. Upon completion, the research assistants collected the completed questionnaires and stored in safe envelopes and handled to the researcher afterwards. To ensure confidentiality, all questionnaires were kept in a locked shelf and they were accessed only by research team.

Semi-structured Interview Guide

A semi-structured interview guide was used to collect data from the nurse educators (39). The questions were based on a pre-determined topic and guided the data collection process (33). The interview guide was prepared in English language and later on translated into Kiswahili, the national language spoken fluently by participants as well as researchers. The interview guide included questions focusing on participants' demographic information, how they determined number of sessions in a module, use of scheme of study, and methods used to assess learners' performance during implementation of the nursing and midwifery CBET curriculum.

Twenty-four (24) interviews with nurse educators were conducted individually in a quiet room in the school premises out of reach from other educators and students. All interviews were conducted by the researcher using the interview guide and with their consent, all responses were audio recorded. Following each interview, the researcher listened to the recorded interviews and read the field notes to understand the materials so as to determine if there emerged issues that needed follow up with subsequent interviews. The exercises facilitated realization of reaching saturation of data at 21 interviews where there was no additional information generated. However, the researcher decided to continue with three additional interviews to ensure that there were no more emerging pieces of information (40). Duration of interview sessions varied from 60 to 120 minutes (26). Four research assistants who were trained before data collection had experience in conducting health research.

Data Analysis Plan

Qualitative data were analyzed using IBM Statistical Product for Social Sciences (SPSS) version 24 for Microsoft Windows.

Dosage referred to number of sessions and assessments covered in a module from the nursing and midwifery CBET curriculum. Descriptive and inferential analyses were used to determine dosage and associations. The status of implementation dosage was established by calculating difference between actual sessions/assessments in the curriculum and sessions/assessments covered by the nurse educator (9,11,41). Depending on number of the sessions offered in a module, for each session, nurse educators scores were grouped into three categories. Those with less than required value were considered as “under dose,” while those with exactly and more than the required values were regarded as having full dose and over dose, respectively. For each item of assessment, nurse educators with frequency of at least two assessments per module were considered to have full dose of assessments for that particular item.

Thematic analysis method, as described by Braun and Clark (42), was used for qualitative data analysis and the NVivo 10 software was used to generate a coding system. Prior to starting the analysis, the audio-recorded interviews were transcribed verbatim, where non-verbal cues were also captured. The interviews were read and re-read to get an understanding of the data (43, 44). The data were organized in a meaningful way and they were coded to reduce data volume. The codes were developed and reviewed throughout the coding process and then they were organized under descriptive themes (43).

Ethical Considerations

Before data were collected ethical approval and permission letter were granted from the Research and Publications Committee of the University of Dodoma [UDOM) Ref: UDOM/GR/209/Vol. II/59 and MoHCDGEC Ref: MP 70933/78.

Furthermore, Nurse Educators provided informed written consent before they were interviewed and for using audio-record gadget to record conversations during the interviews. Nurse Educators were briefed about objectives and procedures of the study. Also, they were informed about their right to agree or disagree to participate or withdraw from the study at any point in time. Moreover, participants were made clear that the information they had to provide, whether orally or in writing, would be treated with strict confidentiality and they were assured that the data analysis including report findings will not identify them in any way. Nurse Educators’ names were not used and the designated numbers as well as collected materials (including hand written notes, transcripts, and tapes) were locked in a cabinet that only the research team could access. Permission to adapt the tools was granted by the authors.

RESULTS

Demographic and Background Characteristics of Nurse Educators Implementing dosage of Nursing and Midwifery CBET Curriculum in Tanzania (n=240)

As indicated in Table 1, 240 nurse educators participated in this study. Two-thirds (62%) of the Nurse Educators were females, 35 percent were between 40 and 50 years of age with mean of 46. Close to half (41%) of nurse educators had Diploma in nursing and midwifery, 31 percent with Bachelor of Science in Nursing (BSc N) and 28 percent had Master of Science (MSc) degree level. Among them, 45 percent had six to ten years teaching experience, 44 percent equal to or less than 5 years and 11 percent had over eleven years of teaching experience using nursing and midwifery CBET curriculum. A little bit higher than half (59%) attended training on the implementation of nursing and midwifery CBET curriculum.

Table 1. Demographic and background characteristics of nurse educators (n=240).

Variable	N	%
Age group (mean)	45.7	
<40	79	32.92
40-50	83	34.58
51+	78	32.50
Sex		
Male	92	38.33
Female	148	61.67
Highest Education level		
Diploma in nursing and midwifery	99	41.25
BSc N	75	31.25
MSc NE	66	27.50
Working experience (Years) as clinical nurse		
1-2 (Advance beginner)	50	20.83
3-5 (Competent/Proficient)	65	27.08
6+ (Expert)	125	52.08
Teaching experience using nursing and midwifery CBET curriculum		
≤5	106	44.17
6-10	107	44.58
11+	27	11.25

Source: Experiences of Nurse Educators on the implementation of the nursing and midwifery CBET curriculum in Tanzania (26).

Distribution of Nurse Educators by module taught in Implementing Nursing and Midwifery CBET curriculum

Table 2 shows modules reported to be facilitated by nurse educators in the last semester (s) of the study period. A bit over half (52%) reported to facilitate Midwifery III; Mental Health Nursing (17%); Midwifery I (15%); Infection Prevention and Control (9%); and Human Anatomy and Physiology (8%). Midwifery I is the module that was taught in the first semester of the second year of the programme, while midwifery III module was taught at the first semester of the third year, respectively.

Scores of Sessions Covered by Nurse Educators Implemented Nursing and Midwifery CBET Curriculum

Scores of Classroom Dosage Covered by Nurse Educators in all Five Modules

Quantitative analysis revealed that almost all five modules with the number of sessions delivered were below than the required number of sessions prescribed in the original nursing and midwifery CBET curriculum. For example, classroom sessions Midwifery III indicated that a bit

over half (58%) delivered less number of sessions that what were required. For Mental Health nursing, majority (93%) delivered less number of sessions, while for Human Anatomy and Physiology 39 percent delivered less number of sessions. For Infection Prevention and Control, majority (85%) delivered less number of sessions.

Table 2. Distribution of nurse educators by module of interest taught in Implementing nursing and midwifery CBET curriculum (n=240).

Module	n	%
Midwifery III	124	51.67
Mental Health Nursing	40	16.67
Midwifery I	36	15.00
Infection Prevention & Control	22	9.17
Human Anatomy and Physiology	18	7.50

Source: Field data (2019)

Implementation Dosage in terms of Clinical sessions Covered in all five Modules

In clinical teaching, Midwifery III majority (81%) provided less number of sessions than what was intended by curriculum designers. For Mental Health Nursing, close to three quarters (73%)

offered less number of sessions. Likewise, for Midwifery I, majority (83%) delivered less number of sessions. Besides, for Infection Prevention and Control, majority (92%) delivered less number of sessions and for Human Anatomy and Physiology, a bit over three quarters (78%) delivered less number of sessions, respectively.

Qualitative findings indicated that the nurse educators were unable to determine number of sessions required in the module they taught. Determining number of sessions in a module is an important aspect for provision of full dosage as per curriculum description. Not knowing the number of sessions in a module indicates nurse-educators' limited understanding to interpret nursing and midwifery CBET curriculum and its implementation dosage. The following quotes illustrate responses from the nurse-educators regarding how they determined the number of sessions in the module they taught:

- "I first look at the heaviness of the contents, sub enabling outcomes and its related tasks" (Participant No. 9 with teaching experience of 9 years).
- "I check the weight of the sub-enabling outcome together with its related tasks. So, it is where I check number of sessions according to their weights" (Participant No 3, Teaching experience 37 years).
- In addition, participants were unaware of existence of the scheme of study in the nursing and midwifery CBET curriculum. The following quote illustrates:
- "For the Scheme of Study, during the preparation of the content for presenting is necessary. For lesson plan? ... I don't know. Or maybe it has another name?" (Participant No. 22, Teaching Experience of 9 years).
- Nurse educators appreciated the importance of credit in a scheme of study when prepared lesson plans.

However, information they provided revealed that they had difficulties to realize the credit value in a module:

- "And for that matter, one notion hour, ten notion hours is equivalent to one hour" (Participant No 3, Teaching experience 37 years).
- "... because one notion hour is equal to ten notion hours is equal to one-to-one" (Participant No 2, Teaching experience 15).
- During interviews, it was evident that participants had difficulty in understanding curriculum components. They were unable to define the principal learning outcomes, enabling outcome and sub enabling outcome in nursing and midwifery CBET curriculum. One participant had this to say,
- "I don't know the meaning of principal learning outcomes, the meaning of sub- enabling, the meaning of enabling, and the meaning of related tasks. So I suggest that I should be given support to understand these for easy implementation. This curriculum is new and I have to be directed on how to use it otherwise it is difficult. So please I still suggest continuing updating on the implementation of this new curriculum" (Participant No 15 and teaching Experience of 5 years).
- A nurse educator with 15 years of teaching experience expressed that,
- "More time is needed to understand competency-based curriculum. We need to hear more and what did the curriculum developer except from the trainers? I'm still not conversant with competency curriculum."

Implementation Dosage in terms of Students Assessments Administered by Nurse Educators Implementing Nursing and Midwifery CBET Curriculum

Majority (93%) of nurse educators administered written assessment, 37

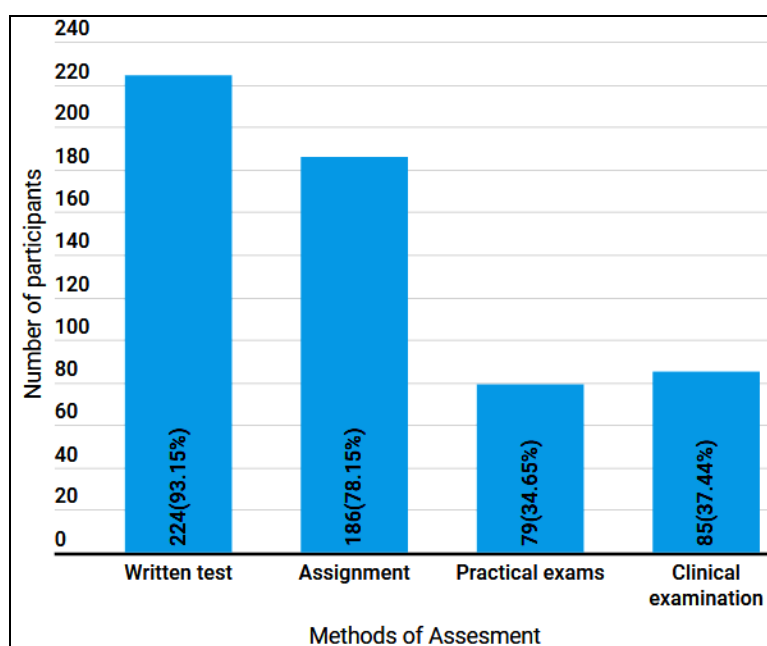


Fig. 2. Overall implementation dosage in terms of assessments administered by nurse educators.

Source: Field data (2019).

percent of nurse educators administered clinical assessment and only 35 percent performed practical (OSCE/OSPE) assessment. Figure 2 shows overall assessments administered to students.

Factors Associated with Implementation dosage of Nursing and Midwifery CBET Curriculum in Tanzania

As presented in materials and methods section, logistic regression model was used to determine factors associated with implementation dosage. Results of models showed that the status of dosage was significantly associated with training on implementation of nursing and midwifery CBET curriculum ($p=0.0416$). The participants who attended training on implementation of the nursing and midwifery CBET curriculum were more likely to implement full dosage than those who did not have training ($OR=2.51$, $p=0.1481$) though it was not statistically significant.

DISCUSSION

The purpose of this study was to assess implementation dosage in the implemented

nursing and midwifery CBET curriculum among nurse educators in Tanzania. The study revealed that nurse educators provided less number of sessions than what was prescribed in the original designed nursing and midwifery CBET curriculum. This implies that learners were less exposed to competencies than what was stipulated in the original designed nursing and midwifery CBET curriculum. This is very serious and critical as it has impact on implementation of the nursing and midwifery CBET curriculum.

As far as dosage is concerned, overall, nurse educators did not deliver the intended dosage as per original designed nursing and midwifery CBET curriculum. This affects learners because they did not get the required amount of sessions to realize acquisition of competencies to perform a specified task as stipulated in the designed nursing and midwifery CBET curriculum.

Findings from this study lead to suggest that nurse educators who provided under

dose and overdose, respectively, were unable to interpret the competency-based curriculum for nursing and midwifery programme. This was evidenced through interviews where participants demonstrated their limited ability to determine number of sessions in a module they taught. When nurse educators are still struggling to determine number of sessions in a module, it is obvious that they could not be able to provide full dose as it was required. We must acknowledge that nurse educators provided low dosage as required due to lack of knowledge and skills to interpret the nursing and midwifery CBET curriculum particularly scheme of study. This is very serious, especially when nursing and midwifery CBET curriculum has been in use for almost past twelve years.

Inability to interpret the nursing and midwifery CBET curriculum was further confirmed when participants were required to share their experience on usage of the scheme of study during preparation of session plans. Results from this study revealed that some participants did not even know about the meaning of scheme of study and whether or not it existed in a nursing and midwifery CBET curriculum. Moreover, they could not even demonstrate the ability of recognizing the value of credits versus notional hours. This is very critical when it comes to determination of the number of sessions to be covered as stipulated in the nursing and midwifery CBET curriculum.

Pertaining to other important pieces of information, participants had mixed ideas on understanding of some parts of the nursing and midwifery CBET curriculum, particularly Principal learning outcomes, enabling outcome and sub-enabling outcome. Moreover, nurse educators explained to be guided with principal learning outcome when prepared lesson

plans while it is not. It was further noted that the issue of notional hours versus credits value had also its own challenges to explain what it entails. These are key components, which must be understood by nurse educators implementing nursing and midwifery CBET curriculum, especially in regard with the amount of sessions to be covered in a given module they taught.

Results from this study are consistent with those from the study that examined school-based programmes safe and drug free and communities, which found that the programs were not implemented with the same attention to core components and dosage (45). Similar results were found by Mihalic and colleagues (8) who conducted a study on factors related to implementation fidelity focusing on whether or not all lessons were taught and duration of lessons was as required. The results revealed that dosage was not reached and there were variations in all three levels of teaching, not indicated reasons in the report (*ibid.*).

Another study was conducted by Finney and Jerusha (7) to measure implementation of students' affairs programme. In exposure/dose component, the study assessed whether or not the extent to which all students participated in a programme received the full dose as it was intended by the programme (*ibid.*). With respect to the programme, all students were expected to receive full dose but it did not always occur (*ibid.*). For example, in 50 minutes' programme component, students received only 20 minutes of time of which students were not exposed to the full dose as it was intended (*ibid.*). In due regard, students could not have the opportunity to learn to the extent intended by the programme.

As important as it is to receive the intended number of sessions, nurse

educators were often responsible for not being able to provide the required dosage because of their own lack of understanding to interpret the competency-based approach, time constraints, commitment, and limited resources (45). Since nurse educators were implementing the curriculum for almost twelve years, it was expected that nurse educators had to demonstrate the ability to provide sessions as stipulated in the curriculum.

Findings from this study revealed that nurse educators in the sample are struggling to implement full dosage as it was specified in the original designed curriculum. Five critical issues were found to be hindrance to successful implementation of dosage. Some terminologies in the curriculum are not very clear, for example, Principal learning outcomes, enabling outcome and related tasks, inadequate time for teaching and learning, not understanding part of the competency-based curriculum, too much work load and shortage of teaching staff. These findings echo results from the previous study conducted by Mihalic (45) who found that number of sessions was compromised by lack of commitment, resources and time. Another study conducted by Olga (46) established that educators struggled but failed to implement the competency-based curriculum due to lack of understanding to translate curriculum and lack of teaching as well as learning resources.

Implementation Dosage in Terms of Assessment Administered by Nurse Educators in Implementing Nursing and Midwifery CBET Curriculum

Results from this study revealed that nurse educators mostly used written tests and assignments to assess learners in a learning process other than use of practical and clinical assessments. This is contrary to the competency-based assessment, which

emphasizes on practical and clinical assessments to enhance competencies. The results further lead to suggest that for effective implementation of the competency-based curriculum, many efforts must be put in clinical teaching, assessment and clinical examinations. These explain much of effective implementation of the CBET curriculum rather than other components. The results echo findings from study conducted by Laban (47) on implementation of the competency-based curriculum in technical colleges. The results from the said study established that trainers had little knowledge on assessment techniques in CBET approach (*ibid.*). It implies that potentially, there is a need to train trainers on assessment of the competency-based curriculum.

The kind of assessments employed to learners, play a crucial role in implementing competency-based curriculum (2). Trainers must assess students' learning and use the assessment results to improve their programme (48). Competency-based education and training is all about skills performance (2). Previous studies confirm that implementation dosage of the curriculum has impact on students' outcome (9). Receiving the amount of sessions delivered in a competency-based curriculum for nursing and midwifery programme is of paramount importance to realize the learners' achievement of competencies and confidence.

Though the government of Tanzania through the MoHCDGEC and other education stakeholders believe that nurse educators understand and implement competency-based curriculum since it was introduced, but with these findings, very little is functional, in practice. From the findings, it might not be surprising to find that products/graduates from this

programme are incompetent in the real clinical practice.

Factors Associated with Implementation dosage of Nursing and Midwifery CBET Curriculum in Tanzania

The study established that Nurse Educators who attended training on implementation of nursing and midwifery CBET curriculum were more likely to implement dosage of nursing and midwifery CBET curriculum three times than those who did not. This is due to the fact that training on implementation of CBET curriculum covers, but not limited to, the concept of CBET approach, navigation of nursing and midwifery CBET curriculum and preparation of sessions from the CBET curriculum. In addition, the training covers the principle of pedagogical and adult teaching and learning, classroom and clinical teaching strategies. Thus, it is not astonishing to find some nurse educators who did not attend training on implementation of nursing and midwifery CBET curriculum are unable to implement dosage as it was intended.

Limitation of the study

There was limited literature on implementation fidelity of the competency-based curriculum for nursing and midwifery programme. However, similar studies from other fields including education provided some insights on implementation of CBET curriculum (26). In questionnaire, nurse educators were required to report number of sessions delivered in a module for the last semester(s) and in due regard, the results might have been flawed due to memory/recalling bias. However, the availability of documents such as plans and schedules were used to counteract and mitigate it (26). In the interview guide, the interviews were audio recorded, transcribed and translated from Kiswahili to English language. In due regard, it is

likely that during the translation, the meaning might have been altered (26). To ensure that the meanings of participants' accounts were not derailed, the translated transcripts were cross-checked with original Kiswahili audio recorded data and transcripts for accuracy translation. Furthermore, two transcripts were back translated by another person and there was no significant difference in meanings.

CONCLUSION

Results from this study established that implementation dosage of the nursing and midwifery CBET curriculum is significantly low. The alarming aspect in this context is that students were not exposed adequately into competencies as it was supposed to be from the original designed nursing and midwifery CBET curriculum. Overall, students did not receive dosage as it was intended from the original designed Nursing and Midwifery CBET curriculum.

IMPLICATIONS OF THE FINDINGS Nursing and Midwifery Education

Comprehensive ongoing on job-training for nurse educators for them be able to determine number of sessions in a module, which they facilitate is recommended. Additional training stints on interpretation of the scheme of the study, credits and understanding of the nursing and midwifery CBET curriculum might benefit nurse educators. Short course on implementation of the CBET curriculum and practical and clinical assessment of the same will save as a strategy to solve some of the curriculum implementation problems.

Practice

Capacity building of nurse educators through technical supportive supervision at school level should be reinforced to ensure consistent monitoring of implementation of the nursing and midwifery CBET curriculum.

Recommendations for Further Research

This study provides an opportunity for further research on implementation dosage with learners' outcomes. Also, based on findings from this study, intervention studies might provide additional insightful aspects of implementation dosage of the nursing and midwifery CBET curriculum. They might be complemented by assessing the students' perception on implementation dosage of the nursing and midwifery CBET curriculum.

Policy

There is a national and global consensus that nurse and midwifery are frontline workers in health care systems. Bearing in mind the significance of nursing and midwifery workforce with in the health care structure in Tanzania, effective production of the same is the key to ensuring improvement in the functioning and the impact of health care system. Therefore, the government, through the Ministry of Health, Community Development, Gender, Elderly and Children, should review the number and competencies of teaching staff in the nursing and midwifery schools for effective implementation dosage of CBET curriculum for nursing and midwifery programme.

List of Abbreviations

CBET	Competency-Based Education and Training
IBM	International Business Machine
MoHCDGEC	Ministry of Health, Community Development, Gender, Elderly and Children
NACTE	National Council for Technical Education
SPSS	Statistical Product for Social Sciences
TNMC	Tanzania Nursing and Midwifery Council

UDOM University of Dodoma

Declaration

This work is based on a thesis that will be submitted to the University of Dodoma (UDOM), Tanzania for an award of Doctor of Philosophy in Nursing Education.

Consent for publication

Not applicable

Availability of data and materials

Data and materials are available on request.

Competing interest

The authors declare that they have no competing interests.

Authors' Contribution

Vumilia conceived the idea of the study, drafted and reviewed the manuscript. All authors contributed in the study design, analysis as well as reviewed and approved the final draft of the manuscript.

ACKNOWLEDGEMENT

Authors extend their gratitude to all study participants for their willingness to share their teaching and learning experiences.

REFERENCES

- [1] Rutayuga AB. The emerging Tanzanian concept of competence: conditions for successful implementation and future development. 2014.
- [2] Boahin P. Competency-Based Assessment and Reporting in Ghanaian Polytechnics: A Critique of the Prevailing Perceptions. 2018;9(5):131–40.
- [3] NACTE. Professionalising Competence-based Education and Training (CBET) through Enhancing a Professional Dimension [Internet]. Dar es Salaam; 2015. Available from: <http://www.nacte.go.tz/files/PUBLICATIONS/1339643616.pdf>

- [4] Boahin P. Competency-Based Curriculum: A Framework for Bridging the Gap in Teaching, Assessment and the World of Work. *Int Jurnal Vocat Tech Educ Res.* 2018;4(2):1–15.
- [5] NACTE. *The National Council for Technical Education Act.* Dar es Salaam; 1997.
- [6] MoHCDGEC. *Curriculum for Technician Certificate (NTA Level 5) in Nursing and Midwifery.* Dar es Salaam: NACTE; 2017.
- [7] Finney SJ, Jerusha JG. Measuring the Implementation Fidelity of Student Affairs Programs: A critical Component of the Outcome Assessment Cycle. 2013;15–28.
- [8] Mihalic S, Abigail F, Susanne A. Implementing the Lifeskills Training drug prevention programme: Factors related to implementation fidelity. *BioMed Cent.* 2008;1–16.
- [9] Wang B, Stanton B, Deveaux L, Poitier M, Lunn S, Koci V, et al. Factors influencing implementation dose and fidelity thereof and related student outcomes of an evidence-based national HIV prevention program. *Implement Sci.* 2015;
- [10] Wilson DK, Sarah G, Ruth SP, Heather K-U, Duncan MC, Mansard Leslie. Using process evaluation for program improvement in dose, fidelity and reach: the ACT trial experience. *Int J Behav Nutr Phys Act.* 2009;7.
- [11] Powers S, Hughes M. ERIC FOI Report 10 [Internet]. East Medlock: Southwest Education Consulting Associates INC.; 2015. Available from: www.sweca.info
- [12] Rutayuga AB, Kondo A. A Shift From Assessing a Set of Learning Contents to Assessing Each Learning Outcome: NACTE’s Perspective. *Int Assoc Educ Assess 32nd Annu Conf [Internet].* 2006;1–16. Available from: <http://www.iaea2006.seab.gov.sg/conference/programme.html%5Cnpapers2://publication/uuid/B6C19270-17E6-4299-9364-FD28F9CD14F9>
- [13] Dix G, Hughes S. Teaching students in the classroom and clinical skills environment. 2005;41–7.
- [14] Jeggels JD. Revitalization of clinical skills training at the University of the Western Cape. 2010;(June):51–9.
- [15] Dusenbury L, R, Falco M HW. A review of research on fidelity of implementation: Implications for drug abuse prevention in school settings. *Health education Res,* 18:237-256. 2003;18:237–56.
- [16] Carroll C, Patterson M, Wood S, Booth A, Rick J, Balain S. A conceptual framework for implementation fidelity. *Implement Sci.* 2007;2(1):1–9.
- [17] Lewis TP, Roder-dewan S, Malata A, Ndiaye Y, Kruk ME. Clinical performance among recent graduates in nine low - and middle - income countries Clinical performance among recent graduates in nine low- and middle-income countries. 2019; (March).
- [18] Carroll C, Patterson M, Wood S, Booth A, Rick J, Balain S. A conceptual framework for implementation fidelity. 2007;(November 2007):1–9.
- [19] Mmari V, Mselle L, Kibusi S, Kalafunja O. Experiences of Nurse Educators on the Implementation of the Competency-Based Curriculum for Nursing and Midwifery Programmes in Tanzania: A mixed methods study. 2020;8(5).
- [20] Mmari V, Stephen K, Lilian M, Kalafunja O. The Implementation Fidelity of Competency Based Curriculum for Nursing and Midwifery Programme in Tanzania: A protocol for a Mixed Methods Study. *Nurs Prim Care.* 2019;3(2):1–6.

- [21] Azano A, Callahan CM, Foster M. Exploring the relationship between fidelity of implementation and academic achievement in a 3rd grade gifted curriculum. A mixed methods study. *J Adv Acad.* 2011;
- [22] Bümen NT, Çakar E, Yildiz DG. Curriculum Fidelity and Factors Affecting Fidelity in the Turkish Context Nilay. *Educ Sci Theory Pract [Internet].* 2014;14(1):219–28. Available from: www.edam.com.tr/estp
- [23] Kafyulilo A, Rugambuka I and, Moses I. The implementation of competency base teaching approaches in Tanzania: The case of pre-service teachers at Morogoro teacher training college. Vol. 1(11). 2012. p. 339–3347.
- [24] Ponce OA, Rico P. Mixed Methods Research in Education : Capturing the Complexity Mixed Methods Research in Education : Capturing the Complexity of the Profession. 2015;(March 2017).
- [25] Leech NL, Onwuegbuzie AJ. A typology of mixed methods research designs. 2009;265–75.
- [26] Mmari V, Mselle L, Kibusi S, Kalafunja O. Experinces of Nurse Educators on the Implementation of the Nursing and Midwifery Competency Based Curriculum in Tanzania. A mixed Methods Study. *BMC Nurs J.* 2020;1–24.
- [27] Graneheim UH, Lundman B. Qualitative content analysis in nursing research: Concepts, procedures and measures to achieve trustworthiness. *Nurse Educ Today.* 2004;24(2):105–12.
- [28] Fox N, Hunn A. Sampling and Sample Size Calculation. *Nhs.* 2009;1–36.
- [29] Cochran WG, Wiley J. Sampling Techniques. 3rd Editio. 1977.
- [30] Denscombe M. Ground rules for social research: guidelines for good practice. Maidenhead Berkshire: Open University Press; 2010.
- [31] Polit DF. Nursing Research: Generating and Assessing Evidence for Nursing Practice. 8th ed. Hilarie SurrKogutena H, editor. 2008. 286–287 p.
- [32] Gravetter FJ, Forzano LB. Research Methods for the Behavioural Sciences Cengage Learning. 2011.
- [33] Dahlgren L, Emmelin M, Winkivist A. Qualitative Methodology for international Public Health. Umea: Epidemiology and Public Health Science. Department of Public Health and Clinical Medicine. Umea University; 2004.
- [34] Dahlgren L, Emmelin M, Winkivist A. Qualitative methodology for international public health Umea: Epidemiology and Public Health Sciences. Umea University; 2007.
- [35] Suri H. Available from Deakin Research Online : Purposeful Sampling in Qualitative Research Synthesis. *Qual Res J.* 2011;11(2):63–75.
- [36] Creswell JW. Research Design: Qualitative, Quantitative and Mixed methods Approaches. United Kingdom: Sage Publication, Inc; 2003.
- [37] Fisher AA, Foreit JR. Designing HIV/AIDS Intervention studies, An Operation Research Handbook. New York: The Population council, Inc; 2002.
- [38] Delwiche LD, Slaughter SJ. The litle SAS book. Third Edit. SAS Institute Inc., SAS Campus Drive, Cary, North Carolina 27513; 2003.
- [39] Kyale S. An introductory to Qualitative Research Interviewing. SAGE; 1996.
- [40] 4Baker SE, Edwards R. How many qualitative interviews is enough? *Natl Cent Res Methods Rev Pap [Internet].* 2012;1–42. Available from: <http://eprints.ncrm.ac.uk/2273/>

- [41] Toomey E, Matthews J, Hurley DA. Using mixed methods to assess fidelity of delivery and its influencing factors in a complex self-management intervention for people with osteoarthritis and low back pain. 2017;1–14.
- [42] Braun V, Clarke V. Using thematic analysis in psychology. *Qual Res Psychol*. 2006;3(2):77–101.
- [43] Maguire M, Delahunt B. Doing a Thematic Analysis: A Practical, Step-by-Step Guide for Learning and Teaching Scholars. 2017;3(3).
- [44] Fusch O, Ness LR. Are we there yet? Data saturation in Qualitative Research. *TQR*; 2015. 20(9), pp. 1408–1416.
- [45] Mihalic S. The importance of implementation fidelity. *Cent study Prev Violence*. 2002;442 *UCB (April)*:1–16.
- [46] Olga M. Implementation of the South Africa National Curriculum: The educators perspectives. 2009;1–10.
- [47] Kanyonga L, Mtana N, Wendt H. Implementation of competence-based curriculum in technical colleges: The case of Arusha City, Tanzania. 2019;(October).
- [48] Good R M. Improving Student Learning in Higher Education: A Mixed Methods Study. 2015;

Cite this Article: Mmari, Vumilia, Bettuel, Mselle, Lillian Teddy, Kibusi, Stephen, Mathew, Osaki, Kalafunja, Mlang'a. Implementation Dosage of Competency-Based Curriculum for Nursing and Midwifery Programme among Nurse Educators in Tanzania. *International Journal of Nursing Critical Care*. 2020; 6(2): 60–76p.